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FINAL REPORT – VOLUME 1: EXECUTIVE SUMMARY

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Volume 1 of the Final Report: Executive Summary

List of Tables

List of Tables

List of Figures

List of Abbreviations and Acronyms

ACMECS	Ayeyawady-Chao Phraya-Mekong Economic Cooperation
ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
BIMSTEC	Bay of Bengal Initiative for Multi-sectoral and Technical Cooperation
CBTA	Cross-Border Transport Agreement
CP	Capacity-enhancement Project
ES	Executive Summary
EU	European Union
FF	freight forwarders
FS	Feasibility Study
GMS	Greater Mekong Subregion
HIV/AIDS	human immunodeficiency virus/acquired immunodeficiency syndrome
IFI	international financial institution
II	Immediate Implementation
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
km	kilometers
Lao PDR	Lao People's Democratic Republic
MRC	Mekong River Commission
NC	New Corridor/Northern Corridor
No.	number
NR	Route National (Cambodia)
NSEC	North-South Economic Corridor
NSL	North-South via Lao PDR Corridor
NTFC	National Transport Facilitation Committee
NWC	Northwestern Corridor
PRC	People's Republic of China
RS	Ranking Study
SASEC	South Asia Subregional Economic Cooperation
SEC	Southern Economic Corridor
SKRL	Singapore-Kunming Rail Link
SPS	sanitary and phytosanitary
TAP	technical assistance project
TAR	technical assistance report
US$	United States dollars
WTO	World Trade Organization

I. INTRODUCTION

1. The Greater Mekong Subregion (GMS) comprises Cambodia, Yunnan Province and Guangxi Zhuang Autonomous Region of the People's Republic of China, Lao People's Democratic Republic, Myanmar, Thailand, and Viet Nam. In 1992, with the assistance of the Asian Development Bank (ADB), the six countries entered into a program of subregional economic cooperation designed to enhance economic relations between and among the countries. The program has contributed to the development of infrastructure to enable the development and sharing of the resource base, and to promote the freer flow of goods and people in the subregion.[1]

2. The objective of this Study was to develop a clear vision and comprehensive strategy for development the GMS transport network to promote subregional connectivity and competitiveness, towards an eventual GMS-wide multimodal transport system. Based on an analysis of current and likely developments, the Study identifies transport projects, policies, programs, and institutions to promote subregional cooperation in the transport sector.[2]

3. The Final Report consists of this Executive Summary (Volume 1, this volume), Main Text (Volume 2), and Appendices (Volume 3).[3] Chapters in the Main Text volume include the following:

Chapter II: Existing GMS Transport Network and Demand;
Chapter III: Constraints on GMS Transport Flows;
Chapter IV: Transport Demand in 2015;
Chapter V: Prospective Constraints on GMS Transport Efficiency;
Chapter VI: Improving GMS Transport Efficiency;
Chapter VII: Proposed GMS Transport Sector Strategy;
Chapter VIII: Identification of Investment and Technical Assistance Projects;
Chapter IX: Prioritization of Investment and Technical Assistance Projects;
Chapter X: Priority Projects and Transport Strategy; and
Chapter XI: Action Plans, Outstanding Issues, and Next Steps.[4]

The Executive Summary focuses on Chapters VII to XI, which reviewed key elements of the Strategy.

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[1] http://www.adb.org/GMS/default.asp.
[2] Asian Development Bank, Technical Assistance for Greater Mekong Subregion Transport Sector Strategy Study, TAR:STU 38052, October 2004, p. 3.
[3] The Final Report is substantially changed from the Draft Final Report submitted in November 2005, based on comments received from the GMS countries at the Workshop on the Draft Final Report held in Ho Chi Minh City, Viet Nam, on 8-9 December 2005, and on comments of Asian Development Bank (ADB). Matrices were prepared and distributed showing the action(s) taken in reply to each comment.
[4] The Appendices are:
Appendix 1: Conduct of the Study;
Appendix 2: Transport Model Specification and Test Outputs;
Appendix 3: Selected Investment Project Concept Profiles;
Appendix 4: Technical Assistance Project Concept Profiles; and
Appendix 5: GMS Transport Sector Strategy Results Framework (2006-2015).

II. PROPOSED GMS TRANSPORT SECTOR STRATEGY TO 2015

4. Following a consideration of the principles of the Kunming Declaration of July 2005 and the transport situation of the GMS countries, the Study Team considered three options in developing the GMS transport sector strategy:

(i) Sectoral Focus;
(ii) Comprehensive Intersectoral Focus; and
(iii) Goal Setting and Results Oriented Management.

5. Option (i) was chosen as a base combining elements of (ii) and (iii). The transport model developed in the course of the Study is potentially an important step towards implementing a top-down strategy. Although still in embryonic form, once refined, it will provide a consistent, reliable tool for ranking of projects.

6. The proposed theme for the Strategy is "Towards Seamless Transport Services on a fully connected and integrated GMS Transport Network". To underpin the theme, the Study proposes the following overarching goals:

(i) **Exploit Synergies in the GMS Transport System**: As yet there is little concept of a GMS transport system. The basic tools have been lacking: detailed network maps, a transport model, and an incentive to think GMS-wide. Several attempts have been made at subregional planning: the Singapore-Kunming Rail Link concept, the definition of the ASEAN highway network and GMS routes, and the definition of investment corridors. These attempts must now be brought a step further, to the point where both national and subregional transport infrastructure projects are explicitly and routinely reviewed in terms of what they contribute to the GMS system as a whole, in addition to their local impact. This is required to achieve the overarching goal of fully exploiting potential synergies within the existing and planned future transport system.

(ii) **Move Towards an Open Market for Transport Services**: The worldwide trend is towards more open cross-border movement, exemplified by the European Union (EU), where borders have effectively been scrapped. The efficiency gains are considered to more than compensate for any resulting loss of control. Transport operators are free to work throughout the EU and a genuine open market in transport services is in prospect. Similar, if less advanced, arrangements are proceeding in other areas. There are no apparent reasons why the GMS should not follow suit. Market opening can be pursued purely as an economic concept. Clearly, there are gainers and losers and a strong argument in certain cases for the protection of infant industries in the less developed of the GMS countries. The overarching goal is, however, clear. Policy should be directed towards furthering the open market concept.

(iii) **Facilitate Economic Efficiency to Reduce Transport Costs:** Transport is not a field in which the GMS could currently claim to be efficient, when judged by international standards. While quoted rates and fares are often low, so is the quality of international service, where available. The efficiency dimension needs to be given greater weight in project and policy decision-making. While the network still needs to be developed, the efficient definition, use and maintenance of the network is of growing importance. Reducing transport costs by facilitating economic efficiency should be an overarching goal.

(iv) **Complete the GMS Network and Improve Links with South Asia:** While much has been accomplished and is in progress towards completing the primary GMS network, much remains to be done. The primary network will also need to be supported by a secondary network. The economic transformation underway in South Asia increases the priority of linking it with the GMS, which has not been given as much attention as have intra-GMS links. It is now time to fully define the primary GMS network and to outline the secondary network, to agree a timetable for its completion. This work must be coordinated with other bodies and countries that are concerned with similar programs for links to South Asia. The overarching goal of achieving efficiency requires network-wide planning to ensure that these objectives are taken into full account in the planning of domestic and subregional programs.

(v) **Encourage Multi-modalism**: There are two distinct aspects of multi-modalism: (i) encouraging the provision of and competition between modes on a given route/corridor, and (ii) facilitating inter-modal transport. Market forces have the key role in these processes, but many barriers operate to restrict them. The rationale for this overarching goal is that it should draw attention to eliminating constraints and on ensuring that all modal options are considered in investment decisions.

7. It is recommended that a comprehensive and detailed railway sector-specific study be undertaken to consider the medium- to long-term perspective and the requirement for a GMS railway system beyond the scope of the Singapore-Kunming Rail Link (SKRL), its route structure, quality of service, operating parameters, and financial and economic viability, taking into account technological developments.

8. It may be, with deepening cooperation, that a GMS-wide airport development strategy could be formulated, rationalizing the provision of new capacity, including the development of competing green field site mega airports. Clearly, national interests and issues of local prestige are involved, and economic issues are only one part of the decision making process. However, a GMS airports committee analogous to cooperation in the railway sector would provide a useful forum for information exchange and commissioning studies, and might then develop further.

III. INVESTMENT PROJECTS

A. Identification of New Links

9. Transport modeling undertaken during the Study suggested that the forecast growth in demand to 2015 will be largely catered for by identified investment projects and that there are few unaddressed missing links. In workshops held at the Interim Report stage, it was noticeable that following the Team's specific request for suggestions for further post-2010 investment projects to be proposed for prioritization, none were identified. However, GMS network optimization is in its infancy and as it develops it will be possible to identify inefficiencies that could be overcome by new projects, e.g., possibly the opening of additional border crossings, increasing network density, providing intermodal facilities.

B. GMS Links with South Asia

10. An emerging weakness in the GMS transport infrastructure is the poor network connection with South Asia. The importance of Myanmar as a landbridge both between India and the PRC and between South Asia and Southeast Asia will become increasingly evident and is reflected in this strategy. Initiatives to address the

issue are being taken bilaterally between Thailand and Myanmar, between India and Myanmar, and between Bangladesh and Myanmar; as well as trilaterally among Thailand, Myanmar, and India; and through ACMECS (Ayeyawady-Chao Phraya-Mekong Economic Cooperation), BIMSTEC (Bay of Bengal Initiative for Multi-sectoral and Technical Cooperation), Mekong Ganga Cooperation, and the India-Myanmar-Thailand Transport Linkage, among others.

C. Redefining GMS Corridors

11. The Study proposed changes to corridors as described below and indicated in Figure ES-1.

(i) **North-South Economic Corridor (NSEC)**: With the inclusion of Guangxi in the GMS, a third eastern corridor needs to be included as part of the NSEC: Kunming-Nanning-Hanoi. The NSEC as now proposed comprises the two existing corridors, to be called the Western Corridor and the Central Corridor and the new Eastern Corridor.

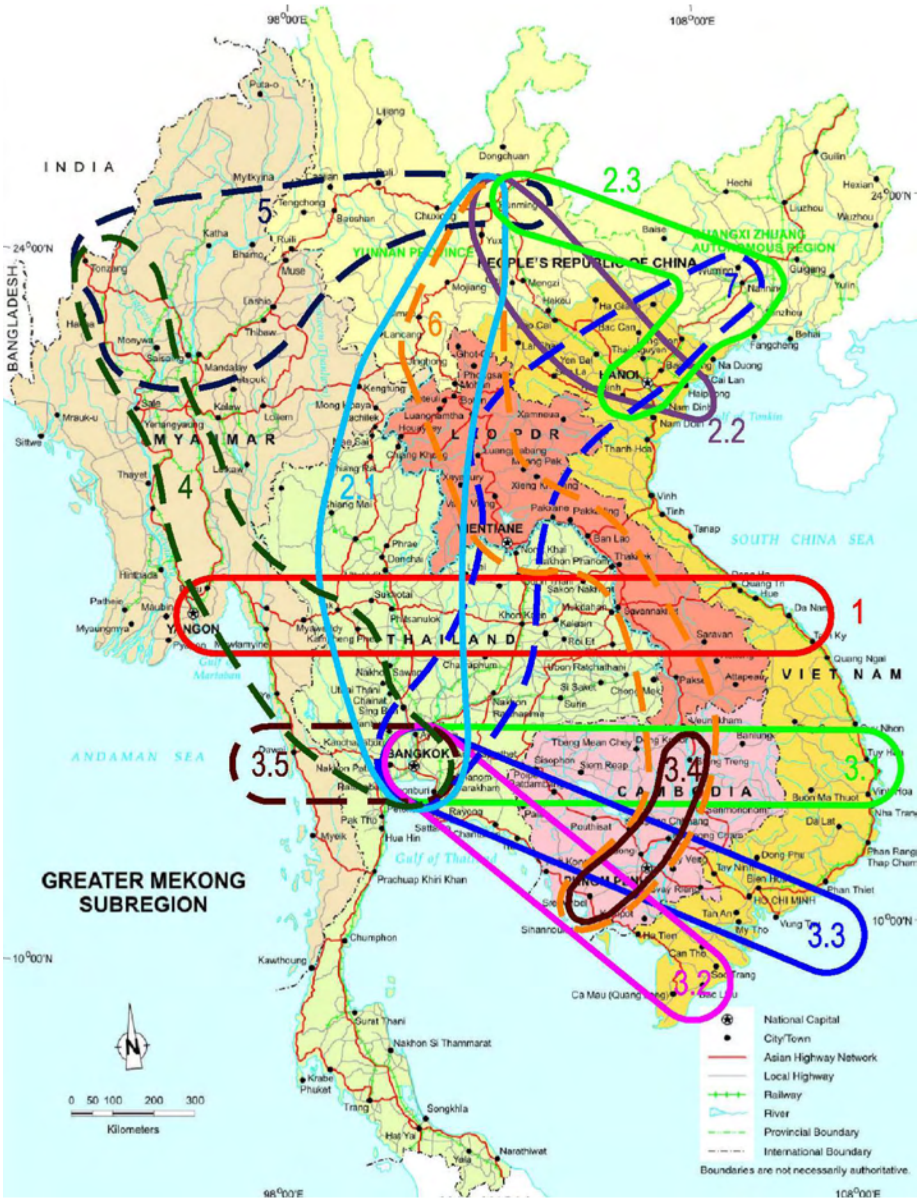
(ii) **Southern Economic Corridor (SEC)**: Both Thailand and Myanmar have proposed that the existing SEC be extended westwards from Bangkok to the Myanmar coast at Dawei. This is a logical extension and is endorsed by the TA. As three of the existing SEC sub corridors start from Bangkok, the extension is best designated as a new sub corridor, the SEC Western Sub corridor.

(iii) **Northwestern Corridor (NWC)**: The rapid development of the Subcontinent since the previous GMS transport study has greatly increased the need to improve connections between the GMS and South Asia. The Thailand-Myanmar-India Transport Linkages project has defined a priority route for development, which should be incorporated as a GMS corridor, part of a new Northwestern Corridor. It is proposed that initially this should comprise the following routes: (i) Mae Sot-Thaton-Bagan-Kalay-Tamu/Moreh; (ii) Kawkareik-Mawlamyine-Thaton; and (iii) Kanchanaburi-Three Pagodas Pass-Thanbuzayat-Mudon-Mawlamyine.

(iv) **Northern Corridor (NC)**: It is anomalous that in the early 21st century the world's two most populous and more dynamic nations are so poorly linked by road. A Yunnan-Myanmar-India corridor should now be defined. The proposed Northern Corridor would have two sub corridors: (i) a sub corridor via Ruili and (ii) a sub corridor further north, as yet undefined, but possibly following the Stillwell Road alignment.

(v) **North-South via Lao PDR Corridor (NSL)**: With the soon expected opening of the Lao PDR/Cambodia border connecting Routes 13S and 7, an additional North-South corridor will be created from Kunming to Sihanoukville, via Louang Prabang, Vientiane, Pakse, Stung Treng, and Phnom Penh.

Figure ES-1: Existing and Proposed GMS Corridors



Legend

1	East-West Economic Corridor	Mawlaymine – Da Nang	3.4	SEC-NSEC Inter-Corridor Link	Dong Kralor – Stung Treng – Kratie – Phnom Penh - Sihanoukville
2.1	North-South Economic Corridor (West)	Kunming – Bangkok via Lao PDR/ Myanmar	3.5	Southern Economic Corridor (Western Extension)	Bangkok – Dawei
2.2	North-South Economic Corridor (Central)	Kunming – Hanoi – Haiphong	4	Northern Corridor	Kunming – Dali – Ruili – Lashio – Mandalay – Tamu – Imphal
2.3	North-South Economic Corridor (East)	Kunming – Nanning – Hanoi	5	Northwestern Corridor	Bangkok –Mae Sot – Payagyi – Meiktila – Tamu – Imphal
3.1	Southern Economic Corridor (Central)	Bangkok – Phnom Penh – Ho Chi Minh – Vung Tau	6	North South Corridor via Lao PDR	Kunming – Mohan – Luang Prabang – Vientiane – Thakhek – Pakse – Phnom Penh – Sihanoukville
3.2	Southern Economic Corridor (Southern Coastal)	Bangkok – Trat – Koh Kong – Kampot – Ha Tien – Nam Can	7	Northeastern Corridor	Nanning – Hanoi – Vientiane – Bangkok/ Laem Chabang
3.3	Southern Economic Corridor (North)	Bangkok – Siem Reap – Stung Treng – Rattanakiri – O Yadov – Play Ku – Quy Nhon			

(vi) **Northeastern Corridor (NEC):** With Guangxi's accession to the GMS, a new northeastern corridor from Nanning to Bangkok is added via Hanoi, Vientiane and Nakhon Ratchashima. This corridor also includes a branch to Laem Chabang port.

D. Identification of Investment Projects

12. A long list of investment projects was prepared: (i) to document ongoing and committed projects, which have been included in the base 2015 transport model network and (ii) for project prioritization and evaluation. The following types of projects have been included in the long list: (i) those physically in progress as of mid-2005; (ii) those included in the country papers presented at the 9th STF in Beijing 1st/2nd June 2005; (iii) those listed in the GMS Development Matrix (relevant projects only); and (iv) projects proposed during the prioritization missions of September/October 2005. The list was subsequently modified based on comments made at the Workshop on the Draft Final Report held in Ho Chi Minh City on 8-9 December 2005.

13. A * to **** classification of projects was applied as shown in Table ES-1 below.

Table ES-1: Categorization of Investment Projects

Category	Basis of Determination
****	Project in progress or sufficiently committed that further evaluation is not required.
***	Uncommitted project, but prima facie of high priority.
**	Uncommitted project, but prima facie of moderate priority.
*	Project unlikely to start by 2015 and/or of prima facie low priority.

Source: Study Team

14. Over 150 projects were examined.

E. Prioritization of Investment Projects

15. The 31 *** investment projects further evaluated comprise:

(i) 20 road projects;
(ii) 2 railway projects;
(iii) 4 airport projects; and
(v) 5 water transport projects.

16. The *** projects were categorized as defined in Table ES-2.

Table ES-2: * Investment Project Category Definition**

Category	Basis of Determination
II	Immediate implementation required without further study (**I**mmediate **I**mplementation)
RS	Top priority based on results of other ranking studies (**R**anking **S**tudy)
FS	Currently under feasibility study, results available 2006 (**F**easibility **S**tudy)
NC	New corridor strategic project, implementation timing primarily policy dependent (**N**ew **C**orridor)
CP	Capacity-enhancement project, implementation primarily timing demand dependent (**C**apacity-enhancement **P**roject)

17. The project categorization is set out in Table ES-3.

Table ES-3: Categorization of * Projects**

Initial Implementation (II)

A2.1-3	Houei Sai-Chiang Khong Third International Mekong Bridge
A3.4-2	Route 13S - NR7 cross-border section
B1-11	Sisophon-Poipet/Aranyaprathet reinstatement
A3.2-3	NR33: Kampong Trach-Lork Viet Nam border missing 17km section

Ranking Study (RS)

A3.6-1	Route 14A: junction Route 16 – Cambodian border paving/reconstruction. Section B
A3.6-3	Pakse-Xekong Direct Route paving/reconstruction
A4-4	Mawlamyine-Mudon-Thanbyuzayat upgrading
A6-3	Route 4: (Lao PDR/Thailand Bridge at Nam Heuang) Ban Nakha-Ken Thao-Paklay-Sayaboury-Xieng Ngern
A6-4	Transport corridors in Lao PDR northern region

Feasibility Study (FS)

A2.2-2	Hanoi-Lao Cai expressway
A6-6	Thakhek-Nakhon Phanom Bridge
A6-9	Dau Giay-Lien Khuong expressway
B1-10	Phnom Penh-Badeng-Sisophon/ Phnom Penh-Sihanoukville rehabilitation
C1-1	Improvement of Savannakhet Airport for joint Thai/Lao PDR use
C1-3	Da Nang port upgrading, phase 2
C3.2-1	Channel, navigation and port improvements on Mekong and for access to port at Siem Reap; development of intermodal terminal at Khone Falls

New Corridor (NC)

A2.3-1	Baise-Longlin expressway
A2.3-2	Baise-Debao-Longbang Viet Nam border expressway
A3.3-2	NR66: Siem Reap-Preah Vihear-Stung Treng
A4-3	Thaton-Payagyi-Bagan-Kalay-Tamu/Moreh (India)
C3.2-3	Construction of floating port on Hamluong river
D19	Xieng Kok-Kyaing Lap Mekong Friendship Bridge

Capacity-Enhancement Projects (CP)

A2.3-5	Chongzuo-Longzhou, upgrading to Class II
A3.1-4	Bien Hoa-Vung Tau expressway
A6-10	Dali-Lijiang upgrading
A6-11	Kunming-Wuding upgrading
C2.1-3	New Kunming International Airport
C2.1-5(a)	Expansion of Dali Airport
C3.2-4	Laem Chabang Phase 2, construction of C and D container terminals
D14	Guilin International Airport improvement
D21	Lancang-Mekong navigation channel improvement and maintenance project

Source: Study Team

F. Transport Model

18. One of the study objectives was to develop a multimodal, GMS-wide transport model that in its final version will enable projects to be evaluated on a consistent basis for their network impact and their impact on other modes. This study has prepared the groundwork and highlighted the problem areas for further model development. Given the tight timescale and the problems encountered in developing the necessary database, the model has not yet achieved sufficient accuracy for use in project analysis and scheduling.

19. In any event, the outstanding modeling issues have proved less significant than might have been expected. Most of the *** projects fall clearly into one of the five categories. Many have already been studied to FS or near-FS level and others are under FS or about have FSs. There are no “new” *** projects. Project implementation is being addressed in the context of these studies and in the preparation of five-year plans. With so many ongoing and committed **** projects, there is a window of opportunity for further model development. There are no immediate issues of project prioritization that will be unaddressed by ongoing work and by the recommended TAPs. The priority is to have by end-2006 the model developed to the stage where a consistent assessment of each project’s impact on the GMS network is possible. Once this is in place, all ** and *** projects can be quickly evaluated and their GMS priorities be determined. Further, the networks can be tested for optimality together with medium to long tem project options. By 2010, the transport model should be one of the main tools for GMS planners and policy makers. What is clear from this study is that there is no alternative to modeling if the GMS is to be developed into an integrated network in the most economical way.

20. Were human-to-human avian flu to break out in Asia, the GMS transport sector would be particularly vulnerable. Drastic travel restrictions have been mooted and tourism would be decimated. It is unlikely that the Study’s traffic forecasts would be realized if such a scenario were to eventuate.

IV. TECHNICAL ASSISTANCE PROJECTS

A. Identification of Technical Assistance Projects

21. A number of technical assistance projects (TAPs) have been proposed to enhance the effectiveness with which infrastructure can meet overarching GMS objectives. The contribution of the TAPs to the efficiency of GMS transport can be seen as a program to minimize the adverse impact of differentials as between GMS countries. TAPs are therefore focused on unifying service delivery capacities within the GMS at a level consistent with optimal approaches for the realization of overarching objectives. Inevitably, the contribution of TAPs to transport efficiency within the GMS varies across the range of identified projects – some build on existing programs, others seek to remedy specific constraints applicable to parts of the subregion, while others are directed towards the promotion of competitive advantage in a sector-specific (e.g., tourism) context.

22. Technical Assistance Projects (TAPs) were identified and classified as CBTA-related, infrastructure related, transport logistics-related, training, and others/cross-cutting as shown in Box ES1-1. It is noted that the classification is somewhat arbitrary, as some TAPs could arguably be placed in more than one category; e.g., TAP 12: Support for Harmonization of GMS Road Signs and Signals, could be considered either CBTA-related or infrastructure-related, although it has been classified here as CBTA-related.

Box ES-1: Technical Assistance Projects

CBTA-Related

TAP 1: Implementing the GMS Agreement to Facilitate the Cross-Border Movement of Goods and People, Phase 2

TAP 2: "Fine Tuning" of the GMS Cross-Border Transport Agreement

TAP 3: Processing and Facility Improvements at Border Crossing Points

TAP 4: Updating or Improving Existing Bilateral Railway Agreements and/or Amending the GMS Cross-Border Transport Agreement (CBTA) To Cover Cross-Border Railway Transport

TAP 5: Project to Establish a Legal Framework for Cross-Border Navigation on the Mekong River ["Navigation Without Frontiers", a motto adopted by the Mekong River Commission]

TAP 6: Establishment of Issuing and Guaranteeing Organizations under the GMS Cross-Border Transport Agreement

TAP 7: Inclusion of a Substantive Health and Sanitary/Phytosanitary (SPS) Regime in the Cross-Border Transport Agreement

TAP 8: Phased Liberalization of Visa Regimes for Travelers

TAP 9: Specification of Transit Charges To Be Implemented Under Protocol 2 of the Cross-Border Transport Agreement

TAP 10: Establishment of a Third-Party Motor Liability Insurance Regime

TAP 11: Institutional Strengthening of National Transport Facilitation Committees

TAP 12: Support for Harmonization of GMS Road Signs and Signals

Box ES-1: Technical Assistance Projects (continued)

Infrastructure-Related

TAP 13: Practicalities of Private Sector Participation in Transport Infrastructure

TAP 14: Cooperation between the ADB-ASEAN Regional Road Safety Program and the PRC

TAP 15: HIV/AIDS Component for all Road Transport Projects in the GMS

TAP 16: Road Maintenance Initiatives for Cambodia, Lao PDR, Myanmar, and Viet Nam

TAP 17: Private Sector Participation in Road Maintenance

TAP 18: Revisiting of the Feasibility Study for the Singapore-Kunming [Nanning] Railway Link (Project)

TAP 19A: Upper (Lancang-)Mekong River Navigation Improvement Project

TAP 19B: Lower Mekong River Navigation Improvement Project

TAP 20: GMS Airports Development Project

TAP 21: Rail Maintenance in Cambodia

TAP 22: GMS Andaman Sea/Indian Ocean Deep Sea Port Study for Myanmar

Transport Logistics-Related

TAP 23: Training in Logistics

TAP 24: Development of Inland Container Freight Depots

TAP 25: Cambodia Freight Forwarders (FF) Competitiveness Project

Training

TAP 26: Training in Road (Passenger and Freight) Transport Operations ("Knowledge Across Frontiers")

TAP 27: Upgrading of Inland Water (Passenger and Freight) Transport Industry

TAP 28: Railways Management Improvement Project

TAP 29: Development of Traffic Engineering Capacity in Myanmar

TAP 30:Development of Highway Engineering Capacity in Myanmar

TAP 31: Financial and Economic Assessment Expertise in Myanmar

Others/Cross-Cutting

TAP 32: Transformation of Transport Corridors into Economic Corridors

TAP 33: Further Development and Enhancement of the GMS Transport Model

TAP 34: Development of Scheduled Cross-Border Bus Routes

TAP 35: Marketing and Container Train Concessions between Laem Chabang Thailand and Thanaleng, Lao PDR

TAP 36: Promotion of Marketing Functions for GMS Ports

TAP 37: Promotion of Short Sea Shipping Services

TAP 38:TA on Transport Requirements for the Development of Tourism

Box ES-1: Technical Assistance Projects (continued)

TAP 39: Sea Cruise Development in Cooperation with ASEAN

TAP 40: Phased Implementation of Open Skies

B. Prioritization of Technical Assistance Projects

23. Technical Assistance Projects were classified as shown in Table ES-4.

Table ES-4: Prioritization Classification of Technical Assistance Projects

Prioritization Classification	Basis of Determination
****	TAPs that are needed to complete physical or policy initiatives that have already been initiated. This level of priority therefore indicates that in the absence of the focus TAP, benefits from prior initiatives will be constrained.
***	TAPs that are not directly linked to earlier initiatives but which either complement earlier initiatives or are now viewed as being critical to the realization of one or more overarching objective(s).
**	TAPs that can make a significant contribution to the realization of overarching objectives
*	TAPs that contribute to overarching objectives but are not viewed as critical *at the present time.*

Source: Study Team

24. It is stressed however that this classification does not reflect, or attempt to rank, the potential benefit of individual TAPs, but rather it focuses on the flexibility of implementation timing given identified relationships with other interventions. These relationships are examined further in the action plan reviewed below.

25. In the prioritization process, impact on GMS as a whole, as compared with individual GMS member countries, is the critical consideration so that while TAPs may be initiated and implemented in individual countries, impact for prioritization purposes is relevant to GMS-wide themes (e.g., economic corridors, competitiveness).

V. ACTION PLANS, OUTSTANDING ISSUES, AND NEXT STEPS

A. Action Plan for Investment Projects

26. Table ES-5 at the end of this Executive Summary presents an implementation plan for the *** projects (i.e., uncommitted, but prima facie of high priority). The table does not include the ** projects, which would be expected to be implemented primarily from 2008-2015 and the * projects, some of which may be implemented post-2015. The table shows estimated project implementation cost, location, possible development partners, initiating responsibility, and indicative project implementation period. The development partners were mainly determined by reference to previous assistance and support and/or expectations of future assistance.

B. Action Plan for Technical Assistance Projects

27. Table ES-6 at the end of this Executive Summary sets out the action plan for technical assistance projects. Expenditure would peak in 2007, declining thereafter so that by 2010, expenditure would be of the order of US$1-2 million per year. Estimated costs have been included in the table for guidance purposes only – precise costing will be a function of the required TAP preparation work. The plan further indicates potential development partners, preliminary implementation responsibility, and the basis for adopting the specified implementation timing. Each of these matters is presented for preliminary illustrative purposes only and will be subject to subsequent refinement as TAP preparation progresses.

28. The action proposals are represented by a finite set of initiatives that have been prioritized but for which it is not possible to provide ordinal properties, due to the need for implementation "in parallel" and the multi-structured nature of envisaged implementation structuring. There may be some scope for further "packaging" of individual TAPs into better, consolidated, interventions, but, in the majority of cases, this has not been currently addressed as decisions based on project preparation work, are required before meaningful consolidations can be undertaken.

C. Outstanding Issues and Next Steps

1. Role of the GMS

29. With an increasing number of bodies, domestic, bilateral, and multilateral, now involved in project initiation and financing, the recommended role for the GMS to 2015 is to play "maiden aunt": encouraging pursuit of agreed strategic goals and objectives, facilitating dialogue between bodies, raising analysis standards, providing technical support (e.g., through support of the transport model and associated database), while focusing projects on improving economic efficiency in transport infrastructure provision and service operation.

2. Specification of a GMS Transport Network

30. It has been suggested that the GMS road, rail, inland water transport, air transport, and sea transport networks need to be defined. At this stage, however, it may be premature to proscriptively define GMS networks, other than being the sum of road, rail, inland water transport, air and sea networks in each of the GMS countries. As part of the recommended further work in developing the GMS Transport Model, a more comprehensive and detailed database of the transport networks within and between GMS countries would be obtained.

3. Financing Issues

31. The envisaged transport strategy has material financing implications in terms of both investment and technical assitance projects. This study has not attempted to draw up detailed financing proposals as this will be dependent on a broad array of considerations beyond the terms of reference. It is however appreciated that given the breadth and magnitude of funding requirements, it will be critical to ensure that full funding potentials are mobilized. In particular, the study recognizes the need to foster active participation by the private sector and to that end TAP13: Practicalities of Private Sector Participation and TAP 17: Private Sector Participation in Road Maintenance have been included in the coverage of crucial technical assistance projects. Mobilization of private sector participation in infrastructure projects depends on facilitating a business environment where risk apportionment is both transparent

and focused on risk-bearing capacity. ADB and other development partners have already undertaken several initiatives within the GMS to foster such conditions in the various transport subsectors, and as such it will be critical for the respective GMS governments to take note of the lessons learned and move towards the implementation of indicated policies. The TAPs noted above will provide assistance and practical expertise in this regard.

4. Role of Myanmar

32. Myanmar will play a key role in the future development of links to BIMSTEC (Bay of Bengal Initiative for Multi-sectoral and Technical Cooperation) and SAARC (South Asian Association for Regional Cooperation) countries. Ways will have to be found to further involve Myanmar in opening these links to the west when conditions are suitable. India and the PRC have both indicated willingness to bridge gaps between the GMS and the Indian Ocean via Myanmar.

5. Multimodal Transport

33. Mainly because of the weakness in GMS rail performance and connectivity, the share of multimodal transport may not increase by 2015. The dominance of road transport throughout the GMS is well entrenched and will be further encouraged by an improving road infrastructure. The case for developing a low-quality GMS rail network is inherently weak, given the huge cost involved, but at some stage (probably post-2015) there may be a case for a high- quality, standard-gauge network; in the interim the focus should be mainly on the efficient operation of the domestic rail networks. There are some intermodal possibilities, e.g., container train services Laem Chabang-Thanaleng and on the Kunming/Nanning-Haiphong corridors. While inland waterway developments will offer increased opportunities for multimodal transport, these are primarily niche roles in specific markets, constrained by network geography. Airport and port development is primarily driven by non-GMS considerations. The role of logistics and optimization along the transport chain is growing, as is the necessity of efficient transport, driven by globalization. GMS support may, however, be most effective at the macro level, strategy-setting and focused support of enabling projects and policies.

6. Project Pipeline

34. It is particularly notable that all projects on the long list were proposed by countries and that no additional projects to enhance capacity were identified during the modeling. With the main GMS corridors already well established, further project identification post-2010 may best be accomplished via detailed domestic studies, with economic efficiency then confirmed by model testing. Development of a supporting secondary network is the next stage in GMS infrastructure provision and this is primarily domestically driven, although with a robust model in place, it will be possible to test for network efficiency gains obtainable with additional cross-border links: some quite short links might prove effective.

7. Development of the GMS Transport Model (GTM)

35. The model developed *ab initio* (from the beginning) with 6-7 person-months' input during this study may be considered a demonstration version of what could become a GMS strategic tool. The limitations of the model and the database and proposals for its further development are set out in Appendix 2 of this report. The study strongly recommends that further development be supported, in line with the program set out below. This represents the best available method to facilitate project

appraisal on a common basis and it is expected that it would in due course substantially improve the economic efficiency of the GMS transport investment portfolio. The specific objectives of this development program would be to: (i) enable a robust methodology for identifying, appraising, and refining transport projects covering “hard” investment projects as well as a number of “soft” technical assistance projects, as well as enabling before-and-after studies of schemes implemented, so as to further validate and strengthen the GTM; and (ii) develop core competencies within GMS countries such that most (and ultimately all) of the work associated with scheme identification, evaluation, refining and out-turn analyses can be undertaken by these national teams.

8. Optimizing GMS Transport Investment

36. As the GMS transport networks come to be viewed as a single network, more consideration will be given to optimizing investment. This requires: (i) that the scope of GMS investment be defined and (ii) that the goals of that investment be agreed. While there are many GMS-related projects, there is no agreed definition of what constitutes such a project and therefore no particular basket of projects to be subject to consistent analysis. Actually defining the limiting conditions is quite difficult: many projects on GMS corridors, for example, do not end at a border and handle only a small proportion of cross-border traffic. For primarily domestic-oriented projects it is arguable that a common standard of analysis is inappropriate: where the marginal efficiency of transport investment varies between/among countries, as it clearly does in the GMS, ranking projects GMS-wide will suboptimize the total investment program. A two-stage process would be preferable: (i) applying a sieve by country with varying minimum EIRRs, or ENPVs calculated at varying discount rates; (ii) optimizing the resulting basket of projects with an agreed macro-level distribution of the investment pie between/among modes and countries. Investment goals also need definition: (i) priorities between modes, areas, strategies, etc.; (ii) relative importance of opening new links against providing enhanced capacity on existing links; and (iii) specification of long-term strategic projects to be implemented irrespective of economic ranking.

9. Training

37. The strategy presented in this report envisages training as an integral part of a number of specific TAP initiatives (e.g., Training in Logistics, Training in Road Operations, Railways Management Improvement Project, Further Development and Enhancement of the GMS Transport Model) rather than developing a detailed training-related theme. Given the wide variation in training needs, both as between and among GMS countries and within national entities, time and resource constraints precluded the initiation of a full training needs assessment. The core focus was therefore directed towards the resolution of specific transport-related needs (e.g., rather than seeking to identify and resolve generic issues). While this approach may not be ideal, the consultants took the view that it was preferable to link training to priority initiatives rather than seeking to develop sectorwide training needs. Having noted these constraints, the strategy presented herein recognizes the need for structured training and the benefits to be realized through cross fertilization between and among GMS countries. In that context, the proposed TAP 11 providing for Institutional Strengthening of National Transport Facilitation Commitees could well be expanded to include the development of mechanisms to promote and coordinate training programs between and within GMS countries.

10. GMS Transport Strategy Results-Based Framework for Monitoring

38. At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, the development of a results framework for the proposed transport strategy was suggested, to show and monitor how the projects support the strategy. A Results Framework for the Strategy is included as Appendix 5 of this report. The Framework is based on the Interim Greater Mekong Subregion Regional Cooperation Strategy and Program Update 2006-2008 Results Framework, which was issued in August 2005. In the preparation of the Strategy Framework, reference was also made to the recent ADB Project Performance Management System publication.

Table ES-5: Action Plan for Investment Projects

Project No.	Project	Category	Estimated Cost / Location / Possible Development Partner	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
A2.1-3	Houei Sai-Chiang Khong Third International Mekong Bridge	II	**US$40 million/ Lao PDR and Thailand/ ADB and the Governments of the PRC and Thailand**	**ADB and relevant Road Authorites**										
A3.4-2	Route 13S - NR7 cross-border section	II	**US$5 million/ Lao PDR and Cambodia/ ADB**	**ADB and relevant Road Authorites**										
B1-11	Sisophon-Poipet/Aranyaprathet reinstatement	II	**US$4 million/ Cambodia/ ADB and/or Government of Malaysia and/or Government of Thailand**	**ADB and relevant Railway Authority**										
A3.2-3	NR33: Kampong Trach-Lork Viet Nam border missing 17km section	II	**US$4 million/ Cambodia/ ADB and/or IFI**	**ADB and relevant Road Authority**										
A3.6-1	Route 14A: Pakse-Wat Phu-Lao PDR/Cambodia border 170km paving/reconstruction. Section B.	RS	**US$33.0 million/ Lao PDR/ Government of Japan**	**ADB and relevant Road Authority**										
A3.6-3	Pakse-Xekong Direct Route paving/ reconstruction	RS	**US$34.0 million/ Lao PDR/ Government of Japan**	**ADB and relevant Road Authority**										
A4-4	Mawlamyine-Mudon-Thanbyuzayat upgrading	RS	**US$10 million/ Myanmar/ Government of the Republic of Korea**	**Relevant Road Authority**										

Table ES-5: Action Plan for Investment Projects (continued)

Project No.	Project	Category	Estimated Cost / Location / Possible Development Partner	Initiating Responsibility	Timing of Project 06	07	08	09	10	11	12	13	14	15
A6-3	Route 4: (Lao PDR/Thailand Bridge at Nam Heuang) Ban Nakha-Ken Thao-Paklay-Sayaboury-Xieng Ngern	RS	**US$50 million/ Lao PDR/ ADB**	**ADB and relevant Road Authority**		■	■	■	■					
A6-4	Northern corridors in Lao PDR	RS	**US$47 million/ Lao PDR/ ADB**	**ADB and relevant Road Authority**			■	■	■	■				
A2.2-2	Hanoi-Lao Cai expressway	FS	**US$715.0/ Viet Nam/ ADB and other IFC**	**ADB, other IFC, and relevant Road Authority**			■	■	■					
A6-6	Thakhek-Nakhon Phanom bridge	FS	**US$38.0 million/ Lao PDR and Thailand/ ADB, JBIC, other IFC**	**ADB, JBIC, other IFC, and relevant Road Authorities**			■	■	■	■				
A6-9	Dau Giay-Lien Khuong expressway	FS	**US$600 million/ Viet Nam/ ADB, JBIC, or other IFI**	**ADB, JBIC, and relevant Road Authority**		■	■	■	■	■				
B1-10	Phnom Penh-Badeng-Sisophon/Phnom Penh-Sihanoukville rehabilitation	FS	**US$40.0 (loan element)/ Cambodia/ ADB**	**ADB and relevant Railway Authority**		■	■							

Table ES-5: Action Plan for Investment Projects (continued)

Project No.	Project	Category	Estimated Cost / Location / Possible Development Partner	Initiating Responsibility	Timing of Project 06	07	08	09	10	11	12	13	14	15
C1-1	Improvement of Savannakhet Airport for Joint Thai/Lao PDR Use	FS	**US$3.5 million/ Lao PDR and Thailand/ Government of Japan**	**ADB, Government of Japan, and relevant Civil Aviation Authorities**		▬	▬							
C1-3	Da Nang port upgrading, phase 2	FS	**To be determined/ Viet Nam/ JBIC**	**ADB, JBIC, and relevant Port Authority**		▬	▬							
C3.2-1	Channel, navigation, and port improvements on Mekong and for access to port at Siem Reap; development of intermodal terminal at Khone Falls (scope to be finalized)	FS	**To be determined/ Cambodia/ Mekong River Commission and Government of Belgium**	**Mekong River Commission**		▬	▬	▬						
A2.3-1	Baise-Longlin expressway	NC	**To be determined/ PRC (Guangxi)/ ADB**	**ADB and relevant Road Authority**		▬	▬	▬						
A2.3-2	Baise-Debao-Longbang Viet Nam border expressway	NC	**To be determined/ PRC (Guangxi)/ ADB**	**ADB and relevant Road Authority**				▬	▬	▬				
A3.3-2	NR66: Siem Reap-Preah Vihear-Stung Treng	NC	**US$26.0 million/ Cambodia/ ADB**	**ADB and relevant Road Authority**				▬	▬	▬				

Table ES-5: Action Plan for Investment Projects (continued)

Project No.	Project	Category	Estimated Cost / Location / Possible Development Partner	Initiating Responsibility	Timing of Project 06	07	08	09	10	11	12	13	14	15
A4-3	Thaton-Payagyi-Bagan-Kalay-Tamu/Moreh (India)	NC	**To be determined/ Myanmar and India/ Governments of Myanmar, India, and Thailand**	**Governments of Myanmar, India, and Thailand including relevant Road Authorities**										
C3.2-3	Construction of floating port on Hamluong river	NC	**US$1.6 million/ Viet Nam/ Mekong River Commission and Government of Belgium or IFI**	**Mekong River Commission and relevant Waterways Authorities**										
D19	Xieng Kok-Kyaing Lap Mekong Friendship Bridge	NC	**US$34 million Lao PDR/Myanmar IFI**	**Governments of Lao PDR and Myanmar**										
A2.3-5	Chongzuo-Longzhou, upgrading to Class I	CP	**To be determoned/ PRC (Guangxi)/ ADB**	**ADB and relevant Road Authority**										
A3.1-4	Bien Hoa-Vung Tau expressway	CP	**US$679.0 million/ Viet Nam/ To be determined**	**IFI**										
A6-10	Dali-Lijiang upgrading	CP	**To be determined/ PRC (Yunnan)/ ADB**	**ADB and the relevant Road Authority**										
A6-11	Kunming-Wuding upgrading	CP	**To be determined/ PRC (Guangxi) ADB**	**ADB and the releavnt Road Authority**										

Table ES-5: Action Plan for Investment Projects (continued)

Project No.	Project	Category	Estimated Cost / Location / Possible Development Partner	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
C2.1-3	New Kunming International Airport	CP	**US$2.9 billion/ PRC/ IFI**	**IFI, relevant Civil Aviation Authority, and provincial Planning Commission**										
2.1-5(a)	Expansion of Dali Airport	CP	**US$19 million/ PRC/ IFI**	**IFI, relevant Civil Aviation Authority, and provincial Planning Commission**										
C3.2-4	Laem Chabang Phase 2, construction of C and D container terminals	CP	**To be determined/ Thailand/ Government of Japan and/or IFI**	**ADB, Government of Japan, and relevant Port Authority**										
D14	Guilin International Airport improvement	CP	**US$12.0 million/ PRC (Guangxi)/ IFI**	**IFI, relevant Civil Aviation Authority, and provincial Planning Commission**										
D21	Lancang-Mekong navigation channel improvement and maintenance project	CP	**US$30.0-30.5 million/ All GMS countries/ Mekong River Commission and IFIs**	**JCCCN, Mekong River Commission, and relevant Waterways Authorities**										

Table ES-6: Action Plan for Technical Assistance Projects

TAP No.	Project	Category	Estimated Cost / Location / Possible Development Partner/ Basis for Timing Determination	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
CBTA-Related														
TAP 1	Implementing the GMS Agreement to Facilitate the Cross-Border Movement of Goods and People, Phase 2	****	**US$0.86 million/ All GMS countries/ ADB/ Timing of related TAPs**	**ADB and Joint Committee of NTFCs**										
TAP 2	“Fine-Tuning” of the GMS Cross-Border Transport Agreement	***	**US$2.00 million/ All GMS countries/ ADB/ Timing of related TAPs/**	**ADB and Joint Committee of NTFCs**										
TAP 3	Processing and Facility Improvements at Border Crossing Points	***	**US$1.00 million for TA and US$20.00 for construction/ All GMS countries/ ADB/ Priority**	**ADB, Joint Committee of NTFCs and border control authorities.**										
TAP 4	Updating or Improving Existing Bilateral Railway Agreements and/or Amending the GMS Cross-Border Transport Agreement (CBTA) To Cover Cross-Border Railway Transport	***	**US0.10 million/ All GMS countries/ IFI/ Timing of related railway infrastructure projects and related TAPs**	**ADB and National Rail Authorities**										
TAP 5	Project to Establish a Legal Framework for Cross-Border Navigation on the Mekong River [“Navigation Without Frontiers”, a motto adopted by the Mekong River Commission]	** / ***	**US$0.10 million/ Cambodia and Viet Nam (and possibly Thailand and Lao PDR)/ MRC/ Timing of related TAPs**	**National Waterway Authorities and MRC**										

Table ES-6: Action Plan for Technical Assistance Projects (continued)

TAP No.	Project	Category	Estimated Cost / Location / Possible Development Partner/ Basis for Timing Determination	Initiating Responsibility	Timing of Project 06	07	08	09	10	11	12	13	14	15
TAP 6	Establishment of Issuing and Guaranteeing Organizations under the GMS Cross-Border Transport Agreement	****	**US$0.30 million/ All GMS countries/ ADB/ Timing of related TAPs**	**NTFCs and their Joint Committee**										
TAP 7	Inclusion of a Substantive Health and Sanitary/Phytosanitary (SPS) Regime in the Cross-Border Transport Agreement	***	**US$0.20 million/ All GMS countries/ IFI/ Priority**	**NTFCs and their Joint Committee and the Public Health and Agricultural Ministries of the six GMS Countries**										
TAP 8	Phased Liberalization of Visa Regimes for Travelers	****	**US$5.00 million/ All GMS countries/ ADB/ Intermittent throughout the planning period**	**NTFCs and their Joint Committee, Immigration and Tourism Departments of each country**										
TAP 9	Specification of Transit Charges To Be Implemented Under Protocol 2 of the Cross-Border Transport Agreement	****	**US$0.15 million/ All GMS countries/ ADB/ Priority**	**NTFCs and their Joint Committee**										
TAP 10	Establishment of a Third-Party Motor Liability Insurance Regime	***	**US$0.10 million/ All GMS countries/ ADB/ Timing of related TAPs**	**NTFCs and their Joint Committee**										

Table ES-6: Action Plan for Technical Assistance Projects (continued)

TAP No.	Project	Category	Estimated Cost / Location / Possible Development Partner/ Basis for Timing Determination	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
TAP 11	Institutional Strengthening of National Transport Facilitation Committees	****	**US$0.30 million/ All GMS countries/ ADB/ Timing of related TAPs**	**NTFCs**										
TAP 12	Support for Harmonization of GMS Road Signs and Signals	***	**US$0.12 million/ All GMS countries/ ADB/ Priority**	**NTFCs as well as national and provincial highway departments**										
Infrastructure-Related														
TAP 13	Practicalities of Private Sector Participation in Transport Infrastructure	***	**US$0.20 million/ All GMS countries/IFI/ Government of Japan/ Priority**	**National Ministries of Transport**										
TAP 14	Cooperation between the ADB-ASEAN Regional Road Safety Program and the PRC	*	**To be determined/ All GMS countries/ IFI/ Donor timetables in PRC**	**ADB and concerned agencies in the GMS and non-GMS ASEAN countries**										
TAP 15	HIV/AIDS Component for all Road Transport Projects in the GMS	****	**US$1.00+ million/ All GMS countries/ IFI/ADB/ Intermittent throughout the planning period**	**Transport/Com-munications and Public Health Ministries of the six GMS countries**										

Table ES-6: Action Plan for Technical Assistance Projects (continued)

TAP No.	Project	Category	Estimated Cost / Location / Possible Development Partner/ Basis for Timing Determination	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
TAP 16	Road Maintenance Initiatives for Cambodia, Lao PDR, Myanmar, and Viet Nam	**	**US$1.50 million/ All GMS countries/ ADB/ Priority**	**National Departments of Road/Ministries of Transport**										
TAP 17	Private Sector Participation in Road Maintenance	**	**US$0.90 million/ All GMS countries/ IFI/ Priority**	**National Roads Authorities.**										
TAP 18	Revisiting of the Feasibility Study for the Singapore-Kunming [Nanning] Railway Link (Project	*	**US$2.00 million/ All GMS countries/ ADB/ Priority**	**ADB and National Rail Authorities**										
TAP 19A	Upper (Lancang-)Mekong River Channel Navigation Improvement and Maintenance Project	***	**US$5.00 million/ PRC, Myanmar, Lao PDR, and Thailand / ADB and MRC/ Timing of related TAPs**	**National Waterway Authorities, ADB, and MRC**										
19B	Lower Mekong River Channel Navigation Improvement and Maintenance Project	***	**US$10.00 million/ Cambodia and Viet Nam/ MRC and ADB/ Timing of related TAPs**	**National Waterway Authorities, MRC, and ADB**										
TAP 20	GMS Airports Development Project	**	**To be determined/ All GMS countries/ IFI/ Phased implementation**	**National Civil Aviation Authorities**										
TAP 21	Rail Maintenance in Cambodia	*	**US$0.30 million/ Cambodia/ ADB or other IFI/ Priority**	**Royal Railway of Cambodia**										

Table ES-6: Action Plan for Technical Assistance Projects (continued)

TAP No.	Project	Category	Estimated Cost / Location / Possible Development Partner/ Basis for Timing Determination	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
TAP 22	GMS Andaman Sea/Indian Ocean Deep Sea Port Study for Myanmar	***	**US$0.50 million/ Myanmar/ IFI/ Priority**	**Ministry of Transportation Myanmar Ports Authority**										
Transport Logistics-Related														
TAP 23	Training in Logistics	***	**US$0.30 million/ All GMS countries/ IFI/ Priority**	**National Transport Authorities**										
TAP 24	Development of Inland Container Freight Depots	*	**US$0.30 million/ All GMS countries/ IFI and/or Government of Japan/ Priority**	**National Ministries of Transport**										
TAP 25	Cambodia FF Competitiveness Project	N/A	**Consolidated with TAP 21**	**N/A**										
Training														
TAP 26	Training in Road (Passenger and Freight) Transport Operations ("Knowledge Across Frontiers")	**	**US0.30 million/ All GMS countries/ IFI and/or International Road Transport Union/ Priority**	**National Transport Authorities**										
TAP 27	Upgrading of Inland Water (Passenger and Freight) Transport Industry	**	**US$0.10 million/ All GMS countries/ MRC/ Priority**	**National Waterways Authorities and MRC**										
TAP 28	Railways Management Improvement Project	*	**US$1.50 million/ Cambodia and Myanmar/ IFI/ Priority**	**National Transport Ministries and Railways**										

Table ES-6: Action Plan for Technical Assistance Projects (continued)

TAP No.	Project	Category	Estimated Cost / Location / Possible Development Partner/ Basis for Timing Determination	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
TAP 29	Development of Traffic Engineering Capacity in Myanmar	Noted	**N/A**	**N/A**										
TAP 30	Development of Highway Engineering Capacity in Myanmar	Noted	**N/A**	**N/A**										
TAP 31	Financial and Economic Assessment Expertise in Myanmar	Noted	**N/A**	**N/A**										
Others/Cross-Cutting														
TAP 32	Transformation of Transport Corridors into Economic Corridors	****	**US$5.0 million/ All GMS countries/ ADB, JBIC, and other IFIs/ Priority**	**ADB, Transport/Economic Development Ministries**										
TAP 33	Further Development and Enhancement of the GMS Transport Model	****	**US$0.35 million for Version 2 and up to US$1.00 million for Version 3/ All GMS countries/ ADB/ Priority**	**ADB and National Transport Ministries**										
TAP 34	Development of Cross-Border Scheduled Bus Routes	**	**Cost from national budgets/ All GMS countries/ As demand warrants**	**National Transport Ministries**										
TAP 35	Marketing and Container Train Concessions between Laem Chabang, Thailand and Thanaleng, Lao PDR	**	**US$0.50 million/ Thailand and Lao PDR/ IFI/ Priority**	**State Railway of Thailand/ Lao PDR Railway Authority/ National Ministries**										

Table ES-6: Action Plan for Technical Assistance Projects (continued)

TAP No.	Project	Category	Estimated Cost / Location / Possible Development Partner/ Basis for Timing Determination	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
TAP 36	Promotion of Marketing Functions for GMS Ports	**	**US$0.05 million/ All GMS countries but especially those with sea ports/ IFI/ Priority**	**ASEAN Secretariat and PRC and other national Port Authorities.**										
TAP 37	Promotion of Short Sea Shipping Services	**	**US$0.50 million/ All GMS Countries/ IFI/ Timing of related TAPs**	**National Ports and Shipping Authorities**										
TAP 38	TA on Transport Requirements for the Development of Tourism	**	**US$1.00-2.00 million/ All GMS countries/ IFI/ Timing of related TAPs**	**Transport/Com-munications and Tourism Ministries of the six GMS countries**										
TAP 39	Sea Cruise Development in Cooperation with ASEAN	*	**US$0.50 million/ All GMS countries/ IFI/ Priority**	**National Port Authorities**										
TAP 40	<u>Phased</u> Implementation of Open Skies	***	**US$0.50 million/ All GMS countries/ IFI/ Timing of related TAPs and ongoing ASEAN initiative**	**ASEAN Secretariat and separate arrangement with PRC National Civil Aviation Authorities**										

Key: Continuous Intermittent Possible 2nd, phase Phased Implementation

Asian Development Bank

T.A. No. 6195-REG: GMS Transport Sector Strategy Study

FINAL REPORT – VOLUME 2: MAIN TEXT

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Volume 2 of the Final Report: Main Text

Table of Contents

Table of Contents (continued)

List of Tables

List of Tables (continued)

List of Figures

List of Abbreviations and Acronyms

ABVT	Advisory Body for Vocational Training
ACMECS	Ayeyawady-Chao Phraya-Mekong Economic Cooperation
AC	asphalt concrete
ADB	Asian Development Bank
AFD	Agence Francaise de Developpement
AH	Asian Highway
AMTA	Agency for Coordinating Mekong Tourism Activities
APEC	Asia Pacific Economic Cooperation
AR	Autonomous Region
ASAs	air services agreements
ASEAN	Association of Southeast Asian Nations
ATA	Admission Temporaire/Temporary Admission
BIMSTEC	Bay of Bengal Initiative for Multi-sectoral and Technical Cooperation
BKK	Bangkok
BOT	build-operate-transfer
BST	bituminous surface treatment(s)
CAA	Civil Aviation Authority
CAAC	General Administration of Civil Aviation of China
CBTA	Cross-Border Transport Agreement
CIQ	customs-immigration-quarantine
CMLV	Cambodia-Myanmar-Lao PDR-Viet Nam
CMR	Convention on the Contract for the International Carriage of Goods by Road
CP	Capacity-enhancement Project
CPC	Certificate of Professional Competence
CSCMP	Council of Supply Chain Management Professionals
CSWs	commercial sex workers
DFID	Department for International Development (British Government Aid)
DG	Directorate-General
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EIRR	economic internal rate of return
ENPV	economic net present value
ESCAP	Economic Commission for Asia and the Pacific
ETO	Express Transport Organization
EU	European Union
EWEC	East-West Economic Corridor
FF	freight forwarders
FIATA	International Federation of Freight Forwarders Association, FIATA (Fédération Internationale des Associations de Transitaires et Assimilés)
FS	Feasibility Study
FTA	Free Trade Area
GB	gigabytes
GDP	Gross Domestic Product
GF	Growth Factor
GFP	Global Facilitation Partnership
GIS	geographic information system

List of Abbreviations and Acronyms (continued)

GMS	Greater Mekong Subregion
ha	Hectares
HAN	Hanoi
HCMC	Ho Chi Minh City
HIV/AIDS	human immunodeficiency virus/acquired immunodeficiency syndrome
HRD	human resource development
IATA	International Air Transport Association
IBRD	International Bank for Reconstruction and Development
ICD	inland container depot
ICT	information and communications technology
IFI	international financial institution
II	Immediate Implementation
IMF	International Monetary Fund
IRU	International Road Transport Union
IWRDM	Integrated Water Resources Development and Management Strategy
IWT	inland water transport
JBIC	Japan Bank for International Cooperation
JCCCN	Joint Committee on Coordination of Commercial Navigation
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
km	kilometers
KMG	Kunming
kph	kilometers per hour
Lao PDR	Lao People's Democratic Republic
LCV	Lao PDR-Cambodia-Viet Nam
LTWG	Land Transportation Working Group
M&T	monitoring and tracking
MCAT	Mukdahan City Air Terminal
MIS	management information system
MJC	Ministerial Joint Committee
MKOC	Mekong Operations Coordination Division
MKRD	Mekong Department
MOU	memorandum of understanding
MRC	Mekong River Commission
mt	metric ton(ne)(s)
NA	not applicable or not available
NC	New Corridor/Northern Corridor
NDF	Nordic Development Fund
NC	Northern Corridor
NGO	non-governmental organization
NNG	Nanning
No.	number
NR	Route National (Cambodia)
NSEC	North-South Economic Corridor
NSEDP	National Socio-Economic Development Plan
NSL	North-South via Lao PDR Corridor
NTFC	National Transport Facilitation Committee
NWC	Northwestern Corridor

List of Abbreviations and Acronyms (continued)

OAG	Official Airline Guide
ODA	Official Development Assistance
OIE	Office International des Epizooties (World Organization for Animal Health
OSZhD	Committee for the Organization for Cooperation between Railways, based in Warsaw
pa	per annum
PAT	Port Authority of Thailand
pax	passengers
pkm	passenger-kilometers
PNH	Phnom Penh
PRC	People’s Republic of China
PSP	private sector participation
RETA	regional technical assistance
RGN	Yangon
RITES	Railway Technical and Economic Services
REG	Regional
RRC	Royal Railway of Cambodia
RS	Ranking Study
SS	Short Sea Shipping Services
SAPI	Special Assistance for Project Implementation
SARS	Severe Acute Respiratory Syndrome
SASEC	South Asia Subregional Economic Cooperation
SCA	Société Concessionnaire de l'Aéroport
SDR	Special Drawing Rights
SEC	Southern Economic Corridor
SE	Southeast
SEDP	Socio-Economic Development Plan
SIDA	Swedish International Development Agency
SKRL	Singapore-Kunming Rail Link
SPS	sanitary and phytosanitary
STIs	sexually transmitted infections
STOM	Senior Transport Officials Meeting
STRADA	System for Travel Demand Analysis
TA	technical assistance
TAP	technical assistance project
TAR	technical assistance report
TEDI	Transport Engineering and Design Incorporated
TIR	Transit International Routier (Customs Transit System)
tkm	ton(ne)-kilometer(s)
TSSS	Transport Sector Strategy Study
UIC	International Union of Railways (Union Internationale des Chemins de Fer)
UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business
UNDP	United Nations Development Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNLY	United Nations Layout Key

List of Abbreviations and Acronyms (continued)

US$	United States dollars
UXO	unexploded ordnance
VITRANSS	Study on the National Transport Development Strategy in the Socialist Republic of Vietnam
VND	Vietnamese dong
VTE	Vientiane
VOCs	vehicle operating costs
VTC	voluntary testing and counseling
WCO	World Customs Organization
WHO	World Health Organization
WTO	World Trade Organization
YGN	Yangon

CHAPTER I: INTRODUCTION

I. INTRODUCTION

1. The Greater Mekong Subregion (GMS) comprises Cambodia, Yunnan Province and Guangxi Zhuang Autonomous Region of the People's Republic of China, Lao People's Democratic Republic, Myanmar, Thailand, and Viet Nam. In 1992, with the assistance of the Asian Development Bank (ADB), the six countries entered into a program of subregional economic cooperation designed to enhance economic relations between and among the countries. The program has contributed to the development of infrastructure to enable the development and sharing of the resource base, and to promote the freer flow of goods and people in the subregion. It has also led to the international recognition of the subregion as a growth area. [1]

2. The objective of this Study was to develop a clear vision and comprehensive strategy for development the GMS transport network to promote subregional connectivity and competitiveness, towards an eventual GMS-wide multimodal transport system. Based on an analysis of current and likely developments, the Study identifies transport projects, policies, programs, and institutions to promote subregional cooperation in the transport sector.[2]

3. The Final Report consists of an Executive Summary (Volume 1), Main Text (Volume 2, this volume), and Appendices (Volume 3). Chapters in the volume include the following:

Chapter II: Existing GMS Transport Network and Demand;
Chapter III: Constraints on GMS Transport Flows;
Chapter IV: Transport Demand in 2015;
Chapter V: Prospective Constraints on GMS Transport Efficiency;
Chapter VI: Improving GMS Transport Efficiency;
Chapter VII: Proposed GMS Transport Sector Strategy;
Chapter VIII: Identification of Investment and Technical Assistance Projects;
Chapter IX: Prioritization of Investment and Technical Assistance Projects;
Chapter X: Priority Projects and Transport Strategy; and
Chapter XI: Action Plans, Outstanding Issues, and Next Steps

4. The Appendices are:

Appendix 1: Conduct of the Study;
Appendix 2: Transport Model Specification and Test Outputs;
Appendix 3: Selected Investment Project Concept Profiles;
Appendix 4: Technical Assistance Project Concept Profiles; and
Appendix 5: GMS Transport Sector Strategy Results Framework (2006-2015).

5. The Final Report follows from a Draft Final Report submitted in November 2005, and a Revised Draft Final Report submitted in March 2006. However, it dutifully reflects the comments received from the GMS countries at the Workshop on the Draft Final Report held in Ho Chi Minh City, Viet Nam, on 8-9 December 2005, and at the Final Meeting on the GMS Transport Sector Strategy Study held in Vientiane, Lao People’s Democratic Republic (Lao PDR), 21 March 2006. Matrices were prepared and distributed showing the action(s) taken in reply to each comment.

[1] http://www.adb.org/GMS/default.asp.
[2] Asian Development Bank, Technical Assistance for Greater Mekong Subregion Transport Sector Strategy Study, TAR:STU 38052, October 2004, p. 3.

6. A few editorial notes may be helpful to the reader:

(i) For the purposes of this study, the terms GMS and “subregion” refer to Cambodia, Yunnan Province and Guangxi Zhuang Autonomous Region of the People’s Republic of China (PRC),[1] the Lao People’s Democratic Republic (Lao PDR), Myanmar, Thailand, and Viet Nam.
(ii) The Lao People’s Democratic Republic is referred to as such or as Lao PDR, not the informal “Laos”. The informal term is used, however, when it is part of a proper noun.
(iii) Place names in Myanmar (formerly Burma) are generally referred to by their new names (e.g., Yangon rather than Rangoon). “Myanma” is used as the adjective form of “Myanmar”. The spelling of proper nouns, however, has been left unchanged.
(iv) The Socialist Republic of Viet Nam is referred to as “Viet Nam” rather than as “Vietnam” (i.e., as two words); however, since as an adjective it must be one word, the word “Vietnamese” is used. Also, the spelling of the country’s name has not been changed when it appears in the names of organizations (e.g., Vietnam Airlines) or in report titles.
(v) The Hong Kong Special Administrative Region has been referred to as “Hong Kong, China”, as per standard ADB usage.
(vi) Extensive footnotes have been provided to credit sources properly and to ease the task of the interested reader who wishes to pursue further topics raised in the text.

7. The study team[2] is exceedingly grateful for having had the opportunity to participate in the process of facilitating the second decade of cooperation among the GMS countries. In particular, the team wishes to acknowledge the excellent assistance provided by ADB, the six governments, and a number of international organizations during the study. The keen interest and active participation of all concerned greatly assisted the work of the consultants. However, responsibility for the contents of the report, including any errors, rests entirely on the consultants.

[1] At the Senior Officials’ Meeting (SOM) preceding the 13th GMS Ministerial Meeting in Vientiane in December 2004, the SOM Chairman’s Report stated that “the SOM welcomed the inclusion of Guangxi Autonomous Region, PRC in the GMS Program”. It added that “the PRC delegation emphasized that PRC participates in the GMS Program in the name of the country”.
[2] Vaughan F. Corbett, Team Leader/Cargo Transport Specialist; Bruce P. Winston, Passenger Transport Specialist; Jeremy D. Whittle, Institutional Strengthening Specialist; Peter Mansell, Investment Program Specialist; Richard F. Di Bona, Transport Modeler; and David Husband, Macroeconomist.

CHAPTER II: EXISTING GMS TRANSPORT NETWORK AND TRAFFIC

II. EXISTING GMS TRANSPORT NETWORK AND TRAFFIC

A. Introduction

1. This chapter provides a description of major GMS links (Section B) and presents available fitted flow data on major GMS links (Section C). Table 2-1 presents a summary cross-comparison of GMS transport networks, which are developed to different degrees by country, partly as a consequence of terrain. As can be seen, roads provide the most extensive transport networks. Railways meanwhile have relatively little penetration. With the exception of Thailand, inland water transport has a larger network than rail in all cases.[1]

B. Description of Major GMS Links

1. The Road Subsector

2. Major strategic, cross-border roads within the GMS can be defined with reference to the Asian Highway network. This is a multilateral initiative to link and consistently upgrade and develop major roads between and through Asian countries.[2]

3. In some cases the Asian Highways are already major carriers of traffic, while in others they are highways with longer-term potential to become important in cross-border trade. Finally, there are some sections that represent "missing links" between or within countries' highway networks.

[1] This material has been prepared in response to the following comment at the Workshop on the Draft Final Report held in Ho Chi Minh City on 8-9 December 2005: "The Study should begin with an overview of national transport systems to better understand the extent of the road networks in each country as well as other modes." Summary of Proceedings, 12(i).

[2] Of course, major strategic, cross-border roads within the GMS may also be defined with respect to the "GMS road network", set out in the 1993-94 ADB-sponsored Subregional Transport Sector Study. The Asian Highway network referenced is notable because it includes connections westward toward the Subcontinent, unlike the GMS network. However, as the consultants explained at the Workshop on the Draft Final Report held in Ho Chi Minh City on 8-9 December 2005, the transport model did not use only Asian Highway data but also data from a large number of sources. Also, as the TA is not a national study, the model included data for individual countries, but in a selective and simplified manner, as dictated by the need to strike a balance between a subregional focus and the need to present a relatively comprehensive picture. Summary of Proceedings, paragraph 12(i).

Table 2-1: Comparison of Transport Networks in GMS Countries

	Cambodia	PRC	Lao PDR	Myanmar	Thailand	Viet Nam
Surface Area km^2 (1)	181,040	9,598,010	236,800	676,580	513,120	331,690
Land Area km^2 (2)	176,520	9,326,410	230,800	657,740	511,770	325,360
Population (2)	13,404,000	1,288,400,000	5,659,800	49,362,000	62,014,000	81,314,000
Roads: Comparative Data						
Estimate For Year/ From Source	2000/ (1)	2003/ (1)	2002/ (1)	Not specified/ (2)	2000/ (1)	2000/ (1)
Total Length km	12,323	1,809,829	32,620	30,000	57,403	215,628
% Paved	16.20%	79.49%	14.07%	n/a	98.50%	n/a
km Paved	1,996	1,438,633	4,590	n/a	56,542	n/a
km Unpaved	10,327	371,196	28,030	n/a	861	n/a
Network Density: km per km^2	0.070	0.194	0.141	0.046	0.112	0.663
Paved Network Density: km per km^2	0.011	0.154	0.020	n/a	0.110	n/a
Railways (2)						
Total length km	602	71,898	0	3,955	4,071	2,600
Electrified km		18,155				
Standard Gauge km		47,953				178
Narrow Gauge km	602			3,955	4,071	2,169
Dual Gauge km		23,945				253
Network Density: km per km^2	0.003	0.008	0.000	0.006	0.008	0.008
Waterways (2)						
Total Length km	2,400	121,557	4,600	12,800	4,000	17,702
Network Density: km per km^2	0.014	0.013	0.020	0.019	0.008	0.054
Airports (2)						
Total Number	20	472	44	78	109	24
Number with Paved Runway	6	389	9	19	65	23

Data Sources: (1) IRF World Road Statistics 2005: Data 1999 to 2003
(2) www.cia.gov/cia/publications/factbook

Note: Complete data were only available for the PRC. The roads data were obtained from the International Roads Federation (IRF), with the exception of Myanmar, where data were only available from other sources. Comparing these numbers, it would appear that data for Viet Nam contain a substantial proportion of local and/or unpaved roads, e.g., given that the Vietnamese total exceeds that of Thailand. Data on other modes (plus road data for Myanmar) were obtained from www.cia.gov/cia/publications/factbook, which provides data for a cross-comparison of sorts between countries. Air transport is not a network issue per se, so it is condered differently in the transport modelling, as explained in Appendix 2.

4. Asian Highway routes by GMS country are described as follows[1]:

a) Cambodia

5. Asian Highway routes in Cambodia connect with Lao PDR, Thailand, and Viet Nam, as well as providing access to Sihanoukville.

6. The "headline" status of the Asian Highway in Cambodia is shown in Table 2-2.

Table 2-2: Status of Asian Highways in Cambodia

No.	Route	Length (km)	Paved (km)		Unpaved (km)	Ferry (km)
			2+ Lanes	1 Lane		
AH1	Bavet (Viet Nam border) – Phnom Penh – Poipet (Thailand border)	575	573			2
AH11	Tranpeangkreal (Lao PDR border) – Stung Treng – Kratie – Phnom Penh – Sihanoukville	765	764			1
Total		1,340	1,337			3

7. While the Asian Highway is classified as wholly paved, AH11 north of Kratie is classified as being in poor condition (upgrading is understood to be ongoing at present).

b) People Republic of China (PRC)

8. The PRC is traversed by a number of different Asian Highways. However, within Guangxi and Yunnan, the key routes are AH1, AH3, and AH14, which connect with Lao PDR, Myanmar, and Viet Nam. These routes are described in Table 2-3.

9. While the Asian Highway database on the characteristics of Asian Highways within PRC does not contain detailed data, it is understood that the Asian highway sections within Guangxi and Yunnan are paved and with at least two lanes (i.e., at least one per direction).

Table 2-3: Status of Asian Highway in PRC (Guangxi and Yunnan)

No.	Route	Length (km)	Paved (km)		Unpaved (km)	Ferry (km)
			2+ Lanes	1 Lane		
AH1	Suixi (Guangdong boundary) – Qinzhou – Nanning – Youyiguan (Viet Nam border)	612				
AH3	Qujing (Guizhou boundary) – Kunming – Yangwu – Puer – Jinghong – Mohan (Lao PDR border) / Daluo (Myanmar border)	1,289				
AH14	Hekou (Viet Nam border) – Kaiyuan – Kunming – Chuxiong – Dali – Ruili (Myanmar border)	1,435				
Total		3,336				0

[1] Based primarily on data from the Asian Highway Handbook published by UNESCAP in 2003.

c) Lao PDR

10. Lao PDR has highway connections with Cambodia, PRC, Thailand, and Viet Nam. In the future a highway and bridge may be built to link Lao PDR by road with Myanmar also.

11. Lao PDR's highway network is of varying standard, as indicated in Table 2-4.

Table 2-4: Status of Asian Highway in Lao PDR

No.	Route	Length (km)	Paved	Unpaved	Ferry	Missing	Unknown
AH3	Boten (Yunnan, PRC border) – Nateuy – Houayxay (Thailand border)	244	65	178	1	0	0
AH11	Vientiane – Ban Lao – Thakhek – Seno – Pakse – Veunkham (Cambodia border)	823	777	46	0	0	0
AH12	Nateuy – Oudomxai – Pakmong – Louang Phrabang – Vientiane – Thanaleng (Thailand border)	684	659	25	0	0	0
AH13	Oudomxai – Muang Ngeun (Thailand border)	173	0	0	1	45	127
AH15	Keoneau (Viet Nam border)– Ban Lao – Thakhek (Thailand border)	133	132	0	1	0	0
AH16	Dansavanh (Viet Nam border) – Seno – Savannakhet (Thailand border)	241	240	0	1	0	0
Total		2,298	1,873	249	3	45	127

12. As can be seen, a number of these routes are partially unpaved (AH3 is largely unpaved). Part of AH13 is still a missing link. In addition, there are a number of vehicle ferries in place of highways.

d) Myanmar

13. Asian Highway routes connect Myanmar with the PRC, India, and Thailand. In addition, Myanmar shares borders with Bangladesh and Lao PDR, although there are no Asian Highway routes connecting to these countries at present.

14. Myanmar has been identified as the landbridge between South Asia to the west, and the PRC and Southeast Asia to the east. However, as can be seen in Table 2-5, in many instances the standard of highways in Myanmar is not ideal: just under half of the Asian Highway route network in Myammar is paved with two or more lanes (i.e., a minimum of one lane per direction).

Table 2-5: Status of Asian Highway in Myanmar

No.	Route	Length (km)	Paved (km)		Unpaved (km)
			2+ Lanes	1 Lane	
AH1	Myawaddy (Thailand border) – Payagyi – Yangon – Meiktila – Mandalay – Tamu (Indian border)	1,650	969	467	214
AH2	Tachilek (Thailand border) – Kyaning Tong – Meiktila – Mandalay – Tamu (Indian border)	807	50	541	216
AH3	Mongla (Yunnan, PRC border) – Kyaning Tong	93	0	5	88
AH14	Muse (Yunnan, PRC border) – Lashio - Mandalay	453	453	0	0
Total		3,003	1,472	1,013	518
Percent		100	49.0	33.7	17.3

e) Thailand

15. Asian Highway routes connect Thailand with Cambodia, Lao PDR, Malaysia, and Myanmar. In general, Thailand's highway network is of good standard and is also extensive. Table 2-6 shows Asian Highway links within Thailand, again for indicative purposes.

Table 2-6: Status of Asian Highway in Thailand

No.	Route	Length (km)	Paved (km)		Unpaved (km)
			2+ Lanes	1 Lane	
AH1	Aranyaprathet (Cambodia border) – Kabin Buri – Hinkong – Bang Pa-in (– Bangkok) – Nakhon Sawan – Tak – Mae Sot (Myanmar border)	701	700		
AH2	Sa Dao (Malaysia border) – Hat Yai – Bangkok – Bang Pa-in – Nakhon Sawan – Tak – Chiang Rai – Mae Sai – Tachilek (Myamar border)	1,549	1,549		
AH3	Chiang Khong (Lao PDR border) – Chiang Rai	117	116		1
AH12	Nong Khai (Lao PDR border) – Udon Thani – Khon Kaen – Nakhon Ratchasima – Hin Kong	511	510		
AH13	Huai Kon (Lao PDR border) – Nan – Uttaradit – Phitsanulok – Nakhon Sawan	557	557		
AH15	Nakhon Phanom (Lao PDR border) – Udon Thani	243	242		1
AH16	Mukdahan (Lao PDR border) – Khon Kaen – Phitsanulok – Tak	708	707		1
AH18	Hat Yai – Sungai Kolok (Malaysia border)	268	268		
AH19	Nakhon Ratchasima – Kabin Buri – Laem Chabang – Chonburi – Bangkok	458	458		
Total		5,113	5,113		3

f) Viet Nam

16. Asian Highway routes connect Viet Nam with Cambodia, PRC, and Lao PDR Table 2-7 shows Asian Highway links within Viet Nam. As can be seen, some sections remain one lane only, although the network is wholly paved.

Table 2-7: Status of Asian Highway in Viet Nam

No.	Route	Length (km)	Paved (km)	
			2+ Lanes	1 Lane
AH1	Huu Nghi (Guangxi, PRC border) – Hanoi – Vinh – Dong Ha – Hue – Da Nang – Hoi An – Nha Trang – Bien Hoa (– Vung Tau) – Ho Chi Minh City – Moc Bai (Cambodia border)	2,063	2,063	
AH14	Hai Phong – Hanoi – Viet Tri – Lao Cai (Yunnan, PRC border)	446	260	186
AH15	Vinh – Cau Treo (Lao PDR border)	85	20	65
AH16	Dong Ha – Lao Bao (Lao PDR border)	84	84	
Total		2,678	2,343	335
Percent		100	87.5	12.5

2. The Rail Subsector

17. The rail subsector is currently present in all GMS countries with the exception of Lao PDR, although Lao PDR is expected to have a short line operational within a few years, connecting to Thailand.

18. While Thailand’s network connects with Malaysia’s network offering services as far south as Singapore, at present it has no cross-border rail services with other GMS countries.

19. While both Cambodia and Myanmar have domestic railway networks, neither country’s rail network connects to any other country.

20. The PRC’s rail network is extensive nationwide and Yunnan and Guangxi connect to it. In addition, there is one line each between Yunnan and Viet Nam and between Guangxi and Viet Nam. These constitute the two external connections to Viet Nam’s network.

21. In most instances rail speeds are relatively slow as compared to road. Also, in most instances lines are single tracked, further constraining the growth of the rail subsector.

a) Cambodia

22. Cambodia’s rail network comprises two routes, one running south from Phnom Penh to Sihanoukville (264 km) and one running north to Sisaphon (337 km).

23. Cambodia’s railway network has 1,000 mm track gauge and is single track throughout. At present, Cambodia’s railway network handles freight but not passengers.

24. The performance of Cambodia’s railway network is currently constrained due to poor track quality. However, rehabilitation works are in progress.

25. Cambodia’s railway network formerly ran to Poipet near the border with Thailand, but the track between Sisophon and Poipet has been disused for some time. Furthermore, within Poipet much of the railway embankment has been built on. This complicates the issue of reclaiming the railway’s alignment.

b) PRC

26. Rail has long been the backbone of PRC's national transport system. While the network in Guangxi is fairly extensive, the network in Yunnan is limited, relative to much of the rest of PRC.

27. PRC's national railway system uses 1,435 mm track gauge. However, the 468 km line from Kunming to Hekou uses 1,000 mm track gauge. This line is presently freight only and connects to the Viet Nam railway system via Lao Cai. However, a new standard gauge alignment is being built between Kunming and Hekou/ Lao Cai.

28. In addition to the Hekou-Lao Cai cross-border line, freight and passenger services operate between Guangxi and Viet Nam via the Friendship Pass. However, the Nanning-Friendship Pass line uses 1,435 mm track gauge, as opposed to Viet Nam's 1,000 mm gauge.

c) Lao PDR

29. At present, Lao PDR does not have any operational railway.

30. It is anticipated that Lao PDR will have a railway spur connecting Thannaleng across the Friendship Bridge to Nong Khai, Thailand. It is expected that contractors will be appointed by the end of 2005 to commence construction work.

31. The State Railway of Thailand will manage this rail spur line. However, if and when Lao PDR's railway network expands, then Lao PDR may manage its own railways.

d) Myanmar

32. Myanmar has an extensive railway network, with a total route mileage of 2,974 miles (4,785 km) and a total track mileage of 3,860 miles (6,210 km). There are 739 stations in all.

33. Myanmar's railway operates a track gauge of 1,000 mm and is predominantly single-tracked.

e) Thailand

34. Thailand's railway network extends over 4,000 km. It is predominantly single track. Thailand operates 1,000mm track gauge.

35. Once the spur line across the Friendship Bridge to Lao PDR is completed, it is envisaged that the State Railway of Thailand will manage and operate all services on this track.

36. The average operating speed of Thailand's railways is 27kph for freight trains.

f) Viet Nam

37. Viet Nam's railway network has approximately 2,600km of track, mainly single track.

38. Most of Viet Nam's rail network has a 1,000mm track gauge. However, the Hanoi – Dong Dang (162 km) and Hanoi – Quan Trieu (75 km) tracks are mixed gauge, offering both 1,000mm and 1,435mm track gauge. In addition, the Kep –

Uong Bi – Ha Long (106km) and Kep – Luu Xa (57km) tracks have a 1,435mm track gauge.

3. The Water Transport Subsector

a) Overview

39. The water transport subsector offers the possibility of cheap, bulk freight transport along those corridors where this is feasible. However, by the very nature of waterways and the terrain in the GMS, the water "network" in fact breaks down into a number of separate systems, which do not of themselves connect.

40. These are described as follows:

- Lancang-Mekong River

41. The Lancang-Mekong starts in the PRC and becomes navigable for short stretches in Yunnan. It then defines the border between the PRC and Myanmar, between Myanmar and Lao PDR, and then between Thailand and Lao PDR. After a stretch to Luang Prabang, wholly within Lao PDR. it then once again defines the border between Thailand and Lao PDR.

42. After the Khone falls in southern Lao PDR, it enters Cambodia and has a confluence with the Tonle Sap River and also with the Bassac River near Phnom Penh.

43. The Mekong and Bassac then both flow through southern Viet Nam and into the South China Sea. There is substantial traffic on these rivers.

44. Navigation on the Upper Mekong (from the PRC border to the Cambodian border) is characterized by short-distance traffic, which is often seasonal. In addition, the Khone Falls in southern Lao PDR are unnavigable.

- Red River

45. Although originating in the PRC, the Red River is in navigation terms essentially Vietnamese. The Red River Delta is itself a fairly dense network of waterways, but almost exclusively serves domestic traffic.

- Ayeyawady and Lower Chindwin River System

46. Since there is only negligible traffic on the Mekong to/from Myanmar, Myanmar's riparian transport is concentrated on the Ayeyawady and Lower Chindwin River System. While these links are very important in transport terms, some sections are only navigable seasonally.

- Chao Phraya and Tachin River Systems

47. While Thailand has access to the Mekong, its main water network concentrates on the Chao Phraya and Tachin River Systems feedng into Greater Bangkok. They serve domestic traffic.

- River Systems in Guangxi and Yunnan

48. The Lancang-Mekong's headwaters are in the PRC, but there is only limited short-distance navigation within the PRC.

49. The Red River is not currently navigable from Yunnan into Viet Nam.

50. Guangxi's river transport system is more closely tied to southern PRC, rather than the GMS.

C. Available Fitted Flow Data on Major GMS Links

1. Road Subsector

51. Table 2-8 shows the count data available from the Asian Highway Database. No count data were available in the Database on links in the PRC, so these are excluded from the Table.

52. It should be noted that prior to application within the GMS Transport Model, these traffic counts were reconciled with other data sources. Fuller description of this process and the resultant data are provided in Appendix 2.

Table 2-8: Traffic Count Data from ASEAN Highway Database

Country	AH	From	To	Car	Pick-Up	Bus	Truck	Trailer	M'cycle
Cambodia	AH1	Bavet (Border of Viet Nam)	Svay Rieng	13	7	1	10	0	1,723
Cambodia	AH1	Svay Rieng	Neak Loeung	306	90	38	315	17	2,796
Cambodia	AH1	Neak Loeung	Phnom Penh	1,447	335	136	1,289	62	24,109
Cambodia	AH1	Phnom Penh	Prek Kdam	1,458	642	35	537	35	5,482
Cambodia	AH1	Prek Kdam	Odong						
Cambodia	AH1	Odong	Kampong Chhnang	875	140	35	268	23	1,516
Cambodia	AH1	Kampong Chhnang	Pursat	327	70	12	105	12	1,049
Cambodia	AH1	Pursat	Battambang	653	128	12	187	23	3,149
Cambodia	AH1	Battambang	Sisophon	467	385	12	187	23	2,916
Cambodia	AH1	Sisophon	Poipet (Border of Thailand)	350	257	6	175	12	3,969
Cambodia	AH11	Trapeangkreal (Border of Lao PDR)	Stung Treng	23	12	0	23	0	583
Cambodia	AH11	Stung Treng	Kratie	23	12	0	23	0	583
Cambodia	AH11	Kratie	Snuol	23	23	0	35	0	817
Cambodia	AH11	Snuol	Phum Krek	23	23	0	35	0	817
Cambodia	AH11	Phum Krek	Kampong Cham	105	58	0	105	12	1,108
Cambodia	AH11	Kampong Cham	Skun	198	105	15	160	23	1,923
Cambodia	AH11	Skun	Thnal Keng	280	82	23	152	12	2,449
Cambodia	AH11	Thnal Keng	Phnom Penh						
Cambodia	AH11	Phnom Penh	Kampong Speu	782	159	46	447	233	2,572
Cambodia	AH11	Kampong Speu	Veal Rinh	782	159	46	447	233	2,572
Cambodia	AH11	Veal Rinh	Sihanoukville						
Lao PDR	AH3	Boten (Border of China)	Nateuy	1	39	15	75	1	67
Lao PDR	AH3	Nateuy	Louang Namtha	1	39	8	32	1	90
Lao PDR	AH3	Louang Namtha	Houayxay	2	56	3	30	0	0
Lao PDR	AH3	Houayxay	Border of Thailand (Houayxay)	0	0	0	0	0	0
Lao PDR	AH11	Vientiane	Pakxan	46	254	82	128	15	706
Lao PDR	AH11	Pakxan	Ban Lao	92	218	42	117	91	751
Lao PDR	AH11	Ban Lao	Thakhek	92	218	42	117	91	751
Lao PDR	AH11	Thakhek	Seno	19	69	33	52	3	0
Lao PDR	AH11	Seno	Muang Khongxedon	9	142	37	206	9	756
Lao PDR	AH11	Muang Khongxedon	Pakse	9	142	37	206	9	756
Lao PDR	AH11	Pakse	Veunkham (Border of Cambodia)	11	119	56	95	6	905
Lao PDR	AH12	Nateuy	Oudomxai	2	45	13	65	0	86
Lao PDR	AH12	Oudomxai	Pakmong	3	43	8	66	1	206
Lao PDR	AH12	Pakmong	Louang Phrabang	3	73	8	87	1	305
Lao PDR	AH12	Louang Phrabang	Phou Khoun	14	59	26	47	0	0
Lao PDR	AH12	Phou Khoun	Phon Hong	52	297	57	167	24	0
Lao PDR	AH12	Phon Hong	Vientiane	52	237	57	167	24	0

Table 2-8: Traffic Count Data from ASEAN Highway Database (continued)

Country	AH	From	To	Car	Pick-Up	Bus	Truck	Trailer	M'cycle
Lao PDR	AH12	Vientiane	Lao-Thai Bridge (Thanaleng - Border of Thailand)						
Lao PDR	AH13	Taichang (Border of Viet Nam)	Muang Khoua	0	1	2	9	1	0
Lao PDR	AH13	Muang Khoua	Oudomxai	2	42	12	15	1	0
Lao PDR	AH15	Keoneau (Border of Viet Nam)	Lak Sao	105	217	79	380	1	0
Lao PDR	AH15	Lak Sao	Ban Lao	144	302	105	411	0	0
Lao PDR	AH15	Thakhek	Border of Thailand (Thakhek)	0	0	0	0	0	0
Lao PDR	AH16	Dansavanh (Border of Viet Nam)	Muang Phin	6	57	13	80	20	853
Lao PDR	AH16	Muang Phin	Seno	5	79	16	94	20	1,576
Lao PDR	AH16	Seno	Savannakhet						
Lao PDR	AH16	Savannakhet	Border of Thailand (Savannakhet)						
Myanmar	AH1	Myawadi (Border of Thailand)	Kawkareik	30	0	30	28	0	24
Myanmar	AH1	Kawkareik	Paan	30	0	30	28	0	24
Myanmar	AH1	Paan	Thaton	60	0	50	66	0	24
Myanmar	AH1	Thaton	Kyaikhto	188	0	95	214	0	54
Myanmar	AH1	Kyaikhto	Payagyi	1,004	0	470	999	0	78
Myanmar	AH1	Payagyi	Bago						
Myanmar	AH1	Bago	Yangon	804	0	842	1,400	0	124
Myanmar	AH1	Payagyi	Nyaunglebin	1,650	0	853	2,782	0	165
Myanmar	AH1	Nyaunglebin	Toungoo	285	0	255	607	0	197
Myanmar	AH1	Toungoo	Pyinmana	502	0	73	466	0	33
Myanmar	AH1	Pyinmana	Pyawbwe	799	0	496	1,210	0	396
Myanmar	AH1	Pyawbwe	Meiktila						
Myanmar	AH1	Meiktila	Myittha (Yewun)	790	0	129	499	0	66
Myanmar	AH1	Myittha (Yewun)	Mandalay	790	0	129	499	0	66
Myanmar	AH1	Mandalay	Sagaing	1,038	0	889	202	0	469
Myanmar	AH1	Sagaing	Ondaw						
Myanmar	AH1	Ondaw	Chaung-U						
Myanmar	AH1	Chaung-U	Pale						
Myanmar	AH1	Pale	Gangaw						
Myanmar	AH1	Gangaw	Kalemyo	18	0	23	40	0	19
Myanmar	AH1	Kalemyo	Tamu (Border of India)	54	0	15	67	0	12
Myanmar	AH2	Tachilek (Border of Thailand)	Kyaing Tong						
Myanmar	AH2	Kyaing Tong	Takaw						
Myanmar	AH2	Takaw	Loilem						
Myanmar	AH2	Loilem	Taunggyi	20	0	28	65	0	22
Myanmar	AH2	Taunggyi	Kalaw						
Myanmar	AH2	Kalaw	Meiktila	148	0	204	395	0	112

Table 2-8: Traffic Count Data from ASEAN Highway Database (continued)

Country	AH	From	To	Car	Pick-Up	Bus	Truck	Trailer	M'cycle
Myanmar	AH3	Mongla (Border of China)	Kyaing Tong						
Myanmar	AH14	Muse (Border of China)	Hsenwi	67	439	19	100	0	30
Myanmar	AH14	Hsenwi	Lashio	58	384	11	89	0	30
Myanmar	AH14	Lashio	Kyaykme	397	234	48	210	0	40
Myanmar	AH14	Kyaykme	Pyin U Lwin	399	231	49	212	0	30
Myanmar	AH14	Pyin U Lwin	Mandalay	329	522	139	278	0	50
Thailand	AH1	Ban Khlong Luek (Border of Cambodia)	Aranyaprathet	6,354	1,029	1,291	755	668	1,995
Thailand	AH1	Aranyaprathet	Sa Kaeo	6,354	1,029	1,291	755	668	1,995
Thailand	AH1	Sa Kaeo	Kabinburi	5,106	1,815	645	690	922	935
Thailand	AH1	Kabinburi	Prachinburi (Jct.R33/R320)	5,370	1,329	863	772	685	2,270
Thailand	AH1	Prachinburi (Jct.R33/R320)	Nakhonnayok	4,733	3,185	1,300	1,259	1,847	1,981
Thailand	AH1	Nakhonnayok	Jct. Hin Kong	2,936	1,205	1,768	1,175	2,117	1,704
Thailand	AH1	Jct. Hin Kong	Bangkok North (Bang Pa-in Intetchange)	88,710	12,780	30,419	13,334	6,091	3,097
Thailand	AH1	Bangkok North (Bang Pa-in Intetchange)	Angthong	43,662	9,201	15,858	10,546	7,364	4,156
Thailand	AH1	Angthong	Sing Buri	10,654	8,353	2,770	1,583	3,151	586
Thailand	AH1	Sing Buri	Chai Nat	13,718	2,988	1,877	1,545	4,427	498
Thailand	AH1	Chai Nat	Nakhon Sawan	9,630	13,609	2,310	1,838	3,773	1,020
Thailand	AH1	Nakhon Sawan	Jct. Khanu Woralaksaburi	5,976	9,166	699	1,195	2,059	1,505
Thailand	AH1	Jct. Khanu Woralaksaburi	Jct. Khlong Khlung	3,816	6,726	823	1,020	2,001	1,551
Thailand	AH1	Jct. Khlong Khlung	Kampheng Phet	3,203	4,730	636	839	1,736	624
Thailand	AH1	Kampheng Phet	Tak (Jct. R1/R105)	7,904	3,734	764	1,808	2,142	1,489
Thailand	AH1	Tak (Jct. R1/R105)	Mae Sot	2,239	6,447	849	946	869	673
Thailand	AH1	Mae Sot	Tak-Myanmar Friendship Bridge (Border of Myanmar)	990	2,742	238	360	286	1,356
Thailand	AH2	Chang Lon (Border of Malaysia)	Sa Dao	3,160	2,894	753	269	970	3,517
Thailand	AH2	Sa Dao	Jct.R4/R42 (B.Khlong Nga)	4,355	4,808	1,150	631	1,485	4,447
Thailand	AH2	Jct.R4/R42 (B.Khlong Nga)	Hat Yai (Jct. B.Kho Hong)	13,549	10,404	3,040	1,183	1,554	6,734
Thailand	AH2	Hat Yai (Jct. B.Kho Hong)	Jct. R4/R406 (B. Khu-Ha)	3,127	4,572	954	829	1,218	1,837
Thailand	AH2	Jct. R4/R406 (B. Khu-Ha)	Phatthalung	15,953	6,475	2,834	5,142	5,261	4,151
Thailand	AH2	Phatthalung	Thungsong	6,946	2,382	1,995	1,892	1,525	2,137
Thailand	AH2	Thungsong	Waing Sa	5,717	3,606	1,252	1,068	2,735	2,926
Thailand	AH2	Waing Sa	Jct. R41/R401	5,300	4,379	278	2,011	3,422	1,226
Thailand	AH2	Jct. R41/R401	Chai-ya (Jct. R41/R4011)	7,492	5,019	464	2,992	4,732	521
Thailand	AH2	Chai-ya (Jct. R41/R4011)	Lah-Mae (Jct. R41/R4112)	6,740	1,434	785	1,070	3,500	685
Thailand	AH2	Lah-Mae (Jct. R41/R4112)	Chumphon	7,058	12,964	923	2,548	5,506	0

Table 2-8: Traffic Count Data from ASEAN Highway Database (continued)

Country	AH	From	To	Car	Pick-Up	Bus	Truck	Trailer	M'cycle
Thailand	AH2	Chumphon	Tha Sae	9,396	2,544	909	2,060	2,392	0
Thailand	AH2	Tha Sae	Bang Saphan Noi	4,808	4,823	212	1,531	2,557	0
Thailand	AH2	Bang Saphan Noi	Prachuapkhirikhan	9,961	3,167	538	2,799	2,734	0
Thailand	AH2	Prachuapkhirikhan	Pranburi	2,654	16,426	775	1,884	3,654	3,629
Thailand	AH2	Pranburi	Chah-Am	680	727	973	819	614	407
Thailand	AH2	Chah-Am	Phetchaburi	12,133	7,986	5,161	4,060	3,301	2,973
Thailand	AH2	Phetchaburi	Pak Tho (Jct. R4/R35)	16,050	6,923	3,096	3,633	6,019	3,812
Thailand	AH2	Pak Tho (Jct. R4/R35)	Nakhon Pathom	40,080	16,324	31,743	13,635	6,019	3,812
Thailand	AH2	Nakhon Pathom (Jct. R4/R323)	Bangkok West (Chim Pli Interchange Jct. R9/R338)	216,386	37,802	62,684	25,238	20,035	17,740
Thailand	AH2	Bangkok West (Chim Pli Interchange Jct. R9/R338)	Bangkok North (Bang Pa-in Intetchange)	70,815	19,980	13,269	10,082	17,442	10,218
Thailand	AH2	Tak (Jct. R1/R105)	Thoen	6,973	2,839	2,215	1,669	1,838	1,300
Thailand	AH2	Thoen	Lampang	4,475	3,687	629	744	1,773	2,732
Thailand	AH2	Lampang	Ngao	1,070	1,258	330	253	290	1,282
Thailand	AH2	Ngao	Phayao	3,509	9,969	792	736	736	6,107
Thailand	AH2	Phayao	Chiang Rai	8,376	14,474	1,133	913	540	850
Thailand	AH2	Chiang Rai	Mae Sai (Border of Myanmar)	10,519	9,978	2,840	2,090	1,383	6,570
Thailand	AH3	Border of Lao PDR (Chiang Khong)	Chiang Khong						
Thailand	AH3	Chiang Khong	Jct. R1152/R1020 (B. Tatalat)	814	1,961	141	410	249	1,863
Thailand	AH3	Jct. R1152/R1020 (B. Tatalat)	Jct. R1020/R1152 (B. Huadoi)	2,086	3,160	259	394	361	2,673
Thailand	AH3	Jct. R1020/R1152 (B. Huadoi)	Chiang Rai (Jct. R1/R1020)	1,731	3,735	254	429	199	2,452
Thailand	AH12	Thai-Lao Friendship Bridge (Border of Lao PDR)	Jct. R2/Bridge Access Road	647	1,491	21	141	212	2,600
Thailand	AH12	Nongkhai	Jct. R2/Bridge Access Road	2,364	5,604	479	1,975	489	2,959
Thailand	AH12	Jct. R2/Bridge Access Road	Jct. Ban Phue	2,364	5,604	479	1,975	489	2,959
Thailand	AH12	Jct. Ban Phue	Udonthani	15,547	2,178	1,878	1,230	1,626	4,150
Thailand	AH12	Udonthani	Nam Phong	9,476	5,571	2,261	1,219	1,202	2,268
Thailand	AH12	Nam Phong	Khonkaen	21,570	14,329	16,672	9,662	7,149	15,522
Thailand	AH12	Khonkaen	Banphai	28,029	17,082	4,744	4,338	5,519	10,743
Thailand	AH12	Banphai	Phon	7,048	2,481	1,125	1,213	1,684	848
Thailand	AH12	Phon	Pimai	2,656	8,237	968	1,425	2,301	507
Thailand	AH12	Pimai	Nakhonrachasima	3,441	11,501	943	1,694	2,756	937
Thailand	AH12	Nakhonrachasima	Sikhui	7,314	10,908	2,337	1,821	3,441	887
Thailand	AH12	Sikhui	Muaklek	9,874	14,419	3,344	2,905	4,219	982
Thailand	AH12	Muaklek	Saraburi	11,067	8,189	2,883	4,861	5,322	2,430
Thailand	AH12	Saraburi	Jct. Hinkong	19,243	5,123	4,795	4,186	9,514	1,430
Thailand	AH15	Border of Lao PDR (Nakhonphanom)	Nakhonphanom						
Thailand	AH15	Nakhon Phanom	Jct. R22/R223 (B.That Na Weng)	2,328	4,183	845	803	330	2,818

Table 2-8: Traffic Count Data from ASEAN Highway Database (continued)

Country	AH	From	To	Car	Pick-Up	Bus	Truck	Trailer	M'cycle
Thailand	AH15	Jct. R22/R223 (B. That Na Weng)	Phangkhon	1,425	2,467	379	314	191	1,118
Thailand	AH15	Phangkhon	Sawang Dan Din	744	2,998	219	347	243	2,188
Thailand	AH15	Sawang Dan Din	Udonthani	89	307	27	48	62	1,605
Thailand	AH16	Border of Lao PDR (Mukudahan)	Mukudahan						
Thailand	AH16	Mukudahan	Nong Sung	6,292	624	941	197	192	3,832
Thailand	AH16	Nong Sung	Som Det	1,766	671	564	457	299	1,060
Thailand	AH16	Som Det	Kalasin	5,126	1,942	407	427	170	3,209
Thailand	AH16	Kalasin	Yang Ta Lat	3,543	2,887	814	615	722	1,502
Thailand	AH16	Yang Ta Lat	Khonkaen	10,356	9,137	5,021	3,279	1,358	8,250
Thailand	AH16	Khonkaen	Jct. Nam Nao	26,789	20,136	7,509	4,688	1,358	25,516
Thailand	AH16	Jct. Nam Nao	Jct.R12/R21 (Lom Sak)	853	2,196	221	194	227	1,791
Thailand	AH16	Jct.R12/R21 (Lom Sak)	Ban Yaeng	1,385	3,184	546	340	227	1,308
Thailand	AH16	Ban Yaeng	Wang Thong	1,832	756	617	287	112	0
Thailand	AH16	Wang Thong	Phitsanulok	4,969	6,122	1,650	859	714	0
Thailand	AH16	Phitsanulok	Sukhothai	2,530	3,612	675	1,092	839	1,725
Thailand	AH16	Sukhothai	Tak (Jct. R1/R105)	3,195	3,199	554	418	289	721
Thailand	AH18	Sungai Kolok (Border of Malaysia)	Tak Bai	1,448	88	173	285	421	2,835
Thailand	AH18	Tak Bai	Narathiwat	1,482	100	121	260	366	2,120
Thailand	AH18	Narathiwat	Saiburi	1,215	381	109	297	323	1,935
Thailand	AH18	Saiburi	Jct. R42/R4061 (B. Pa Lat)	2,720	1,299	320	392	405	1,854
Thailand	AH18	Jct. R42/R4061 (B. Pa Lat)	Bypass Pattani	6,794	2,440	1,160	532	946	5,976
Thailand	AH18	Bypass Pattani	Nong Chik (Jct. R43/R42)	953	473	290	304	307	398
Thailand	AH18	Nong Chik (Jct. R43/R42)	The Pa (Jct. R43/R4085)	5,310	1,438	1,035	780	1,074	1,232
Thailand	AH18	The Pa (Jct. R43/R4085)	Cha Na	6,706	1,547	1,307	752	875	528
Thailand	AH18	Cha Na	Hat Yai (Jct. R43/R4-B. Pru)	6,306	3,571	842	922	1,312	1,268
Thailand	AH19	Nakhon Ratchasima	Pak Thong Chai	4,144	5,278	816	725	757	1,937
Thailand	AH19	Pak Thong Chai	Kabin Buri	3,625	1,454	590	1,198	1,460	1,077
Thailand	AH19	Kabin Buri	Plaeng Yao	6,355	2,344	1,139	1,799	2,913	1,437
Thailand	AH19	Plaeng Yao	Jct. R331/R344	3,115	599	304	630	1,054	734
Thailand	AH19	Jct. R331/R344	Jct. R331/R3241	3,303	1,751	214	678	1,621	0
Thailand	AH19	Jct. R331/R3241	Jct. R7						
Thailand	AH19	Jct. R7	Leam Chabang	21,788	7,434	4,926	5,217	6,853	3,077
Thailand	AH19	Jct. R7	Chonburi	17,541	6,600	733	4,097	5,606	248
Thailand	AH19	Chonburi	Bangkok East (Outer Ring Road Jct. R7/R9)	9,511	5,454	819	1,937	1,849	56
Thailand	AH19	Bangkok East (Outer Ring Road Jct. R7/R9)	Bangkok North (Bang Pa-in Intetchange)	19,776	15,511	3,009	5,250	0	1,482
Viet Nam	AH1	Huu Nghi (Border of China)	Lang Son	143	0	318	480	0	585

Table 2-8: Traffic Count Data from ASEAN Highway Database (continued)

Country	AH	From	To	Car	Pick-Up	Bus	Truck	Trailer	M'cycle
Viet Nam	AH1	Lang Son	Bac Giang	342	0	616	844	0	990
Viet Nam	AH1	Bac Giang	Bac Ninh	650	0	866	1,236	0	5,253
Viet Nam	AH1	Bac Ninh	Hanoi	7,591	0	2,500	2,945	0	129,951
Viet Nam	AH1	Hanoi	Phu Ly	1,114	126	646	1,720	0	3,819
Viet Nam	AH1	Phu Ly	Ninh Binh						
Viet Nam	AH1	Ninh Binh	Thanh Hoa	500	59	345	1,067	0	981
Viet Nam	AH1	Thanh Hoa	Dien Chau						
Viet Nam	AH1	Dien Chau	Vinh	514	0	466	977	0	0
Viet Nam	AH1	Vinh	South of Vinh (Vot)						
Viet Nam	AH1	South of Vinh (Vot)	Ha Tinh	316	0	272	760	0	0
Viet Nam	AH1	Ha Tinh	Dong Hoi						
Viet Nam	AH1	Dong Hoi	Dong Ha	192	0	308	521	0	0
Viet Nam	AH1	Dong Ha	Hue	337	0	493	1,054	0	0
Viet Nam	AH1	Hue	Da Nang	282	0	268	835	0	0
Viet Nam	AH1	Da Nang	West of Hoi An						
Viet Nam	AH1	West of Hoian	Tam Ky	590	0	703	695	0	0
Viet Nam	AH1	Tam Ky	Quang Ngai						
Viet Nam	AH1	Quang Ngai	An Nhon	430	0	605	483	0	0
Viet Nam	AH1	An Nhon	Tuy Hoa	702	0	743	1,643	0	0
Viet Nam	AH1	Tuy Hoa	Ninh Hoa						
Viet Nam	AH1	Ninh Hoa	Nha Trang	195	0	538	828	0	0
Viet Nam	AH1	Nha Trang	Phan Rang	264	0	447	466	0	0
Viet Nam	AH1	Phan Rang	Phan Thiet	620	0	487	397	0	0
Viet Nam	AH1	Phan Thiet	Song Phan	1,066	0	818	842	0	0
Viet Nam	AH1	Song Phan	Xuan Loc						
Viet Nam	AH1	Xuan Loc	Bien Hoa	2,172	0	928	836	0	0
Viet Nam	AH1	Bien Hoa	Ho Cni Minh	12,108	0	5,166	3,442	0	0
Viet Nam	AH1	Ho Chi Minh	Cu Chi						
Viet Nam	AH1	Cu Chi	Go Dau Ha						
Viet Nam	AH1	Go Dau Ha	Moc Bai (Border of Cambodia)						
Viet Nam	AH13	Hanoi	Ha Dong	2,263	90	422	1,131	0	19,589
Viet Nam	AH13	Ha Dong	Xuan Mai						
Viet Nam	AH13	Xuan Mai	Hoa Binh	236	26	93	551	0	1,402
Viet Nam	AH13	Hoa Binh	Moc Chau						
Viet Nam	AH13	Moc Chau	Son La						
Viet Nam	AH13	Son La	Tuan Giao	50	1	48	111	0	228
Viet Nam	AH13	Tuan Giao	Dien Bien						
Viet Nam	AH13	Dien Bien	Tay Trang (Border of Lao PDR)						
Viet Nam	AH14	Hai Phong	Hai Duong	1,077	123	435	2,901	0	747

Table 2-8: Traffic Count Data from ASEAN Highway Database (continued)

Country	AH	From	To	Car	Pick-Up	Bus	Truck	Trailer	M'cycle
Viet Nam	AH14	Hai Duong	Hanoi	1,620	146	843	2,879	0	1,445
Viet Nam	AH14	Hanoi	Phuc Yen	974	0	1,192	2,718	0	3,536
Viet Nam	AH14	Phuc Yen	Viet Tri						
Viet Nam	AH14	Viet Tri	Doan Hung	615	0	604	2,068	0	1,075
Viet Nam	AH14	Doan Hung	Lao Cai (Border of China)	87	0	84	183	0	921
Viet Nam	AH15	South of Vinh (Vot)	Linh Can	20	0	8	144	0	0
Viet Nam	AH15	Linh Can	Cau Treo (Border of Lao PDR)	20	0	6	144	0	0
Viet Nam	AH16	Dong Ha	Lao Bao (Border of Lao PDR)	21	0	5	64	0	689
Viet Nam	AH17	West of Hoian	Dai Loc						
Viet Nam	AH17	Dai Loc	Giang	188	0	45	675	0	0
Viet Nam	AH17	Giang	Dak To	75	0	15	131	0	0
Viet Nam	AH17	Dak To	Kon Tum						
Viet Nam	AH17	Kon Tum	Play Cu						
Viet Nam	AH17	Play Cu	Buon Ma Thuot						
Viet Nam	AH17	Buon Ma Thuot	Dak Nong						
Viet Nam	AH17	Dak Nong	Dong Xoai						
Viet Nam	AH17	Dong Xoai	Chon Thanh						
Viet Nam	AH17	Chon Thanh	Thu Dau Mot						
Viet Nam	AH17	Thu Dau Mot	Ho Chi Minh						
Viet Nam	AH17	Bien Hua	Vung Tau	1,290	0	3,848	5,131	0	21,805

2. Rail Subsector

53. Observed rail data were obtained from a wide number of sources.

54. Table 2-9 summarizes these rail flows, in terms of annual passengers and tonnes by link. Note that these were not ultimately the modelled units. In some instances, data were generated sections without formal names, typically where a "counts" had to be estimated, as in PRC; hence the repetition of names.

55. Appendix 2 describes these procedures, assumptions, and the ultimate use of these data in more detail.

Table 2-9: Observed Rail Subsector Flows

Country	From	To	Two-Way?	Tonnes p.a.	Pax p.a.
Viet Nam	Lao Cai	Lang Giang	No	720,766	312,176
Viet Nam	Lang Giang	Lao Cai	No	348,898	312,176
Viet Nam	Lang Giang	Yen Bai	No	1,526,280	567,179
Viet Nam	Yen Bai	Lang Giang	No	381,768	567,179
Viet Nam	Yen Bai	Viet Tri	No	1,778,944	801,014
Viet Nam	Viet Tri	Yen Bai	No	480,774	801,014
Viet Nam	Viet Tri	Dong Anh	No	1,414,205	856,802
Viet Nam	Dong Anh	Viet Tri	No	805,911	856,802
Viet Nam	Dong Anh	Yen Vien	No	1,319,951	843,151
Viet Nam	Yen Vien	Dong Anh	No	1,324,308	843,151
Viet Nam	Yen Vien	Gia Lam	No	1,340,545	999,042
Viet Nam	Gia Lam	Yen Vien	No	1,317,575	999,042
Viet Nam	Gia Lam	Hanoi	No	824,128	1,211,709
Viet Nam	Hanoi	Gia Lam	No	814,623	1,211,709
Viet Nam	Quan Trieu	Dong Anh	No	202,369	81,110
Viet Nam	Dong Anh	Quan Trieu	No	401,173	81,110
Viet Nam	Bang Tuong	Dong Mo	No	249,496	59,745
Viet Nam	Dong Mo	Bang Tuong	No	135,837	59,745
Viet Nam	Dong Mo	Kep	No	333,849	53,216
Viet Nam	Kep	Dong Mo	No	28,910	53,216
Viet Nam	Bac Giang	Yen Vien	No	450,280	252,233
Viet Nam	Yen Vien	Bac Giang	No	205,141	252,233
Viet Nam	Co Thanh	Chi Linh	No	0	0
Viet Nam	Chi Linh	Co Thanh	No	956,004	0
Viet Nam	Hai Phong	Gia Lam	No	607,898	514,358
Viet Nam	Gia Lam	Hai Phong	No	642,749	514,358
Viet Nam	Nam Dinh	Hanoi	No	1,176,590	1,054,434
Viet Nam	Hanoi	Nam Dinh	No	657,402	1,054,434
Viet Nam	Thanh Hoa	Nam Dinh	No	957,192	1,149,392
Viet Nam	Nam Dinh	Thanh Hoa	No	767,892	1,149,392
Viet Nam	Vinh	Thanh Hoa	No	694,628	1,124,861
Viet Nam	Thanh Hoa	Vinh	No	953,628	1,124,861
Viet Nam	Dong Hoi	Vinh	No	709,677	1,024,166
Viet Nam	Vinh	Dong Hoi	No	811,059	1,024,166
Viet Nam	Hue	Dong Hoi	No	664,926	1,068,282
Viet Nam	Dong Hoi	Hue	No	664,530	1,068,282
Viet Nam	Da Nang	Hue	No	624,531	1,121,300
Viet Nam	Hue	Da Nang	No	596,018	1,121,300
Viet Nam	Quang Ngai	Da Nang	No	658,986	1,038,212
Viet Nam	Da Nang	Quang Ngai	No	379,788	1,038,212
Viet Nam	Dieu Tri	Quang Ngai	No	600,770	1,077,580
Viet Nam	Quang Ngai	Dieu Tri	No	324,741	1,077,580

Table 2-9: Observed Rail Subsector Flows (continued)

Country	From	To	Two-Way?	Tonnes p.a.	Pax p.a.
Viet Nam	Nha Trang	Dieu Tri	No	542,158	1,101,715
Viet Nam	Dieu Tri	Nha Trang	No	284,742	1,11,715
Viet Nam	Thap Cham	Nha Trang	No	502,952	1,156,514
Viet Nam	Nha Trang	Thap Cham	No	270,089	1,156,514
Viet Nam	Muong Man	Thap Cham	No	469,290	1,152,360
Viet Nam	Thap Cham	Muong Man	No	248,704	1,152,360
Viet Nam	Sai Gon	Muong Man	No	403,153	1,748,026
Viet Nam	Muong Man	Sai Gon	No	220,190	1,748,026
Thailand	Hat Yai	Phattalung	Yes	224,763	2,494,445
Thailand	Phattalung	Ron Phibun	Yes	261,523	2,351,347
Thailand	Nakhon Si Thammarat	Ron Phibun	Yes	80,872	1,628,924
Thailand	Trang	Thung Song	Yes	14,913	446,402
Thailand	Thung Song	Wiang Sa	Yes	318,421	3,460,567
Thailand	Surat Thani	Chumphon	Yes	342,785	4,304,934
Thailand	Chumphon	Prachuap Khiri Khan	Yes	360,653	4,824,313
Thailand	Prachuap Khiri Khan	Phetchaburi	Yes	377,195	5,297,231
Thailand	Pak Tho	Nakhon Pathom	Yes	403,500	7,028,316
Thailand	Kanchanaburi	Nakhon Pathom	Yes	108,283	285,458
Thailand	Nakhon Pathom	Bangkok	Yes	478,780	7,312,672
Thailand	Sattahip	Chon Buri	Yes	3,932,738	46,963
Thailand	Chon Buri	Chachoengsao	Yes	6,940,125	73,039
Thailand	Sa Kaeo	Kabin Buri	Yes	925,350	457,114
Thailand	Chachoengsao	Bangkok	Yes	9,253,500	3,032,165
Thailand	Bangkok	(rail junction)	Yes	4,542,000	11,947,819
Thailand	Udon Rathchatani	Si Saket	Yes	146,845	1,947,700
Thailand	Si Saket	Surin	Yes	396,126	3,284,958
Thailand	Surin	Buriram	Yes	564,618	4,320,027
Thailand	Buriram	Nakhon Ratchasima	Yes	771,017	5,067,761
Thailand	Nong Khai	Udon Thani	Yes	32,671	441,363
Thailand	Udon Thani	Khon Kaen	Yes	121,222	1,567,283
Thailand	Khon Kaen	Bua Yar	Yes	193,748	1,996,895
Thailand	Saraburi	rail jn	Yes	1,696,313	7,448,577
Thailand	Lamphun	Lampang	Yes	282,495	1,053,462
Thailand	Lampang	Den Chai	Yes	424,547	1,363,403
Thailand	Den Chai	Phitsanulok	Yes	980,190	2,624,234
Thailand	Nakhon Sawan	Lop Buri	Yes	2,437,000	4,444,305
Thailand	Lop Buri	(rail junction)	Yes	2,794,052	4,918,953
Thailand	Phra Nakhon Si Ayuttahya	(rail junction)	Yes	4,126,160	11,419,853
			Yes		
Myanmar	Yangon - Mandalay		Yes	670,632	8,689,980
Myanmar	Amarapura - Myitkina		Yes	147,313	4,308,810
Myanmar	Naungpattaya - Mawlamyaine		Yes	44,375	1,539,682
Myanmar	Kyimyindaine - Pyay		Yes	15,010	3,996,136
Myanmar	Langwa - Katha		Yes	0	192,045
Myanmar	Ngalontin - Tawgyangyi		Yes	0	75,656
Myanmar	Kaunghmudaw - Budalin		Yes	7,071	817,912
Myanmar	Sagaing-Monywa		Yes	7,071	893,543
Myanmar	Tonbo - Lashio		Yes	60,127	366,881
Myanmar	Tada-U - Sanpya		Yes	0	375,585
Myanmar	Tawma - Myingyan		Yes	1,000	740,411
Myanmar	Hlaingdet - Shwenyaung - Yaksauk		Yes	130,474	353,593
Myanmar	Inwon - Loikaw		Yes	0	142,589
Myanmar	Taunggyi - Banyin		Yes	0	156,742

Table 2-9: Observed Rail Subsector Flows (continued)

Country	From	To	Two-Way?	Tonnes p.a.	Pax p.a.
Myanmar	Pyudwin - Dlangyun		Yes	20,953	403,762
Myanmar	Nyaungwaing - Tharrawaw		Yes	0	740,694
Myanmar	Mawlamyaine South - Ye		Yes	4,950	901,002
Myanmar	Tavoy - Yephyu		Yes	0	74,356
Myanmar	Henzada - Pathein		Yes	4,938	915,734
Myanmar	Tagwa - Kyangin		Yes	23,517	666,299
Myanmar	Kalay - Gangaw		Yes	0	906,410
Myanmar	Saka - Pagan		Yes	637,822	302,456
Myanmar	Obauk - Kyeni		Yes	11,000	1,180,397
Cambodia	Battambang	Sisophon	Yes	227,598	
Cambodia	Tuek Phos	Pursat	Yes	455,195	
Cambodia	spur to	Phnom Penh	Yes	757,664	
Cambodia	Angkor Chey	Doun Kaev	Yes	302,469	
Cambodia	Sihanoukville	Prey Nob	Yes	302,469	
PRC	Dali	Chuxiong	Yes	11,844,668	1,803,801
PRC	Chuxiong	Chuxiong	Yes	15,710,427	2,135,643
PRC	Chuxiong	Sichuan	Yes	3,266,990	1,219,049
PRC	Chuxiong	Chuxiong	Yes	18,671,307	3,294,993
PRC	Kunming	Kunming	Yes	11,039,910	662,477
PRC	Kunming	Kunming	Yes	27,802,082	3,727,117
PRC	Kunming	Honghe	Yes	7,209,882	0
PRC	Kunming	Kunming	Yes	47,787,363	4,891,829
PRC	Kunming	Kunming	Yes	4,187,393	408,554
PRC	Qujing	Qujing	Yes	1,759,458	271,737
PRC	Kunming	Kunming	Yes	42,912,373	4,415,067
PRC	Guizhou	Guizhou	Yes	51,714,814	6,021,033
PRC	Guizhou	Guizhou	Yes	8,648,531	1,513,494
PRC	Guizhou	Guizhou	Yes	8,751,173	1,530,837
PRC	Qujing	Qujing	Yes	3,749,765	915,704
PRC	Guizhou	Zhaotong	Yes	3,788,101	930,028
PRC	Zhaotong	Zhaotong	Yes	55,234	15,085
PRC	Bose	Bose	Yes	51,714,814	6,021,033
PRC	Bose	Bose	Yes	59,615,101	10,372,040
PRC	Chongzuo	Nanning	Yes	10,827,689	3,896,128
PRC	Nanning	Nanning	Yes	66,113,237	13,090,115
PRC	Nanning	Qinzhou	Yes	20,548,018	3,275,340
PRC	Qinzhou	Fengcheng	Yes	14,324,855	1,320,812
PRC	Qinzhou	Qinzhou	Yes	15,627,159	2,456,210
PRC	Qinzhou	Nanning	Yes	19,562,984	5,102,698
PRC	Nanning	Nanning	Yes	59,842,486	14,531,155
PRC	Nanning	Nanning	Yes	79,405,470	19,633,854
PRC	Nanning	Guigang	Yes	40,447,244	16,996,333
PRC	Guigang	Yulin	Yes	31,346,224	12,640,852
PRC	Yulin	Guangdong	Yes	9,915,976	3,700,119
PRC	Nanning	Laibing	Yes	76,342,417	20,070,552
PRC	Laibing	Liuzhou	Yes	72,460,664	18,815,633
PRC	Liuzhou	Liuzhou	Yes	35,347,176	7,905,492
PRC	Guilin	Hunan	Yes	722,105	246,198
PRC	Liuzhou	Liuzhou	Yes	18,798,924	8,092,200
PRC	Liuzhou	Liuzhou	Yes	5,888,545	2,220,548
PRC	Liuzhou	Hechi	Yes	13,354,446	6,190,399
PRC	Hechi	Guizhou	Yes	2,306,693	961,045
PRC	Hechi	Guizhou	Yes	111,017	79,687

3. Water Transport Subsector

56. Observed count data on the water transport subsector were scarce. Aside from data at two Mekong ports in Thailand and one customs post in Yunnan, PRC, domestic water transport data were only available in Cambodia, Myanmar, and Viet Nam. And in the case of Myanmar, only freight data were available.

57. These data on Cambodia, Myanmar, and Viet Nam are shown in Table 2-10.

Table 2-10: Observed Data on Water Transport Subsector

Country	At/From	To/Type	MT pa	Pax pa
Viet Nam	Yen Hung	(link flow)	11,114,761	1,111,476
Viet Nam	Duong Ha	(link flow)	11,377,415	1,137,742
Viet Nam	Son Tay	(link flow)	14,778,120	1,477,812
Viet Nam	Viet Tri	(link flow)	17,867,115	1,786,712
Viet Nam	Phu Nha	(link flow)	4,625,572	462,557
Viet Nam	Phuoc Dong	(link flow)	14,061,698	1,406,170
Viet Nam	Binh Duc	(link flow)	14,935,764	1,493,576
Viet Nam	Lap Vo	(link flow)	9,809,923	980,992
Viet Nam	Cao Lanh	(link flow)	8,224,545	822,455
Viet Nam	Hanoi	(port throughput)	1,261,700	126,170
Viet Nam	Viet Tri	(port throughput)	431,000	43,100
Viet Nam	Dap Cau	(port throughput)	150,000	15,000
Viet Nam	Hoa Binh	(port throughput)	150,000	15,000
Viet Nam	Ninh Binh	(port throughput)	1,300,000	130,000
Viet Nam	Nam Dinh	(port throughput)	157,000	15,700
Viet Nam	My Tho	(port throughput)	150,000	15,000
Viet Nam	Vinh Long	(port throughput)	303,000	30,300
Viet Nam	Long Xuyen	(port throughput)	605,500	60,550
Viet Nam	Binh Tri	(port throughput)	2,815,000	281,500
Myanmar	Bhamo	Loadings	9,000	
Myanmar	Katha	Loadings	18,000	
Myanmar	Thabeikkyin	Loadings	0	
Myanmar	Kyaukmyaung	Loadings	6,000	
Myanmar	Mandalay	Loadings	89,000	
Myanmar	Sagaing	Loadings	6,000	
Myanmar	Mawlaik	Loadings	0	
Myanmar	Kalewa	Loadings	9,000	
Myanmar	Monywa	Loadings	45,000	
Myanmar	Myingyan	Loadings	6,000	
Myanmar	Pakokku	Loadings	67,000	
Myanmar	Nyaung-U	Loadings	3,000	
Myanmar	Kyunchaung	Loadings	18,000	
Myanmar	Chauk	Loadings	50,000	
Myanmar	Sinbyugyun	Loadings	13,000	
Myanmar	Yenangyaung	Loadings	4,000	
Myanmar	Minbu	Loadings	0	
Myanmar	Magwe	Loadings	2,000	
Myanmar	Minhla	Loadings	7,000	
Myanmar	Myayde	Loadings	4,000	
Myanmar	Thayet	Loadings	176,000	
Myanmar	Pyay	Loadings	32,000	
Myanmar	Myanaung	Loadings	132,000	
Myanmar	Hinthada	Loadings	11,000	
Myanmar	Danubyu	Loadings	7,000	
Myanmar	Nyaungdone	Loadings	13,000	

Table 2-10: Observed Data on Water Transport Subsector (continued)

Country	At/From	To/Type	MT pa	Pax pa
Myanmar	Einme	Loadings	52,000	
Myanmar	Myaungmya	Loadings	90,000	
Myanmar	Pathein	Loadings	77,000	
Myanmar	Ngathainggaung	Loadings	6,000	
Myanmar	Yangon - ALL	Loadings	136,000	
Myanmar	Bhamo	Unloading	23,000	
Myanmar	Katha	Unloading	16,000	
Myanmar	Thabeikkyin	Unloading	4,000	
Myanmar	Kyaukmyaung	Unloading	1,000	
Myanmar	Mandalay	Unloading	158,000	
Myanmar	Sagaing	Unloading	2,000	
Myanmar	Mawlaik	Unloading	2,000	
Myanmar	Kalewa	Unloading	9,000	
Myanmar	Monywa	Unloading	23,000	
Myanmar	Myingyan	Unloading	1,000	
Myanmar	Pakokku	Unloading	65,000	
Myanmar	Nyaung-U	Unloading	5,000	
Myanmar	Kyunchaung	Unloading	0	
Myanmar	Chauk	Unloading	56,000	
Myanmar	Sinbyugyun	Unloading	16,000	
Myanmar	Yenangyaung	Unloading	1,000	
Myanmar	Minbu	Unloading	9,000	
Myanmar	Magwe	Unloading	12,000	
Myanmar	Minhla	Unloading	1,000	
Myanmar	Myayde	Unloading	20,000	
Myanmar	Thayet	Unloading	5,000	
Myanmar	Pyay	Unloading	11,000	
Myanmar	Myanaung	Unloading	45,000	
Myanmar	Hinthada	Unloading	23,000	
Myanmar	Danubyu	Unloading	7,000	
Myanmar	Nyaungdone	Unloading	23,000	
Myanmar	Einme	Unloading	10,000	
Myanmar	Myaungmya	Unloading	61,000	
Myanmar	Pathein	Unloading	17,000	
Myanmar	Ngathainggaung	Unloading	1,000	
Myanmar	Yangon	Unloading	548,000	
Cambodia	Kampong Chhnang	Siem Reap	228,528	114,264
Cambodia	Phnom Penh	Kampong Chhnang	571,320	285,660
Cambodia	Phnom Penh	Kratie	152,352	76,176
Cambodia	Kratie	Stung Treng	38,088	19,044
Cambodia	Phnom Penh	Chau Doc (Mekong)	28,566	14,283
Cambodia	Phnom Penh	Chau Doc (Bassac)	14,283	7,142

CHAPTER III: CONSTRAINTS ON GMS TRANSPORT FLOWS

III. CONSTRAINTS ON GMS TRANSPORT FLOWS

A. Introduction

1. This chapter addresses constraints on passenger (Section B) and freight (Section C) flows in the GMS. A number of constraints affect both passenger and freight flows and accordingly Section C incorporates by reference various of the constraints discussed in Section B.

B. Passenger[1]

1. Introduction

2. In the following sections, background and existing conditions as well as constraints on development to 2015 are discussed with respect to passenger transport: road (section 2), railway (section 3), inland waterway (section 4), maritime (section 5), and air (section 6).[2] The focus is on cross-border (i.e., international) transport as the GMS Transport Strategy is to address the integration of the region's transport system as opposed to the study of six isolated national transport systems.

2. Cross-Border Road Passenger Transport

a) Background and Existing Conditions

3. Cross-border road passenger transport in the GMS includes: (i) bus transport and (ii) the border crossing of noncommercial (i.e., private) vehicles.

4. **Cross-border bus services**[3] in the GMS currently include the routes (some of which are unofficial) and service frequencies in parentheses shown in Box 3-1.

5. There are no cross-border bus routes involving Myanmar at present, and there is scope for further bus routes involving other countries.

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[1] This section has been extracted from Working Paper 7 on Strategy Considerations for Passenger Transport from the July 2005 Interim Report, and suitably updated.

[2] Intermodal passenger transport is considered where relevant in the discussion of passenger transport by mode; e.g., combined flight-cruise packages may be considered under maritime sea passenger transport. It is recognized that passenger intermodality – a policy and planning principle that aims to provide a passenger using different modes of transport in a combined trip chain with a seamless journey - has received increased attention in the European Union (EU), but generally the kind of interventions considered in the EU are not and will not be applicable in the GMS during the 2006-2015 planning horizon. See, e.g., Babtie spol., Langzaam Verkeer, and ETT, *Analysis of the Key Issues for Passenger Intermodality, July 2004; Analysis of the National Inventories on Passenger Intermodality, October 2004; and Recommendations for Advancing Passenger Intermodality in the EU*, December 2004 [all reports prepared for the European Commission, DG Energy and Transport].

[3] The symbolic importance of cross-border bus services has been illustrated dramatically in another subregion, with the opening of a Kashmir bus link between India and Pakistan. See, e.g., John Lancaster, "Kashmir Bus Link Boosts Hope", Washington Post Foreign Service, 8 April 2008, http://www.washingtonpost.com/wp-dyn/articles/A35839-2005Apr7.html ["Amid threats of violence and tears of joy, India and Pakistan kicked off a historic bus service Thursday across the divided Himalayan province of Kashmir, reuniting relatives who had not seen each other for decades and boosting hopes for a lasting peace between the nuclear-armed rivals".]

Box 3-1: Bus Routes and Frequencies

Cambodia-Thailand

Phnom Penh-Bangkok (variable)

Cambodia-Viet Nam

Phnom Penh-Ho Chi Minh City (variable)

PRC-Lao PDR

Mengla-Louang Namtha (once every two days)
Jinghong-Muang Xai (three times per week)
Mengla-Phongsali (once every two days)
Mengxing-Mengman (twice per day)
Mengla-Vientiane (twice per week)

PRC-Viet Nam

Nanning-Halong City (twice per day)

Lao PDR-Thailand

Vientiane-Nong Khai (four times per day)
Vientiane-Udon Thani (four times per day)
Vientiane-Bangkok (variable)

Lao PDR-Viet Nam

Vientiane-Hanoi (one per day)
Louang Prabang-Hanoi (variable)

6. Cross-border bus frequencies change from time to time depending on demand and currently vary from twice a **week** between Vientiane, Lao PDR and Mengla, PRC to four times per **day** between Vientiane, Lao PDR and Nong Khai and Udon Thani, Thailand.

7. Fares are relatively low, typically of the order of US$0.02-0.04 per passenger-km, e.g., 142 RMB between Vientiane and Mengla (738 km), 30 baht between Vientiane and Nong Khai (about 25 km), US$9 between Phnom Penh and Ho Chi Minh City (about 240 km). Since load factors are also often low (e.g., only 24% at the start of the Vientiane-Udon Thani service in April 2004, although this had increased to 63% by December 2004), and border crossing charges are sometimes excessive, some cross-border bus operators have experienced financial difficulty.

8. **Cross-border passenger transport by noncommercial (private) vehicles** has traditionally been limited in the GMS, due to constraints related to vehicles, people, infrastructure, and other factors, which are set out in the following subsection.

9. **Road traffic safety** is particular concern, for passenger as well as freight transport, domestically and cross-border. Table 3-1 presents data on the deaths, injuries, and losses from road traffic accidents in GMS countries in 2003; annual losses from road traffic accidents amount to 2.1-3.2% of GDP in the subregion.

Table 3-1: Road Traffic Accident Data in GMS Countries, 2003

Country	Official Deaths	Official Injuries	Estimated Deaths	Estimated Injuries	Annual Losses (US$ m)	Percentage of GDP
Cambodia	824	645	1,017	20,340	116	3.2%
PRC	104,372	494,174	100,000+	NA	NA	NA
Lao PDR	415	6,231	415	6,231	47	2.7%
Myanmar	1,308	9,299	1,308	9,299	200	3.0%
Thailand	13,116	69,313	13,116	1,529,034	3,000	2.1%
Viet Nam	11,319	20,400	13,186	30,999	885	2.5%

Source: Data for the five GMS countries that are members of ASEAN (i.e., all but the PRC) are from ASEAN Region Road Safety and Action Plan, 2005-2010, Final Draft, produced as a component of the ADB/ASEAN Regional Road Safety Program, 26 November 2004, p. 59. Data for the PRC are countrywide and are from CPCS Transcom in association with Meyrick and Associates and China Academy of Transportation Sciences, Policy Reform in Road Transport, TA 4351-PRC, Inception Report, March 2005, p. 11; estimated injuries were not available (NA) from this source and the estimate of annual losses (3.4 billion yuan or US$410 million seemed too low in relation to the PRC's GDP, which was US$1,414,000 million in 2003 according to http://www.worldbank.org/data/databytopic/GDP.pdf (a similar number is found at http://www.chinaconsulate.org.nz/eng/xwdt/t112575.htm). Official data used here for all countries are police data.

b) Constraints on Development of Cross-Border Road Passenger Transport in the GMS Toward 2015

10. Constraints on cross-border road passenger transport in the GMS have traditionally included:

(i) limited mutual recognition of vehicle registration and roadworthiness certificates;
(ii) inconsistent vehicle technical standards and specifications;
(iii) inconsistent traffic rules and signage;
(iv) limited mutual recognition of driving licenses (between the PRC and the other GMS countries, which are members of ASEAN)[1];
(v) limited mutual recognition of third-party liability insurance;
(vi) restrictive regimes for the temporary importation of vehicles;
(vii) requirements related to passports, visas, and border passes;
(viii) health controls;
(ix) regulations concerning personal effects and currency;
(x) absence of format standardization of road signs and traffic signals;
(xi) inadequate border crossing facilities;[2] and

[1] ASEAN addressed this issue to a large extent with the Agreement on the Recognition of Domestic Driving Licenses Issued by ASEAN Countries, Kuala Lumpur, 9 July 1985.
[2] The GMS Tourism Sector Strategy TA found that:
(i) current land border crossing facilities and related processing and management of tourists in the GMS is of low standard, generally unsuited to the needs of high-yielding tourists and the management of fast-growing tourism markets, and do not support the development of GMS priority tourism routes and markets;
(ii) access, tourist information, signage, food and beverage, transit accommodation, shopping, money exchange, toilets, and other facilities are absent, insufficient, or of poor quality;
(iii) key border crossing points need to be fully opened for tourism in order to develop tourist destinations and routes essential for poverty alleviation;

(xii) discriminatory national laws and regulations.[1]

11. These constraints are to be addressed by GMS Cross-Border Transport Agreement (CBTA)[2] and its annexes/protocols. Table 3-2 summarizes the content of the GMS CBTA.

12. Of particular relevance is Annex 5 on the Cross-Border Movement of People; Table 3-3 lists the contents of this Annex.

13. The status of the CBTA and its annexes/protocols as of this writing is as follows:

(i) The CBTA entered into force, legally, on 31 December 2003, having been signed and ratified by all six GMS countries.
(ii) The GMS countries have signed 16 of the 20 Annexes and Protocols to the Agreement. Final drafts of the remaining four annexes and protocols were agreed at Vientiane on 3 November 2005. It is expected that these remaining annexes and protocols will be signed at the second meeting of the GMS Joint Committee, to be held in the PRC during the first half of 2006.
(iii) A memorandum of understanding (MOU) for initial implementation of the CBTA at Dansavanh-Lao Bao on the Lao PDR-Viet Nam border was signed on 25 March 2005, with commencement of implementation on 30 June 2005. Full MOUs for initial implementation were signed on 4 July 2005 for Mukdahan-Savannakhet on the Thailand-Lao PDR border and for Poipet-Aranyaprathet on the Cambodia-Thailand border. In addition, full MOUs have been finalized (although not yet signed) for Mae Sot-Myawaddy on the Thailand-Myanmar border, and for Hekou-Lao Cai on the PRC-Viet Nam border. Also, a one-page MOU was signed on 4 July 2005 for Bavet-Moc Bai on the Cambodia-Viet Nam border.
(iv) Additional implementation MOUs are required, e.g., for Mohan-Boten on the Lao PDR-PRC border, Houayxay-Chiang Khong (on the Lao PDR-Thailand border), Cham Yeam-Hat Lek on the Cambodia-Thailand border, Thanaleng-Nong Khai on the Lao PDR-Thailand border, and Ruili-Muse on the PRC-Myanmar border.[3]

(iv) the current situation of border crossing facilities reflects poorly on the image of the GMS as a world-class tourism destination and impedes the development of tourism; and
(v) the marketing of the GMS as a single destination needs to be supported by first-class border facilities and services.

Asia Pacific Projects, *Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Draft Report, Annex Volume*, 7 March 2005, pp. 131-33.

[1] See PADECO Co., Ltd., *T.A. No. 5749-REG: Cross-Border Movement of Goods and People in the Greater Mekong Subregion, Appendixes*, prepared for the Asian Development Bank, September 1998, Appendix D.

[2] *Agreement Between and Among the Governments of the Lao People's Democratic Republic, the Kingdom of Thailand, and the Socialist Republic of Viet Nam for the Facilitation of Cross-Border Transport of Goods and People*, originally signed at Vientiane, Lao People's Democratic Republic on 26 November 1999, amended at Yangon, Myanmar on 29 November 2001, acceded to by the Kingdom of Cambodia at Yangon, Myanmar on 29 November 2001, acceded to by the People's Republic of China (PRC) at Phnom Penh, Cambodia on 3 November 2002, acceded to by the Union of Myanmar at Dali, PRC on 29 September 2003, and amended at Phnom Penh, Cambodia on 30 April 2004.

[3] At the Ninth Meeting of the GMS Subregional Transport Forum held in Beijing, PRC on 1-2 June 2005, it was remarked that the use of bilateral MOUs for the initial implementation of the CBTA might impede implementation of the wider agreement. It was explained, however, that such MOUs are only a means to jumpstart the process, so that initial implementation can pave the way for full implementation.

Table 3-2: Contents of the GMS Cross-Border Transport Agreement

Main Agreement	
Preamble	
Part I:	General Provisions
Part II:	Facilitation of Frontier Crossing Formalities
Part III:	Cross-Border Movement of People
Part IV:	Cross-Border Transport of Goods
Part V:	Requirements for the Admittance of Road Vehicles
Part VI:	Exchange of Commercial Traffic Rights
Part VII:	Infrastructure
Part VIII:	Institutional Framework
Part IX:	Miscellaneous Provisions
Part X:	Final Provisions
Annexes and Protocols	
Annex 1:	Carriage of Dangerous Goods
Annex 2:	Registration of Vehicles in International Traffic
Annex 3:	Carriage of Perishable Goods
Annex 4:	Facilitation of Frontier Crossing Formalities
Annex 5:	Cross-Border Movement of People
Annex 6:	Transit and Inland Clearance Customs Regime
Annex 7:	Road Traffic Regulation and Signage
Annex 8:	Temporary Importation of Motor Vehicles
Annex 9:	Criteria for Licensing of Transport Operators for Cross-Border Transport Operations
Annex 10:	Conditions of Transport
Annex 11:	Road and Bridge Design Standards
Annex 12:	Border Crossing and Transit Facilities and Services
Annex 13a:	Multimodal Carrier Liability Regime
Annex 13b:	Criteria for Licensing of Multimodal Transport Operators for Cross-Border Transport Operations
Annex 14:	Container Customs Regime
Annex 15:	Commodity Classification System
Annex 16:	Criteria for Driving Licenses
Protocol 1:	Designation of Corridors, Routes, and Points of Entry and Exit (Border Crossings)
Protocol 2:	Charges Concerning Transit Traffic
Protocol 3:	Frequency and Capacity of Services and Issuance of Quotas and Permits

Table 3-3: Contents of Annex 5 on the Cross-Border Movement of People

Preamble	
Part I:	General Provisions
Article 1:	Definitions
Part II:	Immigration (Entry/Exit), Health, and Customs Control
Article 2:	Valid Travel Documents and Visas
Article 3:	Health Inspection of People
Article 4:	Customs Control of Personal Effects: Duty-Free Allowance
Article 5:	Sanitary Inspection of Personal Effects
Part III:	Facilitation Measures
Article 6:	Facilitation Measures
Part IV:	Passenger Transport Conditions
Article 7:	Transport Pricing
Article 8:	Accompanied Luggage Allowance and Excess Luggage Charges
Article 9:	Unaccompanied Luggage
Part IV:	Passenger Road Carrier Liability Regime
Article 10:	Scope of Application
Article 11:	The Contract of Carriage
Article 12:	Principles of Carrier Liability
Article 13:	Subject of Carrier Liability
Article 14:	Measure of Compensation and Limitation of Carrier Liability
Article 15:	Exoneration of Carrier Liability
Article 16:	Lifting of the Exoneration or Limitation of Carrier Liability
Article 17:	Claims and Actions
Article 18:	Compulsory Passenger Carrier Liability Insurance
Part VI:	Final Provisions
Article 19:	Amendment
Article 20:	Ratification or Acceptance
Article 21:	Entry into Force
Article 22:	Conforming National Law
Article 23:	Reservations
Article 24:	Suspension of the Annex
Article 25:	Relationship with the Agreement
Article 26:	Dispute Settlement
Article 27:	Denunciation

14. However, implementation of the GMS CBTA and its annexes and protocols remains a major task, and some constraints will remain to be addressed[1] even after full implementation.

15. Finally, as noted, road traffic accidents present a significant constraint on transport in the GMS, for passenger as well as freight transport, domestically and cross-border.

3. Cross-Border Railway Passenger Transport

a) Background and Existing Conditions

16. At present, the only cross-border railway passenger service within the GMS connects Beijing and Guangxi Zhuang Autonomous Region, PRC, with Lang Son Province and Hanoi, Viet Nam, which has been operating over the last ten years, with a current frequency of twice per week. The service takes about 33 hours with a fare of about US$260 equivalent for soft sleeper tickets. Cross-border railway passenger traffic is of the order of a few thousand per year (only) on the route. A railway service between Yunnan Province, PRC, and Lao Cai Province, Viet Nam, was discontinued a few years ago due to poor line quality; traffic was of the order of about 1,000 per year before discontinuation of the service.[2]

17. A useful basis for understanding the current subregional railway network in terms of cross-border traffic, present and potential, is the Feasibility Study for the Singapore-Kunming Rail Link undertaken by ASEAN and completed in November 2000. Figure 3-1 summarizes the designated study routes by country.

18. In terms of “software,” at present there are two bilateral railway agreements in the GMS (a March 1992 agreement between the PRC and Viet Nam,[3] and an April 1997 agreement between Lao PDR and Thailand),[4] which like interchange agreements between railways in Europe, North America, and elsewhere, provide for through movement of coaches and wagons, with locomotives changed at border stations. The arrangement between the PRC and Viet Nam continues an arrangement that has been in place for about 50 years. Since technical details are covered in separate protocols, the agreement is quite brief. Because both countries are long-time members of OSZhD (the Committee for the Organization for Cooperation between Railways, based in Warsaw), arrangements for common ticketing and other commercial aspects are

[1] According to a draft ADB TA paper, key challenges for effective implementation of the CBTA include: (i) establishment of efficient management systems and associated capacity building; (ii) streamlining and harmonization of border control documents; (iii) preparation of revised manuals of operation at the border checkpoints and associated training; (iv) establishment of required infrastructure, and in some cases, relocation and/or modification of layouts of border checkpoints as well as provision of common control areas to allow single-stop inspection and single-window inspection; and (v) mitigation of negative externalities associated with increased cross-border movement.

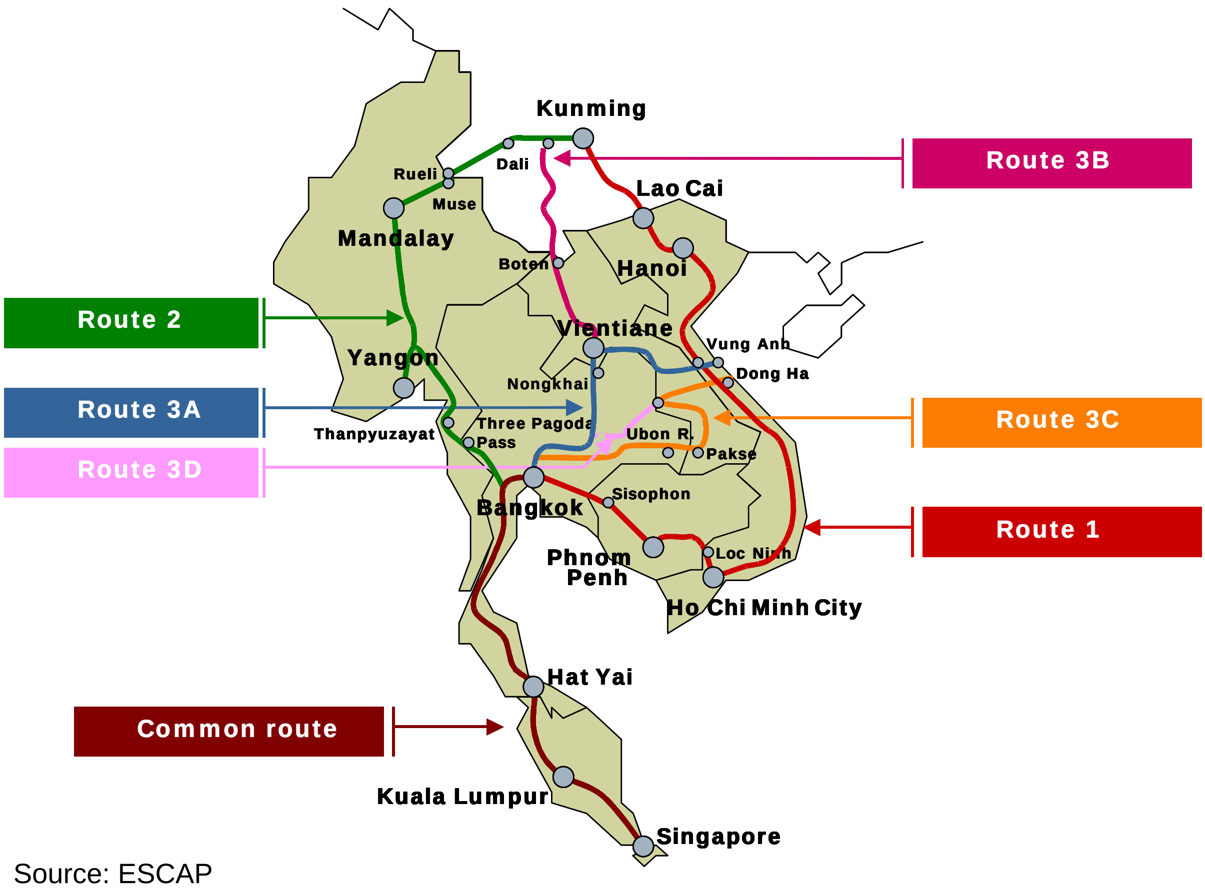
[2] See, e.g., Japan International Cooperation Agency, *The Study on the National Transport Development Strategy in the Socialist Republic of Vietnam (VITRANSS), Technical Report No. 10, Rural Transport and Cross Border Transport*, July 2000, p. II-2-5.

[3] Agreement on Border Railway Transport between the Ministry of Transport Telecommunication and Post, Socialist Republic of Viet Nam, and Ministry of Railways, People’s Republic of China, Beijing, 8 March 1992. It may have been updated in recent years.

[4] The Agreement on Joint Traffic Working over the Government of Lao People’s Democratic Republic and Kingdom of Thailand, 4 April 1997.

covered by reference to the terms of the OSZhD[1] Agreement.[2] The Lao PDR-Thailand agreement, on the other hand, in the absence of a railway operating entity in Lao PDR or of other precedents,[3] covers exchange of wagons, issuance of through tickets, and so on.

Figure 3-1: Singapore-Kunming Railway Routes



Source: ESCAP

19. Protocol 6 of the ASEAN Framework Agreement on the Facilitation of Goods in Transit covers Railway Border and Interchange Stations but it has not yet been signed.[4] Topics covered in the draft include obligations, designated railway border and interchange stations, type and quantity of rolling stock and inspection of rolling stock, basic operational arrangements, and institutional provisions.

20. The GMS CBTA does not currently cover cross-border railway transport, although the consultants' original draft included a Part VII covering Particulars on Rail

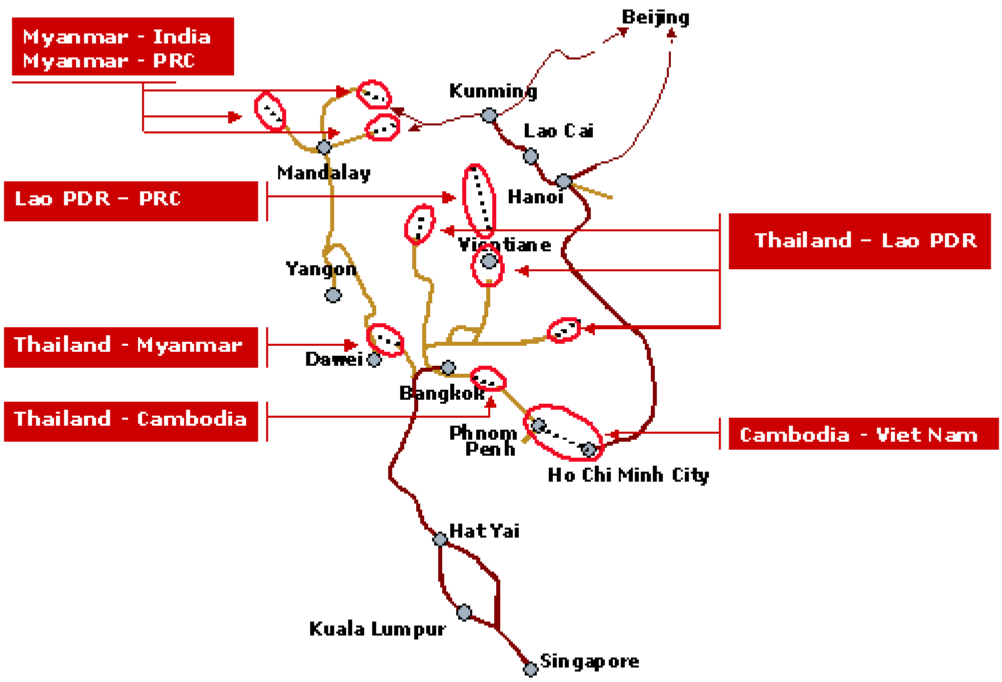
[1] Sometimes also referred to in English as the OSJD or OSShD Agreement.
[2] Under the PRC-Viet Nam bilateral railway agreement, Lao Cai station in Viet Nam acts as the border station for the trains of both railway systems, while on the Nanning-Hanoi line, the common border station is at Dong Dang. PRC rolling stock is permitted to move into Viet Nam, but a change of locomotives and rivers is required beforehand.
[3] Except for an interchange agreement between Thailand and Malaysia, which has been in operation for more than 75 years.
[4] No such Protocol is attached to the (draft) ASEAN Framework Agreement on the Facilitation of Inter-State Transport.

Transport,[1] including an article on cooperation between railways (with an associated protocol) and an article part addressing rail liability regime (with an associated annex).

b) Constraints on Development of Cross-Border Railway Passenger Transport in the GMS Toward 2015

21. The critical constraint on the development of cross-border railway transport in the GMS relates to hardware or infrastructure, with a number of missing links, as shown in Figure 3-2. As indicated by the Feasibility Study for the Singapore-Kunming Rail Link and by this study, passenger traffic is forecast to be relatively light and insufficient to attract commercial investment due to the low incomes of the catchment population and the long travel times. Demand for cross-border travel involving Cambodia, the PRC, Lao PDR, Myanmar, and Viet Nam is expected to be low in the period from 2006-2015, i.e., the time horizon of the current study. The construction of new links is not expected to result in much additional cross-border rail travel, except for some commuter traffic over shorter distances, between Cambodia and Thailand, and between Cambodia and Viet Nam. Even over the 30-year time horizon of the Feasibility Study for the Singapore-Kunming Rail Link (to 2035), the volume of passenger travel generated by the study routes is expected to be low in relation to total passenger traffic carried by existing national railways operating in the region.

Figure 3-2: Singapore - Kunming Railway Missing Links



Source: ESCAP

[1] The current GMS CBTA was originally formulated in 1998 as a Draft Framework to Facilitate the Cross-Border Movement of Goods and People in the GMS, which included a part on railways. However, in late 1998 this draft framework was streamlined to form the basis of a trilateral agreement between and among Lao PDR, Thailand, and Viet Nam; since cross-border railways were not at the time applicable to these three countries, the part of the draft framework on railways was deleted in the streamlined agreement. Later this trilateral agreement became a GMS-wide agreement (the GMS CBTA) with accession by Cambodia (November 2001), the PRC (November 2002), and Myanmar (September 2003).

22. To the extent that railways are to be developed in the GMS - and construction on one new railway line, that between Nong Khai, Thailand and Vientiane, Lao PDR, is expected to commence soon - existing bilateral agreements may be updated and improved, or the GMS CBTA amended to cover cross-border railway transport.

4. Cross-Border Inland Waterway Passenger Transport

a) Background and Existing Conditions

23. The Lancang-Mekong River[1] is the potentially most significant artery for cross-border inland water transport in the GMS.[2] Navigation on the river may be divided into two major segments: (i) an upper segment, suitable for only inland navigation, from the PRC port of Simao to Kompong Cham in Cambodia (although there is no through traffic between Cambodia and Lao PDR because of the impassable Khone Falls in southern Lao PDR), and from Kompong Chnnang to the Great [Tonlé Sap] Lake in Cambodia; and (ii) a lower segment, suitable both for inland and maritime navigation, from Kompong Cham to the sea and from Kampong Chnnang to the sea via the Mekong, Bassac, and Tonlé Sap rivers. There is an immediate need for improvements of navigational facilities to improve passenger safety, as well as to help promote six major tourism zones along the Mekong River identified by the GMS Tourism Sector Strategy Study.

24. Cross-border passenger transport along the Lancang-Mekong River is rather limited at present, although there is a well-developed domestic passenger transport system in the Mekong delta and domestic passenger travel along the river is of some importance in Lao PDR. Available passenger statistics are shown in Table 3-4. There are some notable services that have been initiated by private operators such as a tourist passenger boat service between Siem Reap and Ho Chi Minh City.[3] The Mekong River Commission (MRC)[4] has concluded that passenger traffic data on the Lancang-Mekong River is insufficient and accordingly have called for systematic collection of this data.

Table 3-4: Passenger Transport Flows along the Lancang-Mekong River

Section	Annual Passengers (m)	Annual Passenger-Km
PRC-southern points-PRC	0.02 (2004)	NA
Lao PDR, domestic	1.8 (2000)	72.8 (2000)
Thailand-Lao PDR-Thailand	0.2 (2001)	0.4 (2001)
Cambodia	0.3 (2001)	54.3 (2001)
Viet Nam (Mekong Delta)	86.0 (2001)	1,291.1 (2001)

Source: Interviews conducted for this study and [Captain] Lieven Geerinck [Navigation Programme Manager, Mekong River Commission], Incorporation of Navigation into the Integrated Water Resources Development and Management Strategy, January 2005, p. 13.

[1] The name "Lancang-Mekong" has been used to refer to the river in its entirety or in the upper reaches, while the term "Mekong" alone has been used to refer to the lower portions of the river.
[2] Cross-border passenger traffic on other international rivers in the GMS (e.g., the Red River) is not expected to be significant in the period to 2015.
[3] See, e.g., http://www.unescap.org/ttdw/Publications/TPTS_pubs/Pub_1821/Pub_1821_Seg4.pdf.
[4] The MRC is the leading repository of data and expertise relating to the Mekong River, and as such, is uniquely positioned to lead implementation of initiatives/interventions relating to the inland waterway transport along the River.

25. While existing cross-border passengers flows along the Lancang-Mekong River have been small, there is potential for relatively large passenger flows. One MRC document cited possible traffic along the Upper Lancang-Mekong River corridor as 400,000-500,000 by 2010, while officials of the Yunnan Provincial Navigation Affairs Bureau have expectations of passenger traffic of 1 million passengers per year in the next 5-10 years.[1]

26. Regarding **software**, major active[2] legal instruments include:

(i) the Agreement on Commercial Navigation on Lancang-Mekong River among the Governments of the People's Republic of China, the Lao People's Democratic Republic, the Union of Myanmar and the Kingdom of Thailand [hereafter Upper Lancang-Mekong Commercial Navigation Agreement] (Tachileik,[3] Myanmar, 20 April 2000), which aims to open the Upper Lancang-Mekong basin for international navigation[4]; and
(ii) the Mekong River Commission Agreement on the Co-operation for the Sustainable Development for the Mekong River Basin [hereafter MRC Agreement], which covers Freedom of Navigation in its Article 9.[5]

With respect to the Lower Mekong, there is also a Cambodia-Viet Nam bilateral agreement on waterway transportation (Hanoi, 1998), which aims to establish navigation regulations based on the MRC Agreement (prescribing a transit route), but which it is understood has not been ratified by Cambodia.

b) Constraints on Development of Cross-Border Inland Waterway Transport in the GMS Toward 2015

27. With respect to the **hardware** (i.e., facilities and infrastructure), major constraints relate to traffic safety and efficiency, e.g., because navigation aids are in place only on a limited scale on some parts of the waterway, and some of these date to the Indochina period. River tourism development is in turn constrained by hardware deficiencies.

28. With respect to **software**, the GMS countries consider upstream issues to largely have been resolved by the first agreement listed above. Regarding the legal environment for the Lower Mekong River, while Article 9 of the MRC Agreement

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[1] Globally, river cruise are quite popular, e.g., on the Rhine, Donau, Po, Seine, Volga, Nile, Mississippi, Murray, and Yangtze (Changjiang) rivers.
[2] The Bangkok Convention between France and Siam (1926) and the Paris Convention among Cambodia, Laos, and Viet Nam (1954) may have theoretical applicability, but are largely unknown, exist only on paper, are not implemented in practice.
[3] Also spelled Tachilek.
[4] Key features are as follows: (i) there are no charges for specific services; (ii) designated ports are declared open for international traffic; (ii) there is a pilotage exemption; and (v) there are five common regulations and guidelines.
[5] Article 9 states that: "On the basis of equality of right, freedom of navigation shall be accorded throughout the mainstream of the Mekong River without regard to territorial boundaries, for transportation and communication to promote regional co-operation and to satisfactorily implement projects under this Agreement. The Mekong River shall be kept free from obstructions, measures, conduct and actions that might directly or indirectly impair navigability, interfere with this right or permanently make it more difficult. Navigational uses are not assured any priority over other uses, but will be incorporated in any mainstream project. Riparians may issue regulations for the portions of the Mekong River within their territories, particularly in sanitary, customs and immigration matters, police and general security." [emphasis added]

provides a mandate to promote and coordinate cross-border waterborne traffic, it is not sufficiently comprehensive or detailed to provide an operational framework to govern navigation. In fact, it is a step backward from the 1954 Paris Convention, which was at the time a model river navigation agreement. It is noteworthy, however, that the MRC will be executing Belgian-sponsored consulting services, which among other things, will strive to develop Article 9 into clear principles on free navigation and harmonized technical and operational rules in line with the regime of other international rivers. These services will also describe the tasks and roles for agencies drafting a bilateral Cambodia-Viet Nam navigation agreement, including coverage of the "maritime" stretch between the river ports of Cambodia and the sea.[1]

29. Even after the completion of the Belgian-sponsored consulting services, there will be gaps in the legal regime covering cross-border navigation on the Lancang-Mekong River, e.g., the need to prepare a draft framework or frameworks for maritime and inland navigation, including coverage of the stretch between Louang Prabang and the Khone Falls, taking due regard of the Upper Lancang-Mekong Commercial Navigation Agreement. In addition, the navigation regime could productively be integrated with the regime established by the GMS Cross-Border Transport Agreement (CBTA). Once new rules are established on an international basis, they will need to be incorporated into the national law of the riparian countries.

5. Cross-Border Maritime Passenger Transport (Cruise Shipping)

a) Background and Existing Conditions

30. This section relates to (sea) cruise shipping, a combination of the transport and tourism sectors that is potentially an important driver of economic development in the GMS. Cruise ships can be massive, e.g., a few times longer than a jumbo jet. In a sense, the cruise industry is supply-led as it "creates its own demand". Economic benefits include increased employment and tax revenues in homeports and/or ports of call, and secondary benefits through tourist consumption in local communities, followed by "knock-on" multiplier effects.[2]

31. The most significant sea cruise ports in the region, present and potential, include the following:

(i) Sihanoukville and Phnom Penh in Cambodia;
(ii) Beihai, Guangxi Zhuang Autonomous Region, PRC;
(iii) Yangon-Thilawa in Myanmar;
(iv) Phuket, Bangkok, Chon Buri (Laem Chabang), Ranong, Satune, and Narathiwas in Thailand; and
(v) Ho Chi Minh City, Da Nang, and Ha Long in Viet Nam.

32. The only dedicated cruise terminal in the GMS is at Chon Buri (Laem Chabang), which allows it to serve as a homeport (i.e., a starting and end point of a cruise tour, as opposed to a port of call, which does not need to develop exclusive infrastructure and facilities); Phuket is expected to serve such function in the future.

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[1] See, e.g., Mekong River Commission, *MRC Navigation Programme, Component 2, Legal Framework for Cross-Border Navigation*, December 2003.

[2] One study in Singapore (a homeport) found that considering indirect impacts, the cruise industry multiplier was 1.46, compared to 1.18 for air transport, 1.25 for water transport, 1.44 for restaurants, and 1.54 for hotels. See http://www.cybercruises.com/leeloongkoonspeech.htm.

33. Country-by-country issues with respect to cruise development in the GMS include the following:

(i) Cambodia: limited cruise traffic may not justify construction of an exclusive cruise terminal; Sihanoukville has limited tourism resources and Phnom Penh and Siem Reap are quite far from Sihanoukville; Phnom Penh is a river port, with associated constraints;
(ii) Myanmar: Yangon is a river port not a seaport; the Andaman Sea, with it unexploited marine resources, offers great cruise potential;
(iii) Thailand: lack of a dedicated cruise terminal, apart from Chon Buri (Laem Chabang); after opening of the New Bangkok International Airport, greater opportunity to market fly-cruise packages using Chon Buri (Laem Chabang); customs-immigration-quarantine (CIQ) services not located at the ports; and
(iv) Viet Nam: strategic location between regional cruise hub ports of Hong Kong, China, and Singapore; tourist attractions are spread along the country's long coastline; but no dedicated cruise shipping facility at present.

34. Indications are that cruise ship passenger traffic in the GMS may have decreased in recent years, due to SARS (Severe Acute Respiratory Syndrome) and other factors. For example, Phuket, the busiest cruise port in the GMS, had 455 calls by cruise ships in 1995, 138 calls in 1999, but only 81 in 2003; however, the passenger volume per ship has increased significantly. Cruise passengers per year in Viet Nam were 403,464 in 2001, 228,209 in 2002, 132,241 in 2003, and 120,343 in 2004; two PRC ships (one 400-passenger ship and one 1,000-passenger ship), which accounted for a considerable amount of passengers, were taken out of service, causing a collapse in the cruise market from Beihai and other PRC cities to Ha Long Bay, Viet Nam. To date, the number of cruise ships calls and passengers has been relatively insignificant in Cambodia and Myanmar. For example, Myanmar, averaged about 3,000 sea cruise passengers per year between 1998 and 2004. One study estimated passenger spending around US$150 per day for each sailing guest, although the actual figure may be lower in the GMS. An ASEAN study estimated that one job (i.e., person-year of employment) is created for every 100 cruise passengers.

35. In terms of institutions, the ASEAN Cruise Working Group established under the ASEAN Senior Transport Officials Meeting and supported by the Government of Japan, has taken a leading role, with respect to the ASEAN countries, which include all GMS countries except the PRC. Such regional cooperation is vital since a seamless cruise experience promotes customer satisfaction and hence the success of the industry.

b) Constraints on Development of Cross-Border Maritime Passenger Transport in the GMS Toward 2015

36. There are a number of constraints on the development of sea cruise shipping in the GMS:

(i) Status of cruise infrastructure, both "soft" and "hard", including CIQ handling capacity, fresh water and fuel supplies, drainage and waste disposal systems, access to inland tourist sites, safety and rescue facilities, as well as the basic quality of port and harbor facilities: Most GMS cruise ports cannot receive large cruise ships, and passenger facilities are limited or nonexistent. General ports accord priority to cargo ships over cruise ships at mixed-use berths. Some ports, such as Yangon and Bangkok, are river ports with restricted nighttime navigation and long waiting times for tidal change. CIQ procedures tend to be ad hoc and case-by-case. More liberalized arrangements on a region-wide

basis could be adopted for cruise ships and passengers, such as on-board immigration clearance, issuance of visas on arrival, and simplified CIQ procedures.

(ii) Regulations prohibiting cabotage, even though there are very few domestic cruise operations in the region: As the ASEAN Cruise Development study noted, very little is being protected under such circumstances. Alternatives may be sought, e.g., issuance of special permits to foreign operators organizing irregular domestic cruises, free operation when a foreign operator sells cruise tours abroad.

(iii) Need for calm seas: This may be an issue during monsoon seasons, e.g., from May to September in the Andaman Sea.

(iv) Need to ensure passenger safety and security, particularly in view of the prevalence of sea piracy in the region:[1] While there have been no instances of attacks on cruise ships in the GMS or elsewhere in the (ASEAN) region, partly due to the safeguards on board and the high deck structure of cruise ships, the risk still needs to addressed, given the catastrophic consequences of even one incident.

(v) Need to preserve the marine environment, e.g., through facilities to handle wastewater and oil residues at ports and harbors, strict penalties for violators including suspension of cruise licenses: The need is particularly great in environmentally sensitive areas, such as the UNESCO World Heritage Site in Ha Long Bay.

6. Cross-Border Air Passenger Transport

a) Background and Existing Conditions

37. As noted in the 1993-94 GMS Subregional Transport Sector Study, air transport can play an important role in the economic development of the GMS. Air services linking the six countries with each other and with the rest of the world are necessary for two reasons (i) to allow business and professional persons to link with trading partners and with sources of capital and technology; and (ii) to facilitate (high-value) tourism, an important source of foreign exchange.

38. Air passenger growth in the Asia-Pacific region in general, and the GMS in particular, exceeds that of the world. Indicative airline passenger traffic growth rates in the GMS are summarized in Table 3-5. Rapid growth in tourism arrivals is a major driver of the growth in air traffic in the GMS. Table 3-6 shows total nonstop, round-trips international flights between GMS city pairs as of June 2005.

[1] See, e.g., “Combating Piracy and Armed Robbery at Sea, Charting the Future in Asia Pacific Waters”, Bangkok, 24-25 March 2001; the Tokyo Appeal aims at implementing measures to address the threat of sea piracy.

Table 3-5: Air Passenger Transport Volumes and Growth Rates at Selected GMS Locations (Indicative)[1]

Country	Location	Traffic ('000)	Annual Growth Rate
Cambodia	Phnom Penh Siem Reap	1,000 (2002) 580 (2002)	6.3% (1995-2002) 61.8% (1995-2002)
PRC	Kunming Jinghong Guangxi (province-wide)	9,800 (2004)[2] 951 (2004) 4,920 (2004)	15.3% (2001-04) 5.7% (2002-03) [3] 9.1% (1991-2004)
Lao PDR	Vientiane Louang Prabang	400 (2002) 99 (2002)	7.7% (1990-2002) -0.1% (1998-2002)
Myanmar	Yangon	548 (2003)[4]	16.7% (1988-2003)
Thailand	Bangkok Bangkok (GMS passengers only) Chiang Mai (GMS passengers only)	37,960 (2004) 2,501 (2004) 60 (2004)	8.6% (2002-2004) 4.6% (1999-2004) 2.8% (1999-2004)
Viet Nam	Hanoi Ho Chi Minh City Da Nang Other Airports	1,898 (2004) 2,397 (2004) 793 (2004) 1,051 (2004)	10.7 (1998-2004) 10.6 (1998-2004) 11.3 (1998-2004) 10.6 (1998-2004)

Notes: [1] Based on available data.
[2] 2004 data based from interview.
[3] Statistic affected by SARS.
[4] International traffic only.

Source: GMS governments

Table 3-6: Nonstop, Round-Trip International Flights between GMS City Pairs (June 2005)

	Bangkok	Chiang Mai	Da Nang	Guilin	Hanoi	Ho Chi Minh City	Jing-hong	Kunming	Louang Prabang	Mandalay	Phnom Penh	Siem Reap	Vientiane	Yangon
Bangkok	NA	NA	3	4	24	36		12	9		69	42	14	49
Chiang Mai	NA	NA		-	-	-	3	2	6	1	-	-	-	2
Da Nang	3	-	NA	-	NA	NA	-	-	-	-	-	3	-	-
Guilin	4	-	-	NA	-	-	-	NA	-	-	-	-	-	-
Hanoi	24	-	NA	-	NA	NA	-	3	-	-	-	33	10	
Ho Chi Minh City	36	-	NA	-	NA	NA	-	3	-	-	21	34	-	-
Jinghong	-	3	-	NA	-	-	NA	NA	-	-	-	-	-	-
Kunming	12	2		NA	3	3		NA		4		2	4	3
Louang Prabang	9	6	-	-	-	-	-	-	NA	-	-	-	NA	-
Mandalay	-	1	-	-	-	-	-	4	-	NA	-	-	-	NA
Phnom Penh	69	-	-	-	-	21	-	-	-	-	NA	NA	7	-
Siem Reap	42	-	3	-	33	34	-	2	-	-	NA	NA	-	-
Vientiane	14	-	-	-	10	-	-	4	NA	-	7	-	NA	-
Yangon	49	2	-	-	-	-	-	3	-	NA	-	-	-	NA

Note: NA = not applicable (for the same city or city pairs in the same country)
Source: Official Airline Guides, Asia Pacific, OAG [Official Airline Guide] Executive Flight Guide, June 2005.

39. Major **hardware** developments in this environment of rapid air traffic passenger growth include the following:

(i) Bangkok, already the largest air transport hub in the GMS, is aiming to serve as the air transport hub for all of Southeast Asia with the opening of the Second Bangkok International Airport (Suvarnabhumi Airport)[1] in 2006, with capacity to accommodate 45+ million passengers per year. All operations will shift from the existing airport to the new airport.

(ii) Already faced with saturation at its existing site 6.6 km from downtown Kunming,[2] China's Civil Aviation Administration and the Planning Commission of Yunnan Province have plans for the construction of a new international airport, to be completed by 2010.

(iii) Guangxi Zhuang Autonmous Region has plans to improve Nanning International Airport by extending the runway from 2,700 m to 3,200 m and building an additional 25,000 m^2 terminal (doubling current terminal capacity), by 2008. Similarly, Guangxi plans to improve Guilin International Airport by extending the current runway from 2,800 m to 3,200 m and expanding the existing 50,300 m^2 terminal by 30,000 m^2.

(iv) Société Concessionnaire de l'Aéroport (SCA), the manager of Phnom Penh and Siem Reap International Airports in Cambodia, has continuing plans for improvements of the two airports. At Phnom Penh's Pochentong Airport, the 2003-2007 capital expenditure program includes runway lengthening and expansion, expansion of the apron and warehouse facilities, and modernization of the airport operating equipment. At Siem Reap, the program includes major repairs of the runway and taxiway, extension of the taxiway and aprons, construction of a new terminal building with a capacity of 1.4 million passengers per year, modernization of the airport operational equipment, and construction of a new airport warehouse.

(v) Thailand has provided a concessionary loan to improve Vientiane (Wattay) Airport so that it can accommodate a B747 with 86% load factor by widening the shoulder (to provide runway width of 60 m including shoulders compared to the present 45 m), by November 2005, and to improve Pakse Airport in southern Lao PDR to serve A320 and B737 aircraft.[3]

(vi) While runway length at Yangon International Airport currently limits use of the facility to B767-300-600R operations, the runway is currently being extended from 2,430 m to 3,400 m, the apron from 540 m x 180 m to 730 m x 180 m, and the international airport terminal expanded to accommodate 2.7 million passengers per year, with completion of all components expected by August 2006.

(vii) Hanoi's Noi Bai Airport is being expanded to accommodate up to 21.5 million passengers per year by 2015. A new terminal and related facilities, for international traffic, are under construction at Tan Son Nhat Airport, with a JPY 22.7 billion loan from JBIC, giving a total capacity of 16 million

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[1] The New Bangkok International Airport Project, Project A4, was set out in the 1993-94 *GMS Subregional Transport Sector Study*. See PADECO Co., Ltd., *Regional Technical Assistance on Promoting Subregional Cooperation among Cambodia, the People's Republic of China, Lao PDR, Myanmar, Thailand, and Viet Nam – Subregional Transport Sector Study*, prepared for the Asian Development Bank, October 2004, pp. D-37-D-43 [called the Second Bangkok International Airport Project at that time].

[2] Further expansion of airport capacity at the urban site of the existing airport would result in substantial relocation impacts.

[3] Improvement of Pakse Airport is Project 2-8 in Infrastructure Development Institute – Japan, *Future Assistance for the Infrastructure Sector of the Mekong (Recommendations)*, November 2004, p. 29.

passengers by 2006. A new terminal is to open at Da Nang by 2006-2007, providing a capacity of 4 million passengers per year.

(viii) Joint use of Savannakhet Airport by Thailand and Lao PDR has been under discussion.

(ix) The ADB-sponsored GMS Tourism Project is financing airport improvement projects at Rattanak Kiri and Stung Treng in northeastern Cambodia (resurfacing and extension of the runway, a new taxiway and apron, and a new passenger terminal) and at Louang Namtha Airport in northern Lao PDR (repairing and extension of the runway and construction of a passenger terminal).

40. On the **software** side,[1] major developments include the following:

(i) Traditionally, the GMS countries have relied heavily on bilateral air services agreements (ASAs), which constitute the dominant form of airline regulation:

(a) Cambodia has 20+ ASAs and has granted fifth freedom rights to Viet Nam for the Ho Chi Minh City-Phnom Penh route.

(b) The PRC has almost 100 ASAs with countries all over the world including ASAs with its GMS partner countries.

(c) Lao PDR has 14 ASAs (although 6 are inactive); its ASAs with Cambodia and Viet Nam are flexible, with Phnom Penh-Vientiane service operated as a fifth freedom service by Vietnam Airlines.

(d) Myanmar has 45 ASAs, although most are inactive; Myanmar grants some fifth freedom rights,[2] e.g., in its ASA with Thailand, revised in early 2004, the designated airlines of each party are entitled to exercise fifth freedom rights via any two intermediate and/or beyond points on their respective routes up to seven weekly services per point. Thailand and the PRC both have two carriers operating to Myanmar.

(e) Thailand has almost 100 ASAs; they vary by GMS country partner (e.g., open routing and unlimited fifth freedom rights, with PRC and Myanmar; open points of the two countries, with a limit of two intermediate points and three beyond points, with Viet Nam;[3] routing

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[1] A major source for the assessment of software options in this Working Paper is an excellent Australian government funded report performed for the ASEAN Secretariat. See Monash International Pty Ltd (Peter Forsyth, John King, Cherry Lyn Rodolfo, and Keith Trace), *Preparing ASEAN for Open Sky*, AADCP [ASEAN Australia Development Cooperation Program] Regional Economic Support Facility Project 02/008, Final Report, February 2004.

[2] Freedoms of the air (these definitions relate to aircraft registered in state A) may be defined as follows:

- first freedom – the right to fly over state B without commercial or technical stops;
- second freedom – the right to land in state B for *technical* purposes, e.g. refueling;
- third freedom – the right to set down traffic from state A in state B;
- fourth freedom – the right to pick up traffic in state B destined for state A;
- fifth freedom – the right to pick up traffic in state B destined for state C or put down traffic in satate B originating in state C;
- sixth freedom – a service taking passengers between states B and C that flies via state A;
- seventh freedom – a service between state B and state C operated by an airline of state A – a "free-standing" fifth freedom"; and
- eighth freedom – cabotage.

http://www.dft.gov.uk/stellent/groups/dft_aviation/documents/page/dft_aviation_025899.hcsp#P101_14304.

[3] An increase of one flight per year on specified routes and unlimited third and fourth freedom rights between Bangkok and Hanoi in 2006 and between Bangkok and Hi Chi Minh City in 2010.

between open points of both countries with limited capacity to be agreed, with Lao PDR; and routing between specified points, with no intermediate and two beyond points, and with limited capacity to be agreed, with Cambodia).

(f) Viet Nam has 56 ASAs and supports opening of gateways such as Da Nang and Hanoi to unlimited third and fourth freedom traffic; it has granted limited fifth freedom rights to Thailand and Singapore and to some non-GMS (and non-ASEAN) carriers.

(ii) ASEAN has formulated a Roadmap for Integration of the Air Travel Sector, which was adopted by the Ninth ASEAN Transport Ministers Meeting in Yangon in October 2003. The Roadmap calls for liberalization of Scheduled Passenger Services, with no limitations on third and fourth freedom rights for all designated points with ASEAN subregions by December 2005; no limitations on third and fourth freedom rights for at least two designated points in each country between the ASEAN subregions by December 2006; no limitations on fifth freedom rights for all designated points within the ASEAN subregions also by December 2006; no limitations on fifth freedom rights for at least two designated points in each country between the ASEAN subregions by December 2008; ASEAN-wide liberalization of scheduled passenger services, with no limitations on third and fourth freedom rights in each capital city in each ASEAN country by December 2008; and no limitations on fifth freedom rights for the capital city in each ASEAN country by December 2010. In line with the “ASEAN-X” formula, the Roadmap provides that two or more ASEAN countries that are ready can negotiate, conclude, and sign implementing agreements on a plurilateral, multilateral, or subregional basis.[1]

(iii) Under the ASEAN umbrella, the CMLV [Cambodia-Myanmar-Lao PDR-Viet Nam] Multilateral Agreement on Air Services, done at Hanoi on 4 December 2003 (although not signed by Lao PDR until 29 April 2005),[2] covers air services between the four contracting parties. Key points of this Agreement include the following:

(a) the bilateral ASAs signed between the CMLV countries will terminate upon the Multilateral Agreement’s entry into force;
(b) third, fourth, and fifth freedom traffic rights within the CMLV subregion are granted for the designated points, which include Phnom Penh in Cambodia, Vientiane (Wattay), Louang Prabang and Pakse in Lao PDR, Yangon and Mandalay in Myanmar, and Hanoi (Noi Bai), Da Nang, Ho Chi Minh City (Tan Son Nhat), Dien Bien Phu, Phu Bai, Haiphong (Cat Bi), and Lien Khoung in Viet Nam;
(c) multiple designation arrangements (which permit an unlimited number of scheduled carriers to operate) and substantial and effective control criteria are included; and
(d) the Agreement is open to accession by other countries subject to acceptance by all contracting parties.[3]

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[1] ASEAN also has adopted the Protocol to Implement the Fourth Package of Commitments on Air Transport Services under the ASEAN Framework Agreement on Services, at Phnom Penh, on 23 November 2004.
[2] As of this writing, it had been ratified by Myanmar and Viet Nam.
[3] A more detailed assessment of the CMLV Multilateral Agreement on Air Services appears in Appendix A-8 of Working Paper 7 on Strategy Considerations for Passenger Transport Strategy in the Interim Report, July 2005.

b) Constraints on Development of Cross-Border Air Passenger Transport in the GMS Toward 2015

41. While development of cross-border air passenger transport has proceeded at a rapid rate over the last 10+ years, there remain a number of constraints on cross-border air passenger transport looking toward 2015.

42. With respect to **hardware**, in many instances, the civil aviation infrastructure is insufficient to serve the traffic at present and expected in the coming ten years. In some instances, however, funding to address these constraints has been obtained. For example, as noted, the Second Bangkok International Airport (Suvarnabhumi Airport), with capacity to accommodate 45+ million passengers per year, is to be completed by 2006. Although the runway at Phnom Penh (Pochentong) International Airport is currently only 40 m wide with 7.5 m shoulders and cannot accommodate B747, B777, or A330 aircraft, this constraint is being addressed with assistance of the International Finance Corporation (IFC) of the World Bank Group, with completion expected by 2006. As noted, at Yangon International Airport the runway is currently being extended from 2,454 m to 3,400 m, the apron from 540 m x 180 m to 730 m x 180 m, and the international airport terminal expanded to accommodate 2.7 million passengers per year, with completion of all components expected by August 2006. And while Ho Chi Minh City's Tan Son Nhat Airport's terminal buildings and parking areas are congested, making it difficult to secure slots, causing the Civil Aviation Administration of Vietnam to encourage foreign airlines to divert traffic to Da Nang, the JBIC-assisted Tan Son Nhat International Airport Construction Project, which will increase capacity to 8 million passengers per year, is to be completed in 2006 and will address this constraint.

43. However, in other instances, infrastructure development projects still need to be financed to address hardware constraints on civil aviation. For example, Guangxi Zhuang Autonomous Region has plans to improve Nanning International Airport by extending the runway from 2,700 m to 3,200 m and doubling current terminal capacity, by 2008. Similarly, Guangxi plans to improve Guilin International Airport by extending the current runway from 2,800 m to 3,200 m and expanding the existing 50,300 m^2 terminal by 30,000 m^2. Lao PDR's Civil Aviation Master Plan calls for certain improvements to Vientiane (Wattay) Airport that are not yet funded (e.g., upgrading of taxiways, apron, firefighting and rescue facilities; enhancement of passenger terminal and other functional facilities) and improvements at Louang Prabang Airport (e.g., runway, taxiway, apron, passenger terminal, and firefighting and rescue station improvements, first to address aircraft operational safety requirements, and second to accommodate traffic demand and operational needs).

44. **Software**[1] constraints relate to the limited implementation of open skies to date in the GMS. There are a number of bilateral ASAs in place in the GMS, reflecting a range of government policies. While some of these bilateral agreements are liberal, others limit the number of airlines that can compete and the amount of capacity that they can offer.

45. Specific software constraints on air transport currently in place in at least some GMS countries include:

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[1] Again, the reader is referred to Monash International Pty Ltd (Peter Forsyth, John King, Cherry Lyn Rodolfo, and Keith Trace), *Preparing ASEAN for Open Sky*, AADCP [ASEAN Australia Development Cooperation Program] Regional Economic Support Facility Project 02/008, Final Report, February 2004.

(i) restrictions on fares (double approval of fares is commonly required in bilateral ASAs), which limit the ability of airlines to respond quickly to market changes;
(ii) investment and ownership controls, e.g., when an air services agreement specifies that only airlines from particular countries may operate on specific routes, which prevents airlines from competing on the basis of efficiency to provide lower fares and better services;
(iii) application of single designation, in which only one airline from the two countries having a bilateral ASA may serve a route, which limits competition and the range of choices available to the consumer;
(iv) controls on market access, e.g., by regulating the total capacity to be offered, the capacity to be offered by specific airlines, or the type of aircraft to be used;
(v) restrictions on fifth freedom rights, within the GMS and beyond the GMS, which make it difficult to develop routes on which traffic demand is low;
(vi) for cargo,[1] restrictions on frequencies, tonnage, and access to gateways, which limit the efficiency of carriers in using back-haul space;
(vii) restrictions on gateways (i.e., airports) that must be used for international routes, which limits new routes and competition; and
(viii) restrictions on charter flights, which can promote the development of tourist destinations not served by existing routes.

46. As noted by the recent Australian study conducted for the ASEAN Secretariat, gains from open skies would flow from increased airline productivity, improved targeting of markets, and improved operational flexibility of airlines. If routes are opened to competition, the airlines will be pressured to lower costs and pass on these cost savings to passengers in the form of lower fares. Low-cost carriers may become more successful in such a liberalized environment, which would put pressure on existing airlines to improve their performance.

47. The PRC has recommended that it and ASEAN could establish an expert team to work on a simplified agreement identifying “soft” items that could be liberalized earlier on a (sub)regional basis, and “hard” items that should be liberalized first bilaterally and later (sub)regionally. The PRC has proposed a number of specific cooperation initiatives, e.g., exchanging experience and expertise in the field of accident investigation, exchanging information on safety and security regulations and practical measures with a view of harmonizing them, exchanging information and experience on infrastructure financing and construction, promoting joint research and human resources building, sharing traffic growth statistics, coordinating closely in air traffic control under the auspices of the International Civil Aviation Organization.[2]

C. Freight

1. Introduction

48. This section assesses factors affecting the performance of the major Corridors and other routes included in Protocol 1 of the Cross-Border Transport Agreement. The assessment starts with a review of the constraints identified in the ADB TA 5479-REG: Cross-Border Movement of Goods and People in the Greater Mekong Subregion and progress made since 1998. The general corridor characteristics and subsector specific constraints are then considered.

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[1] Cargo is not the subject of this subsection, but it is mentioned here for comprehensiveness.
[2] Concept Paper on China-ASEAN Regional Air Services Arrangements, Agenda Item 5, Fourth ASEAN and China Senior Transport Officials Meeting (4th STOM + China), Vientiane, 15 November 2005.

49. The section generally focuses on constraints to the free and effective movement of goods. In addition to the discussion of constraints on the free movement of passengers discussed in Section B, “Passenger”, a number of constraints affecting the smooth flow of passengers and goods are mentioned. Attention is also paid to the constraints that affect the development of multimodal transport.

2. Progress on Constraints Identified in 1998

50. A number of initiatives have been launched over the last seven years addressing previously identified constraints. The Agreement Between and Among the Governments of the Lao People’s Democratic Republic, the Kingdom of Thailand, and the Socialist Republic of Viet Nam for the Facilitation of Cross-Border Transport of Goods and People was originally signed at Vientiane, Lao People’s Democratic Republic on 26 November 1999, amended at Yangon, Myanmar on 29 November 2001, acceded to by the Kingdom of Cambodia at Yangon, Myanmar on 29 November 2001, acceded to by the People’s Republic of China (PRC) at Phnom Penh, Cambodia on 3 November 2002, acceded to by the Union of Myanmar at Dali, PRC on 29 September 2003, and amended at Phnom Penh, Cambodia on 30 April 2004. The Agreement was presented in Annex 1 of Working Paper 7 of the Interim Report for this TA.

51. An ADB staff consultant inspected four selected pilot locations for initial implementation of the CBTA:

(i) Davansanh, Lao PDR, and Lao Bao, Cambodia;
(ii) Mukdahan, Thailand, and Savannakhet, Lao PDR;
(iii) Bavet, Cambodia, and Moc Bai, Viet Nam; and
(iv) Aranyaprathet, Thailand, and Poipet, Cambodia.

The objective of the staff consultancy was to assess the suitability of current border post infrastructure and facilities for the introduction of Single Window Inspection (SWI) and Single Stop Inspection (SSI) as well as other relevant transport facilitation measures called for in the CBTA, in accordance with international best practices.[1] Major findings of the Mission included:

(i) inspections by multiple agencies;
(ii) a fairly low level of Electronic Data Interchange (EDI); and
(iii) use of non-standard documentation.

52. The GMS Strategic Framework for Action on Trade Facilitation and Investment (SFA-TFI) was the subject of a Special Meeting of the Trade Facilitation Working Group in Manila on 25-26 April 2005. A current draft SFA-TFI was considered at the Meeting. Proposed activities included work on:

(i) Customs Procedures;
(ii) Inspection and Quarantine Measures;
(iii) Trade Logistics; and
(iv) Mobility of Business People.[2]

53. UNESCAP has also been active in the area, having held 24 joint workshops since 2000, assisting members in the application of trade facilitation tools of the UN such as the Convention on the International Transport of Goods under Cover of TIR Carnets, 1975, and International Convention on Harmonization of Frontier Control of

[1] Information supplied by Mekong Department, ADB.
[2] Summary of Proceedings, GMS Economic Cooperation Program, Special Meeting of the Trade Facilitation Working Group, 25-26 April, 2005 Manila.

Goods, 1982; United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) instruments such as the UN Layout Key (UNLK), Single Window Recommendations, and the use of electronic trade documentation instruments. Regional partner organizations have included the ADB, the ADB Institute (ADBI), ASEAN, the Colombo Plan, the South Asian Association for Regional Cooperation, the Economic Cooperation Organization, and the Pacific Islands Forum. Cambodia, Myanmar, and Viet Nam have received assistance in the alignment of trade documents.[1]

54. Table 3-7 shows the constraints identified in the course of ADB TA 5479 and indicates progress in eradication of the constraints.

Table 3-7: Constraints on Free and Efficient Movement of Goods Identified in Course of ADB TA 5479

Constraint	Status and Where Addressed
Constraints Related to Vehicles	
Limited Commercial Operating Rights for Cross-Border Transport	Part VI and Protocols 1 and 3, CBTA
Limited Mutual Recognition of Vehicle Recognition and Roadworthiness Certificates	Part V, CBTA
Inconsistent Technical Standards and Specifications	Part Vii and Annex 11, CBTA
Inconsistent Traffic Rules and Signage	Annex 7, CBTA
Limited Mutual Recognition of Drivers Licenses	Annex 16, CBTA
Limited Recognition of Third-Party Liability Insurance	Article 16, CBTA (but not adequately covered)
Restrictive Regimes for the Temporary Importation of Vehicles	Article 18 and Annex 8, CBTA
Constraints Related to Goods	
Need for Further Customs Facilitation	Annexes 4, 6,8,12, and 14 of the CBTA, and under SFA-TFI
Cumbersome Transit Regimes	See above.
Multi-Stop Processing of Goods	Article 4 and Annex 4, CBTA
Medico-Sanitary, Phytosanitary, and Veterinary Inspection	Annex 9, CBTA [but only by reference to international agreements]
Compulsory Quality Control Checks	Not addressed directly.
Special Regimes for Certain Categories of Goods	Annexes 1 and 3, CBTA
Constraints Related to Persons	
Passports, Visas, and Border Permits	Part III and Annex 5, CBTA
Health Controls	Article 3 of Annex 5, CBTA
Regulations Concerning Personal Effects and Currency	Annex 5 of CBTA; most currency restrictions relaxed in Cambodia, PRC, Lao PDR, Thailand, and Viet Nam
Constraints Related to Infrastructure	
Inconsistent Road and Bridge Design Standards	Annex 11, CBTA
Absence of Formal Standardization of Road Signs and Traffic Signals	Annex 7, CBTA

[1] "UNESCAP's Regional Cooperation Framework for Trade Facilitation in Asia and the Pacific", presentation to IMO/ADBI Workshop on Managing Regional Public Goods: Cross-Border Trade and Investment, Labor Migration and Public Health", 15 June 2005, Bangkok, Thailand.

Table 3-7: Constraints on Free and Efficient Movement of Goods Identified in Course of ADB TA 5479（continued）

Constraint	Status and Where Addressed
Absence of a Consistent Road User Charge Regime	Protocol 2 (preparatory work on Protocol 2 carried out by ADB and UNESCAP; report Issued in November 2004)[1]
Inadequate Border Crossing Facilities	Annex 12
Rail Transport Operating Arrangements	UNESCAP Asian Railway Initiative and SKRL Feasibility Study
Other Constraints	
Lack of Harmonization of Documents and Formats	Article 35 and Annex 15, CBTA; also STF-TFI and UNESCAP
Discriminatory National Laws and Regulations	Article 32, CBTA

Sources: 1) ADB TA 5479 - REG: Cross-Border Movement of Goods and People in the Greater Mekong Subregion.
2) This TA.

55. It can be seen that a considerable number of constraints have been addressed over the past seven years, while other issues are in the process of being addressed. The GMS is located in a dynamic region with numerous developments arising from a general opening of the economies of the subregion. The investigations during this TA have identified a number of additional factors that are relevant to the efficient transport of goods, which are discussed in following sections. Section B, although primarily concerned with passenger flows, also dealt with a number of CBTA implementation related aspects of goods carriage.

3. General Subsectoral Constraints

a) General

56. The discussion proceeds corridor by corridor in the order in which the corridors are mentioned in Protocol 1 of the CBTA. Anchor ports are discussed followed by a consideration of road, rail, inland waterway, and civil aviation links. Impediments to the expansion of multimodal and intermodal transport dimensions are assessed. A discussion of transport links to other regions of Asia concludes the section.

b) Anchor Ports

57. Table 3-8 shows selected characteristics of ports that are identified under Protocol 1 of the CBTA and which can play a role in GMS trade with the rest of the world.

[1] United Nations Economic and Social Commission for Asia and the Pacific, *Study of Transit Charges to Be Assessed Under Protocol 2 of the Agreement for the Facilitation of the Cross-Border Transport of Goods and People in the Greater Mekong Sub-Region*, prepared under ADB RETA 6098: Implementing the Agreement for the Facilitation of the Cross-Border Transport of Goods and People in the Greater Mekong, November 2004.

Table 3-8: Selected Characteristics of CBTA Deep Sea Ports Available to the GMS Countries Identified under Protocol 1

Economic and Other Corridors/Routes	Port	Country	Depth of Container Berths (m)	Container Ship TEU Limit
Economic Corridors				
North- South	Haiphong	Viet Nam	8	< 1200
	Laem Chabang	Thailand	16	7200 +
East-West	Mawalamyine	Myanmar	Na	Na
	Da Nang	Viet Nam	11-12	< 1700
Southern	HCMC/Vung Tau	Viet Nam	6.6-9.5	1200
Other Corridors				
Vientiane – Sihanoukville (b)	Sihanoukville	Cambodia	11.5	< 2000
Nateuy-Vientiane-Bangkok (c)	Laem Chabang	Thailand	16	7200 +

Sources: 1) CBTA, Protocol 1.
2) Myanmar Presentation to STF-9, Beijing, June 2005.
3) Port Authority of Thailand.
4) ASEAN Maritime Development Study, ALMEC Corporation, 2002.
5) PDP Australia Pty. Ltd. and Meyrick and Associates, *Promoting Efficient and Competitive Intra-ASEAN Shipping Services*, REPSF Project 04/001, for ASEAN and Government of Australia, 2005.
6) Port Autonome de Sihanoukville.
7) Myanma Port Authority Brochure, January 2005.

58. With the exception of Laem Chabang, which can handle reasonably large container vessels, ports accessible under Protocol 1 are generally limited to feeder vessel services. The consensus of most maritime analysts interviewed during the course of this TA is that they are likely to remain so. Generally, ports including Laem Chabang are served by feeder services based on Singapore and Hong Kong, China, where GMS cargoes are loaded into or offloaded from the intercontinental container shipping system and carried between Singapore and Hong Kong, China, on the one hand and the ports shown in Table 3-8. This is an efficient system within the limits dictated by the international shipping system. The feeder vessels are considerably smaller and more high cost on line-haul services (i.e., deep sea port – deep sea port) than the Panamax and Post-Panamax vessels increasingly used for intercontinental movements. Nevertheless, considering the limited parcel size characterizing all Protocol 1 Ports except for Laem Chabang, they are efficient at that scale.[1]

59. The parcel size of the smaller GMS country economies is, by definition, currently comparatively small. Annual data for 2003, and partial data for 2004 and 2005, is presented in Table 3-9 for the Port of Sihanoukville. It should be noted that Sihanoukville has undergone significant upgrades in the past few years as regard container wharfs and facilities. It is now embarking upon the second phase of a JBIC-supported Urgent Expansion Plan that will expand the port's container handling capacity to 300,000 TEU per year.

[1] Parcel size refers to the number of containers picked up or dropped of in a ship call.

Table 3-9: Maximum Parcel Sizes of Container Ships Calling at the Port of Sihanoukville 2003-2005

Item/Year	2003 (12 months)	2004 (January-April)	2005 (January-April
Container Ship Calls	400	258	214
Containers Loaded and Unloaded (TEU	181,286	61,899	58,596
Average Parcel Size (TEU)	453	240	274

Source: Sihanoukville Autonomous Port "The Statistic of Cargo", 5 May 2005

60. There are other ports available to GMS countries as well. The Port of Phnom Penh handles 1,500 TEU per month transshipped from HCMC/Vung Tao in shallow draft vessels with a capacity of 40-150 TEU. The Port of Fangcheng in Guangxi Zhuang Autonomous Region is one of 20 National Ports and has undergone rapid expansion in recent years.[1] It is served by feeder services from Hong Kong, China, a situation likely to continue for some years as there are tidal restrictions on use of the entrance channel, the depth being 9.5 m at low tide. Although the current designated port for the western end of the East-West Economic Corridor, Mawlamyine, is designated as an outport by the Myana Ports Authority (MPA), a deep water facility could conceivably be built. Alternatively, the Port of Thilawa downriver from Yangon has received considerable investment and currently can accommodate ships of 9 m in draft and 20,000 DWT. At the 9th Subregional Transport Forum Meeting held in Beijing in June 2005, the Myanmar Delegation presented long-range proposals for a number of ports north and south of Mawlamyine.

61. As regards the ports of Viet Nam which anchor route c) of the North-South Economic Corridor (Haiphong) and the East-West Economic Corridor (Da Nang), there have been significant improvements at both ports. Da Nang's capacity, including downriver development, will increase to 5 million mt per year with recently completed and planned works.[2] Two container berths and a deeper access channel will be completed at Haiphong Port by 2008.[3]

62. On a related matter, the PRC is currently reviewing international shipping policies and plans. The PRC also suggested at the TA Interim Report Workshop held in Beijing on 15 August 2005 that a "Short Sea Shipping Services" initiative could enhance connectivity. An ADB staff member working at the PRC Resident Mission concurred with view during a Videoconference held on 25 August 2005. As will be indicated later in this section, such an initiative has the potential to enhance linkages between the GMS and potential regional partners such as the members of Bay of Bengal Initiative for Multi-sectoral and Technical Cooperation (BIMSTEC, including Bangladesh, India, Myanmar, Sri Lanka, Thailand, Bhutan, and Nepal).

c) Road Subsector

(i) Missing Links

63. Although much work has been done on the reconstruction or rehabilitation of missing links in various corridors, a number of such links still require attention. These are indicated further in Section VIII, Identification of Investment and Technical Assistance Projects.

[1] Through an ADB loan project.
[2] Meeting with Viet Nam National Shipping Lines (Vinalines), 19 July 2005.
[3] PDP Australia Pty. Ltd. and Meyrick and Associates, *Promoting Efficient and Competitive Intra-ASEAN Shipping Services*, for the Government of Australia and ASEAN, March 2005..

(ii) Road Maintenance

64. The large volume of rehabilitation and reconstruction of corridor links to improved standards has created a GMS-wide recognition of the need for sustainable maintenance of newly restored links. Thai transporters have commented that a lack of road maintenance capability in some countries threatens the success of the economic corridors. PRC freight forwarders have made similar comments on roads in Viet Nam when discussing the difficulties of cross-border trucking operations.

65. The importance of sustainable maintenance for efficient transport through GMS corridors is that the consumption of some inputs to vehicle operation such as tires and spare parts increases exponentially with road roughness. Road Roughness is generally measured on the International Roughness Index (IRI). A level of IRI 2.0 is generally considered characteristic of a freshly surfaced tarmac road while a level of IRI 6.0 is characteristic of a freshly graded gravel or lateritic road. Data from the recently installed Road Management System (RMS) of Lao PDR in Table 3-10 shows the roughnesses measured in 2003-2004 in the course of the establishment of the RMS.[1]

Table 3-10: Roughnesses of GMS Roads in Lao PDR

Route Designation	Link	GMS Corridor or Route	Average IRI
3	PRC Border – Mekong River	North-South Economic Corridor	6.21
13S	Vientiane – Chamassak	Vientiane - Sihanoukville	3.24
16	Champassak – Viet Nam Border	NA	3.07
9	Lao Bao – Savannakhet	East-West Economic Corridor	2.36

Source: Road Management System of Ministry of Communication, Transportation, Post and Construction (MCTPC), Lao PDR

66. Table 3-10 shows that the key Lao PDR link of the NSEC is characterized by a roughness of IRI 6.21. The recently refurbished Route 9 of the EWEC is characterized by a roughness of IRI 2.36, a level that would be expected. In Table 3-11, data from a recent study carried out for the Office of Transport and Traffic Policy and Planning shows, for Thailand Registered Vehicles, the vehicle operating costs (VOCs) at roughnesses of IRI 2.0 and IRI 6.0.

Table 3-11: VOCs of Heavy Vehicles and Articulated Truck

Effect of Roughness on VOC and Speed	VOC by and Speed by Vehicle Type (Baht/vehicle-km)	
	Heavy Truck	Articulated Truck
Effect on VOC		
IRI 2	17.77	26.55
IRI 6	21.05	30.84
% Increase in VOCs	+18.46	+16.16
Effect on Speed		
IRI 2	49.69	53.96
IRI 6	46.50	49.47
% Decrease in Speed	-6.42	-8.32

Source: MP Consultants Ltd. and ESRI Thailand, Transport Data and Model Centre 2, A, 2547.

[1] The RMS was installed in the course of the IDA's Road Maintenance Project (RMP-1, Credit 3481-LA; SDR 19.2 million). A second phase of the RMP will be launched shortly.

67. The effect of roughness is considerable for both the heavy and articulated trucks. While the speed effects of roughness are less severe, they still have implications for vehicle utilization and ultimately fleet size. There is little doubt that roughnesses in Lao PDR are less than they were a decade ago. However, some technical officials of MCTPC have expressed concern about the ability of the Ministry to carry out maintenance without further human resource development and equipment beyond what is already planned. Experience in the ASEAN region indicates that it can take up to 10 years to implement effective and sustainable maintenance through the use of road management systems.[1]

68. Sustainable road maintenance is also an issue for transporters and freight forwarders in Cambodia and Viet Nam. As regards the former, the Transport Infrastructure Development and Maintenance Project,[2] which is to be examined under an ADB project preparation technical assistance (PPTA), includes a component focusing on “the institutional structure of the Government for planning and delivery of the road maintenance services to be implemented under the Project and strategy for implementation of the road maintenance services”. This follows previous ADB-assisted road maintenance projects in Cambodia, one of which was undertaken in conjunction with the International Labor Organization (ILO). In Viet Nam, the Central Region Transport Network Project, a loan for which was to be approved in 2005, includes provision for assisting Provincial Departments of Transport in carrying out core road management activities.[3]

69. The PRC and Thailand have generally implemented sustainable maintenance with adequate funding. In Myanmar and Viet Nam, BOT operations have had some success, but it is likely that further work on road maintenance funding will be required. Lao PDR has successfully established a road fund to support road maintenance. In Cambodia, a similar effort has yet to bear fruit.

70. The reform of road maintenance and establishment of up-to-date road management systems and funding mechanisms is probably the work of a decade. Road managements in some GMS countries have been preoccupied until recently with the rehabilitation of key links such as Route 9 in Lao PDR, a key link of the EWEC. Continued success in the strengthening of GMS road maintenance capabilities in Cambodia, Lao PDR, and Viet Nam will be critical to the further development of the Economic Corridors. Myanmar also has expressed interest in participating in technical work in this area during the TA Interim Report Workshop held in Yangon on 3 August 2005.

(iii) Need for Transshipment of Goods

71. Transshipment of goods is still necessary at many Protocol 1 road crossing points. This costly situation will not be resolved until the completion of full implementation of the CBTA. A related point is that backhaul restrictions at many border crossings have an adverse impact on goods vehicle productivity. The need in certain instances such as at the Aranyaprathet (Thailand)- Poipet (Cambodia) crossing to destuff and restuff containers at a remote location is not conducive to further penetration of the container mode in land transport trade.

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[1] The World Bank’s Integrated Road Management System in Indonesia was gradually extended over the whole interurban network over a period of ten years between the late 1980s and 2000.
[2] ADB, PPTA: CAM36354-01, Transport Infrastructure Development and Maintenance.
[3] ADB Loan VIE 34356-01, Central Region Transport Network.

(iv) Road Transport Services

72. The quality of road transport services varies considerably within the GMS. The relative rise of private operators compared to Government-owned companies in the GMS countries moving towards the market economy has not always been matched by sufficient investment in modern vehicles or by the acquisition of modern fleet management techniques. Cambodia and Lao PDR have both expressed an interest in upgrading the fleets of road haulage vehicles and the management capabilities of the private vehicle operators, which would enable them to more effectively take part in intra-GMS and GMS external traffics as the CBTA is implemented.[1] Myanmar has also expressed interest in the professionalization of its road haulage industry.

d) Border Crossing Points

73. Many GMS border crossing points are not physically suited to the quick and expeditious passage of cargo. Information processing and communications hardware and systems are also well below standards elsewhere at numerous crossing points. It is expected that this issue will be addressed partially through the preparatory work for installation of single-stop inspection procedures at four Protocol 1 Crossing Points on a pilot basis.

e) Rail

74. The rail systems of the GMS feature two interconnections handling goods at present. One interconnection links Guangxi Zhuang Autonomous Region with Lang Son Province in Viet Nam. The Kunming-Hanoi line via Lao Cai is the other existing freight interconnection. The upgrading of the interconnection between Yunnan and Haiphong Port in Viet Nam was recently studied under an ADB TA.[2] The Thai railway system operated by State Railways of Thailand will soon be extended from the Friendship Bridge to Thanaleng Customs House in Lao PDR with assistance from Thailand.

75. The Royal Railway of Cambodia (RRC) currently operates low-speed services between Phnom Penh and Sihanoukville (264 km) and between Phnom Penh and Sisophon (338 km) via Battambang. The 48 km section from Sisophon to Poipet on the Thai border is nonfunctional with no track or sleepers. The rehabilitation of RRC infrastructure is to be examined in an upcoming ADB TA for Restructuring of the Railways in Cambodia.[3] On the Thai side, a 1.5 km extension from the Klong Tuk bridge near Aranyaprathet would be required to connect the RRC network with that of the State Railway of Thailand.

76. Existing interconnections have been negotiated bilaterally. Since the CBTA does not currently cover rail cross-border traffic, until a true multimodal transport framework including guarantees has been established, potential cross-border rail freight markets might not be able to exploit their comparative advantage in the carriage of containers.

77. Several potential crossing points for rail goods transport are congested because of provincially sanctioned tourism or other developments such as the potential crossing at Poipet (Cambodia) and Aranyaprathet (Thailand). Rail crossing points require at least one suitably isolated siding for customs formalities to be

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[1] Japan Bank for International Cooperation, *Thailand and Lao PDR, Special Assistance for Project Implementation (SAPI) for Second Mekong Bridge Construction Project*, 2003.
[2] ADB TAR VIE 33307, Preparing the Kunming-Haiphong Transport Corridor Project (KHTC), Approved in 2002 and executed in 2003-04.
[3] This page was not available on the ADB website as of 28 July 2005.

administered. The erection of a number of casinos in the vicinity of the crossing has precluded the design of the most efficient configuration desirable for single-stop inspection at this Protocol 1 crossing.

78. Discussions with several railways have indicated that the marketing of high quality freight services in the GMS is not a priority at present. The Sihanoukville-Phnom Penh Corridor and the Laem Chabang-Thanaleng Corridor are two instances, once upgrades have been carried out, where rail could effectively compete with road except for the highest priority cargoes that would likely remain on the comparatively more expensive road mode. The ongoing development of container train services in the Laem Chabang-Bangkok area is an exception and provides a useful example to be heeded elsewhere in the GMS.

f) Inland Waterway

79. The Mekong River Inland Waterway System, which has connected the six GMS countries of the Mekong hinterland for far longer than the other means of transport, currently is divided into several parts:

(i) the Upper Mekong effectively governed by the Agreement on Commercial Navigation on Lancang-Mekong River Among the Governments of the People's Republic of China, the Lao People's Democratic Republic; and
(ii) the lower stretches of the Mekong linking Thailand, Lao PDR, Cambodia, and Viet Nam, which are theoretically under a Mekong River Commission (MRC) mandate for Cross-Border Navigation under Article 9 of the 1995 Mekong River Agreement.

80. The constraints affecting the operations of inland water transport (IWT) have been summarized succinctly by the (MRC):

"These constraints consist of operational and administrative shortcomings (no common navigation rules and safety standards, no training, inefficient, custom and immigration procedures etc.), channel obstructions (shoals and sedimentation, insufficient waterway maintenance, lack of aids to navigation etc.), poor port and related facilities and a lack of transport promotion capacity (marketing strategy, hinterland facilities, acquisition of cargo), etc. All these weaknesses, problems and threats have been identified and analysed during the formulation of the MRC's Navigation Strategy."[1]

81. Relatively fast-moving rivers such as the Mekong are capable of transporting considerable quantities of sediment so that maintenance dredging will always be an issue. The need for it is continuous and a formalized structure for stewardship of the navigable channels could be considered desirable to ensure that capital improvements are sustained.

82. In the course of the TA workshops, both the PRC and Viet Nam expressed interest in exploring the possibility of further exploiting the navigation potential of the Red River linking Yunnan and Viet Nam.

g) Air Cargo

83. Until recently, intra-GMS air cargo shipments tended to be carried in passenger planes. Cargo was always considered as an adjunct to passenger service. Currently, major air cargo operations are carried out at the airports of Bangkok and Ho Chi Minh City. Major additions to cargo capacity are to take place at Bangkok's

[1] Mekong River Commission, *Incorporation of Navigation into the Integrated Water Resources Development and Management Strategy*, January 2005.

new international airport, Ho Chi Minh City, and Hanoi. There is also interest in developing Hanoi as a transit air cargo hub.

84. It is likely that in intra-GMS air freight markets air cargo will continue to play a specialized role in the shipment of high-value priority items. While the major international airports are well placed to take part in the continued growth of air cargo, it is likely that smaller GMS airports will need some assistance in planning for cargo facility upgrades.

h) Links to Other Regions

85. A number of other regional groupings are relevant to discussions of this topic. The South Asian Association for Regional Cooperation (SAARC) was established when its Charter was formally adopted on 8 December 1985 by the Heads of State or Government of Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. As of this writing, Afghanistan had been invited to join SAARC, thus opening links to Central Asia for several BIMSTEC members.[1]

86. An unofficial initiative sponsored by the PRC through Kunming seeks to link Yunnan with Myanmar, India's Northeast States, and Thailand in an economic grid. India's more formally defined Mekong-Ganges includes all GMS countries with the exception of the PRC, although it is by no means certain that the PRC will remain outside this grouping given increasing levels of economic cooperation and trade between Asia's two largest countries, India and the PRC.

87. A number of projects have been proposed under the latter two groupings in addition to links of the UNESCAP-supported Asian Highway built between India and Myanmar by the former:

(i) As part of an eventual Eurasian Land Bridge, the PRC has included several links in its latest development program. An associated link would involve the connection by rail of Myitkinya (Myanmar) northward to the Dibrugarh station of Indian Railways in Assam.
(ii) The PRC has also developed plans for a road-river Irrawaddy River to the Bay of Bengal. A long-term agreement is in the course of negotiations on the highway and waterway transport system including river port and storage facilities at Bhamo. This initiative offers significant transport savings for Yunnan and Sichuan Provinces.[2]

88. As many of the projects identified under the above-mentioned groupings are still on the drawing board, only some of these links are likely to eventuate within the strategy horizon of 2006-2015. The proposed feasibility study for the promotion of "Short Sea Shipping Services" although suggested by the PRC has relevance to links between GMS countries as well as to the links between the GMS and some members of SAARC and BIMSTEC. It is also relevant to the Ayeyarwady initiative investigated by the PRC and Myanmar.

[1] *Bangkok Post*, 16 November 2005.
[2] The TA Team is indebted to staff of the ECTC Department of ADB for information contained in this subsection.

4. Multimodal Transport, Intermodal Transport, and the GMS Logistics Industry

a) Background

89. As will be indicated in Section VII on the Proposed GMS Transport Sector Strategy, there are two distinct aspects of multi-modalism of relevance to the present study: (i) encouraging the provision of and competition between modes on a given route/corridor, and (ii) facilitating intermodal transport. Both aspects contribute to the emergence of logistics services providers that offer complete door-door services for shippers and the ability on the part of shippers to manage supply and distribution chains at a global level.

90. In discussions with GMS stakeholders, a number of issues related to logistics have arisen:

(i) why logistics costs appear to be high in the GMS;
(ii) links between the GMS transport network and system and aspects of the logistics chain;
(iii) status, prospects, and issues regarding the logistics system; and
(iv) the interface between the GMS Transport Sector Strategy and the emerging Strategic Framework for Action in Trade Facilitation and Investment.

91. The following subsections b), c), and d) address these issues.

b) Definitions

92. In the vernacular, logistics is defined as

“... the job of getting things where they need to be”.[1]

93. In fact, in the modern technical literature, definitions of logistics are relatively scarce. The Council of Supply Chain Management Professionals (CSCMP), a non-profit body specializing in the technical aspects of supply chain management, offers the definition of “logistics management” given below. Phrases and concepts of importance to the GMS Transport Sector Strategy Study are indicated in bold.

“Logistics management is that part of supply chain management that plans, implements and controls the **efficient**, **effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customer’s requirements. Logistics management activities typically include inbound and outbound transportation management, fleet management**, warehousing, materials handling, order fulfillment, **logistics network design**, inventory management, supply/demand planning, and management of third party logistics service providers. To varying degrees, the logistics function also includes sourcing and procurement, production planning and scheduling, packaging and assembly, and customer service. It is involved in all levels of planning and execution – strategic, operational and tactical. Logistics management is an integrating function which coordinates and optimizes all logistics activities, as well as integrates logistics activities with other functions, including marketing, sales, manufacturing, finance and information technology.”[2]

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[1] Long, Douglas, *International Logistics: Global Supply Chain Management*, Springer Series in Operations Research, www.springer.com.
[2] “Supply Chain and Logistics Terms and Glossary”, available at www.cscmp.org.

94. The CSCMP gives no other definition for logistics nor for multimodal transport. However, aside from the mode choice element of multi-modalism indicated in Section III.C.4.a above, the discussion that follows can proceed with the CSCMP definition of intermodal transport:

"Intermodal Transportation: Transporting freight by using two or more transportation modes such as by truck and rail or truck and oceangoing vessel."[1]

95. The final definition of interest is that of supply chain management:

"Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion and all **logistics management activities**. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, **third-party service providers and customers**. In essence, supply chain management integrates **supply and demand management** within and across companies. Supply Chain Management…[i]ncludes all the logistics management activities noted above, as well as manufacturing operations, and it drives coordination of processes and activities with and across marketing, sales, product design, finance and information technology."[2]

96. The concepts of "effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customer's requirements; logistics management activities typically include inbound and outbound transportation management, fleet management…"; "third-party service providers and customers"; and "supply and demand management" are all pertinent to the discussion of the constraints on the GMS transport system. The notion of "supply and demand characteristics" also features in the following discussion, particularly as regards the "scale" of supply and demand and the length of haul. Both of these aspects of supply and demand are of critical importance in understanding the constraints to effective supply chain management in the GMS. Perceived constraints on supply chain management also slow the conversion of transport corridors into economic corridors.

c) Characteristics of the Logistics Industry in the GMS and the Relationship to the GMS Transport Network and System

97. The GMS logistics industry encompasses logistics service providers in the GMS operating, in part over GMS transport infrastructure. A case study from the only landlocked country in the GMS provides a number of insights into GMS logistics issues. On the basis of discussions with Lao PDR importers and logistics experts, Professor Ruth Banomyong has analyzed the routing alternatives for a typical movement of a Lao PDR import from Marseilles in France shown in Table 3-12 on the next page.[3]

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[1] See previous footnote.
[2] See previous footnote.
[3] Banomyong, Ruth, "Assessing Import Channels for A Land-Locked Country: The Case of Lao PDR", *Asia Pacific Journal of Marketing and Logistics,* Volume 16, Number 2, 2004.

Table 3-12: Alternative Routings for a Lao PDR Import from Marseilles, France to Vientiane, Lao PDR

Route	Mode	Tranship at:	Mode	Transhipment/ Intermodal Transfer	Mode
1	Sea	Singapore	Sea	Danang (Viet nam)	Road
2	Sea	Singapore	Sea	Bangkok (Thailand)	Road
3	Sea	Port Klang (Malaysia)	Rail	Lad Krabang (Thailand	Road

Source: Banomyong, Ruth: "Assessing Import Channels for a Land-Locked Country: The Case of Lao PDR", *Asia Pacific Journal of Marketing and Logistics*, Volume 16, Number 2, 2004, p. 65.

98. The analysis is of interest because it shows the relative order of magnitude of the costs to shippers of the various modes involved in GMS import transport and illuminates various issues of concern to GMS shippers.[1] Table 3-13 summarizes the travel time, cost to shippers, distance, and reliability of the various route alternatives. The reliability of the route alternatives was calculated on the basis of ratings supplied by respondents who were knowledgeable about international trade transactions, transit transport operations, documentary procedures and rules and regulations in their respective country or region. The respondents "intuitively" assigned a rating for each transport mode, intermodal transfer charge and other nodal activities. A rating of "1" indicates almost no confidence while a rating of "5" indicates a high level of confidence.[2] Costs for line-haul and nodal activities were obtained by interviewing importers, logistics service providers, and shipping lines.[3]

Table 3-13: Summary of Travel Times, Costs to Shippers, and Reliability Rating Characterizing Three Route Alternatives – Marseilles – Vientiane

Item/Route Characteristic	Routing/Shipment Characteristics					
	Singapore-Da Nang	Singapore-Bangkok	Port Klang/ Lad Krabang	Singapore-Da Nang	Singapore-Bangkok	Port Klang/ Lad Krabang
Travel Time by Mode	**Travel Time (days per TEU)**			**%**		
Deep Sea and Associated Activities	27.0	22.5	16.0	79.3	74.8	62.6
Rail and Associated Activities			6.0			23.5
Road and Associated Activities	7.0	7.6	3.6	20.7	25.2	13.9
Total	34.0	30.1	25.6	100.0	100.0	100.0
Costs by Mode	**Costs to Shippers ($ per TEU)**			**%**		
Deep Sea and Associated Activities	1,304.0	1,007.8	587.0	46.6	34.4	20.2
Rail and Associated Activities			419.0			14.4
Road and Associated Activities	1,497.0	1,919.5	1,894.0	53.4	65.8	65.3
Total	2,801.0	2,927.3	2,900	100.0	100.0	100.0

[1] Shipper in this context refers to the entity paying the freight. It may be a GMS importer or a GMS exporter. GMS producers may of course be importers or exporters.
[2] This measure in fact is based on the respondent's perception of service reliability, which may differ from actual reliability.
[3] Banomyong, Ruth: "Assessing Import Channels for a Land-Locked Country: The Case of Lao PDR", *Asia Pacific Journal of Marketing and Logistics,* Volume 16, Number 2, 2004.

Table 3-13: Summary of Travel Times, Costs to Shippers, and Reliability Rating Characterizing Three Route Alternatives – Marseilles – Vientiane (continued)

Item/Route Characteristic	**Routing/Shipment Characteristics**					
	Singapore-Da Nang	**Singapore-Bangkok**	**Port Klang/ Lad Krabang**	**Singapore-Da Nang**	**Singapore-Bangkok**	**Port Klang/ Lad Krabang**
Reliability Rating by Mode	**Average Reliability Rating**			Not Applicable		
Deep Sea and Associated Activities	3.3	3.7	3.4			
Rail and Associated Activities			2.8			
Road and Associated Activities	1.1	2.8	2.9			
Total Route Average	2.9	3.1	3.1			
Cost per tkm	**Cost per tkm (US$)**					
Deep Sea and Associated Activities	0.003	0.003	0.003			
Rail and Associated Activities	0.013	0.014				
Road and Associated Activities			0.019			
	0.046	0.144	0.157			

Source: Banomyong, Ruth: "Assessing Import Channels for a Land-Locked Country: The Case of Lao PDR", Asia Pacific Journal of Marketing and Logistics, Volume 16, Number 2, 2004.

99. The table shows that shipping to the landlocked country of the GMS is a lengthy process by surface transport. The deep sea legs account for the greatest proportion of the trip in terms of by time and are seen as being the most reliable. The reliability of the road legs is seen as ranging between a very low level of confidence and a medium level of confidence.

100. In interpreting the cost per tkm figures, it should be noted that the net cargo weight of 16.5 mt including pallets is likely relatively high compared to the average pertaining throughout the GMS. Nevertheless, the relative tkm rates are of interest. The Europe-Southeast (SE) Asia ocean rates are the lowest as would be expected. However, the Intra-SE Asia ocean rates are considerably higher, being carried out over shorter distances in smaller vessels than are utilized on the Europe-SE Asia sector. This then, is one important factor in the perceived high costs of logistics services – **the question of scale**. Bangkok is the largest port in the GMS but functions as a feeder port in terms of Southeast Asian ports, whereas Hong Kong, China, and Singapore are the main termini of the most efficient intercontinental services. Table 3-14 shows the volume differences between Laem Chabang/Port of Bangkok and the regional hubs.

Table 3-14: Throughput of Selected Southeast Asia Ports (TEU million) – 2004 and 2005

Port	2004	2005
Port of Bangkok	NA	0.66
Laem Chabang	3.5	3.7
Hong Kong, China	22.0	NA
Singapore	21.3	23.2

Sources: 1) Marine Department, Hong Kong, China
2) Port of Singapore
3) Bangkok Shipowners and Agents Association

101. The major international shipping companies have an investment in the billions of dollars in the fleet of containers ships in the 4,000-9,200 TEU range that serve Singapore and Hong Kong, China. The 6,000 TEU limit was surpassed in 1997 with the construction of the Sovereign Maersk.[1] Until recently, Laem Chabang was unable to serve the largest container ships, because of draft restrictions, quay length, and ship beam. In March 2005, the Port Authority of Thailand announced its aim of making Laem Chabang a "hub port". Although Laem Chabang has managed to capture a TEU trade of 3 million plus in the decade since facilities opened, much work will be needed to make it a hub competitive with its regional neighbors. It is likely that the advent of the "Malaccamax" ship with a capacity of 18,000 TEU would lead to a major restructuring of major container trade routes.[2] Until that time, Hong Kong, China, and Singapore can be expected to aggressively protect the investment of their cargo terminal operators and trading houses.[3]

102. In a previous subsection, the issue of parcel size was discussed. With the investment in modern container ships, shipping companies attempt to minimize their ship calls in any one continent, dropping off and picking up relatively large parcels in a small number of ports. In North America, where rail freight operations are competitive and plentiful, shipping companies have consolidated operations in one or two ports, with onward distribution by rail unit train. Table 3-15 shows the parcel size for Hong Kong, China; Singapore; and Laem Chabang.

Table 3-15: Parcel Size Characterizing Ship Calls to Selected SE Asia Ports

Port	Parcel Size (TEU)
Hong Kong, China	970.9
Singapore	1156.7
Laem Chabang	921.7

Sources: 1) Marine Department, Hong Kong, China.
2) Port of Singapore.
3) Bangkok Shipowners and Agents Association.

103. The Hong Kong, China parcel size reflects a fair amount of costal traffic with the rest of the PRC carried out by smaller vessels similar to those carrying out feeder operations to Bangkok. If one considers the growth rates in ship calls and TEUs in the three ports, it suggests that the larger ships, above 6,000 TEU in capacity, have been growing at a rapid rate in the two hub ports. Laem Chabang has only acquired the ability to handle larger ships in the last few years. GMS parcel sizes, with the exception of the PRC and Thailand, are also small, thus restricting the access of GMS shippers to efficient large-scale long distance shipping services.

104. Basically, two megaports have until recently dominated Southeast Asian container shipping. However, Shanghai and Shenzen are growing as rapidly as any ports in the world. The rates of growth for selected PRC and Southeast Asian Ports in terms of TEUs between 2003 and 2004 are shown in Table 3-16.

[1] The largest container vessel afloat at the time of this writing was the MSC Pamela launched in 2005 with a capacity of 9200 TEU (maximum load capacity of loaded containers). See http://en.wikipedia.org.
[2] A Malaccamax vessel would be too large to safely transit the Straits of Malacca. See http://en.wikipedia.org.
[3] Since container terminal operation is an international business, several companies have terminals in Hong Kong and Laem Chabang.

Table 3-16: Throughput of Selected Southeast Asian Ports

(2004 and 2005, TEU million)

Port	Throughput (TEU million)		Growth (2004 as % of2003)
	2004	2005	
Shanghai	11.3	14.6	29.1
Shenzen	10.7	13.6	27.9
Hong Kong, China	20.4	22.0	7.5
Singapore	18.4	21.3	15.8
Laem Chabang	3.0	3.5	15.8

Sources: 1) Marine Department, Hong Kong, China
2) Port of Singapore
3) Bangkok Shipowners and Agents Association

105. It is apparent that Shenzen and Shanghai have taken some growth away from Hong Kong, China, although largely in the coastal and transshipment trades. In addition, both Shanghai and Shenzen have tidal limits on the entrance channels. Thus, the largest ships and those to come with a capacity of up to 18,000 TEU will continue to use the hub ports, losing only coastal and localized trades around emerging container ports such as Shanghai and Shenzen.

106. To this point, the discussion has focused on the scale effects of transport in general and container ship size supply in particular. Additionally, the development of intermodal transport services is critically reliant on traffic volumes or the scale of demand. The scale of demand in the GMS is small compared to flows in Europe or North America. For instance, the two main railways in Canada accomplish between them about 93,034 million tkm at a cost of between US$0.016 and US$0.023.[1] About half of the tkms are accomplished carrying Asian goods to Eastern Canada over a haul length of 4,500 km.

107. The preceding discussion touches on the fact that intermodal land freight transport operates at its most efficient in North America and Europe where the length of haul is considerably longer than that pertaining elsewhere. That said, Europe has experienced difficulty in achieving the same quality of seamless intermodal service for intra-European goods services as opposed to seamless rail passenger services. Railways have not been able to manifest the same level of cooperation in building intra-European freight services that have characterized their efforts in building intra-European passenger services. In Europe, there are a number of high-technology intermodal freight services through the Alps and under the English Channel that mirror the intermodal piggyback services developed in North America whereby truck trailers are carried medium-to-long distances on railway flat cars.

108. The essential point is that Europe and North America offer sufficient volumes traveling in excess of 3,000 km to justify the considerable investment in unit container trains. The PRC and the Russian Federation equally offer the length of haul for the development of long-distance container trains that are linked to maritime and road services at either end. On the African continent, South Africa has also developed unit container services north to Tanzania and intermediate points.

[1] Total rail tkm for all commodities for the two railways was 298,892 million. By comparison, the tkm accomplished on the consultants' defined surface transport network in 2004 was 252,508 million.

109. Within the GMS, there are unit container train services operating between the ports of Bangkok and Laem Chabang on the one hand and Lad Krabang Industrial Estate on the other hand. These services carry limited volumes over short distances at a reasonable level of efficiency. Interestingly, there are no plans as of yet for the development of container rail services over the Bangkok-Vientiane line although it would appear to be a promising opportunity.[1]

110. Returning to Table 3-14, road transport rates are higher than the ocean rates by a considerable margin as would be expected, being 4-48 times the Europe-SE Asia ocean rates, while rail rates are between the deep sea and road rates. Section III.C.3 indicated the constraints on the trucking industry in some GMS countries. Data collected from four GMS countries in the course of the consultants' field work indicated a range of freight rates per tkm for containerized cargo by road of between US$ 0.07 and US$ 0.23. The simple non-traffic weighted average rate is about US$ 0.15 per containerized tkm. The range and average are high by world standards and reflect the constraints referred to in Section III.C.3. With roads maintained to an acceptable standard, enhanced competition, increasing scale of shipments and the upgrading of road transport operations in several GMS countries, the average rate charged would be expected to drop to towards the lower end of the range.

111. Other than road ferries, there has been relatively little development of road-inland waterway transport terminals. Cambodia has investigated the possibility of such interchanges at a pre-feasibility level. The Mekong River Commission has also signaled that such interchanges are desirable for the further development of the inland waterway transport industry.[2]

112. GMS flows are small compared to those characterizing major intermodal transport markets. Lengths of haul on major corridors are also short compared to those characterizing large intermodal operations. While traffic will grow fairly rapidly in future thus increasing scale, the relatively short distances characterizing GMS transport demand will require interventions recognizing these factors. At this point, the best contribution to the further development of intermodal shipping would focus on alignments of documents to intermodal practices, encouragement of more cargo interchange points in the network, and upgrading of the trucking industry.

d) Other Constraints on the Development of the GMS Logistics Industry

113. While outside the scope of this TA, parallel developments have been recommended for the logistics industry under the ADB-supported Strategic Framework for Action on Trade Facilitation and Investment. A Framework document (known as SFA-TFI) was proposed for adoption on 10 June 2005. In the development of the SFA-TFI, TA 6020-REG was carried out by the International Trade Institute of Singapore.[3]

114. Major findings of TA 6020-REG of relevance to the GMS Transport Sector Strategy Study include:

(i) a need for human resource development in the logistics industry given the small number of professionally trained logistics experts currently deployed;
(ii) a lack of effective promotion of services available from logistics services providers to potential clients;

[1] The Friendship Bridge to Thanaleng line now being implemented would make such services possible.
[2] GMS Transport Sector Strategy Study Interim Report, p. WP4-10, August 2005.
[3] ADB TA 6020-REG: *Facilitating Cross-Border Trade and Investment for SME Development in the GMS*, November, 2004.

(iii) a lack of intermodal interchanges or trade hubs, which is constraining the growth of the industry and restricting its geographic reach; and
(iv) a lack of refrigerated facilities and services.

115. Trade logistics including the development of the GMS logistics industry has been identified as a topic to be pursued in order to enhance trade. The following principal activities are being considered for adoption:

(i) complementing the CBTA by supporting implementation of the Annexes and Protocols related to transport and logistics;
(ii) improving the transparency of transport costs, administrative and documentation fees, port and handling charges, and other logistics-related costs in transporting goods along the GMS corridors so that traders and manufacturers can make better freight scheduling and supply chain decisions;
(iii) taking a holistic approach to logistics development assessing gaps and needs, identifying the infrastructure needed to support logistics development, and establishing logistics facilities such as intermodal interchanges or distribution hubs/centers within the GMS to support trade facilitation; and
iv) upgrading the quality of logistics professionals and practitioners in the GMS to improve their comprehension of logistics and supply chain management to better service GMS traders and manufacturers.

116. There is a considerable complementarity with technical assistance projects (TAPs) proposed and evaluated under the GMS Transport Strategy Study as profiled in Appendix 4. This includes: (i)12 CBTA-related TAPs, three logistics related TAPs including human resource development components; (iii) three TAPs focusing on the upgrading of the road, railway, and inland waterway transport; and (iv) three TAPs related to port marketing, railway management, and short sea shipping services.

117. In order to achieve a productive division of labor between the GMS Transport Sector Strategy and the SFA-TFI, there should be a formalized link between Transport Strategy implementation and the execution of activities of the SFA-TFI. ADB staff working on the SFA-TFI should be invited to the annual meetings of the Subregional Transport Forum, be invited to comment on TORs, and serve on the Steering Committees for the above-noted TAPs. Likewise, it is urged that ADB staff charged with implementation of the Transport Sector Strategy attend the scheduled meetings held under the SFA-TFI.

118. It should be noted that there are resources and facilities in the GMS to assist in the further development of the GMS logistics industry. Thailand is continuing its pioneering work in logistics with a new initiative that will address the following five areas:

(i) Infrastructure;
(ii) Data linkage;
(iii) Capacity building;
(iv) Logistics service providers; and
(v) Trade with neighbors.[1]

119. Thailand has previously indicated to the TA team that arrangements could be made under ACMECS for the training of candidates from neighboring countries. The PRC and Viet Nam also offer programs in the broad area of logistics and have indicated that such programs could include logistics operators from other organizations.

[1] Discussion with Thai National Shippers' Council (TNSC) on 19 October 2005.

5. Conclusion

120. Many constraints to the effective and efficient movement of goods are in the course of being addressed as indicated in Sections B and C. Approaches to the relaxation of additional constraints identified in the course of these Sections are discussed in Chapter VI, Improving GMS Transport Efficiency.

CHAPTER IV: FORECAST TRANSPORT DEMAND IN 2015

IV. FORECAST TRANSPORT DEMAND IN 2015

A. Socioeconomic Forecasts

1. Introduction

1. Interim Report Working Paper 9, Review of Macroeconomic Factors Relevant to Updating the GMS Transport Sector Strategy, provided forecasts to 2015 of key economic and demographic factors including: (i) Gross Domestic Product; (ii) Population; (iii) Gross Domestic Product per capita; (iv) Exports; (v) Imports; and (vi) Tourism Arrivals.

2. These indicators have been utilized to develop traffic forecasts. After growth in each factor was calculated by comparing 2015 values by 2004 values, the average annual growth rate over the forecast horizon was calculated. The traffic growth factors assumed by mode and vehicle type are shown in Table 4-1.

Table 4-1: Traffic Growth Factors

<table>
<tr><th>Mode/Traffic Type</th><th>Growth Factor (GF)</th></tr>
<tr><td colspan="2">Domestic</td></tr>
<tr><td colspan="2">Passenger</td></tr>
<tr><td>Motorcycle</td><td>GDP GF x Population GF</td></tr>
<tr><td>Car</td><td>GDP GF x Population GF</td></tr>
<tr><td>Bus</td><td>GDP GF x Population GF</td></tr>
<tr><td>Rail Passenger</td><td>GDP GF x Population GF</td></tr>
<tr><td>Inland Waterway Transport Passenger</td><td>GDP GF x Population GF</td></tr>
<tr><td colspan="2">Freight</td></tr>
<tr><td>Truck</td><td>GDP GF * 1.2</td></tr>
<tr><td>Rail Freight</td><td>GDP GF * 1.2</td></tr>
<tr><td>Inland Waterway Transport Freight</td><td>GDP GF * 1.2</td></tr>
<tr><td colspan="2">Cross-Border</td></tr>
<tr><td colspan="2">Passenger</td></tr>
<tr><td>Motorcycle</td><td rowspan="5">(0.8 x Per Capita GF x Population GF)

Plus

(0.2 x Tourism Arrival GF)</td></tr>
<tr><td>Car</td></tr>
<tr><td>Bus</td></tr>
<tr><td>Rail Passenger</td></tr>
<tr><td>Inland Waterway Transport Passenger</td></tr>
<tr><td colspan="2">Freight Including to/from External Traffic Zones</td></tr>
<tr><td>Truck</td><td rowspan="3">Average of
(Import and Export GFs)
and
(GDP GF * 1.2)</td></tr>
<tr><td>Rail Freight</td></tr>
<tr><td>Inland Waterway Transport Freight</td></tr>
</table>

Sources: 1) World Bank research.
2) TA estimate prepared on basis of Working Paper 9 of the Interim Report, Review of Macroeconomic Factors Relevant to Updating the GMS Transport Sector Strategy.

3. Research carried out by the World Bank in developing countries has shown that surface freight transport has an elasticity of 1.2 to growth in GDP. The elasticity has been applied to all GMS countries, with the exception of Thailand, which has moved towards middle-income country status. Therefore, growth in surface freight transport will more likely track GDP growth in the future in Thailand.

4. For passenger transport, a per capita GDP x population growth factor was calculated. These apply to domestic passenger transport demand. Although there has been a rapid increase in car and motorcycle ownership during the past decade, most GMS countries are still ranked fairly low in motorcycle and four-wheeled ownership per 1,000 persons. Accordingly, over the forecast period, it was assumed that in all countries except Thailand, 7.5% of bus passengers will migrate to the motorcycle mode and 7.5% to the car mode over the forecast horizon. In the case of Thailand, it was assumed that 10% of bus passengers would switch to the car mode over the forecast horizon.

5. Adjustments were made to cross-border passenger transport. It was assumed that 80% of cross-border transport growth would be driven by the domestic demand of GMS partners. The remaining 20% of cross-border passenger transport growth was assumed to be driven by the growth in tourism arrivals. Data from the GMS Tourism Strategy Study was utilized in calculating growth in tourism arrivals.[1]

6. As regards cross-border freight transport, trade between GMS countries has grown at a higher rate than trade in general. While in 1992 about 5.7% of total GMS country trade was between GMS countries, by 2003 it had risen to 12.0%, and it was as high as 12.9% of total trade in 2002.[2] Lao PDR and Myanmar's trade with GMS partners is a much higher percentage of total trade than is the case of other GMS countries.

7. It has been assumed that the trade of all GMS countries will grow at a rate higher than the rate applying to the rest of the world. Thus different rates were calculated for each country except Lao PDR for Intra-GMS Trade as opposed to trade with the rest of the world. It was assumed that the recent percentage of Intra-GMS trade would be 20% higher by 2015 than the levels indicated by recent trade data. Difficulties in isolating Lao PDR transit trade with the rest of the world from Intra-GMS trade entailed that the same calculation could not be made for that country.

8. Since trade data is only calculated in value terms in four of six GMS countries, a further adjustment was made to the growth rates for trade to reflect an increasing proportion of higher value goods, characterized by higher value to weight proportions as compared to recent flows as a proportion of total rates. Conversely, less bulky goods characterized by low value to weight goods are likely to be shipped. The trade forecast projections contained in Working Paper 9 were factored by 0.8. The resulting growth rates applied to the flows over the "do minimum" network are shown in Table 4-2.

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[1] Asia Pacific Projects, *Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Draft Report, Annex Volume*, 7 March 2005, pp. 43-45.
[2] Working Paper 9, Interim Report.

Table 4-2: Assumed Growth Rates in Macroeconomic, Demographic, and Traffic Growth 2004-2015 (% per annum)

Indicator	Cambodia	PRC, Yunnan	PRC, Guangxi Zhuang AR	Lao PDR	Myanmar	Thailand	Viet Nam
Basic Macroeconomic and Demographic Indicators							
GDP (2004 constant prices)	6.93	6.60	5.54	7.56	6.01	6.93	7.21
GDP per Capita (2004 constant prices)	3.94	6.21	4.94	5.22	4.13	3.94	6.41
Population	2.27	0.36	0.53	2.27	1.82	2.27	0.79
Exports	9.99	9.99	9.99	12.00	10.47	9.99	9.99
Imports	9.60	9.99	9.99	9.11	8.57	9.60	10.40
Tourism Arrivals	12.69	12.69	12.69	10.87	2.97	12.69	10.33
Transport Growth Rates by Mode and Passenger/Cargo – Domestic							
Motorcycle	6.73	10.31	10.31	7.76	14.90	5.03	9.37
Car	7.66	11.87	11.87	16.99	9.42	12.27	14.70
Bus	4.71	4.53	4.53	5.90	4.50	4.03	5.65
Rail Passenger	6.27	6.62	5.53	7.48	6.05	5.03	7.23
Inland Waterway Transport Passenger	6.27	6.62	5.53	7.48	6.05	5.75	7.23
Truck	8.72	8.41	7.29	9.36	7.76	5.75	7.20
Rail Freight	8.72	8.41	7.29	9.36	7.76	5.75	7.20
Inland Waterway Transport Freight	8.72	8.41	7.29	9.36	7.76	5.75	7.20
Transport Growth Rates by Mode and Passenger/Cargo – GMS Cross-Border							
Motorcycle	8.21	10.83	10.83	8.45	13.34	5.49	9.57
Car	8.87	12.04	12.04	16.00	8.41	11.41	13.95
Bus	6.84	6.73	6.73	7.09	4.21	4.73	6.76
Rail Passenger	7.89	8.13	7.39	8.24	5.51	5.49	7.92
Inland Waterway Transport Passenger	7.89	8.13	7.39	8.24	5.51	5.49	7.92
Truck	8.86	9.98	9.98	10.65	9.55	8.40	10.19
Rail Freight	8.86	9.98	9.98	10.65	9.55	8.40	10.19
Inland Waterway Transport	8.86	9.98	9.98	10.65	9.55	8.40	10.49
Foreign and Intra-GMS Goods Transport							
Exports – Intra GMS	12.02	12.90	12.90	10.65	11.52	9.98	13.16
Exports – Extra GMS (Rest of World)	9.86	9.92	9.92	10.65	9.82	7.79	9.53
Imports – Intra GMS	11.60	12.90	12.90	10.65	9.59	10.80	12.42
Imports – Extra GMS (Rest of World	7.97	12.90	9.90	10.65	7.82	8.57	9.95

Source: TA estimate prepared on basis of Working Paper 9 of the Interim Report, Review of Macroeconomic Factors Relevant to Updating the GMS Transport Sector Strategy

B. Forecast GMS Transport Flows

1. Introduction

9. Summary statistics from the 2015 "Do Minimum" GMS Transport Model run are presented in this section. These forecasts take into account committed transport schemes. The eight modeled transport types (motorcycles, cars, buses, rail passengers, water passengers, trucks, rail freight, and water freight) were converted into passengers and tonnes on a link basis, generating passenger-km and tonne-km.

2. Road

10. Tables 4-3 and 4-4 compare 2004 and 2015 passenger- and tonne-km by road by GMS country.

Table 4-3: 2004 and 2015 Annual Passenger-km (millions) - Roads

Country	2004	2015	2004-2015 Growth %	Annual Growth %
Cambodia	1,399	2,861	105	6.7
PRC (Yunnan/ Guangxi)	95,223	165,812	74	5.2
Lao PDR	1,092	2,415	121	7.5
Myanmar	15,833	26,026	64	4.6
Thailand	340,509	536,037	57	4.2
Viet Nam	68,572	122,523	79	5.4
Total	522,627	855,674	64	4.6

Table 4-4: 2004 and 2015 Annual Tonne-km (millions) - Roads

Country	2004	2015	2004-2015 Growth %	Annual Growth %
Cambodia	1,539	4,492	192	10.2
PRC (Yunnan/ Guangxi)	26,617	66,726	151	8.7
Lao PDR	897	2,662	197	10.4
Myanmar	5,352	15,677	193	10.3
Thailand	89,436	197,413	121	7.5
Viet Nam	23,504	56,990	142	8.4
Total	147,345	343,961	133	8.0

3. Rail

11. Tables 4-5 and 4-6 show annual passenger-km and tonne-km on railways, by country. The 2015 forecasts for Lao PDR refer to the Nong Khai-Thanaleng link, which did not exist in 2004. It has been assumed that this link will be freight only. Similarly, in Cambodia it has been assumed that the railway system will continue to provide only freight services. The potential impact of the committed upgrades to Viet Nam's railway system can be clearly seen in the anticipated growth in system-wide passenger-km.

Table 4-5: 2004 and 2015 Annual Passenger-km (millions) - Railways

Country	2004	2015	2004-2015 Growth %	Annual Growth %
Cambodia	0	0	n/a	n/a
PRC (Yunnan/ Guangxi)	17,145	32,779	91	6.1
Lao PDR	0	0	n/a	n/a
Myanmar	9,742	19,070	96	6.3
Thailand	11,608	15,984	38	3.0
Viet Nam	5,424	22,199	309	13.7
Total	43,919	90,032	105	6.7

Table 4-6: 2004 and 2015 Annual Tonne-km (millions) - Railways

Country	2004	2015	2004-2015 Growth %	Annual Growth %
Cambodia	208	539	160	9.1
PRC (Yunnan/ Guangxi)	80,659	198,339	146	8.5
Lao PDR	0	0	n/a	n/a
Myanmar	789	2,025	157	8.9
Thailand	3,581	8,639	141	8.3
Viet Nam	3,032	8,021	165	9.2
Total	88,269	217,564	146	8.5

4. Inland Waterway

12. Tables 4-7 and 4-8 show annual passenger-km and tonne-km on inland waterways, by country. The small amount for the PRC is attributable to the single coded inland water transport (IWT) link, from Jinghong (Yunnan) to the Mekong between Myanmar and Lao PDR.

13. Observed counts were available neither on the Chao Phraya/Tachin River Systems in Thailand, nor on the Mekong between Thailand and Lao PDR within Lao PDR (aside from data on Chiang Saen and Chiang Khong Ports in the north of Thailand, serving primarily PRC-Thai trade). As such, forecasts of inland waterway transport in Lao PDR and Thailand should be treated with caution.

14. Furthermore, given the coding structure of the GMS Transport Model and the definition of Phnom Penh as both a riverport and a seaport, maritime traffic to/from Phnom Penh Port is excluded from these numbers. Similarly, maritime traffic to/ from seaports in the Vietnamese Mekong Delta are also excluded from these numbers.

15. These data refer to inland water transport only.

Table 4-7: 2004 and 2015 Annual Passenger-km (millions) - Inland Waterways

Country	**2004**	**2015**	**2004-2015 Growth %**	**Annual Growth %**
Cambodia	113	229	103	6.6
PRC (Yunnan/ Guangxi)	0	0	n/a	n/a
Lao PDR	2,184	4,476	105	6.7
Myanmar	662	1,010	52	3.9
Thailand	676	1,142	69	4.9
Viet Nam	1,098	1,812	65	4.7
Total	4,733	8,668	83	5.7

Table 4-8: 2004 and 2015 Annual Tonne-km (millions) - Inland Waterways

Country	**2004**	**2015**	**2004-2015 Growth %**	**Annual Growth**
Cambodia	164	418	156	8.9
PRC (Yunnan/ Guangxi)	3	10	233	11.6
Lao PDR	471	1,196	154	8.9
Myanmar	582	1,523	162	9.1
Thailand	52	107	105	6.7
Viet Nam	15,623	35,471	127	7.7
Total	16,894	38,725	129	7.8

CHAPTER V: PROSPECTIVE CONSTRAINTS ON GMS TRANSPORT EFFICIENCY

V. PROSPECTIVE CONSTRAINTS ON GMS TRANSPORT EFFICIENCY

A. Infrastructure Constraints

1. Road Transport

a) Introduction

1. At the time of the 1993-94 GMS transport sector study, intra-GMS movement was highly constrained by a combination of a lack of infrastructure and border crossing points and regulatory obstacles. Infrastructure development in the interim and progress in implementing the GMS Cross-Border Transport Agreement (CBTA) have considerably eased constraints on road transport and further easing is in prospect. The forecast growth in transport demand to 2015, detailed in Chapter IV, will result in some capacity-induced deterioration in quality of service, unless addressed by further infrastructure improvements, but these are expected to be put in place over the period. Progress with intra-GMS links to Myanmar and extra-GMS links through Myanmar has lagged that in other areas. If unaddressed, this will increasingly be a constraint. In a few other cases important missing links remain uncommitted for various reasons: e.g., the 6km connection between Route 13S in Lao PDR and NR7 in Cambodia, construction of which may not be possible until agreement is reached on demarcation of the border in the area and the financing of the Houei Sai-Chiang Khong Third International Mekong Bridge.

2. Road is the predominant mode of intra-GMS transport and road has the greatest geographic penetration. The standard of the road networks varies considerably between countries.

b) Cambodia

3. While much of Cambodia's road network has been rehabilitated in recent years, significant links such as Siem Reap-Sisophon-Poipet have yet to be fully rehabilitated. The road network remains a mixture of Class II, Class III, and Below III standard roads. The highest specification road in the country is the Phnom Penh-Sihanoukville Highway (NR 4), but this is also classified as Class II. Consequently, road capacity is limited as compared to Thailand and Viet Nam. This may hinder the development of and reduce the attractiveness to potential drivers of road-based schemes within the Southern Economic Corridor, Central Sub-Corridor, or Southern Coastal Sub-Corridor.

4. It is understood that following rehabilitation of road sections there is a very marked increase in traffic levels. Given the scale of rehabilitation recently completed, underway, or committed, and its impacts on travel demand, it is likely that road-based travel patterns will change markedly over the next 5-10 years. This of itself might create sufficient demand to justify the further upgrading of roads, which in turn would make the Southern Economic Corridor routes more attractive.

c) Yunnan and Guangxi, People's Republic of China

5. During the last 10 years, the PRC has greatly enhanced its highway network. In many instances new tolled expressways have been constructed parallel and in addition to longer-established National Highways. The PRC has one of the most developed road networks within the GMS.

6. Furthermore, both Guangxi and Yunnan have a number of major Class 1 and Expressway projects committed. On completion of these projects, it is not foreseen that there will be major constraints on cross-border transport within the GMS in respect of these provinces.

d) Lao PDR

7. The road network in Lao PDR is predominantly of Class III standard on key links and lower on many other roads. In addition, there are a number of vehicle ferries in operation. It is generally recognized that the relatively low road standard of Lao PDR, together with its often mountainous terrain (particularly in the East, bordering Viet Nam) acts as a bottleneck in trans-GMS trade.

8. Given its relatively low population density and income level, upgrading the highway network might not be particularly attractive in strict economic terms. Furthermore, given terrain conditions as well as unexploded ordnance (UXO) problems in many areas bordering Viet Nam, construction of roads would be relatively slow and expensive. However, without upgrading key routes the network would act as a constraint on road-based trading between, for instance, Thailand and the PRC, and Thailand and Viet Nam.

e) Myanmar

9. Myanmar has some high quality (Class I and Class II) roads near Yangon. However, in most parts, roads are of Class III standard or lower. Several vehicle ferries are also in operation.

10. Given its size, the biggest country by land area wholly within the GMS and its location (between Southeast Asia, the PRC, and South Asia), the poor state of its road network constrains the development not only of Myanmar, but also inter-regional trade (i.e., between the GMS and South Asia).

11. During discussions in Myanmar it was acknowledged that the country lacks funding for much of the road network upgrade work, which the Government deems important. Unless a solution can be found to financing Myanmar's road infrastructure development, it seems unlikely that surface-based transport between South Asia and China and South East Asia would be able to develop as fast as desirable.

f) Thailand

12. Thailand has probably the best developed road network within the GMS. With the exception of a few small border roads, including a number of "missing links" with Myanmar, roads are generally of good standard and in good repair. Road connections with Lao PDR are currently being upgraded, e.g., the Mukdahan-Savannakhet Bridge.

g) Viet Nam

13. Viet Nam's road network is being rapidly developed and upgraded. While National Highway 1 is typically of Class II standard (Class I near Hanoi), mountain roads, especially those connecting with Lao PDR are often of a poorer standard. Nevertheless, it is some of these links that are likely to be more crucial to cross-border trade within the GMS.

14. In the Mekong Delta there are still a number of "missing links" currently served by vehicular ferries. These reduce overall capacity and slow journey times within the Mekong Delta. However, a number of ferries have already been replaced with bridges and a number of other bridges are committed.

15. While not a constraint currently, a possible future constraint is Highway 1. Given Viet Nam's geography there is at present only one major north-south highway. Much of it has been upgraded in recent years. However, as domestic trade grows increasing pressure would be put onto this single link, which might constrain traffic growth. In GMS terms, potential congestion along Highway 1 would constrain any cross-border traffic along the Southern Economic Corridor from continuing further north within Viet Nam. Under such circumstances, the importance of east-west links through Lao PDR would increase.

16. Another highway running broadly parallel for part of Highway 1's length is under construction, namely "duong Ho Chi Minh Tay". This may serve to relieve congestion on Highway 1, although the purpose of this parallel route is more to improve accessibility and north-south transport through the Highlands.

h) Summary

17. The quality of the road networks within the GMS varies greatly. Thailand's network is generally good. The PRC's network continues to develop and once committed projects are completed, Guangxi and Yunnan will also have comprehensive networks of high quality roads. Viet Nam's network is generally of reasonable standard, with the exception of some highland routes, particularly near/ connecting Lao PDR and also of some "missing" bridges in the Mekong Delta (although many of these are being addressed).

18. However, the road networks in Cambodia, Lao PDR and Myanmar are deemed to be sub-standard in many places. This constrains growth in road-based trade between Thailand and Viet Nam, Thailand, and the PRC and between the GMS and South Asia. In addition, poor standard roads increase road transport costs.

19. While an alternative route for PRC-Thailand trade is available through Myanmar, via Mae Sai/Tachilek, customs clearance is often very time consuming in Myanmar (see below).

2. Railway Transport

a) Introduction

20. GMS rail transport remains highly constrained by the lack of physical connections between the national railway systems. It is also constrained by the nature of the systems, largely meter gauge offering a relatively low quality of service in terms of operating speed, axle load, rolling stock, and service reliability. A major improvement is in prospect on the Kunming/Nanning-Hanoi-Haiphong/Cai Lan corridors. By 2015 a high quality standard gauge service should be operating on all the Yunnan/Guangxi sections, including high-speed operation (160-200 kph) linking Kunming and Nanning. On the Vietnamese sections, a high quality meter gauge system should be in place, with the possible construction of a standard gauge line in addition. A standard gauge line in Yunnan to the Myanmar border is also expected to be complete. In Cambodia, the existing network should have been renovated and the Poipet-Sisophon/Aranyaprathet missing link reinstated to connect the Cambodian and Thai systems. The Nong Khai-Vientiane link may also be in place. For other

missing links: Cambodia-Viet Nam, Thailand-Myanmar, Myanmar-Yunnan, Lao PDR-Viet Nam, Lao PDR-Yunnan, and Thailand-Lao PDR-Yunnan, prospects are uncertain, given the high construction costs involved in all cases. Thus major network constraints are expected to remain in 2015. Full GMS rail connectivity may be only a long-term prospect.

b) Cambodia

21. Cambodia's rail network comprises two routes, one running south from Phnom Penh to Sihanoukville (264 km) and one running north to Sisaphon (337 km). The performance of Cambodia's railway network is currently constrained due to poor track quality. However, rehabilitation works are planned. The railway formerly ran to the Thai border at Poipet, but the track between Sisophon and Poipet has been disused for some time. In Poipet much of the railway embankment has been built on.

c) Yunnan and Guangxi

22. Rail has long been the backbone of the national transport system. While the network in Guangxi is fairly extensive, the network in Yunnan is more limited, relative to much of the rest of the country. The national railway system is generally of standard gauge. However, the 468 km line from Kunming to Hekou is meter gauge. This line is presently freight-only and connects to the Viet Nam railway system at Lao Cai.

23. In addition to the Hekou-Lao Cai cross-border line, freight and passenger services operate between Guangxi and Viet Nam via the Friendship Pass. The Nanning-Friendship Pass line is standard gauge to Yen Vian.

d) Myanmar

24. Myanmar's meter-gauge, single-track network comprises 4785 route-km and 6,210 track-km. There are 739 stations.

e) Thailand/Lao PDR

25. Thailand's railway network over 4,000 km. It is predominantly single track. Thailand operates 1,000mm track gauge. Once the spur line across the Friendship Bridge to Lao PDR is completed, it is envisaged that State Railways of Thailand will manage and operate all services on this track. The average operating speed of Thailand's railways is 27kph for freight trains. This is substantially slower than speeds attained by trucks on roads.

f) Viet Nam

26. Viet Nam's railway network has approximately 2,600km of track, mainly single track. Most of Viet Nam's rail network has a 1,000mm track gauge. However, the Hanoi – Dong Dang (162 km) and Hanoi – Quan Trieu (75 km) tracks are mixed gauge, offering both 1,000mm and 1,435mm track gauge. In addition, the Kep – Uong Bi – Ha Long (106km) and Kep – Luu Xa (57km) tracks have a 1,435mm track gauge.

g) Summary

27. Rail offers the possibility of efficient long-distance transport, especially for freight. However, aside from PRC-Vietnamese trade, this cannot happen until such

time as network connectivity is established. However, rail infrastructure requires large capital investment compared to road. Furthermore, substantial human resource development is required to successfully, efficiently, and effectively operate a rail network.

3. Other Modes

a) Introduction

28. Infrastructure is not in general as significant an existing or prospective constraint for other modes as the efficiency with which facilities are operated. While there is a lack of a deepwater port in Myanmar, runway-length constraints at some airports and channel restrictions limiting inland waterway use, much of the infrastructure for these modes serves primarily extra-GMS services. Its development is driven by external demand and few major projects are primarily GMS-transport related. This is not expected to change by 2015, with the share of intra-GMS movement in total GMS transport perhaps little changed, except for the tourism sector, where it could become more important.

b) Inland Waterways

29. Inland waterways offer the possibility of cheap, bulk freight transport. However, the GMS inland waterway network comprises a number of separate systems, namely:

(i) Lancang-Mekong, which itself can be broken down into the PRC sections, the sections running alongside/through Lao PDR (Upper Mekong), and the Lower Mekong (through Cambodia and Viet Nam);
(ii) the Red River System in northern Viet Nam;
(iii) the Ayeyawady and Lower Chindwin Rivers, in Myanmar; and
(iv) the Chao Phraya and Tachin River Systems, in Thailand.

30. As a consequence, most of the inland water transport (IWT) network serves domestic transport, or in the cases of cities such as Yangon, Phnom Penh, Bangkok, and Ho Chi Minh City, riparian access to maritime routes. However, by and large the IWT system is under-developed, in that it serves primarily short-distance traffic, which is largely domestic. Data on these short-distance journeys are also hard to obtain.

31. A further consideration is that, even more so than for rail, intermodal interchange is critical to developing the sector. Unless the origins and destinations of cargoes (especially bulk cargoes) happen to be near ports, road or rail connectivity to modern, efficient ports is essential. Without these the catchment areas for water transport are limited. It is perhaps not surprising therefore that the areas where waterways are most used are typically also those areas with fairly dense transport networks of other modes, such as in the Mekong Delta, the Red River Delta and in Central Thailand.

(i) Lancang-Mekong River

32. While the Lancang-Mekong River itself is international, crossing or bordering all six GMS countries, at present there is minimal international traffic from the PRC. China. Likewise, there is negligible official traffic to/ from Myanmar on the Mekong.

33. While there are programs to dredge the Lancang-Mekong in the PRC and Lao PDR (including the sections abutting Thailand and Myanmar) at present, traffic is overwhelmingly short distance and domestic north of the Khone Falls. The Khone Falls, near the Lao PDR-Cambodian border, make navigation between the Lower and Upper Mekongs impossible at present.

34. Recently, Thailand has been developing port facilities on the Upper Mekong in Chiang Rai Province. Chiang Khong port has been operational since December 2003 (officially opening in January 2004). In addition, a port at Chiang Saen is currently being evaluated. These ports are intended to boost Yunnan-Thailand trade, as the Upper Mekong is dredged.

35. However, the program to dredge the Upper Mekong in particular need to take into account impacts on the river's biodiversity, as many rely on the river's varied fish stocks for sustenance. Given that at present channel navigability (in terms of dry season constraints and maximum vessel size constraints) are the main constraints on riparian transport, any quantum improvements in navigability could substantially improve the economics of transport along the Upper Mekong. This in turn could potentially lead to substantial increases in the volumes of river trade.

36. There is substantial shipping in the Lower Mekong, mainly from Phnom Penh downstream towards the Delta and within the Mekong Delta in Viet Nam. There is also some traffic between the Tonlé Sap River and the Mekong in Cambodia (the two converge at Phnom Penh). Likewise, the Mekong and Bassac Rivers split near Phnom Penh and there is traffic between the two. Similarly, there is significant traffic between/among the Mekong, Bassac, and other delta tributaries within Viet Nam. However, there is a dearth of reliable statistics on domestic river transport within Cambodia and within Lao PDR.

(ii) Red River

37. Although originating in the PRC, at present there is no international navigation between Yunnan and Viet Nam along the Red River. The Red River is navigable as far upstream as Lao Cai, near the border with the PRC.

38. The Red River Delta system provides riparian connectivity within northern Viet Nam. While there are significant traffic volumes within the Red River System, much of this appears to be for domestic Viet Nam traffic, although there is connectivity with seaports, such as Haiphong and Halong.

(iii) Ayeyawady and Lower Chindwin River System

39. Although Myanmar borders the Mekong, there is no official traffic on this stretch of the Mekong to/from Myanmar, although there is anecdotal (but no statistical) evidence available of informal traffic along and across the Mekong at this point. Rather, Myanmar's riparian traffic is concentrated on the Ayeyawady and Lower Chindwin River Systems.

40. However, certain key sections of these rivers are either passable only seasonally, or barely at all. For example, the section of the Chindwin between Monywa and its confluence with the Ayeyawady is passable only in the low water season. The Ayeyawady north of Bhamo is similarly viewed by the Government of Myanmar as a missing link.

41. Officials in both Myanmar and Yunnan mentioned the possibility of linking southwestern PRC to the Gulf of Martaban and the Indian Ocean through opening up both the upper reaches of the Ayeyawady and landbridges between Yunnan and Myitkyina and/or Bhamo. However, for the time being at least, Myanmar's navigable waterways offer only domestic transport routes.

(iv) Chao Phraya and Tachin River Systems

42. While Thailand has access to the Mekong, as previously mentioned, these sections of the Mekong cannot access the sea. In addition, capacity is constrained by current dimensions, including seasonal limitations on navigation along much of the Mekong. Hence Thailand's riparian transport concentrates on the Chao Phraya and Tachin River Systems.

43. The Chao Phraya and Tachin River Systems are augmented by a number of smaller tributaries, such as the Khwae Noi and Maeklong Rivers, as well as by a number of canals. These waterway systems form an important component of Thailand's transport system, and enable access to the Gulf of Thailand. However, they do not offer transport to/from other GMS countries.

(v) River Systems in Yunnan and Guangxi

44. The Lancang-Mekong's headwaters are in the PRC and there is limited short-distance navigation within the PRC. However, there is not at present large-scale navigation from the PRC south to Lao PDR, although the benefits of this potential are being actively discussed. The Red River is not currently navigable from Yunnan into Viet Nam.

45. Guangxi's river transport system is more closely tied to southern PRC, offering some connectivity with the Pearl River via Guangdong. As such, this does not directly serve the rest of the GMS.

46. While land transport to southern PRC via Guangxi is possible, water-based transport to southern PRC China is better suited to coastal or maritime transport. An exception is Yunnan, which is linked to Guangxi by both road or rail, from which Yunnan cargoes could proceed by river to southern PRC. However, Guangxi's riparian transport systems are not seen as critical to the rest of the GMS.

B. Constraints on Operation of Border Crossings

1. Road Subsector

47. Currently, border crossings within the GMS can be characterized by delay. There is little published information on how long it takes to cross borders within the GMS, but anecdotal evidence indicates that goods vehicles the process normally takes a several hours.

48. A recent study for ADB of the Poipet (Cambodia)-Aranyaprathet (Thailand) border crossing points by a staff consultant suggests that at present import checks

often take in excess of 4 hours for freight and passenger checks take an average of 40 minutes.[1]

49. However, customs clearance for goods vehicles entering Myanmar can take substantially longer. During the Country Mission to Myanmar in May 2005, the TA Team was informed that it typically takes 48 hours for trucks to enter Myanmar from Yunnan. This is in part due to a lack of modern equipment, such as passport scanners and X-ray machines for the checking of cargoes.

50. It is understood that the PRC is providing funds for one such X-ray machine to Myanmar costing approximately US$5 million, for use at Muse (Ruili being the corresponding PRC border crossing point). It is expected that this will reduce customs clearance times to within 24 hours.

51. Myanmar also informed the TA Team that many customs officials could benefit from international training to speed up customs clearance.

52. The volumes passing through Ruili-Muse alone are substantial: estimated at approximately 0.5 million MT of cargo two-way and over 2.5 million people each way in 2004. Thus the value of lost time through customs and immigration delays is enormous.

53. It may also indicate that there is substantial suppressed cross-border travel demand, which could be unleashed should customs and immigration procedures be accelerated.

54. An issue at most borders is that the majority of trucks are not permitted to operate within a second country. Hence a truck from the exporting country has to have its cargo de-stuffed and then re-stuffed into a truck from the importing country. This is typically a manual exercise.

55. This procedure adds unnecessary time and expense to trading. Furthermore, such arrangements make it very difficult logistically to arrange for transit through a third country (e.g., Thailand-Viet Nam via either Lao PDR or Cambodia) as three trucks would need to be scheduled to meet.

56. While there are some permits for operators to deliver (but rarely if ever to collect) in another country, they are limited in number. Relaxing the availability of these permits however needs to be weighed against the concerns of some countries that their domestic trucking industries could be wiped out by competition from richer, better-organized neighbors. While such a move may well reduce transport costs for shippers, the concern is that it would also increase unemployment, at least in the short term, within the poorer countries, where unemployment is already a major issue.

57. While it seems likely that the issue of relaxing cross-border permit restrictions will eventually be resolved, with the agreement on the final draft of Protocol 3 of the CBTA (Frequency and Capacity of Services and Issuance of Quotas and Permits) at Vientiane in November 2005, there will nevertheless be a transitional phase of several years, while domestic trucking industries prepare themselves for competition.

58. As an aside, this also suggests that there may be requirements for international assistance in developing and enhancing the necessary skills/human

[1] Additional "before" studies of selected border crossing points included in Protocol 1 of the CBTA are expected to be conducted by ADB in the coming months.

resource requirements for such firms to prosper against foreign competition. If this were achieved, then once competition came, it would be more sustainable.

2. Rail Subsector

59. It is not only road freight that requires being de-stuffed and re-stuffed at borders. Cargoes arriving by rail in Viet Nam from Guangxi (PRC) for destinations beyond the immediate border also have to be transferred from one train to another; and this too is usually a time-consuming, manual exercise.

60. The State Railway of Thailand will operate the rail spur to Thanaleng (Lao PDR).

61. If cross-border rail services are expanded elsewhere, in order to maximize the benefits of any such connections, there will need to be appropriate agreements in place allowing in the first instance, railway operators from either country to pick up and set down passengers and cargo in either country. Having to transfer between trains at borders would be economically wasteful and reduce the potential benefits of any such connections.

62. However, in the longer term more complicated arrangements would also need to be considered. For example, should Bangkok-Phnom Penh-Ho Chi Minh City services be launched, all three operators should have rights to operate in one anothers' territory on those routes, presumably with a charging mechanism for use of track. This would allow, for example, Cambodia to charge Thai and Vietnamese trains for use of Cambodian permanent way and use these proceeds to upgrade and maintain their rail network.[1]

3. Water Transport Subsector

63. As stated above, aside from the Lancang-Mekong system (Bassac River included therein), there are few navigable cross-border water routes. Furthermore, current volumes between/among the PRC, Myanmar, Lao PDR, Thailand, and Cambodia on the Upper Mekong are currently very small.

64. The main constraint on waterway transport at present thus appears to be channel navigability rather than cross-border issues.

65. Nevertheless, in the event that channel navigability issues are resolved (some dredging programs are in progress and others under consideration), more attention would need to be given to facilitating legitimate cross-border riparian transport, as well as enforcement against smuggling operations. Indeed, improving riparian transport on the Mekong, in terms of increasing vessel size (particularly during the dry season) could markedly change the economics of riparian transport. This in turn could accelerate the development of cross-border riparian trade.

66. Within the Lower Mekong, there is substantial traffic between Cambodia and Viet Nam, as well as shipping traffic to/from Phnom Penh using the Lower Mekong for access/egress.

67. However, during discussions with the Mekong River Commission it emerged that there are constraints on maritime vessels using the Bassac River, which in fact

[1] See the discussion in Section III.B. 3.

would offer a more direct route to the South China Sea. This is despite the fact that the Bassac River is suitable for navigation by maritime vessels.

68. As trade volumes increase restricting Cambodian shipping to the Mekong may place capacity constraints on the River.

69. Furthermore, the expected growth on Can Tho (situated on the Bassac) into a major port, it would make more sense to enable shippers to offer services calling at Phnom Penh and Can Tho to/from other international ports (e.g., Hong Kong, Singapore).

70. Indeed, a further specific concern regards the Vam Nao Pass, linking the Mekong and Bassac rivers south east of Chau Doc. The Mekong River Commission expressed concern that this might become a capacity constraint on traffic both between the Mekong and Bassac rivers and, as a consequence, on shipping to/from Cambodia.

CHAPTER VI: IMPROVING GMS TRANSPORT EFFICIENCY

VI. IMPROVING GMS TRANSPORT EFFICIENCY

A. Overview

1. Globalization is widening choice for both producers and consumers. The location of industry is becoming more closely aligned to transport cost considerations, while transport supply is a critical determinant of, for example, tourism demand. Improving the efficiency of the transport sector in the GMS is of growing priority. It requires actions at all levels and is a continuing process. This chapter discusses actions that would improve efficiency in infrastructure provision.

2. This chapter provides an initial overview of investment and technical assistance projects that are the fundamental working elements of the GMS Transport Strategy 2006-2015. The intention here is not to examine these projects in detail, as these matters are addressed in subsequent chapters of this report, but rather to set the background against which specifics have been identified and to illustrate the perceived thrusts and impacts pertinent to the project profile as a whole.

3. It is perhaps appropriate at this juncture to clarify the treatment of the terms "investment projects" and "technical assistance projects". The term "investment projects" has been applied to identified potential projects that are predominantly characterized by development of physical assets such as constructing roads or providing navigational aids – they therefore comprise the "hardware" components of the transport strategy. Technical assistance projects, by contrast, relate to policies, procedures, and processes constituting the "software" components of the strategy.

4. The remainder of this chapter is therefore divided into two sections, the first covering investment projects and the second technical assistance projects. In each case, the core focus is on their potential contribution to improving GMS transport efficiency at the conceptual level, rather than an examination of details, which is undertaken in subsequent sections of the report.

B. Investment Projects

1. Economic Appraisal

5. The identification and programming of GMS investment projects has changed since the 1993-94 study from an ad hoc basis to a loosely coordinated basis. Much more attention is being given to GMS-wide aspects in decision-making and such initiatives as the corridor approach have given a clear focus to investment across countries. This process can deepen and yield further benefits, if the tools becoming available for better project appraisal are applied. One tool is the GMS transport model, development of which started with this study. Perhaps more important initially is the fund of goodwill that has been created between and among the various transport agencies involved in GMS projects. Substantial efficiency gains can be realized by further exchange of information between them.

6. One area of concern is the downgrading of economic analysis in project appraisal. With the plethora of (admittedly very important) impacts currently taken into consideration (e.g., environmental impact, impact on poverty, gender impact, and impact on minorities), the fundamental importance of a project's economics may be obscured. In an increasingly competitive world, the GMS countries need to invest ever more productively, which would suggest a higher rather than a lower priority for project economics.

7. From an economic perspective, transport projects can be categorized as either: (i) the opening of new routes, corridors, or facilities, an “investment in the future” that would not always be expected to yield an initial high rate of return, or (ii) capacity enhancement projects, an “investment in the present” that need not be constructed until their initial benefits are sufficiently attractive. The two categories thus require different appraisal techniques. For category (i) EIRR and ENPV over 20 years are appropriate, but for category (ii) first year rate of return should be a key criterion, together with EIRR of ENPV, but calculated over a shorter period, up to 10 years. Otherwise, the rapid escalation of benefits in the later years of the appraisal period, when congestion impacts in the “without project” case become extreme, may result in projects being constructed too early.

8. GMS investment 2006-15 will be shifting from mainly category (i) projects to category (ii) projects. However, the absolute economic rate of return is sometimes given little weight in prioritization. A pro forma economic appraisal showing that a project achieves an EIRR above 12 per cent is not a justification for early implementation. The loss of benefit in for example giving a category (ii) project with an EIRR of 20 per cent priority over a project with an EIRR of 30 per cent is substantial and unaffordable for the GMS. More attention therefore needs to be given to comparing projects between/among areas and between/among modes, to prioritizing implementation and to optimizing the use of the budget allocation. A top quality project portfolio yields the greatest benefits. The green light for one project should be seen as the red light for alternative projects. While approval for a high profile project, such as an expressway or a new airport, may be easier to obtain than that for the construction of secondary routes or missing links, the latter investment may impact a much wider area and result in quicker returns. The appropriate mantra might be: “Invest where necessary, but only when necessary”. While readers of this report are well aware of these issues, it is important on occasion to ask simple strategic questions of the “why are we proposing to do this, when we could be doing that” type.

9. It has not previously nor is it yet really possible to develop project priorities GMS-wide with confidence. However, with a robust GMS transport model hopefully in place by 2010, optimizing investment over the whole GMS network and between modes should become possible, resulting in a step-change in the economic efficiency of the sector. This study represents an initial step, but it is constrained by a weak database and a model in the early stages of development. It is not yet possible to prioritize cross-country or cross-mode with assurance. Moving to that stage must be undertaken with great care, to have the support of all parties concerned at all stages. Developing a GMS-wide database, applying common appraisal techniques, agreeing on and coordinating policies and goals for the medium and long term and such steps require time and goodwill. They are not unrealistic objectives for 2015, given GMS progress over the last 12 years. Since the GMS operates increasingly in parallel with many other bilateral and multilateral bodies, coordination must be outward-focused as well as inward-focused and be without prejudice and complement the parallel activities. A better coordinated GMS approach to investment should in fact also improve the work of the other bodies.

2. Project Identification

10. The situation concerning GMS transport infrastructure development is very different today from what it was at the time of the previous study 11-12 years ago. Much has been accomplished on the main corridors and with the enabling Cross-Border Transport Agreement (CBTA). Also, crucially, there is now a pipeline of projects coordinated through the GMS Subregional Transport Forum and through the

various transport working groups established by other bodies since the last study. The GMS Summit Meetings ensure that this pipeline is endorsed at the highest level and has the necessary priority. There is also an increasing concern in national transport plans with cross-border issues, ensuring that high quality projects are developed with a strong rationale. The regular meetings of key officials ensure that national proposals are not developed without full knowledge of the concerns of neighboring countries. There is general agreement that everybody is benefiting from GMS initiatives and a willingness to deepen the concept and to complete the GMS transport networks for all modes.

11. With bottom-up aspects of transport strategy (e.g., project identification) generally in place, the strategic focus needs to shift to top-down aspects[1]: the facilitating of transport efficiency through improved project appraisal, as noted above, and to enhancing the range of transport services offered, within the concept of increasing the efficiency of the whole logistics chain. Hence the much greater importance given to policy initiatives in this study than in the previous study.

12. The transport modeling suggests that the forecast growth in demand to 2015 will be largely catered for by identified projects and that there are few unprogrammed missing links. In the Interim Report workshops it was noticeable that following the TA Team's specific request for further post-2010 projects to be proposed for prioritization, none were identified by the delegates of any country. However, GMS network optimization is in its infancy and as it develops it will be possible to identify inefficiencies that could be overcome by new projects, possibly the opening of additional border crossings, increasing network density, providing inter-modal facilities, etc.

13. Infrastructure development to date has been overwhelmingly supply driven. Increasingly the emphasis should switch to demand- and market-driven projects. What transport service providers and transport users want and their priorities have not yet played a significant role in GMS decision-making. The increasing sophistication of both providers and users, many of which are based in countries with much more efficient transport than that in the GMS, suggests that they have much to offer to optimize infrastructure provision.

14. There is a wealth of experience within the GMS, but exchange of information on project appraisal is limited. This would encourage more attention to traffic forecasts and to the scheduling of projects. Corridor performance needs to be closely monitored against pre-construction estimates. Where traffic does not reach the forecast volume, explanations should be sought, further measures be put in place where possible and any lessons learned be applied in the definition of future projects. Some mechanism might be developed for sharing project risk, such that underutilization would attract penalties. On toll roads this is automatic for developers, but on non-tolled projects there is no mechanism.

15. As the GMS moves towards a more integrated network, it becomes more important to consider common standards and to apply best practice where possible,

[1] As was explained at the Workshop on the Draft Final Report held in Ho Chi Minh City on 8-9 December 2005, the top-down approach to transport development is one that is supported by comprehensive and coordinated analysis, involving optimization of the entire subregional transport network. This is contrasted with the bottom-up approach, which is based largely on local studies, with little coordination and no standard appraisal methodology, since no tool was available then to enable a more comprehensive analysis. Summary of Proceedings, paragraph 14(i).

from project design through to monitoring of performance: Inefficiency in one country will become increasingly a cost to the other countries. Information exchange between GMS technical staff could deepen from the current "what we are doing and planning to do" stage to the "this is how we do it, how do our techniques compare with yours" level.

3. GMS Links with South Asia

16. A particular weakness in the GMS transport infrastructure is the poor network connection with South Asia. The importance of Myanmar's strategic location as the landbridge both between India and the PRC and between South Asia and Southeast Asia becomes daily more evident. Initiatives to address the issue are being taken, although generally not under GMS auspices: bilaterally between Thailand and Myanmar, between India and Myanmar, and between Bangladesh and Myanmar; trilaterally among Thailand, Myanmar, and India; and through Ayeyawady-Chao Phraya-Mekong Economic Cooperation (ACMECS) and Bay of Bengal Initiative for Multi-sectoral and Technical Cooperation (BIMSTEC). If financial support for Myanmar-related projects is not available through the GMS, its rationale may be affected. Potentially the highest priority GMS strategic projects of the next decade would then be undertaken by other groupings. Technical and loan assistance to Myanmar may be currently the single most economically effective action in support of GMS transport strategy.

4. Redefining GMS Corridors

17. The corridor concept has proved beneficial for the development of GMS transport infrastructure. It has deepened from ad hoc route improvements, through coordinated investment, to the defining of economic corridors that seek to maximize the benefits of the infrastructure investment and the associated policy initiatives. Corridors form part of the transport strategy to 2015, but some changes in definition and some additional corridors are proposed. As infrastructure provision on the existing corridors will be largely complete by 2010, new initiatives beyond corridors are also required.

18. The proposed changes to corridors are described below and shown in Figure M-1 presented in the map section at the end of this volume. The revised corridors have been used to group projects in a long list, presented in Chapter VIII.

Road Corridors

(a) North-South Economic Corridor (NSEC)

19. With Guangxi now part of the GMS, a third eastern corridor needs to be included as part of the NSEC: Kunming-Nanning-Hanoi. The NSEC as now proposed comprises the two existing corridors, to be called the Western Corridor and the Central Corridor and the new Eastern Corridor.

(b) Southern Economic Corridor (SEC)

20. Both Thailand and Myanmar have proposed that the existing SEC be extended westwards from Bangkok to the Myanmar coast at Dawei. This is a logical extension and is endorsed by the study. As three of the existing SEC sub corridors start from Bangkok, the extension is best designated as a new sub corridor, the SEC western sub corridor.

(c) Northwestern Corridor (NWC)

21. The rapid development of the Subcontinent since the previous study has greatly increased the need to improve connections between the GMS and South Asia. The Thailand-Myanmar-India Transport Linkages project has defined a priority route for development. This route should be incorporated as a GMS corridor, part of a new Northwestern Corridor. It is proposed that initially this should link Bangkok-Kanchanaburi (joint with SEC western extension)-Three Pagodas Pass-Thanbyuzayat-Payagyi-Meiktila-Tamu-Imphal.[1]

(d) Northern Corridor (NC)

22. It is anomalous that in the early 21st century the world's two most populous and more dynamic nations are so poorly linked by road. A Yunnan-Myanmar-India corridor should now be defined. The proposed Northern Corridor would have two sub corridors: (i) a sub corridor via Ruili and (ii) a sub corridor further north, as yet undefined, but possibly following the Stillwell Road alignment.

(e) North-South via Lao PDR Corridor (NSL)

23. With the soon expected opening of the Lao PDR/Cambodia border link connecting Routes 13S and NR7, an additional north-south corridor will be created from Kunming to Sihanoukville, via Louang Phrabang, Vientiane, Pakse, Stung Treng, and Phnom Penh.

(f) Northeastern Corridor (NEC)

24. With Guangxi's inclusion in the GMS, a new northeastern corridor from Nanning to Bangkok is added via Hanoi, Vientiane, and Nakhon Ratchasima. This corridor also includes a branch to Laem Chabang port.

Railway Routes

25. Since the previous study, railway routes have been defined and numbered for the Singapore-Kunming Rail Link (SKRL) study. This nomenclature has been generally adopted by GMS railway administrations and it is therefore used in this study.

5. Enhancing Corridor Efficiency

26. Completing the basic infrastructure of a corridor is the initial priority and in some cases this has been achieved or is close to achievement. A little-used corridor is however an inefficient corridor. Demand should be encouraged at the outset, particularly when new cross-border and transit links become available, by widely disseminating information to prospective freight and passenger users on the new routes, their usage charges, border opening times, documentation requirements, etc. The cost is minimal compared with that of the infrastructure provision, but all post-completion benefits are derived from the usage. Bilingual or multilingual signposting

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[1] At the Final Meeting on the GMS Transport Sector Study, held in Vientiane on 21 March 2006, Mr. Sunant Gliengpradit, Thailand, suggested that the proposed Northwestern Corridor (NWC) be modified as Bangkok-Mae Sot-Paan-Payagyi-Meiktila-Tamu-Imphal as the main route for this corridor and to consider the section from Bangkok-Three Pagoda Pass-Thanbyuzayat-Thaton as a subcorridor. Summary of Proceedings, paragraph 21.

of corridors (as well as the use of graphical symbols, where appropriate) and access routes to corridors are also important.

C. Technical Assistance Projects

27. The technical assistance projects (TAPs) are directed towards enhancing the effectiveness with which infrastructure can be used in terms of meeting overarching GMS objectives. Unfortunately, what amounts to a fairly straightforward principle (making better use of existing and proposed assets) has more complex implications when decisions about timing, location, and methodology for implementation are to be made. While the GMS countries are making significant progress towards a finite and connected transport network, there are still very considerable differences as between countries - both in terms of the general level of economic development and the way in which (and capacities with which) transport services are offered and operated. It is indeed those very differentials that, to a large extent, constrain the transport system's capacity to effectively realize subregional objectives. The simple solution of course would be to ensure that the countries provide service delivery using the same techniques, skills, and relationships – but such an approach is to deny the richness of diversity – there is no possibility of a "one size fits all" solution; rather GMS diversity in business, lifestyles, and aspirations must be recognized and provided for in terms of localized projects.

28. Just as the GMS countries are not a homogeneous unit, so the impact in GMS countries of any given project can be expected to be equally diverse. It is in fact that very question of impact that drives the entire subsequent analysis of TAPs. That process, where action initiated in one country, has impact both domestically and within other GMS countries comprises the critical element of both TAP selection and subsequent prioritization and evaluation.

29. Having noted these conditions and relationships, the contribution of technical assistance projects to the efficiency of GMS transport can be seen as a program to minimize the adverse impact of differentials as between GMS countries. TAPs are therefore focused on unifying service delivery capacities within the GMS at a level consistent with optimal approaches for the realization of overarching objectives. Once again, however, that harmonization process, while objectively clear, incorporates implementation difficulties to ensure that harmonization is realized at a "level" consistent with both the potential of GMS as a whole and the capacities of individual countries. The appropriate level for the GMS as a whole has typically been determined by reference to international experience – individual country needs (and impact on other countries) have been identified through stakeholder consultations and the series of workshops/discussions that have been such a consistent theme of the strategy study.

30. Inevitably, the contribution of TAPs to transport efficiency within the GMS varies across the range of identified projects – some build on existing programs, others seek to remedy specific constraints applicable to parts of the subregion, while others are directed towards the promotion of competitive advantage in a sector specific (e.g., tourism) context. Given that diversity of impact, prioritization and ranking of TAPs is inevitably problematical - in the same way that interpersonal utility comparisons have long been supported in terms of cardinal parameters, but generate ongoing disputes in terms of ordinal profiles.[1]

[1] See http://www.findarticles.com/p/articles/mi_m0254/is_3_64/ai_n15627630.

31. In a practical context there is little alternative but to gauge TAP efficiency contribution in terms of broad rankings rather than structured standings. Given that constraint, it is clear that results and TAP outcomes are central to the overall evaluation of potential TAP contribution and as such subsequent sections of this report examine further the prospect for identification and implementation of indicators for purposes of monitoring, tracking, and determining results of focus TAPs. In addition, the findings of an economic appraisal of a package of selected projects carried out in relationship to savings identified in Europe and Asia will be summarized. Such savings have resulted from improvements in the logistics chain and in trade facilitation.[1]

[1] A presentation by the United Nations Economic Commission for Asia and the Pacific (UNESCAP) at a 15 June 2005 workshop held by the International Maritime Organization (IMO) and the ADB Institute in Bangkok provides data suitable for ranking a package of TAPs.

CHAPTER VII: PROPOSED GMS TRANSPORT SECTOR STRATEGY

VII. PROPOSED GMS TRANSPORT SECTOR STRATEGY

A. Introduction

1. This chapter develops a proposed GMS transport sector strategy to 2015 and beyond. Section B considers the rationale for preparing such a strategy. Section C reviews the development of GMS strategy to date. Strategy as currently formulated in the Kunming Declaration is discussed in Section D. Country transport strategies are summarized in Section E. Strategic options for the GMS transport sector are defined in Section F. The important strategic role of the GMS transport model is considered in Section G. The proposed strategy to 2015 and beyond is set out in Section H. How the strategy may be implemented is reviewed in Section I, while modal strategy is considered in Section J (railways) and Section K (airports).

B. Rationale for Developing a GMS Strategy

2. The development of a GMS transport sector strategy to 2015 and beyond best begins by considering the rationale for developing such a strategy. Each GMS member country has its own transport program developed for five-year plans and as a basis for year-to-year budgets. These programs are supported to varying degrees with sector policy statements, strategies, objectives, priorities, and individual project analyses. The programs necessarily incorporate consideration of the importance of undertaking GMS-related projects. There are also a number of international organizations concerned with aspects of GMS transport, including: Ayeyawady-Chao Phraya-Mekong Economic Cooperation (ACMECS); the Association of Southeast Asian Nations (ASEAN); Bay of Bengal Initiative for Multi-sectoral and Technical Cooperation (BIMSTEC); the United Nations Economic Commission for Asia and the Pacific (UNESCAP); ASEAN-Mekong Basin Development Cooperation (AMBDC); Mekong Ganga Cooperation; the India-Myanmar-Thailand Transport Linkage; the Joint Committee on Coordination of Commercial Navigation (JCCCN) on the Lancang-Mekong River, based on the Quadripartite Agreement among PRC, Lao PDR, Myanmar, and Thailand; the Lao PDR-Cambodia-Viet Nam (LCV) Development Triangle and the Emerald Triangle involving cooperation among the same three countries mainly in the tourism sector; and South Asia Subregional Economic Cooperation (SASEC). One question is then what role remains for an overarching GMS strategy and how can it be developed to have a synergistic effect in combination with all the parallel strategic initiatives.[1] While there are many (sub) regional cooperation groupings involved in transport in the countries concerned, it was noted that the GMS grouping could perhaps be distinguished from others in that it "goes right to the top," with its initiatives being endorsed at the highest levels of

[1] At the Workshop on the Draft Final Report on 8-9 December 2005 at Ho Chi Minh City, it was stated that the Study should take account of the presence of and the activities on transport cooperation of the many other cooperation initiatives in the subregion (e.g., ACMECS, the Lao PDR-Cambodia-Viet Nam (LCV) Development Triangle, Emerald Triangle). The consultants noted that although it is recognized that the GMS is just one among (sub)regional cooperation initiatives, it was the hope that it can take on a leading and coordinating role since it has the resources and capacity to do so. It was noted that for ADB to undertake this role, it is important that it be informed about projects before coordination. Summary of Proceedings, paragraphs 12(ii), 19(vi), 19(xi), 28, and Appendix 11, paragraph 4. An upcoming ADB technical assistance (REG 39592-01) titled A Study on Economic Cooperation between East Asia and South Asia will delineate a road map of specific policy options to enhance economic cooperation and integration between the two regions.

leadership.[1] Another question is what can it change and, specifically, what benefits may result from it. The GMS concept has rapidly established itself as an effective forum for international cooperation from the working level to the Heads of Government level. This fact, and the deepening of cooperation agreed at the Kunming Summit, provides the GMS with a leading role in coordinating projects and in developing strategy.

3. Growing international competitive pressure requires that GMS transport operating costs be reduced. A key purpose of GMS strategy should thus be to provide the focus steering initiatives towards more economically desirable objectives, without preempting the role that wider considerations will always have in such decisions. Perhaps the critical point to note is that even domestic transport projects are seldom undertaken purely on the basis of their relative economic benefits – for that to be the case it would be necessary to demonstrate that each project yielded at least a higher rate of return than any other possible infrastructure project or even than any use of the investment in another sector. Transport is a highly politicized sector where priorities have to balance the implementing of national prestige projects, the concerns of public pressure groups, equity issues, long-run network considerations, and the solving of pressing local issues. For international projects, economic benefits may play an even smaller role. Thus the particular need for a GMS-wide strategy that focuses on future needs and priorities.

4. Strategy should be both aspirational and unifying and provide the top-down[2] context for evaluating projects towards common goals. Once agreed, it provides the essential background for decision-makers at all levels, leading to a collective mindset throughout the GMS. This is a continuing process, with potentially substantial benefits. The GMS necessarily started with ad hoc basic infrastructure initiatives: getting a border crossing open, patching together bits of infrastructure to create a corridor, bringing together officials who had little idea what was going on across their borders. To move within 15 years from such a stage to thinking about logistics chains and optimizing networks within an agreed strategy represents a great leap forward.

C. GMS Achievements and Strategy to Date

5. The GMS has provided a catalyst for developing transport links between member countries in a number of ways: (i) by providing a forum for personal contacts between the officials concerned with projects and policies, primarily at the nine meetings of the GMS Subregional Transport Forum, which have facilitated in-depth discussion of issues and agendas and the free exchange of information; (ii) by developing a common approach to cross-border issues, most notably through the CBTA; (iii) by providing a framework for loan and TA projects by ADB and other financing institutions, and (iv) by putting GMS issues on the agenda of Heads of Government themselves at the tri-annual GMS Summits. Both tangible and intangible progress has been outstanding. The latter best observed in the change from a "think

[1] This point was made by the consultants at the Ho Chi Minh City Workshop. Summary of Proceedings, paragraph 19(i). A possible definition of the role of the GMS in relation to other cooperation initiatives was given at the 13th GMS Ministerial Conference in Vientiane in 2004: "the GMS is the 'backbone' into which the other regional cooperation initiatives feed." Summary of Proceedings, paragraph 19(iii).

[2] As was explained at the Ho Chi Minh City Workshop, the top-down approach to transport development is one that is supported by comprehensive and coordinated analysis, involving optimization of the entire subregional transport network. This is contrasted with the bottom-up approach, which is based largely on local studies, with little coordination and no standard appraisal methodology, since no tool was available then to enable a more comprehensive analysis. Summary of Proceedings, paragraph 14(i).

domestic" to a "think GMS" mindset throughout the transport sector and in the creation of a fund of goodwill.

6. There is almost universal agreement that a GMS-wide approach provides benefits to all countries concerned, that it provides the most appropriate forum for deepening cooperation in the transport sector, and that it should be pursued with vigor, one indication of which being the enthusiasm shown by all officials interviewed for this particular study.

7. In the 13 years since its inception, GMS strategy has developed from ad hoc project and policy formulation, to the definition of priority corridors, to the detailed specification of common policies (most notably in the Cross-Border Transport Agreement or CBTA), and to a definition of GMS-wide objectives, culminating in the Kunming Declaration (discussed in Section D). Strategy has thus developed primarily from the bottom up,[1] its definition even lagging somewhat behind progress on the ground. Now is a good time for strategy to leapfrog actual progress and to become itself a driver of further progress, the initial stage being to coordinate the bottom-up with a top-down approach and then in the medium term to achieve a true top-down approach where all initiatives accord with and contribute to implementing the agreed strategy and its objective goals.

D. The Kunming Declaration

8. The GMS Heads of State affirmed their strong commitment to economic cooperation at the First GMS Summit in Phnom Penh in 2002. Regarding the transport sector, they stated:

"We will complete the transport corridors critical to linking the subregion and promoting trade and investment. We will coordinate our strategies to ensure that transport corridors evolve into economic corridors, enabling agricultural diversification, industrialization and the creation of employment opportunities. We will accelerate the implementation of 'software' arrangements of infrastructure linkages. We will expedite the full implementation of the Framework Agreement for the Facilitation of Cross-Border Movement of Goods and People. We will facilitate pilot-testing of single stop customs inspection with a view to implementing this procedure at our shared borders."

9. The Kunming Declaration of the Second GMS Summit June 2005 sets out the guiding principles for further GMS cooperation:

(i) equality and mutual respect;
(ii) consensus-building in decision-making;
(iii) flexibility on timing and participation;
(iv) thorough project-level consultations and the pooling of comparative advantages and strengths;
(v) an action-oriented, result-based, and need-driven approach;
(vi) the gradual expanding and deepening of cooperation; and
(vii) a focus on both short-term urgent priorities and longer-term need-based strategies.

10. Concerning infrastructure, the Declaration recognizes the key economic development role of a well-built, seamless, multi-modal cross-border infrastructure and of fully "connecting GMS". Links will be strengthened through a multi-sector

[1] See second footnote on previous page for explanation.

holistic approach, with sustained and greater inputs. The major transport links of the East-West corridor to be completed by 2008 and of the North-South and Southern Coastal corridors by 2010. Transport infrastructure cooperation to be expanded to include railways, air transport, and waterways. Negotiation of the remaining annexes and protocols of the CBTA was completed in November 2005, with implementation of the Agreement at an increasing number of border crossings. All necessary domestic measures are to be taken for implementation of the Agreement in 2006.

11. Concerning tourism, the Declaration recognizes its key role in job creation and the comparative advantage of the GMS in this sector. The recommendations of the *GMS Tourism Strategy Study* are welcomed, including implementation of high-priority projects, the marketing of the GMS as a single tourist destination and further work to develop a GMS visa.

12. The Declaration also supports the goal of this study, the development of a GMS transport sector strategy in 2006, identifying critical links within the GMS and with neighboring countries in South and Southeast Asia.

13. The Kunming Declaration and the country strategies summarized in Section E provide the parameters within which the proposed transport strategy has been developed.

E. Country Transport Strategies

14. GMS country development and transport strategies are set out in detail in Working Paper 9: Review of Macroeconomic Factors Relevant to Updating the GMS Transport Sector Strategy. They are summarized below, with particular reference to the transport sector:

1. Cambodia

15. The Government's Rectangular Strategy was announced by the Prime Minister in July 2004. The Strategy draws on the Socio-Economic Development Plan (SEDP) 2001-05 and the National Poverty Reduction Strategy (NPRS). The SEDP II focuses on growth promotion, regional integration, and poverty reduction. The Rectangular Strategy can be visualized as a series of interlocking rectangles, with good governance at its core. The other rectangles focus on the desired environment to implement the strategy, and on promoting economic growth through agriculture development, rehabilitation and construction of physical infrastructure, private sector development, and capacity building and human resource development. To implement the development vision set out in the Rectangular Strategy, the Government and development partners have agreed to prepare a single planning document, the National Strategic Development Plan 2006-10.

16. The transport strategy focuses on road rehabilitation, improved management, and financing mechanisms for road maintenance, consolidation of transport authorities to better internalize externalities, and creation of a more receptive policy and regulatory framework for private sector participation.

2. Lao PDR

17. Two documents detail the Government's development strategy:

(i) the Five Year National Socio-Economic Development Plan (NSEDP); and
(ii) the National Growth and Poverty Eradication Strategy (NGPES).

18. The NGPES will be fully integrated into the new NSEDP, which is expected to be released in October 2005. The National Development Framework outlined in both documents incorporates the guidelines of the 6th Party Congress (1996) and the 7th Party Congress (2001). The Framework sets out the long-term targets designed to lead to realization of the 2020 goal – the elimination of severe poverty and graduation from least developed country status.

19. In order to achieve at least a 7 percent growth rate, the National Development Framework and the National Growth and Poverty Eradication Strategy are based on five strategic thrusts including a five-year action program for poverty-focused transport sector development. The action program highlights the following priorities:

(i) maintenance of transport facilities;
(ii) investment in transport infrastructure (this includes a road sector development plan to 2020, as well as details for air, water, and rail transport investments);
(iii) strengthening of the regulatory framework and capacity of ministry and provincial/local agencies (includes enforcement of a Transport Safety Strategy);
(iv) private/public sector development (including contracting out transport services); and
(v) transit and trade facilitation (including improved management and operational efficiency within the transport sector).

3. Myanmar

20. The Government's economic policies since 1962 have been guided by the "Burmese Way to Socialism", which placed production and distribution under centralized control. All major industries were nationalized during the 1970s. In response to growing economic difficulties during the 1970s and 80s, in 1988/89 the Government took steps to open up the economy, to allow private sector activities, and to encourage foreign trade and investment. Between 1989 and 1996, Myanmar made measurable progress toward liberalization and inflows of foreign private investment increased. The Asian financial crisis in 1997, however, prompted the Government to return to restrictive practices in trade and foreign exchange management. With exports and imports equivalent to less than 1 percent of GDP, Myanmar would appear to be largely a closed economy. Myanmar's degree of openness is understated due the official exchange being less than 2 percent of the market rate and due to informal trade.

21. The Governor of the Bank of Myanmar included the following remarks in his address to the IMF/World Bank Annual Meetings in 2004:

> "--- Myanmar has been striving to achieve economic stability, with our own resources, in order to fulfill the basic needs of its populace. For that, a series of short-term economic plans have been formulated and implemented which have resulted in significant growth rates for the country in recent years. We are now implementing the fourth year of the third short-term plan. --- Myanmar's growth has been led by growth of the agricultural sector; strong growth in the energy, livestock, fishery, mining, and manufacturing and processing have also contributed significantly. --- The authorities are encouraging industrial development and at present there are 18 industrial zones. --- the government is investing in building the necessary infrastructure, including construction of dames reservoirs, roads, bridges and major hydropower projects. --- With regard to fiscal policy, the government is giving high priority to fiscal consolidation efforts --- tax administration and collection

have been strengthened in order to increase tax revenue, while unproductive expenditures have been cut. The main objective of monetary policy is price stability and soundness of the banking system."

4. Thailand

22. Thailand's 9^{th} National Economic and Social Development Plan 2002-06 emphasizes balanced development of human, social, economic, and environmental resources. Sections of the Plan particularly relevant to updating the GMS transport sector strategy include:

(i) Infrastructure development project strategy:

(a) develop Bangkok Metropolis as the regional business hub (multi-modal transport approach, relocating business activities affecting traffic congestion, relocate sea transportation activities from Bangkok port to Laem Chabang harbor, convert Bangkok port to new financial district and business center)
(b) transshipment corridor development (linking Bangkok and Laem Chabang Harbor)
(c) developing highway networks (linking Laem Chabang Harbor to northeastern and northern regions, and to border trading gates linking northbound to southbound and eastbound to westbound; also, rural networks linked to logistics hubs)
(d) railway network (increase capacity of critical railway networks and improve effectiveness)
(e) Suvarnabhumi Airport as the air transport hub of the Southeast Asia region)

(ii) International economic cooperation strategy:

(a) free trade and bilateral agreements with other countries (FTAs, Free Trade Areas, are being formed with Australia, the PRC, Bahrain, India, Peru, and BIMSTEC; FTAs with the US and Japan are being negotiated; FTAs with the Republic of Korea, New Zealand, and South Africa are being studied)
(b) subregional economic cooperation (Greater Mekong Subregion, Indonesia-Malaysia-Thailand Growth Triangle, the Ayeyawady-Chao Phraya-Mekong Economic Cooperation Strategy)

(iii) Strategy to become regional logistics hub:

(a) infrastructure and the law (improve management of the transportation system and of the multimodal interchange system)
(b) technology and information system (help deploy logistics-related technology)
(c) human resources and knowledge (includes HRD to enhance knowledge on logistics)
(d) SME entrepreneurs (upgrading of entrepreneurs to develop effective logistics activities and logistics service providers).

5. Viet Nam

23. In order to maintain rapid economic growth and poverty reduction, the Government prepared a Ten-Year Socio-Economic Development Strategy 2001-10.

In addition, it prepared a series of sector strategies. Further, the Government prepared a Five-Year Socio-Economic Development Plan 2001-05. Other initiatives have included the Prime Ministers' decisions on socio-economic development in the Central Highland, North Mountainous, and Mekong river delta provinces.

24. The Government prepared its Comprehensive Poverty Reduction and Growth Strategy (CPRGS) in 2003, in a manner designed to translate the above strategies and plans into concrete measures with well-defined road maps for implementation.

25. Large-scale infrastructure investment will be address poverty reduction while meeting the demands of industrialization and modernization. Viet Nam has targeted achievement of a modern network of infrastructure services by 2020. Private sector participation will encouraged in this endeavor, and Official Development Assistance (ODA) employed more effectively. Sector initiatives for agriculture and rural development include market research and the timely provision of information, as well as developing storage and processing facilities. Sector initiatives for industry and urban development include support for labor-intensive industries, strengthening of education and vocational training, resolution of the problem of urban migration, and continued expansion and improvements of urban infrastructure.

26. Some US$60 billion has been allocated to development investment for the 2001-05 period, two-thirds of which will be financed domestically and one-third by ODA. Priority will be given to developing infrastructure, especially rural infrastructure, improving community health, increasing income-generating opportunities, and developing productive and competitive subsectors. According to the Ten-Year Socio-Economic Development Strategy and the CPRGS, between 2000 and 2010 GDP is projected to double. The incidence of poverty is expected to fall by two-fifths. Of particular relevance for the GMS transport sector strategy is the declaration that investment in infrastructure must be linked to goals for socio-economic development; and for transport, investment will focus on the main transport network connecting key economic zones, for protection of borders, and for post and telecommunications infrastructure.

27. Transport sector initiatives in the CPRGS include:

(i) by 2010 it is expected that the transport system will have the capacity to handle 450 million tons of cargo (112 billion tons per kilometer) and 1.225 billion passengers (57.6 billion passengers per kilometer);
(ii) priority will be given to complete upgrading of all national highways (including a new highway parallel to National Highway No.1) connecting important economic regions, border areas and the Southern Highlands; inter-provincial roads in the Mekong Delta; border roads in the Northern provinces; and complete the Ho Chi Minh Highway;
(iii) develop the trans-Asia railway and road networks, connecting ASEAN capital cities, industrial centers, and tourist destinations; and
(iv) modernize airways, airports, ports, and other modes of transport.

6. Yunnan and Guangxi

28. The PRC's economic growth strategy as outlined in the 9th and 10th Five-Year Plans 1996-2000 and 2001-05 stresses balanced growth, focusing on lagging regions with particular emphasis on the interior and western parts of the country. The 10th Plan aims for higher productivity growth, with special attention to harnessing modern technology more broadly. Features of the 10th Plan of particular relevance for Yunnan and Guangxi are summarized below:

- Growth – targeted at 7 percent per year for 2001-2005, leading to a doubling of total output by 2010 (this implies a growth rate of 7.4 percent annually for 2006-2010); as part of the 10th Plan, the Government has targeted support of domestic demand through interest rate cuts and increased public spending.

- Development of Economically and Socially Lagging Western and Central Provinces – by fostering economic development zones through investments in strategic physical infrastructure for transport, water resources management, energy, and mining; acceleration of other development objectives cited above; and introducing advanced technologies to upgrade local industries and increase competitiveness.

29. The “Going West” policy is described as the largest aid program in the world, representing a massive redistribution of resources from coastal areas to the 12 western provinces including Guangxi and Yunnan. These lagging areas represent 18 percent of PRC’s GDP, 29 percent of the population and 50 percent of the poor.

30. The strategy is designed to create conditions supportive of a wide range of competitive economic activities. Investment in transport infrastructure, logistics, and utilities services features prominently in the strategy, as do protection of the natural environment, investment in education and health, and encouragement of business investment. Investment in transport has three objectives: (i) improve access of inland localities in the South-West to sea ports; (ii) develop navigation on the Yangtze River; and (iii) revive the North-West as the land bridge linking the PRC and Central Asia and beyond to Europe.

F. Options for GMS Transport Sector Strategy

31. The GMS Program was a bold visionary action in 1992. The Program continues to be highly relevant, but its relative importance will only be secured if its purpose and results lead or at least keep pace with the changes and challenges posed by modernization and diversification of the Mekong economies and of the forces of globalization. The merits and benefits of regional cooperation are not in question, but the next stage of transport sector strategy needs to be clarified.

32. A virtuous circle should result from infrastructure investment: more growth, more fiscal revenue, more “fiscal space” (i.e., increased budgetary allocations for infrastructure investment). The highly political and technical nature of infrastructure provision means that central institutions must play a strong role, while facilitating local participation and action.

33. The transport sector strategy will lead to lower costs to consumers and producers, more competitive exports, reduced travel times, and a more attractive investment climate. The more efficient environment for production and trade will stimulate economic growth, contributing to further poverty reduction, improved living standards and new employment opportunities.

34. Important strategic considerations are that:

(i) the GMS Program has promoted regional cooperation as a way of creating good neighbors and facilitating trade and investment, leading to a virtuous, reinforcing circle of growing trust, confidence and economic integration; the Program has been very successful; together with other initiatives and developments, this virtuous, reinforcing cycle is now largely self-perpetuating, with the member countries and private sector interests increasingly leading

the process of further economic integration; in this context, the GMS Program is becoming a subset of a broad stream of activities and development contributing to economic integration; nonetheless, the relative importance of the Program is being maintained through more inclusive resource mobilization with development partners, and through broadening what is included;

(ii) GMS transport initiatives have been instrumental in giving substance to the subregion as a subregion, for the transport corridors and cross-border transport agreement have been or will soon be effective in reducing the barriers to intra-regional trade and in linking the subregion into a cohesive whole; as noted earlier, though, much remains to be done so as to complete the corridors, to make fully operational the cross-border transport agreement, to address missing links in the network, and to redress logistical and other weaknesses; and

(iii) major changes are expected to occur over the next decade in the structure of the economies of GMS countries, including in the acceleration of urbanization, an acceleration in the shift from agriculture to the industry and service sectors, and the growing importance of global value chains and international production networks.

35. Options considered in developing the GMS transport sector strategy include:

(i) <u>Sectoral Focus</u>: Identify factors critical to intra-regional and transit trade and improved competitiveness
   - missing links in the transport network
   - critical common needs (e.g., maintenance, logistics, multi-modal integration)
   - intra-regional trade as complementary to inter-regional/global trade

(ii) <u>Comprehensive Intersectoral Strategy</u>: Identify major expected socio-economic trends and developments to 2015, and identify and prioritize transport initiatives to best accommodate these trends and developments
   - transport sector strategy as a subset of a comprehensive plan
   - integration of country and regional strategies/tourism strategy

(iii) <u>Goal Setting and Results-Oriented Management</u>: Identify key goals of economic integration/regional cooperation for 2015 and beyond, and set performance indicators and prioritize GMS transport initiatives to best realize these goals
   - the GMS as a “growth bridge” between the PRC and India
   - capitalizing on the strategic location of the GMS
   - realization of Millennium Development Goals

36. Option (i) is highly practical and best amenable to the project approach (e.g., focus on ports and connections to ports to facilitate export trade); it suffers from discounting the future and hence deemphasizes preparation for long-term needs or desired results; further, evaluating projects discounts the cumulative impact.

37. Option (ii) is more complex as it is difficult to select and prioritize transport initiatives on a fully transparent basis; it has, however, the merit of being more consultative and process orientated.

38. Option (iii) is intuitively the most appealing, but it requires a parallel exercise of country consultation to identify the goals and to set performance indicators; further, it requires close examination of competitiveness and comparative advantage, for

there is little point in targeting results (e.g., increased trade openness) if there is no basis for them.

39. A blend of the options is required, with Option (i) as the base and elements of Options (ii) and (iii) incorporated.

G. Role of the GMS Transport Model

40. The development of a GMS transport model is an important step towards implementing strategy, in particular top-down strategy. The model (described in Appendix 2) provides the first possibility to view the GMS transport network as a whole, to see its strengths and weaknesses in terms of coverage and capacity, to simulate its ability to cope with forecast demand growth and to gauge its economic efficiency in terms of transport cost. Clearly, the resources available under this study have only begun this process. To achieve the full benefits of the model, much further development is required. It is recommended that copies of the model be provided to the appropriate authorities in each GMS country, that a coordinated model development program be agreed and that its funding be secured. More detailed country sub-models might also be developed where, as in the case of Lao PDR; there is no domestic model currently operational. The immediate priorities are: (i) to more accurately specify the network, incorporating secondary supporting links; (ii) to improve and continually update the traffic flow database; (iii) to refine transport cost data, both operating and capital costs; and (iv) to agree procedures for using the model in the evaluation of GMS candidate projects and, where appropriate, policies. The achievable objective would be that by 2010 all GMS-related projects would be both screened and refined by model testing and that by 2015 economic efficiency criteria as evaluated by modeling would be a primary ranking mechanism for prioritizing financial support for such projects.

H. Proposed Strategy to 2015 and Beyond

1. Overarching Goals

41. The proposed theme for future transport sector initiatives crystallizes the underlying theme of the Kunming Declaration:

> **“**Towards seamless transport services on a fully connected and integrated GMS network.”

42. The two parts of the theme are interdependent. The full economic and other benefits of a connected, integrated network are only achievable if the services provided on it are efficient, implying easy interchange between modes, simplified border crossing and, where appropriate, common operating standards.

43. To support the theme, the following overarching goals are proposed:

(i) Exploit synergies in the GMS transport system;
(ii) Move towards an open market for transport services;

(iii) Facilitate economic efficiency to reduce transport costs;[1]
(iv) Complete the GMS network and improve links with South Asia;[2] and
(v) Encourage multi-modalism.

2. Exploit Synergies in the GMS Transport System

44. As yet there is little concept of a GMS transport system. The basic tools have been lacking: detailed network maps, a transport model, and an incentive to think GMS-wide Several attempts have been made at subregional planning: the Singapore-Kunming Rail Link concept, the definition of the ASEAN highway network and GMS routes, and the definition of investment corridors. These attempts must now be brought a step further, to the point where both national and subregional transport infrastructure projects are explicitly and routinely reviewed in terms of what they contribute to the GMS system as a whole, in addition to their local impact. This is required to achieve the overarching goal of fully exploiting potential synergies within the existing and planned future transport system.

3. Move Towards an Open Market for Transport Services

45. The worldwide trend is towards more open cross-border movement, exemplified by the European Union (EU), where borders have effectively been scrapped. The efficiency gains are considered to more than compensate for any resulting loss of control. Transport operators are free to work throughout the EU and a genuine open market in transport services is in prospect. Similar, if less advanced, arrangements are proceeding in other areas. There are no apparent reasons why the GMS should not follow suit. Market opening can be pursued purely as an economic concept. Clearly, there are gainers and losers and a strong argument in certain cases for the protection of infant industries in the less developed of the GMS countries. The overarching goal is, however, clear. Policy should be directed towards furthering the open market concept.

4. Facilitate Economic Efficiency To Reduce Transport Costs

46. Transport is not a field in which the GMS can currently claim to be efficient, when judged by international standards. While quoted rates and fares are often low, so is the quality of international service, where available. The efficiency dimension needs to be given greater weight in project and policy decision-making. While the network still needs to be developed, the efficient definition, use, and maintenance of the network is of growing importance. Reducing transport costs by facilitating economic efficiency should be an overarching goal.

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[1] At the Final Meeting on the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006, H.E. Mr. Chhin Kong Hean, Cambodia, commented that the issues of private sector participation and environmental aspects of transport development may not have been considered under any of the five overarching goals presented. In reply, the consultants clarified that private sector participation was included under the second and third overarching objectives. It was also noted that environmental aspects would be carefully addressed in detailed project preparation work. Summary of Proceedings, paragraph 9. Section 15 of each Project Concept Profile in Appendices 3 and 4 covers social and environmental issues.

[2] At the Final Meeting on the GMS Transport Sector Study, held in Vientiane on 21 March 2006, Mr. Sunant Gliengpradit, Thailand, expressed strong support for the fourth overarching goal (Complete the GMS Transport Network and Improve Links with South Asia). He stated that in the past ten years of transport cooperation in the GMS, the focus was on linkages within the GMS. It is now time to build stronger links with other regions, particularly South Asia. Summary of Proceedings, paragraph 14.

5. Complete the GMS Network and Improve Links with South Asia

47. While much has been accomplished and is in progress towards completing the primary GMS network, much remains to be done. The primary network will also need to be supported by a secondary network. The economic transformation underway in South Asia increases the priority of linking it with the GMS, which has not been given as much attention as have intra-GMS links. It is now time to fully define the primary GMS network and to outline the secondary network, to agree a timetable for its completion. This work must be coordinated with other bodies and countries that are concerned with similar programs for links to South Asia. The overarching goal of achieving efficiency requires network-wide planning to ensure that these objectives are taken into full account in the planning of domestic and subregional programs.

6. Encourage Multi-Modalism

48. There are two distinct aspects of multi-modalism: (i) encouraging the provision of and competition between modes on a given route/corridor, and (ii) facilitating intermodal transport. Market forces have the key role in these processes, but many barriers operate to restrict them. The rationale for this overarching goal is that it should draw attention to eliminating constraints and on ensuring that all modal options are considered in investment decisions.

49. Project and policy initiatives should be judged initially for their consistency with and furtherance of at least one of the five overarching goals and should not be in conflict with any of the goals. At an operational level, goals need to be translated into specific policy and project objectives. This is a continuing process, only the initial steps of which have been undertaken in this study, as discussed in the Section I.

I. Implementing the Transport Strategy

50. Strategy is best implemented by ensuring that project and policy development accords with the theme and overarching goals at all levels: strategic plans for each mode, disaggregated into corridor plans, prioritization of investments, policy initiatives and time bound implementation plans. Ultimately the detailed implementation of strategy stands or falls on the quality of the database and of the forecasting assumptions. These need to be regularly updated to reflect changing circumstances. The detailed planning stage generates critical survey data supplementing that available for this study: current network condition and capacity, flow pattern, cost levels, operating efficiency at border crossings, etc. General agreement on the theme and overarching goals and their operational impacts should precede the detailed feasibility study stage for shortlisted investment and technical assistance projects.

51. For this study, strategy has been operationalized though a combination of the top-down and bottom-up approaches: (i) modeling GMS infrastructure supply and demand to 2015 on the basis of readily available data; (ii) identifying missing or substandard links; (iii) enabling multimodal initiatives; (iv) reviewing GMS external linkages; and (v) programming projects in accordance with their economic priority, while ensuring a balanced program considering the distribution of investment between areas and between modes. The resulting program is considered to be generally consistent with the overarching goals and supportive of the theme. However, the planning database and modeling is relatively coarse and the results should be considered as provisional. It is particularly important that they be further

developed and refined as better information becomes available. This study is one step in the continuing and permanent process of developing GMS transport strategy.

J. Modal Strategy – The Railway Issue

52. The GMS railway network currently provides only limited cross-border connections, Viet Nam-Yunnan/Guangxi. Construction of a new railway link, Thailand-Lao PDR across the Friendship Bridge, is imminent. The chief progress since the previous study has been the definition and coordinated study of the various routes for a Singapore-Kunming Railway Link.[1] This Malaysian initiative has provided a regular forum for information exchange and a focus for further studies. The rationale for the link is rather aspirational than economic, the 20th century equivalent of the 19th century's Cape to Cairo railway, a route that has yet to be completed. The main strategic considerations would appear to be the following:

(i) the rationale and the economic case for the SKRL;
(ii) whether a priority route should be selected and available resources be focused on it or whether missing links on all routes should be constructed piecemeal;
(iii) the relative priority of cross-border links and of domestic requirements; and
(iv) the link design parameters and the gauge issue.

53. Each of the above points is discussed below:

(i) Feasibility studies have shown that there is no financial case for the new SKRL routes, that although in favorable traffic circumstances additional revenues generated may cover day-to-day operating costs, no repayment of capital investment or loan servicing should be expected. There is unlikely to be an economic case for any SKRL route evaluated as a single project, given the very large investment required, but that does not vitiate the case for individual links, which should be evaluated on their own merits.

(ii) The SKRL routes serve primarily a collection of local purposes. Completion of the whole route would not result in significant end-to-end traffic, other than some tourist traffic analagous to that on the Trans-Siberian railway. While the latter is an important freight route, little if any through freight would be carried on the SKRL. The route would thus mainly serve a collection of intermediate demands. Given this finding and the various combinations of countries concerned in the alternative routes, it is perhaps better that priorities be established ad hoc and that no priority route be designated. There is however considerable merit in maintaining the SKRL concept, even if its achievement may be long delayed. It is fully congruent with GMS objectives, it is the most suitable forum for mobilizing international support, and it encourages cooperation between the railway systems.

(iii) The GMS national railways all have pressing problems with their domestic networks: replacing deteriorated track, operating with old and variegated rolling stock which is difficult to maintain, maintaining traffic against rapidly

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[1] At the Workshop on the Draft Final Report held in Ho Chi Minh City on 8-9 December 2005, it was noted that under the ASEAN Transport Ministers Meeting and ASEAN-Mekong Basin Development Cooperation, there is a sub-working group on railways and a special working group on SKRL project, respectively. They have identified cooperation with ADB and the PRC as key with respect to completion of the Singapore-Kunming Rail Link project. Summary of Proceedings, paragraph 19(x).

increasing competition from road and air transport, inadequate financial resources, poor financial position, a political focus on urban rail projects, and in some cases a strategic policy vacuum for rail. Given these issues, constructing expensive cross-border links with uncertain traffic potential is not likely to be a management priority. The development of the SKRL essentially depends on political decisions.

(iv) The existing meter-gauge lines on the SKRL routes operate generally with maximum speeds of 90kph and with axle loads in the 12-15 tonne range. They are basically unimproved 19th century railway systems and the quality of service reflects this fact. As new SKRL links would connect to the existing systems, they too would be constrained to 19th century service standards. In contrast, new capacity on competing modes, air and road, is provided to 21st century standards and operated on by 21st century aircraft and vehicles. This presents a major dilemma. There are a number of possible responses, in ascending order of cost:

(a) Construction of new links to minimal standards to reduce cost, with acceptance of existing service quality, operating primarily as a subsidized social service serving the poorer sections of the community and offering a basic freight service competing on price.

(b) Systematic upgrading of the whole of the SKRL routes. This would be very expensive, disruptive during the renovation process and provide only modest improvement in service quality – maximum speeds of 120kph and a general 15 tonne axle load – limited by the meter gauge.

(c) Construction of new links with provision for future upgrading and for conversion to standard gauge.

(d) Abandoning the SKRL meter-gauge concept. Definition and staged development of a GMS standard gauge network operating generally at 160-200kph, 20-25 tonne axle loads, including some passenger-only high-speed lines operating at 300-350kph.

(e) Leapfrogging current rail technology for passenger services, moving straight to maglev or another advanced technology operating at 400+kph.

54. The GMS is a densely populated area experiencing rapid economic growth and with a clearly substandard rail network. The issue is whether, given the strong competition from other modes, an otherwise desirable railway (or maglev) network can still be developed, basically from scratch. Viet Nam has long-term plans for an extensive standard gauge network and for a high speed Hanoi-Ho Chi Minh City line, while Thailand has also considered such lines.

55. Given the high cost of constructing any of the missing SKRL lines (with the exception of Poipet-Sisophon), now is an appropriate time for a comprehensive and detailed sector-specific study to be undertaken to consider the medium- to long-term perspective and the requirement for a GMS railway system beyond the scope of the Singapore-Kunming Rail Link (SKRL), its route structure, quality of service, operating parameters, and financial and economic viability, taking into account technological developments.

K. Modal Strategy – The Airports Issue

56. Given the rapid deepening of cooperation within the GMS transport sector, consideration may be given before 2015 to formulating a GMS-wide airport development strategy, rationalizing the provision of new capacity, including the development of competing greenfield site mega-airports. Clearly, issues of national and local prestige are involved and economic considerations are only one element in the decision-making process. However, a GMS airports committee, analogous to cooperation in the railway sector, would provide a useful forum for information exchange, for commissioning studies and might then develop further.[1]

[1] At the Workshop on the Draft Final Report held in Ho Chi Minh City on 8-9 December 2005, a question was raised on a proposed GMS airport committee. The consultants noted that in airports there are many issues cutting across countries, which could productively be considered GMS-wide. Since airports have very long lead times all over the world, these are very long-term issues, and the ramifications of decisions need to be assessed early. It was suggested that there could even be tradeoffs between and among countries and modes. Summary of Proceedings, paragraph 19(ix).

CHAPTER VIII: IDENTIFICATION OF INVESTMENT AND TECHNICAL ASSISTANCE PROJECTS

VIII. IDENTIFICATION OF INVESTMENT AND TECHNICAL ASSISTANCE PROJECTS

A. Introduction

1. This chapter identifies investment and technical assistance projects. The list of investment projects in Section B is divided into (a) road projects, (b) railway projects, (c) airport, port, and inland waterway projects and (d) tourism-related projects, of all modes. The list of technical assistance projects is given in Section C.

B. Identification of Investment Projects

1. Introduction

2. The list of projects is used: (i) to document ongoing and committed projects, which were included in the base 2015 transport model network and (ii) for project prioritization and evaluation. The following projects are listed: (i) those physically in progress as of mid-2005; (ii) those included in the country papers presented at the 9th STF in Beijing 1-2 June 2005; (iii) those listed in the GMS Development Matrix (relevant projects only); and (iv) projects proposed during the prioritization missions of September/October 2005.[1] The list was originally finalized on 1 November 2005 and subsequently updated based on the Meeting on the Draft Final Report of this Study held at Ho Chi Minh City on 8-9 December 2005. Corridors are defined in Table 8-1[2]; there are some changes from the previous corridor definitions, as noted in Chapter VI, section A. The * to **** classification of projects is defined in Table 9-2. Figures M-2 to M-7 at the end of this volume present the various investment projects, generally by mode.[3]

Table 8-1: List of Corridors

	<u>All Modes Except Rail</u>
1	East-West Economic Corridor (EWEC): Mawlaymine-Da Nang (R2)
2	North-South Economic Corridor (NSEC)
2.1	NSEC Western Corridor: Kunming-Bangkok via Lao PDR/Myanmar (R3A/R3B)
2.2	NSEC Central Corridor: Kunming-Hanoi-Haiphong (R5)
2.3	NSEC Eastern Corridor: Kunming-Nanning-Hanoi

[1] The projects proposed in other (sub)regional cooperation initiatives (as listed in Section VII.B) were taken into account in formulating the list of projects set out in this chapter. However, the list of GMS projects is understood to not necessarily include all projects in all other initiatives, as the objectives of each grouping may be somewhat different and subject to change over time.
[2] It has been suggested that it may be useful to specify the endpoints (including border points) of all corridors defined. However, in transport planning/modeling terms, precise definitions of corridors can be left somewhat vague and defined in terms of demand patterns. In terms of defining the width of the corridor, any routes used between points X and Y become part of the X-Y corridor; in terms of defining the length of the corridor, if most cross-border traffic ended at a given city with only negligible flows past it, then that city may be considered the endpoint. However, in order to use such demand definitions reliably, reliable origin-destination survey data should be available, but it is not. Also, with demand-based definitions, corridor specification may change over time. If the concern is for the naming of border crossings, it should be noted that in many instances there are multiple crossings in a corridor, even if they are not or have not yet been included in Protocol 1 to the CBTA.
[3] * projects are not shown.

Table 8-1: List of Corridors (continued)

3	Southern Economic Corridor (SEC)
3.1	SEC Central Subcorridor: Bangkok-Phnom Penh-Ho Chi Minh-Vung Tau (R1)
3.2	SEC Southern Coastal Subcorridor: Bangkok-Trat-Koh Kong-Kampot-Ha Tien-Ca Mau-Nam Can (R10)
3.3	SEC Northern Subcorridor: Bangkok-Siem Reap-Stung Treng-Rattanakiri-O Yadov-Play Ku-Quy Nhon
3.4	SEC-NSEC Inter-Corridor Link: Dong Kralor-Stung Treng-Kratie-Phnom Penh-Sihanoukville (R6)
3.5	SEC Western Subcorridor: Dawei-Kanchanaburi-Bangkok Extension
4	Northwestern Corridor (NWC): India-Myanmar-Thailand: Bangkok-Mae Sot-Paan-Payagyi-Meiktila-Tamu-Imphal
5	Proposed Northern Corridor (NC): Yunnan-Myanmar-India: Kunming-Dali-Ruili-Lashio-Mandalay-Tamu-Imphal
6	North-South via Lao PDR Corridor: Kunming-Simao-Mohan-Louang Prabang-Vientiane-Thakhek-Pakse-Veunekham-Stung Treng-Phnom Penh-Sihanoukville
7	Northeastern Corridor: Nanning-Lang Son-Hanoi-Moc Hau-Xam Nua-Xieng Khouang-Vientiane-Khon Kaen-Nakhon Ratchasima-Bangkok/Laem Chabang
	<u>Rail</u>
1	SKRL Route 1: Eastern Route via Viet Nam/Cambodia/Thailand
2	SKRL Route 3A: East-Central Route via Viet Nam/Lao PDR/Thailand
3	SKRL Route 3B: Central Route via Lao PDR (Vientiane)/Thailand
4	SKRL Route 2A: Western Route via Myanmar/Thailand
5	Non-SKRL Route: Central Route via Lao PDR/Thailand (Chiang Rai)

Note: Other corridors are conceivable (e.g., a Yangon-Haiphong road corridor, as was suggested at the Final Meeting on the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006.

2. Road Projects

3. Road projects[1] are given by corridor and country, with countries listed in alphabetical order.

A1 East-West Economic Corridor: Mawlaymine-Da Nang (R2)

Lao PDR:
A1-1 Route 9: proposed projects (i) Savannakhet-km12 section widening to 4-lane; (ii) rehabilitation of adjacent 18km section to Seno (proposed as ADB loan project); (iii) seven feeder road improvements and (iv) reconstruction of 21 bridges. (**)

Thailand:
A1-2 Highways 105/12/209/213/2042: Mae Sot-Mukdahan 770km, progressive widening to 4-lane, 233km completed; 75km under construction, additional 262km to be widened in 10th Plan 2007-11. (****)

[1] As suggested by Lao PDR at the Draft Final Report Workshop in Ho Chi Minh City on 8-9 December 2005, all road transport projects in the GMS should include a road safety component. Also, following upon a suggestion of Cambodia at the Final Meeting on the GMS Transport Sector Study, road infrastructure projects that involve border crossings are understood to involve development of the associated border crossing infrastructure/facilities. Summary of Proceedings, paragraph 68.

A1-3 Mukdahan-Sa Kaeo-Laem Chabang, missing links under construction. (****)

Thailand/Lao PDR:
A1-4 Mukdahan-Savannakhet Second Mekong International Bridge and approach roads 6km, bridge length 1.6km, opening late-2006/early-2007, financed by JBIC Y8.1 billion loan. (****)

Viet Nam:
A1-5 Highway 9: Dong Ha-Lao Bao 83km, improvement under ADB Loan No1278-VIE, completion end-2005. (****)

A1-6 Other highway projects, upgrading to class 3 of following sections: Highway 8 Cau Treo border-Hong Linh 80km, VND700 billion; Highway 217 Na Meo-Do Len check point 154-194km, (upgrading to class 4; overlaps with A6-8) VND160 billion; Highway 49 in Hue 80km; Highway 19 Quy Nhon port-Binh Dinh province 250km, VND2000 billion; Highway 24 Dung Quat port-Kon Tum 168km, VND1360 billion; Highway 9 phase 3, 83km VND3000 billion; Highway 26 Cam Ranh port-Buon Ma Thuot 151km, VND1208 billion; Highway 14 Nam Giang-Giang Bridge 76km, VND760 billion, and; Highways 20/28 Phan Thiet-Da Lat 140km, VND1120 billion. (**)

A2 North-South Economic Corridor (NSEC)

A2.1 NSEC Western Corridor: Kunming-Bangkok via Lao PDR/Myanmar (R3A/R3B)

Lao PDR:
A2.1-1 Route 2: Houay Goan/Maung Ngeun (Thailand/Lao PDR border)-Pakbeng 49km, reconstruction, forms part of additional north-south route to Kunming, to be financed by Thailand (30:70 grant:loan) under AMBDC initiative. Estimated cost Baht840 million/US$20 million. Completion expected in 2007. (****)

A2.1-2 Route 3: Bo Ten-Houayxay 228km (R3A), construction/rehabilitation in progress, completion 2007. Financed by ADB (74km-US$30 million), PRC (69km-US$30 million), Thailand (85km-US$28.5 million) and Lao PDR (US$7.3 million). Details in *Proposed Loan to Lao PDR for the GMS Northern Economic Corridor Project* RRP: LAO 34321, November 2002. (****)

Lao PDR/Thailand:
A2.1-3 Route 3/Highway 1020: Houei Sai-Chiang Khong Third International Mekong Bridge. Site selected, project awaiting agreement on financing, Thailand has agreed to meet 50% of estimated cost of US$40 million. EIRR 16% for the Lao PDR economy. See *Coordinating the North-South Economic Corridor Bridge Project* ADB TA6227 REG. Quadripartite meeting in Kunming 24/25 November 2005, ADB, China, Lao PDR and Thailand. (***)

A2.1-4 Route 4/Highway 1268: new link Pak Lay-Thai border (proposed by Thailand). Some overlap with A6-3. (**)

Myanmar:
A2.1-5 Route 4: Mongla-Kengtung-Tachileik 256km (R3B), upgrading in progress. (****)

Thailand:
A2.1-6 Highway 1020: Chiang Khong-Chiang Rai 115km, rehabilitation/widening in progress. Further upgrading expected in 10th Plan 2007-11. (****)

Yunnan:
A2.1-7 Kunming-Mohan Lao PDR border 687km: Kunming-Mohei section 348km, expressway open; Mohei-Simao section 71km, class II road to be upgraded to expressway 65km by end-2009; Simao-Xiaomenyang section 98km, upgrading to expressway in progress, completion end-2006; Xiaomenyang-Mohan section 175km, class IV road being upgraded to predominantly class I, some class II sections, completion end-2007. (****)

A2.2 NSEC Central Corridor: Kunming-Hanoi-Haiphong (R5)

Viet Nam:
A2.2-1 Highways 2/70: Noi Bai-Vinh Yen section 32km, improved 2-lane under BOT scheme 2005-7, cost VND400 billion; Den Hung-Lao Cai section 228km, improved 2-lane under Government bond 2005-8, cost VND2800 billion. (****)

A2.2-2 Hanoi-Lao Cai expressway 260km: Mai Dich-Noi Bai section 35km, estimated construction cost US$350 million, new construction 2006-9, ADB funding to be requested; Noi Bai-Viet Tri section 56km, cost US$200 million, new construction 2007-10, JBIC funding to be requested; Viet Tri-Lao Cai section 204km, cost US$365 million, new alignment/upgrading 2008-11, ADB funding to be requested. (***/**)

A2.2-3 Mong Cai-Ha Long: all expressway (****)

Yunnan:
A2.2-4 Kunming-Hekou expressway 407km: Kunming-Shilin section 79km open; Shilin-Mengzi section 183km, upgrading class II road to expressway 2005-7; Mengzi-Xinjie-Hekou section 141km, upgrading to expressway 2004-7. (****)

A2.3 NSEC Eastern Corridor: Kunming-Nanning-Hanoi

Guangxi:
A2.3-1 Baise-Longlin expressway 117km. (***)

A2.3-2 Baise-Debao-Longbang Viet Nam border expressway 140km, proposed 11th Plan project. (***)

A2.3-3 Qinzhou-Chongzuo expressway 140km, possible 12th Plan project, timing dependent on funding. (**)

A2.3-4 Chongzuo-Daxin upgrading to Class II, completion 2006; Daxin-Jingxi upgrading to Class II in 11th Plan, in total 200km. (****)

A2.3-5 Chongzuo-Shuikou, upgrading to Class II in 11th Plan. (***)

A2.3-6 Chongzuo-Napo-Funing expressway 300km, possible 12th Plan project. (**)

A2.3-7 Fangcheng-Dongxing Viet Nam border 55km, upgrading to Class II, completion 2006. Expressway a possible 12th Plan project. (****)

A2.3-8 Longzhou-Shuikou Viet Nam border, 50km upgrading to Class II, completion 2006. (****)

A2.3-9 Nanning-Baise expressway 189km, cost US$600 million including proposed ADB loan of US$200 million, construction 2005-8. (****)

A2.3-10 Nanning-Youyiguan expressway/class I 136/43km, completion late-2005, under ADB and EIB loans. (****)

Viet Nam:
A2.3-11 New expressway: Hanoi-Lang Son (113km, in addition to the current 50 km) ("Friendship Pass") (**)

A3 Southern Economic Corridor (SEC)

A3.1 SEC Central Subcorridor: Bangkok-Phnom Penh-Ho Chi Minh-Vung Tau (R1)

Cambodia:
A3.1-1 NR5/6: Poipet-Sisophon-Siem Reap 145km, rehabilitation under ADB Loan 1945-GMS US$77 million, under tendering for construction 2005-8. (****)

A3.1-2 NR1: Phnom Penh-Neak Loueng 56km, under tendering for construction 2005-10, grant from Japan, estimated cost US$45 million; Mekong Bridge at Neak Loueng, FS in progress, construction 2008-10, estimated cost US$120 million, expected to be funded by grant from Japan. (****)

Thailand:
A3.1-3 Highway 33: Kabinburi-Sa Keaw section 54km, widening to 4-lane 2006: Sa Keaw-Aranyaprathet-Khlong Louek Cambodia border 55km, widening in progress. (****)

Viet Nam:
A3.1-4 Bien Hoa-Vung Tau expressway 90km, estimated cost VND10.8 trillion, construction 2007-10, subject to funding. (***)

A3.2 SEC Southern Coastal Subcorridor: Bangkok-Trat-Koh Kong Kampot-Ha Tien-Ca Mau-Nam Can (R10)

See overview in *GMS Southern Coastal Corridor Project* Final Report, July 2004. ADB RETA 6134.

Cambodia:
A3.2-1 NR48: Koh Kong-Sre Ambel 153km, paving/bridge construction. Estimated construction costs US$25.8 million, financing Thai loan Baht867 million for pavement/grant Baht288 million for bridges. FS *Trat-Koh Kong-Sre Ambel Road Project Final Report June 2005.* Project EIRR 20%, ENPV at 12% US$22 million. Expected completion in 2007. Existing road laterite, four ferry crossings. (****)

A3.2-2 NR3: Veal Rinh-Kampot-Kampong Trach 105km, under rehabilitation by World Bank/Republic of Korea ICA 65km complete, remaining sections by 2007. (****)

A3.2-3 NR33: Kampong Trach-Lork Viet Nam border missing 17km section, may be financed by ADB. (***)

Thailand:
A3.2-4 Highway 3: Trat-Hat Lek Cambodia border 89km, widening to 4-lane in 10th Plan 2007- 11. (****)

Viet Nam:
A3.2-5 Highways 80/63: Ha Tien-Ca Mau-Nam Can 222km, Tac Cau bridge and bypasses, cost estimate US$140 million proposed for ADB loan, PPTA 2005, construction from 2007. (****)

A3.2-6 Highway 1: Can Tho-Nam Can reconstruction, completion 2006 (World Bank project); Can Tho Bridge under construction, completion 2007 (financed by JBIC, estimated cost US$300 million). (****)

A3.3 SEC Northern Subcorridor: Bangkok-Siem Reap-Stung Treng-Rattanakiri-O Yadov-Play Ku-Quy Nhon

Cambodia:
A3.3-1 NR5/6: Poipet-Sisophon-Siem Reap 153km, rehabilitation under ADB Loan 1945-GMS, 2005-7. (****)

A3.3-2 NR66: Siem Reap-Preah Vihear-Stung Treng c250km, proposed for construction/ rehabilitation. (***)

A3.3-3 NR78: Stung Treng-Ban Lung 130km, study completed under Viet Nam technical assistance; Ban Lung-Ou Ya Dav Viet Nam border 69km, to be upgraded with US$26 million loan from Viet Nam, to be signed October 2005, FS in progress, project completion expected 2010. (****)

Lao PDR:
A3.3-4 Route 1J: Attapeu-Cambodian border 81km, construction/reconstruction proposed as LCV Development Triangle project. (**)

Viet Nam:
A3.3-5 Highway 19: Play Ku-Quy Nhon 151km, proposed for rehabilitation. (**)

A3.4 SEC-NSEC Inter-Corridor Link: Dong Kralor-Stung Treng-Kratie-Phnom Penh-Sihanoukville (R6)

Cambodia:
A3.4-1 NR7: Dong Kralor-Stung Treng-Kratie 187km, rehabilitation under PRC loan of US$85 million, completion end-2006. (****)

Lao PDR/Cambodia:
A3.4-2 Route 13S - NR7: 6km missing cross-border section, construction awaiting border demarcation. (***)

A3.5 SEC Western Extension (Proposed by Thailand/Myanmar)

Thailand/Myanmar:
A3.5-1 Highway 323: Kanchanaburi-Myitta-Dawei 186km, proposed new construction/ reconstruction, alignment in Myanmar to be confirmed, feasibility study required. Preliminary study by RITES, India. (**)

A3.6 SEC Other Projects

Lao PDR:
A3.6-1 Route 14A: Pakse-Wat Phu-Lao PDR/Cambodia border 170km paving/reconstruction. Section B. Houay Phek-B. Soukhouma 59km proposed for financing by Japan, estimated construction cost (2002 prices) US$33 million. (***/**)

A3.6-2 Route 14B: junction Route 16 – Cambodian border 149km, proposed for paving/ reconstruction. (**)

A3.6-3 Pakse-Xekong Direct Route paving/reconstruction, proposed for financing by Japan, estimated construction cost (2002 prices) US$34 million. (***)

A3.6-4 Route 18A: junction Route 13S-Attapeu 112km, proposed for paving/ reconstruction. (**)

A3.6-5 Route18B: Attapeu-Viet Nam border 123km, paving/reconstruction, completion expected December 2005, financed by Viet Nam. (****)

Thailand/Myanmar:
A3.6-6 Prachuap Port, Bang Saphan-Bokpyin new link (proposed by Thailand). (**)

A4 Northwestern Corridor: India-Myanmar-Thailand

Myanmar:
A4-1 Route 58: Mae Sot-Myawaddy-Tanowsri 18km, reconstruction under Thai grant Baht123 million/US$3 million, completion in 2006; Tanowsri-Kawkareik 40km bottleneck mountainous section currently operating one-direction per day, estimated improvement cost US$19 million, new southern alignment selected for Thingannyinaung-Kawkareik section, with construction 2006-8 under Thai grant; Kawkareik-Thaton 140km, reconstruction under soft loan proposed by Thailand. (****)

A4-2 Route 8: Kawkareik-Mawlamyine-Thaton 189km, proposed construction/ reconstruction under phase 2 of Thailand-Myanmar-India Transport Linkages Project, with financial assistance from Thailand. (**)

A4-3 Thaton-Payagyi-Bagan-Kalay-Tamu/Moreh (India) upgrading/new construction by Myanmar/India. (***)

A4-4 Mawlamyine-Mudon-Thanbyuzayat 64km, proposed upgrading, ranked as highest priority link in the *Preparation Studies for the ASEAN Highway Network Development* Final Report, 2004, Korea Transport Institute. FS by KTI completed February 2005. (***)

Myanmar/Thailand:
A4-5 Thanbuzayat-Three Pagodas Pass-Kanchanaburi: construction/reconstruction, proposed by Myanmar/Thailand, new link. (**)

A4-6 Yangon-Mandalay upgrading in progress under BOT. (****)

A5 Northern Corridor: Yunnan-Myanmar-India

Myanmar:
A5-1 Route 3: Lashio-Muse (R4) 176km, to be upgraded from BST to AC. (****)

Myanmar/China/India:
A5-2 Stillwell Road second world war route, some upgrading in progress. (**)

Yunnan:
A5-3 Kunming-Dali-Ruili Myanmar border expressway 729km: Kunming-Anlong section 22km under construction, opening 2006/7; Aning-Chuxiong section 130km opened June 2005; Chuxiong-Dali-Baoshan section 345km open; Baoshan-Longling section 78km under construction (ADB loan) opening 2007; Longling-Ruili section 154km proposed for ADB loan, completion expected 2008. (****)

A6 Other Road Projects

Cambodia:
A6-1 NR57: Battambang-Pailin Thailand border 97km, proposed for rehabilitation by Japan. (**)

Lao PDR:
A6-2 Route 2: Pakbeng-Taichang Border (GMS R9): missing section Pakbeng-Muong Ngeun to be constructed with Thai loan of US$20 million. Viet Nam to assist in constructing Muong Khoa-Taichang section. (****)

A6-3 Route 4: Ngam Heung-Meng Thai Friendship Bridge-Paklai-Xayaboury-Luang Prabang 350km, proposed GMS flagship project to open up the west bank of the Mekong and connect the East-West and North-South Economic Corridors. Rated top priority project in ADB TA 6193 REG *GMS Infrastructure Connections in Northern Lao Transport Final Report* June 2005. Draft PPTA prepared. Some overlap with A2.1-4. (***)

A6-4 Package of 16 priority strategic transport corridors in northern region. ADB staff consultant Preben Nielsen's report 2004. (***/**)

Myanmar:
A6-5 Route 4: Lashio-Thibaw-Loilem-Kengtung (R7) 666km: Lashio-Thibaw 70km, BOT construction 2-lane; Thibaw-Loilem 238km, being upgraded by Public Works; Loilem-Kengtung 358km, 107km section being upgraded to 1-lane bituminous pavement. (****)

Thailand:
A6-6 Proposed Thakhek-Nakhon Phanom Bridge: *Feasibility Study of the (Third) Mekong Bridge Construction Project (Nakhon Phanom) Inception Report* June 2005. Project may be financed by Government of Thailand. (****)

Viet Nam:
A6-7 Highway 6: Hanoi-Tay Trang Lao PDR border 522km, reconstruction to be completed 2006. (****)

A6-8 Highway 217: Thanh Hoa-Lao PDR border (overlaps with A1-6); Highway 7: Vinh-Lao PDR border, possible alternative route. To form part of new East-West Economic Corridor Thanh Hoa Province-Northern Lao PDR-Northern Thailand (proposed by Viet Nam). (**)

A6-9 Dau Giay-Lien Khuong expressway 189km, estimated cost US$600 million, local pre-FS complete, proposed for construction 2007-10, subject to financing. (***)

Yunnan:
A6-10 Dali-Lijiang 228km upgrading, proposed for ADB loan. (***)

A6-11 Kunming-Wuding 61km upgrading, proposed for ADB loan. (***)

A6-12 Luliang-Funing expressway, construction started 2005. (****)

3. Railway Projects

4. Railway projects are listed from north to south by Singapore-Kunming Rail Link route, with route numbering as given in the *Feasibility Study for the Singapore-Kunming Rail Link* Final Report, November 2000, K.L. Consult.

B1 SKRL Route 1: Eastern Route via Viet Nam/Cambodia/Thailand

Yunnan:
B1-1 Kunming-Hekou existing meter gauge line, currently operating as freight only, passenger service was suspended in 2002. Standard gauge line under construction: Kunming-Yuxi section completed, Yuxi-Mengzi section 141km, construction started 1st September 2005, total cost US$560 million, including ADB loan of US$150 million, expected opening 2009. Mengzi-Hekou (Viet Nam border) section 165km proposed for 12th Plan. Pre-FS completed, estimated cost US$1.45 billion. (****/**)

Viet Nam:
B1-2 Lao Cai-Yen Vian 285km, rehabilitation of metre gauge line, estimated cost US$130 million, including proposed ADB loan of US$60 million. Second stage: double track line partly on new alignment. Pre-FS of standard gauge line option made in 2002/3, estimated cost US$550million, including 2km of tunnels. ADB TA *Kunming-Hanoi-Haiphong Corridor Study* December 2005-June 2006 will evaluate options for all modes. (**)

B1-3 Hanoi-Haiphong Phase 1 rehabilitation, electrification and double tracking planned for 2006-2012, 38km section Hanoi - Hai Duong, proposed for financing by Japan. FS in progress, completion mid-2006. Total project cost (102km whole line) US$400 million. Hai Duing-Haiphong long term project, after 2015. (****/**)

B1-4 Yen Vien-Pha Lai-Ha Long-Cai Lan port 130km construction of dual gauge line started April 2005, completion 2009 (estimated cost VND4 trillion, US$250 million, financing from state budget). Yen Vien-Lim 20km is existing dual gauge, Lim-Pha Lai 35km new alignment, Pha Lai-Ha Long 70 km existing standard gauge to be upgraded to dual gauge, Ha Long-Cai Lan 5km new construction. (****)

B1-5 Signaling and telecommunications improvements Lao Cai-Yen Vian and Dong Dang (border)-Hanoi 163km, under soft loan from PR China (US$64 million) completion 2009, project will double freight capacity. (****)

B1-6 Yen Vian-Hanoi-Km11 south improvement 24km, under Hanoi Elevated Railway Project 2007-2015, dual gauge double track. Expected to be financed by Japan. Double track Red River bridge programmed for 2010-2012. Three phase project Hanoi-Km11 south in phase 1, Hanoi-Gialam 8km in phase 2 and Gailam-Yen Vien 5km in phase 3. (**)

B1-7 Improvement of Hanoi-Saigon line (1726km). Km11-Vinh double tracking (300km), long-term project to start after 2010, pre-FS completed. Nha Trang-Saigon double tracking, long term project (420km). 500 small bridges to be improved. Reconstruction of 44 large bridges on Hanoi-Saigon line 2005-2011 to increase axleload from 13.5 to 15.0 tonnes. Cost US$150 million. (**)

B1-8 Di An Station (on Saigon-Hanoi line)-Loc Ninh Viet Nam border 131km, reinstatement of abandoned line/new line, feasibility study prepared, project cost estimate US$75 million (KL Consult, Malaysia estimate), 80km of the old French alignment exists. Two options evaluated by TEDI, Viet Nam: (i) northern connection at Hoa Lu border to Xnuon in Cambodia, option proposed by Cambodia and (ii) southern connection at Ta Vat border to Memot in Cambodia, option recommended by TEDI. (*)

Cambodia:
B1-9 Loc Ninh-Badeng 255km, includes 1800m Sab bridge and 2000m Mekong bridge. Estimated project cost US$500 million. Pre-FS financed by China, US$1m, in progress. (*)

B1-10 Phnom Penh-Badeng-Sisophon 338km rehabilitation, expected to be financed by ADB loan of US$40 million under *Track Rehabilitation and Upgrading and Restructuring of Railway Authority* projects, which also includes rehabilitation of Phnom Penh-Sihanoukville 264km section, estimated cost US$53 million. See *Assessment of modal competitiveness and traffic potential of a rehabilitated railway in Cambodia* Final Report, January 2004, COWI for ADB. (***)

B1-11 Sisophon-Poipet/Aranyaprathet section 48km. *Feasibility Study on Re-Establishing the Bangkok-Aranyaprathet-Phnom Penh Railway Line* Final Report, August 2000, Halcrow/TDRI. Negotiations in progress for used rails to be supplied by Malaysia. (***)

B2 SKRL Route 3A: East-Central Route via Viet Nam/Lao PDR/Thailand

Viet Nam:
B2-1 Tan Ap-MuGia (Lao PDR border) 52km and Tan Ap-Vung Ang port 66km, pre-FS in progress, estimated cost US$230 million. (**)

Lao PDR:
B2-2 MuGia-Thakhek-Vientiane, long-term project; Viet Nam has agreed to conduct a feasibility study. (**)

Thailand:
B2-3 Bua Yai-Mukdahan-Nakhon Phanom link with connection to B2-2 (Thakhek). (**)

B3 SKRL Route 3B: Central Route via Lao PDR (Vientiane)/Thailand

Lao PDR:
B3-1 Bo Ten-Louang Prabang-Vientiane, long term project. (*)

B3-2 Vientiane-Thanaleng (10.5km), France has offered grant of Euro150,000 for detailed engineering. (**)

B3-3 Thanaleng-Nong Khai (Friendship Bridge) Customs Depot (3.5km) cost of Baht197 million financed by Thai soft loan (70%) and grant (30%), 18 months construction period, expected to start early-2006. (****)

B4 SKRL Route 2A: Western Route via Myanmar/Thailand

Yunnan:
B4-1 Dali-Ruili c350km, studies and bidding completed. Estimated cost RMB15.4 billion/ US$1.9 billion, longest tunnel 18km. Possible start of construction 2006/7, construction period 4.5 years. (****)

Myanmar:
B4-2 Ruili/Muse-Lashio 232km, (GMS RW5) feasibility study by Chengdu No.2 Railway Design Institute started May 2005. (**)

B4-3 Mandalay-Yangon double tracking in progress, 250km north from Yangon complete, 130km remaining. (****)

B4-4 Mawlamyine-Thanbyuzayat upgrading in progress. Thanlwin railway bridge 3.2km to open end-2006. (****)

Myanmar/Thailand:
B4-5 Thanbyuzayat-Three Pagodas Pass 110km and Three Pagodas Pass-Nam Tok 153km. *Feasibility Study for the Thailand-Myanmar-Railway Link of the SKRL Project* Inception Report April 2005, Presentation Handouts June 2005, Korea Transport Institute, Draft Final Report due August 2006. (**)

B5 Non-SKRL Route: Central Route via Lao PDR/Thailand (Chiang Rai)

Yunnan:
B5-1 Yuxi-Jinghong-Bo Ten (772km). Estimated construction cost Baht90.3 billion/ US$2.26 billion. Earliest expected completion 2015-2018. Project approved by State Council. (*)

Lao PDR:
B5-2 Bo Ten-Chiang Saen/Houei Sai 240km. Estimated construction cost Baht21.6 billion/US$540 million. (*)

Thailand:
B5-3 Chiang Saen 308km or Chiang Khong/Houei Sai 326km-Chiang Rai-Denchai. *Feasibility Study Update of a Railway Link from Den Chai to Chiang Rai and Feasibility Study of an Extension from Chiang Rai to Southern China* Final Report, March 2004, AEC/Wilbur Smith. Estimated cost Baht28.8-31.9 billion, including rolling stock (at 2004 prices). Earliest possible completion to Chaing Saen 2012, to Chiang Khong 2015-2018. (*)

B5-4 Denchai-Chiang Rai implementing a project for which a feasibility study was completed in 1995 and a detailed design completed in 1998. (**)

B6 Other Railway Projects

Guangxi:
B6-1 Baise-Debao-Jingxi-Viet Nam border new line, proposed for completion by 2020. Baise-Debao section 75km may be constructed earlier to serve Debao aluminium plant. (*)

B6-2 Fangcheng-Viet Nam border new line, proposed for completion by 2020. (*)

B6-3 Chongzuo-Longzhou-Shuikou new line, long term project, planning may start in 12th Plan. (*)

Guangxi/Yunnan:
B6-4 Nanning-Kunming 600km, double tracking and upgrading for 160-200kph operation, 2005-2010, estimated cost RMB18 billion/US$2.2 billion. (****)

Yunnan:
B6-5 Dali-Lijiang 168km, new single track line under construction, includes 54 bridges and tunnels, ADB loan US$180 million. (****)

B6-6 Zhanyi-Liupanshui (between Kunming and Guiyang), for which double tracking is likely to be included in the 11th five-year plan. (**).

B6-7 Kunming-Chengdu, includes 150km within Yunnan province, for which equipment modernization may be required. (*)

Myanmar/India:
B6-8 Tamu (Border)-Kalay 135km, missing link. RITES, India conducting feasibility study, estimated cost US$60 million. Also requires construction of Iribam-Tamu section in India. (*)

B6-9 Kyaw-Kalay 210km, final 43km under construction, completion expected in 2006. (****)

Cambodia:
B6-10 Poipet-Siem Reap 105km, estimated cost US$100million. Ranked top for tourist potential in study by Halcrow. (**)

Viet Nam:
B6-11 Saigon-My Tho 70km, reinstatement of French-built line, as double track, meter gauge. (**)

4. Airport, Port, and Inland Waterway Projects

5. Airport, port, and inland waterway projects are listed below.

C1 East-West Economic Corridor: Mawlamyine-Da Nang

Airport
Lao PDR:
C1-1 Improvement of Savannakhet Airport to accommodate medium-sized aircraft for joint domestic use by Lao PDR and by Thailand via Mukdahan- Savannakhet Bridge, project proposed by Lao PDR. (***)

Port
Lao PDR:
C1-2 Proposed development of Mekong river ports between Vientiane and Savannakhet. (**)

Viet Nam:
C1-3 Da Nang port upgrading, phase 2. Local FS complete, to be proposed for JBIC financing. (***)

C1-4 Lien Chieu port construction, Da Nang Bay, cost VND2400 billion. (**)

C2.1 Western Corridor: Kunming-Bangkok via Lao PDR/Myanmar

Airport
Lao PDR:
C2.1-1 Upgrading of Louang Namtha and Houayxay airports to accommodate medium-sized aircraft. (**)

Thailand:
C2.1-2 New Suvanabhumi Bangkok international airport, expected to open mid-2006. (****)

Yunnan:
C2.1-3 Kunming new airport planned 20-30km NE of city, site confirmation in progress. Estimated cost, US$2.9 billion. Probable construction period 2007-2010, dependent on financial resources. (***)

C2.1-4 Manshi airport upgrading 2006, cost RMB120 million US$15 million, to become international airport primarily for services to/from Myanmar from 2007. (****)

C2.1-5 Proposed feeder airport expansion projects at Dali [C2.1-5(a)] (***) and Lijiang. [C2.1-5(b)]. Total estimated cost US$45 million. (**)

Port
Thailand:
C2.1-6 Chiang Saen, Kok/Mekong rivers, construction of second port to berth 20 vessels, construction to start 2005. (****)

C2.2 Eastern Corridor: Kunming-Hanoi-Haiphong

Inland Waterway
Viet Nam:
C2.2-1 Thao River Lao Cai-Viet Tri waterway upgrading, FS completed by VIWA 2004, estimated improvement cost US$55 million, including construction of four locks, proposed implementation phased over 2005-13. (**)

C2.2-2 Upgrading of northern inland waterway ports at Hanoi, Viet Tri, Hoa Binh, Ninh Phuc, Da Phuc and Bac Giang. Total cost with C3.1-4 VND2300 billion. (**)

Airport
Yunnan:
C2.2-3 Development of new Wenshan Airport, 2400 m runway, 1800 m^2 terminal, estimated cost RMB 260 million or US$32 million. (****)

C3.1 Central Subcorridor: Bangkok-Phnom Penh-Ho Chi Minh-Vung Tau

Port
Viet Nam:
C3.1-1 Vung Tau being rehabilitated under JBIC financing, completion 2007. (****)

C3.1-2 Can Tho planned upgrading, financing to be sought. (**)

C3.1-3 Cai Mep-Thi Vai deepwater port, FS by JICA, estimated cost US$240 million, JBIC loan expected to be signed 2005. (****)

C3.1-4 Upgrading of southern inland waterway ports at Ho Chi Minh, Ca Mau, Vinh Long, An Giang and Dong Thap. (**)

C3.2 Southern Coastal Subcorridor: Bangkok-Trat-Koh Kong-Kampot-Ha Tien-Ca Mau-Nam Can

Inland Waterway
Cambodia:
C3.2-1 Channel, navigation and port improvements on Mekong and for access to port at Siem Reap; development of intermodal terminal at Khone falls. Project scope to be defined in early-2006 under ongoing *Master Plan for Waterborne Transport on the Mekong River System in Cambodia* Inception Report, July 2005. (***)

Viet Nam:
C3.2-2 FS of upgrading Tien River channel to Cambodian border to start soon, Belgian grant Euro700,000. (**)

C3.2-3 Floating port to be constructed on Hamluong river for trade with Cambodia using inland waterway vessels. (***)

Port
Thailand:
C3.2-4 Laem Chabang Phase 2, construction of C and D container terminals 2005-14, doubling capacity. (***/**)

C3.3 Northern Subcorridor: Bangkok-Siem Reap-Stung Treng-Rattanakiri-O Yadov-Play Ku-Quy Nhon

Port
Viet Nam:
C3.3-1 Van Phong planned to be upgraded to an international port. (**)

C3.4 Inter-Corridor Link: Dong Kralor-Stung Treng-Kratie-Phnom Penh-Sihanoukville (R6)

Airport
Cambodia:
C3.4-1 Sihanoukville Airport to be upgraded by SCA. (****)

Port
Cambodia:
C3.4-2 Sihanoukville port expansion, construction of container terminal, estimated cost US$35 million, financed by JBIC, completion expected in 2008. (****)

C3.5 Western Extension of Southern Economic Corridor (Proposed)

Port
Myanmar:
C3.5-1 New Dawei deepwater port 13’48”N, 98’04”. Nippon Koei pre-FS identified possible sites at Nabule, Sanlan and Nyawbyin. (**)

C4 Other Projects

Airport
Guangxi:
C4-1 Nanning international airport improvement: runway lengthening to 3200m, doubling of terminal capacity, completion expected in 2008. (****)

Port
Myanmar:
C4-2 Deepwater port, a number of sites proposed including Kelagoke 15’31”N, 97’43”E, Kyaukphyu and Bokpyin. See also project C3.5-1. (**)

Thailand:
C4-3 Ranong port multi purpose and container berth for 12,000 DWT, completion 2006. (****)

Multimodal
Myanmar/India:
C4-4 Sittwe port upgrading, Kaledan river improvement to Paletwa, Paletwa-Mizoram border highway. Under study by RITES, India. (**)

5. Tourism-Related Projects (All Modes)

6. A TA on GMS transport requirements for tourism development was recommended in ADB TA 6179-REG: *GMS Tourism Sector Strategy,* Draft Final Report, March 2005. Annex 9 of that study identified infrastructure requirements for 10 tourism zones. This includes strategic projects, most of which are already included in sections (a)-(c) above. The supporting projects for the tourism zones are given in this section. Tourism-related projects other than in the TA are listed by country.

GMS Tourism Sector Strategy:
D-1 Golden Quadrangle Tourism Zone, 300-400km of secondary/feeder roads US$20million and Mekong river improvements US$10 million, border facilities US$4 million. (**)

D-2 East-West Tourism Corridor, 300-400km of secondary/feeder roads US$22 million, jetties US$2 million, border facilities US$3 million. (**)

D-3 Emerald Triangle, 200-300km of secondary/feeder roads, river facilities US$2 million, border facilities US$2 million. (**)

D-4 Green Triangle, 150-200km of secondary/feeder roads, US$10 million. Proposed ADB project for pro-poor tourism in the Green Triangle would include an infrastructure element. (**)

D-5 Tenchong-Myitkyina Tourism Zone, 300-400km of secondary/feeder roads US$14 million, Myitkyina airport upgrading US$6 million. (**)

D-6 Southern Tourism Coastal Corridor, 300-400km of secondary/feeder roads US$15 million, coastal/delta jetties and small bridges US$10 million, border facilities US$2 million. Proposed ADB TA on tourism and infrastructure feasibility along the Southern Economic Corridor Coastal Subcorridor to identify projects. (**)

D-7 Andaman Coastal and Marine Zone, 500-600km of secondary/feeder roads US$40 million, upgrading of Kawthoung and Myeik airports US$20 million, coastal facilities US$10 million, border facilities US$5 million. (**)

D-8 Heritage Necklace, secondary/feeder roads and parking US$35 million, upgrading of Nyaung Oo airport (for Bagan) US$10 million, jetties etc. US$10 million. (**)

D-9 Red River Valley Tourism Zone, 200-300km of secondary/feeder roads US$20 million, Halong Bay/Haiphong and Red River facilities US$20 million, border facilities US$2 million. (**)

D-10 Northeast Lao PDR/Viet Nam Highlands Zone, 400-500km of secondary/feeder roads US$40 million, Udomxai airport US$5 million, border facilities US$2 million. (**)

Cambodia:
D-11 Rattanakiri and Stung Treng airports upgrading. (**)

D-12 NR67 Chong Sa Ngum-Anlong Veng-Siem Reap 124km, road rehabilitation 2005-7, estimated cost US$28 million, under loan from Thailand. (****)

Cambodia/Thailand:
D-13 Phimai-Phnom Rung-Siem Reap road construction/improvement (proposed by Thailand). (**)

Guangxi:
D-14 Guilin international airport improvement, runway lengthening to 3200m, terminal area to be expanded by 60%. (***)

Lao PDR:
D-15 Northeast Tourism Circuit Vienxay caves involves upgrading Route 1 Vieng Kham-Vieng Thong and upgrading Xam Nua airstrip. (**)

D-16 Improvement of Louang Prabang airport. (**)

D-17 Upgrading of Pakse airport. (**)

D-18 Upgrading of other airports recommended in *Civil Aviation Master Plan 2004-13* December 2003, ADB TA 3968-LAO. (**)

Lao PDR/Myanmar:
D-19 Mekong Xieng Kok-Kyaing Lap Friendship Bridge 800m, preliminary studies for suspension bridge completed, financing sought.[1] Improvement of access roads Tarlay-Kyainglap 60km, Myanmar and Xieng Kok-Bridge 16km, Lao PDR in progress. (***)

[1] As was noted at the Workshop on the Draft Final Report held in Ho Chi Minh City on 8-9 December 2005, this project is part of the northern East-West Corridor already proposed in ACMECS, linking Yangon-Meiktila-Kwaingtong-Tarlay-Kyainglap-Xieng Kok-Louang Namtha-Hanoi-Haiphong. Summary of Proceedings, Appendix 11, paragraph 25.

Mekong-adjoining countries:
D-20 Proposed Mekong World Tourism River Corridor to link six priority tourism zones, involves secondary and feeder road development and river-based infrastructure. (**)

D-21 Lancang-Mekong navigation improvement and maintenance project to support GMS Tourism Sector Strategy: navigation aids etc. (***)

Myanmar:
D-22 Upgrading of Yangon International Airport, runway lengthening and terminal improvements in progress, completion expected in 2006. (****)

D-23 Upgrading of airports at Nyaung Oo (for Bagan), Heho (for Inle lake), and Dawei. (**)

6. Extra Projects

7. A number of projects have been added to the long list pursuant to suggestions offered at the Workshop on the Draft Final Report held in Ho Chi Minh City on 8-9 December 2005 and at the Final Meeting on the GMS Draft Transport Sector Strategy Study on 21 March 2006. The Subregional Transport Forum may wish to expand upon the project formulation, based on receipt of a project profile from the government(s) concerned, after which these projects may be accorded a more definitive “star” classification. However, a provisional classification has been suggested in the following table, generally **.

Cambodia:
E-1 Phnom Penh Inner Ring Road, including New Monivong Bridge over Bassac River (**)
E-2 Phnom Penh Outer Ring Road (**)
E-3 New Bassac River Bridge at Prek Ho (**)
E-4 Second Mekong Bridge, near Neak Loueng (**)

Guangxi:
E-5 Fangcheng port improvement project (**)
E-6 Beihai port improvement project (**)
E-7 Qinzhou port development project (**)
E-8 Hechi airport development project (**)

Guangxi and Viet Nam:
E-9 Fangcheng-Haiphong railway project (**)

Lao PDR and Thailand:
E-10 Houay Kon (Thailand)-Muang Ngeun (Lao PDR)-Hongsa-Mekong Bridge-Luang Prabang (**)
Lao PDR and Viet Nam:
E-11 Pak Thapan-Saravan-Route 15-Lao PDR connect to Highway 49 in Viet Nam (**)

Lao PDR, Thailand, and Viet Nam:
E-12 Vung Ang Deep Sea Port (Viet Nam)-Road 12-Thakhek-Mekong Bridge-Nakhon Phanom road improvement project (**)

Myanmar:
E-13 Muse-Mandalay road improvement project (**)
E-14 Meiktila-Taunggyi-Loilem road improvement project (****)

E-15 Sale-Sittwe road improvement project (****)

Viet Nam:
E-16 Vung Ang Port improvement project, including a container yard and to benefit both Viet Nam and Lao PDR (**)

Yunnan:
E-17 Wenshan Airport (**)
E-18 Tengchong Airport (**)
E-19 Red River Airport (**)

7. Maps

8. The foregoing projects are presented on maps, as presented in the map section at the end of this volume for ready reference:

Figure M-2: GMS Road Projects: Committed (****);
Figure M-3: GMS Road Projects: High Priority (***);
Figure M-4: GMS Road Projects: Moderate Priority (**);
Figure M-5: GMS Railway Projects;
Figure M-6: GMS Water Transport Projects;
Figure M-7: Air Transport Projects;
Figure M-8: Extra Projects.[1]

C. Identification of Technical Assistance Projects

9. The list of "technical assistance projects" (TAPs) was gathered through a combination of discussions, meetings and background research at subregional, national, and institutional levels. A long list, essentially comprising a broadly determined needs assessment, was initially prepared. A more refined list (see Box 8-1) is presented here categorized into CBTA-related, infrastructure-related, transport logistics-related, training, and others/cross-cutting. It is noted that the classification is somewhat arbitrary, as some TAPs could arguably be placed in more than one category; e.g., TAP 12: Support for Harmonization of GMS Road Signs and Signals, could be considered either CBTA-related or infrastructure-related, although it has been classified here as CBTA-related.

[1] Some of the Tourism-Related Projects (D Projects) are not shown because their geographic scope is not well defined.

Box 8-1: Technical Assistance Projects

CBTA-Related

TAP 1: Implementing the GMS Agreement to Facilitate the Cross-Border Movement of Goods and People, Phase 2

TAP 2: "Fine Tuning" of the GMS Cross-Border Transport Agreement

TAP 3: Processing and Facility Improvements at Border Crossing Points

TAP 4: Updating or Improving Existing Bilateral Railway Agreements and/or Amending the GMS Cross-Border Transport Agreement (CBTA) To Cover Cross-Border Railway Transport

TAP 5: Project to Establish a Legal Framework for Cross-Border Navigation on the Mekong River ["Navigation Without Frontiers", a motto adopted by the Mekong River Commission]

TAP 6: Establishment of Issuing and Guaranteeing Organizations under the GMS Cross-Border Transport Agreement

TAP 7: Inclusion of a Substantive Health and Sanitary/Phytosanitary (SPS) Regime in the Cross-Border Transport Agreement

TAP 8: <u>Phased</u> Liberalization of Visa Regimes for Travelers

TAP 9: Specification of Transit Charges To Be Implemented Under Protocol 2 of the Cross-Border Transport Agreement

TAP 10: Establishment of a Third-Party Motor Liability Insurance Regime

TAP 11: Institutional Strengthening of National Transport Facilitation Committees

TAP 12: Support for Harmonization of GMS Road Signs and Signals

Infrastructure-Related

TAP 13: Practicalities of Private Sector Participation in Transport Infrastructure

TAP 14: Cooperation between the ADB-ASEAN Regional Road Safety Program and the PRC

TAP 15: HIV/AIDS Component for all Road Transport Projects in the GMS

TAP 16: Road Maintenance Initiatives for Cambodia, Lao PDR, Myanmar, and Viet Nam

TAP 17: Private Sector Participation in Road Maintenance

TAP 18: Revisiting of the Feasibility Study for the Singapore-Kunming [Nanning] Railway Link (Project)

TAP 19A: Upper (Lancang-)Mekong River Navigation Improvement and Maintenance Project

TAP 19B: Lower Mekong River Navigation Improvement and Maintenance Project

TAP 20: GMS Airports Development Project

TAP 21: Rail Maintenance in Cambodia

TAP 22: GMS Andaman Sea/Indian Ocean Deep Sea Port Study for Myanmar

Transport Logistics-Related

TAP 23: Training in Logistics

Box 8-1: Technical Assistance Projects (continued)

TAP 24: Development of Inland Container Freight Depots

TAP 25: Cambodia Freight Forwarders (FF) Competitiveness Project

Training

TAP 26: Training in Road (Passenger and Freight) Transport Operations ("Knowledge Across Frontiers")

TAP 27: Upgrading of Inland Water (Passenger and Freight) Transport Industry

TAP 28: Railways Management Improvement Project

TAP 29: Development of Traffic Engineering Capacity in Myanmar

TAP 30:Development of Highway Engineering Capacity in Myanmar

TAP 31: Financial and Economic Assessment Expertise in Myanmar

Others/Cross-Cutting

TAP 32: Transfomation of Transport Corridors into Economic Corridors

TAP 33: Further Development and Enhancement of the GMS Transport Model

TAP 34: Development of Scheduled Cross-Border Bus Routes

TAP 35: Marketing and Container Train Concessions between Laem Chabang Thailand and Thanaleng, Lao PDR

TAP 36: Promotion of Marketing Functions for GMS Ports

TAP 37: Promotion of Short Sea Shipping Services

TAP 38:TA on Transport Requirements for the Development of Tourism

TAP 39: Sea Cruise Development in Cooperation with ASEAN

TAP 40: Phased Implementation of Open Skies

CHAPTER IX: PRIORITIZATION OF INVESTMENT AND TECHNICAL ASSISTANCE PROJECTS

IX. PRIORITIZATION OF INVESTMENT AND TECHNICAL ASSISTANCE PROJECTS

A. Introduction

1. This chapter considers the prioritization of identified investment projects (Section B) and of technical assistance projects (in Section C). Progress with the implementation of priority road and railway projects of the previous GMS transport study and project priorities as determined in recent and ongoing studies are also discussed in Section B.

B. Prioritization of Investment Projects

1. Progress Since the Previous Transport Sector Study

a) Introduction

2. The *Subregional Transport Sector Study for the Greater Mekong Subregion,* which was undertaken from August 1993 to June 1994, proved to be a groundbreaking study for GMS transport infrastructure. Much of the subsequent development, in particular of the road network, has been of routes defined in that study. The study also acted as a catalyst for work on the GMS Cross-Border Transport Agreement (CBTA) and the establishment of the Subregional Transport Forum.

3. At the outset of the previous study, the GMS concept was only one year old and the idea of cross-border GMS projects was not well established. The study proposed 32 priority infrastructure projects, comprising nine road, eight railway, four inland waterway, six port, and five airport projects. In addition, projects for new subregional air routes, for transit rules and regulations, and for the Subregional Transport Forum were developed. Project identification was based largely on suggestions made at the Second and Third Conferences on Subregional Economic Cooperation, with the projects defined in more detail by the study team, based on practical considerations and a forecast of cross-border transport requirements to 2020.

4. The bulk of the study work was on preparing comprehensive profiles of each project, including pre-feasibility study level economic evaluation and initial environmental examination. Projects were prioritized in a two-step process: (i) scoring based on giving priority to improvement and rehabilitation projects; to projects already agreed between/among the countries concerned, and to projects of genuine subregional character; and (ii) incorporating the results of the study's economic and financial assessments, socioeconomic and environmental impacts, assessment of project conflicts and complementarities, and technical implementation issues. On the basis of the two-step process, projects were then categorized as:

First Category for immediate implementation - 6 projects;
Second Category for implementation 1994-2000 - 14 projects;
Third Category for implementation 2000-10 - 6 projects; or
Timing Primarily Dependent on National Considerations - 6 projects.

5. Progress with implementation of the road and rail projects is detailed in the following subsections.

b) Implementation of Priority Road Projects

6. The nine priority road projects were:

First category:	R1 Bangkok-Phnom Penh-HCM City-Vung Tau
	R2 East-West Corridor Thailand-Lao PDR-Viet Nam
	R3 Chiang Mai-Kunming via Myanmar and Lao PDR
	R4 Kunming-Lashio
Second category:	R5 Kunming-Hanoi
	R6 Southern Lao-Sihanoukville
	R7 Lashio-Loilem-Kengtung
	R8 Southern Yunnan-Northern Thailand-Northern Lao PDR Northern Viet Nam
	R9 Northeastern Thailand-Southern Lao PDR-Northeastern Cambodia-South Central Viet Nam.

7. The implementation timetable suggested in the study has proved to be somewhat optimistic, but there has been substantial progress with some of these projects, as detailed in the long list in Chapter VIII.

c) Implementation of Priority Railway Projects

8. Eight railway projects were prioritized. These have progressed in terms of concept development and feasibility studies, primarily within the framework of the Singapore-Kunming Rail Link (SKRL), but there has been little progress with construction, other than in Yunnan and in Viet Nam. The projects were:

Second Category:	RW1 Yunnan-Lao PDR/Myanmar-Thailand
	RW2 Yunnan-Viet Nam
	RW3 Thailand-Cambodia-Viet Nam
Third Category:	RW4 Friendship Bridge-Nam Ngum
	RW5 Yunnan-Myanmar
	RW7 Lao PDR Minerals
	RW8 Thailand-Myanmar
National:	RW6 Northeastern Thailand-Lao PDR

RW1: an FS of the Thailand section to the Lao PDR border was undertaken in *FS Update of a Railway Link from Den Chai to Chiang Rai and FS of an Extension from Chiang Rai to Southern China* Final Report, March 2004. The PRC State Council has approved the construction of the Yunnan section to the Lao PDR border, but no decisions on timing have been taken. The routes via Myanmar and via Vientiane are not currently being pursued.

RW2: is making good progress, with the start of construction of a standard gauge line from Yuxi-Mengzi in Yunnan in September 2005. Construction on the adjoining section on to the Viet Nam border at Hekou is expected to start around 2009. Rehabilitation of the meter gauge Lao Cai-Yen Vian line in Viet Nam is planned to start in 2006. Construction of a dual-gauge Yen Vien-Cai Lan line commenced in April 2005. Upgrading of sections of the Hanoi-Haiphong line is expected to begin in 2006.

RW3: discussion of the supply of used rails by Malaysia to reinstate the Thailand-Cambodia missing section Aranyaprathet/Poi Pet-Sisophon is ongoing. Rehabilitation of the Sisophon-Phnom Penh section may start in 2006/07. An FS for the Cambodia-Viet Nam section is in progress by the PRC.

RW4: a feasibility study of the 12.3km section from the Friendship Bridge to Vientiane was undertaken by the Korea Railway Technical Corporation *Nong Khai to Vientiane Railway Project Final Proposal* in July 2002. This updated the *Nong Khai to Vientiane Railway Feasibility Study* Final Report of August 1995, undertaken by W.S. Atkins. The estimated construction cost was US$37.8 million, excluding rolling stock. The calculated EIRR over 20 year's operation was 18%. The financial analysis shows that the project could cover operating costs, but not service capital. Construction of the initial 3.5km across the Friendship Bridge Nong Khai-Thanaleng financed by Thai loan/grant is expected to start early-2006. The extension to Vientiane is under active consideration, while the Vientiane-Nam Ngun section is dormant.

RW5: construction of the Yunnan section is programmed in the 11th Plan and may start in 2007. An FS of the Myanmar section is in progress by the PRC.

RW6: an FS of new lines in the northeast of Thailand was undertaken in 1995, but there are no current plans for construction of this project.

RW7: this project is currently dormant.

RW8: with the opening of the Thanlwin railway bridge expected in 2006, connecting the Mawlamyine-Ye line to the rest of the Myanmar network, the priority route has changed to Nam Tok-Thanbyuzayat via the Three Pagodas Pass. An *FS of the Thailand-Myanmar Railway Link of the SKRL* is in progress, financed by the Republic of Korea; the *Inception Report* was issued in April 2005.

2. Activities of Non-GMS Working Groups

9. This subsection considers the transport work of groups other than the GMS of direct relevance to this study.

a) ASEAN Land Transport Working Group

10. The ASEAN Land Transport Working Group (LTWG) meets twice-yearly and with the associated and more frequent meetings of senior officials (STOM) is perhaps the most active forum for transport issues concerning the GMS countries other than Yunnan and Guangxi. The 10th LTWG Meeting 7/8th September 2005 in Bangkok covered a wide range of transport issues, many of which overlap with GMS work. Of most relevance to this study, the meeting agreed: (i) that Malaysia would be responsible for monitoring progress with the SKRL, pursuant to the ASEAN Transport Action Plan 2005-10; (ii) that priority ASEAN highway road projects: Mawlamyine-Thanbyuzayat, Attapeu-Phia Fai 114km, and Quang Ngai-Kon Tum 168km would be pursued further, with Thailand as coordinator; (iii) that Indonesia and the Philippines would conduct development studies on intra-ASEAN ferry links; and (iv) that Viet Nam would carry forward the regional policy framework for developing inland waterways transport. A number of projects are in progress under the ASEAN-Japan Transport Partnership Program, including the AJLT-5 ASEAN Railways Revival Plan.

11. The Korea Transport Institute undertook a detailed study for ASEAN in 2003 with the primary objective of prioritizing the upgrading or construction of highway road sections below class III standard in Cambodia, Lao PDR, Myanmar, Thailand, and Viet Nam. Class III is defined as a 2-lane DBST road with a pavement width of 6.0m. The final report, *Preparation Studies for the ASEAN Highway Network Development*, was issued in December 2003. In total 34 sections of 3,192 route km were analyzed, 2,358km in Myanmar, 556km in Viet Nam, 263km in Lao PDR, and 15km in Thailand. No part of the Cambodian ASEAN Highway network was found to

be below class III, except Kohkong-Sre Ambel 152km, which was already committed for improvement under grant/loan financing from Thailand. Prioritization of sections was made on a combination of economic factors having a 52.5% weight (traffic volume and cost/km) and political factors having a 47.5% weight (a combination of balanced development, willingness to invest, connectivity, and section priority within a group). The highest priority sections were determined to be in Myanmar: Mawlamyine-Mudon and the adjacent section Mudon-Thanbuzayat, in total 64km, with an estimated improvement cost of US$11 million.

b) UNESCAP/Asian Highway Network

12. The Intergovernmental Agreement on the Asian Highway Network entered into force on 4 July 2005. UNESCAP is preparing subregional overviews of investment needs, in a project financed by Japan. Under this initiative, a meeting focused on Southeast Asia was held in Bangkok, 25-26 April 2005. A list of the 22 priority Asian Highway sections and links thereto in Cambodia, Lao PDR, Myanmar, and Viet Nam is given in Table 9-1.

Table 9-1: Priority Asian Highway Projects

Route	Section	Km	US$m
Cambodia:			
AH11/NR78	Jnct. NR7-Banlung (Rattanak Kiri)	125	44
AH11	Banlung-Oyadav-Viet Nam border	78	27
AH1/NR57	Battambang-Palin-Thailand border	113	40
AH1/11/NR61	Preak Kdam-Thnal Keng	16	6
AH11/NR76	Snuol-Sen Monorom-Lumphat	335	117
AH11/NR73	Jct. NR7 Pratheat-Chhlong	57	20
AH1/NR1	Neak Leoung Mekong bridge	3	200
AH1/11	Siem Reap-Stung Treng	253	260
AH2	Improvement and upgrading	160	14
AH25	Improvement and upgrading	412	15
Lao PDR:			
AH13	Oudomaxay-Muangkhua-Tai Chang	202	40
AH11/R18A	Phiafai-Attapeu	114	23
Myanmar:			
AH1	Thailand border Myawaddi-Kawkareik	40	19
AH1	Monywa-Kalay/Kalewa	184	40
AH2	Kyaing Tong-Takaw-Loilem-Taunggyi	450	23
Viet Nam:			
AH14	Hanoi-Hai Phong Expressway	100	410
AH1	Bien Ha-Vung Tau Expressway	90	600
AH16	Da Nang-Quang Ngai (4 lanes)	140	700
AH1	Saigon-Long Thanh-Dau Day (4/6 lanes)	55	350
AH14	Hanoi-Lao Cai Expressway	290	600
AH15	Vinh-Cau Treo rehabilitiation	85	44
AH1/14	Hanoi Ring Road	65	600

Note: for Cambodia and Lao PDR, projects noted are links to AH.
Source: *Report of the Subregional Expert Group Meeting on Identifying Investment Needs and Priorities for the Development of the Asian Highway Network and Related Intermodal Connections* UNESCAP.

c) ACMECS and SASEC

13. Ayeyarwady-Chao Phraya-Mekong Economic Cooperation (ACMECS) Workshop has held regular meetings. Reports of the Transport Working Group have detailed progress with the implementation of ACMECS projects and with the next stage projects. Most of these projects and all of the “next steps” projects are included in the long list.

14. A South Asia Subregional Economic Cooperation (SASEC) Transport Working Group was established in October 2001. The focus in Phase 1 was on cross-border movements. Following a technical workshop in Bangkok in February 2004, activity in Phase 2 has covered the operating efficiency of six road, rail, and inland waterway corridors, under *Subregional Corridor Operational Efficiency Study* ADB TA6112 REG. None of these corridors connects directly to the proposed GMS-South Asia links. With BIMSTEC becoming the main bridge between among SAARC and ASEAN, SASEC and BIMSTEC might coordinate closely, or SASEC might widen its membership to take into account growing GMS-South Asia linkages.

d) SKRL Working Group

15. The 7th Special Working Group Meeting on the SKRL project was held in Bangkok on 29-30 June 2005. This reviewed progress with feasibility studies, financing, and project preparation. The current status of SKRL links is noted in the long list.

e) Other Important Groupings

16. As noted in Section VII.B, there are also a number of international organizations concerned with aspects of GMS transport, including Bay of Bengal Initiative for Multi-sectoral and Technical Cooperation (BIMSTEC), ASEAN-Mekong Basin Development Cooperation (AMBDC), Mekong Ganga Cooperation, the India-Myanmar-Thailand Transport Linkage, the Lao PDR-Cambodia-Viet Nam (LCV) Development Triangle and the Emerald Triangle involving cooperation among the same three countries mainly in the tourism sector. As was noted in Section VII.B, and stated at the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, that although the GMS is just one among many (sub)regional cooperation initiatives, it is the hope that it can take on a leading and coordinating role since it has the resources and capacity to do so.

3. Studies in Progress

17. It is inevitable, given the large size of the GMS, that many other studies will be in progress the results of which will affect transport strategy or project prioritization. The most relevant of the current studies and studies about to start are listed below:

(i) *Feasibility Study of the (Third) Mekong Bridge Construction Project (Nakhon Phanom)* 2005/6;
(ii) *Kunming-Hanoi-Haiphong Corridor Study* ADB TA 2005/6;
(iii) *Track Rehabilitation and Upgrading of Cambodia Railways* ADB PPTA 2006;
(iv) *Restructuring of Cambodia Railways* ADB ADTA 2006/7;
(v) *Feasibility Study for the Thailand-Myanmar-Railway Link of the SKRL Project* 2005/6;
(vi) *Master Plan for Waterborne Transport on the Mekong River System in Cambodia* 2005/6;

(vii) *Road Master Plan for Cambodia* 2005/6;
(viii) *Coordinating the North-South Economic Corridor Bridge Project* ADB TA6227 REG 2005;
(ix) *Update of Study on National Transport Development Strategy in Viet Nam (VITRANSS)* 2005/6; and
(x) Various feasibility studies for other SKRL sections and highways.

18. These studies were unfortunately at too early of a stage to provide significant information for the current TA. The comprehensive studies in Cambodia and Viet Nam, in particular, should be consulted to confirm this study's findings.

4. Project Ranking

19. The long list of projects, presented in Chapter VIII, comprises well over 150 items. These range from small schemes to linked projects and range in construction cost from a few million dollars to over US$1 billion. Their current implementation status varies from "in progress" to "unlikely to start construction by 2015". In order to focus on higher priority, but uncommitted, projects, a two-stage prioritization has been used. First, each item has been ranked according to the criteria given in Table 9-2. The project analysis in Chapter X then considers mainly the *** projects. It is important to note that the ranking is based primarily on the significance of an item for the GMS.

Table 9-2: Project Ranking Criteria

Category	Basis of Determination
****	Project in progress or sufficiently committed that further evaluation is not required.
***	Uncommitted project, but prima facie of high priority.
**	Uncommitted project, but prima facie of moderate priority.
*	Project unlikely to start by 2015 and/or of prima facie low priority.

Source: TA Team

20. The initial project rank of each item is shown in the long list. The rankings are summarized in Table 9-3.[1] Road projects are prefixed A, railway projects B, airport, inland waterway and port projects C, and tourism-related projects of all modes D.

Table 9-3: Project Ranking

(a) Road, Airport, Inland Waterway, and Port Projects

1 East-West Economic Corridor (EWEC): Mae Sot-Da Nang (R2)

A1-1	**	A1-3	****	A1-5	****
A1-2	****	A1-4	****	A1-6	**
C1-1	***	C1-3	***	C1-4	**
C1-2	**				

[1] Ranking for the Extra Projects are not shown as these are considered highly provisional.

Table 9-3: Project Ranking (continued)

2 North-South Economic Corridor (NSEC)
2.1 NSEC Western Corridor: Kunming-Bangkok via Lao/Myanmar (R3A/R3B)

A2.1-1 ****	A2.1-4 **	A2.1-6 ****
A2.1-2 ****	A2.1-5 ****	A2.1-7 ****
A2.1-3 ***		
C2.1-1 **	C2.1-3 ***	C2.1-5 **
C2.1-2 ****	C2.1-4 ****	C2.1-6 ****

2.2 NSEC Central Corridor: Kunming-Hanoi-Haiphong (R5)

A2.2-1 ****	A2.2-2 ***/**	A2.2-3 ****
A2.2-4 ****	C2.2-1 **	C2.2-2 **
C2.2-3 ****		

2.3 NSEC Eastern Corridor: Kunming-Nanning-Hanoi

A2.3-1 ***	A2.3-5 ***	A2.3-9 ****
A2.3-2 ***	A2.3-6 **	A2.3-10 ****
A2.3-3 **	A2.3-7 ****	A2.3-11 **
A2.3-4 ****	A2.3-8 ****	

3 Southern Economic Corridor (SEC)
3.1 SEC Central Subcorridor: Bangkok-Phnom Penh-Ho Chi Minh-Vung Tau (R1)

A3.1-1 ****	A3.1-3 ****	A3.1-4 ***
A3.1-2 ****		
C3.1-1 ****	C3.1-3 ****	C3.1-4 **
C3.1-2 **		

3.2 SEC Southern Coastal Subcorridor: Bangkok-Trat-Koh Kong-Kampot-Ha Tien-Ca Mau-Nam Can (R10)

A3.2-1 ****	A3.2-3 ***	A3.2-5 ****
A3.2-2 ****	A3.2-4 ****	A3.2-6 ****
C3.2-1 ***	C3.2-3 ***	C3.2-4 ***/**
C3.2-2 **		

3.3 SEC Northern Subcorridor: Bangkok-Siem Reap-Stung Treng-Rattanakiri-O Yadov-Play Ku-Quy Nhon

A3.3-1 ****	A3.3-3 ****	A3.3-5 **
A3.3-2 ***	A3.3-4 **	
C3.3-1 **		

Table 9-3: Project Ranking (continued)

3.4 SEC-NSEC Inter-Corridor Link: Dong Kralor-Stung Treng-Kratie-Phnom Penh-Sihanoukville (R6)

A3.4-1 ****	A3.4-2 ***	
C3.4-1 ****	C3.4-2 ****	

3.5 SEC Western Extension

A3.5-1 **
C3.5-1 **

3.6 SEC Other Projects

A3.6-1 ***/**	A3.6-3 ***	A3.6-5 ****
A3.6-2 **	A3.6-4 **	A3.6-6 **

4 Northwestern Corridor (NWC): India-Myanmar-Thailand

A4-1	****	A4-3	***	A4-5	**
A4-2	**	A4-4	***	A4-6	****

5 Northern Corridor (NC): Yunnan-Myanmar-India

A5-1	****	A5-2	**	A5-3	****

6 Other Projects

A6-1	**	A6-5	****	A6-9	***
A6-2	****	A6-6	****	A6-10	***
A6-3	***	A6-7	****	A6-11	***
A6-4	***/**	A6-8	**	A6-12	****
C4-1	****	C4-3	****	C4-4	**
C4-2	**				

(b) Railway Projects

1 SKRL Route 1: Eastern Route via Viet Nam/Cambodia/Thailand

B1-1	****/**	B1-5	****	B1-9	*
B1-2	**	B1-6	**	B1-10	***
B1-3	****/**	B1-7	**	B1-11	***
B1-4	****	B1-8	*		

2 SKRL Route 3A: East-Central Route via Viet Nam/Lao PDR/Thailand

B2-1	**	B2-2	**	B2-3	**

Table 9-3: Project Ranking (continued)

3 SKRL Route 3B: Central Route via Lao PDR (Vientiane)/Thailand

B3-1	*	B3-2	**	B3-3	****

4 SKRL Route 2A: Western Route via Myanmar/Thailand

B4-1	****	B4-3	****	B4-5	**
B4-2	**	B4-4	****		

5 Non-SKRL Route: Central Route via Lao PDR/Thailand (Chiang Rai)

B5-1	*	B5-3	*	B5-4	**
B5-2	*				

6 Other Railway Projects

B6-1	*	B6-5	****	B6-9	****
B6-2	*	B6-6	**	B6-10	**
B6-3	*	B6-7	*	B6-11	**
B6-4	****	B6-8	*		

(c) Tourism-Related Projects

D-1 to D-11	**	D-16	**	D-21	***
D-12	****	D-17	**	D-22	****
D-13	**	D-18	**	D-23	**
D-14	***	D-19	***		
D-15	**	D-20	**		

4. The *** Projects

21. A total of 31 projects have been classified as *** or ***/**. These comprise 20 road projects, 2 railway, 4 airport, and 5 water transport projects. The *** projects are listed in Table 9-4, with the countries directly involved noted in brackets.

Table 9-4: Projects Ranked ***

Road Projects:

A2.1-3	Route 3/Highway 1020: Houei Sai-Chiang Khong Third International Mekong Bridge [Lao PDR and Thailand]
A2.2-2	Hanoi-Lao Cai expressway 260km: Mai Dich-Noi Bai section 35km, Noi Bai-Viet Tri section 56km, new construction, Viet Tri-Lao Cai section 204km, new alignment/upgrading [Viet Nam]
A2.3-1	Baise-Longlin expressway 117km [PRC]
A2.3-2	Baise-Debao-Longbang Viet Nam border expressway 140km [PRC]
A2.3-5	Chongzuo-Longzhou 70km, upgrading to Class II [PRC]
A3.1-4	Bien Hoa-Vung Tau expressway 90km [Viet Nam]
A3.2-3	NR33: Kampong Trach-Lork Viet Nam border missing 17km section [Cambodia]
A3.3-2	NR66: Siem Reap-Preah Vihear-Stung Treng c250km, construction/ rehabilitation [Cambodia]

Table 9-4: Projects Ranked * (continued)**

Road Projects (continued):

A3.4-2	Route 13S - NR7: 6km missing cross-border section, construction awaiting border demarcation [Lao PDR and Cambodia]
A3.6-1	Route 14A: junction Route 16 – Cambodian border 170km paving/reconstruction. Section B [Lap PDR]
A3.6-3	Pakse-Xekong 64km, paving/reconstruction [Lao PDR]
A4-3	Thaton-Payagyi-Bagan-Kalay-Tamu/Moreh (India) upgrading/new construction [Myanmar]
A4-4	Mawlamyine-Mudon-Thanbyuzayat 64km, upgrading. [Myanmar]
A6-3	Route 4: (Lao PDR/Thailand Bridge at Nam Heuang) Ban Nakha-Ken Thao-Paklay-Sayaboury-Xieng Ngern 350km [Lao PDR and Thailand]
A6-4	Transport corridors in Lao PDR northern region [Lao PDR]
A6-6	Thakhek-Nakhon Phanom Bridge [Lao PDR and Thailand]
A6-9	Dau Giay-Lien Khuong expressway [Viet Nam]
A6-10	Dali-Lijiang 228km upgrading [PRC]
A6-11	Kunming-Wuding 61km upgrading [PRC]
D19	Xieng Kok-Kyaing Lap Mekong Friendship Bridge [Lao PDR and Myanmar]

Rail Projects:

B1-10	Phnom Penh-Badeng-Sisophon 338km rehabilitation/Phnom Penh-Sihanoukville 264km rehabilitation [Cambodia]
B1-11	Sisophon-Poi Pet/Aranyaprathet 48km reinstatement [Cambodia]

Airport, Inland Waterway, and Port Projects:

C1-1	Improvement of Savannakhet Airport for Joint Thai/Lao PDR Use [Thailand and Lao PDR]
C1-3	Da Nang port upgrading, phase 2 [Viet Nam]
C2.1-3	Guilin International Airport improvement [PRC]
C2.1-5(a)	Expansion of Dali Airport [PRC]
C3.2-1	Channel, navigation and port improvements on Mekong and for access to port at Siem Reap; development of intermodal terminal at Khone falls [Cambodia, Lao PDR, and Viet Nam]
C3.2-3	Construction of floating port on Hamluong river [Viet Nam]
C3.2-4	Laem Chabang Phase 2, construction of C and D container terminals [Thailand]
D14	New Kunming International Airport project [PRC]
D21	Lancang-Mekong navigation improvement project [Cambodia, PRC, Lao PDR, and Myanmar]

C. Prioritization of Technical Assistance Projects

1. Background and Methodology

a) Background

22. This chapter focuses on prioritization of the long list of technical assistance projects presented in Chapter VIII. Subsequently, Chapter X will evaluate the prioritized technical assistance projects leading subsequently to a time-bound action program for packaging and implementation.

23. The process of prioritization involves ascribing to individual technical assistance projects a status of importance or urgency – the critical initial consideration however is importance or urgency – relative to what? Throughout the development of the GMS transport strategy, a set of overarching objectives has been deployed as the focus for strategy determination and in prioritizing technical assistance projects a similar rationale has been adopted. The core elements of this rationale require that identified technical assistance projects should contribute to the realization of at least one of the overarching objectives and not be at variance with any of the others. Unfortunately, for current purposes, this is not sufficiently rigorous as, in the case of technical assistance projects where impact typically cannot be gauged effectively beyond the core application zone, application of the "contribute/not constrain" criteria, does not lead to precise practical advances in setting priorities, as all technical assistance projects, given the initial screening process, meet those requirements. Evidently, the logical way forward would be to seek to quantify the contribution of individual projects to meeting overarching objectives, but given the level of subjectivity associated with policy rankings, such an approach is unlikely to result in practically useful indicators.

24. The prioritization process has therefore been based on a more pragmatic regimen, where support for overarching goals is taken as a pre-existing attribute and subsequently prioritization in based on the procedures noted in the subsection below. Contribution to overarching goals (and where necessary, lack of consistency with such goals) is however examined further in Section X.B on the evaluation of technical assistance projects.

b) Methodology

25. In attributing priorities to individual technical assistance projects, the following methodology has been adopted:

(i) Rather than seeking to undertake a discrete prioritization of all technical assistance projects (TAPs), a four-category prioritization classification has been adopted. This approach is considered to be appropriate as TAPs are not mutually exclusive but in many cases are mutually dependent.

(ii) Prioritization has therefore been established by classifying technical assistance projects (TAPs) into four bands as follows:

Top Priority	**** Classification
Second Priority	*** Classification
Third Priority	** Classification
Fourth Priority	* Classification

(iii) Prioritization is of course a time critical attribute – what is seen as, say, a fourth priority today, may become a first priority as the planning period progresses and earlier projects are completed. The prioritizations attached to TAPs are therefore applicable at the beginning of the planning period – 2006 – subsequent changes in priorities are catered for in the ensuing time-bound action plan.

(iv) In determining the priority classification to be applied to individual TAPs, the approach shown in Table 9-5 has been adopted.

Table 9-5: Approach to TAP Priority Classification

Prioritization Classification	Basis of Determination
****	TAPs that are needed to complete physical or policy initiatives that have already been initiated. This level of priority therefore indicates that in the absence of the focus TAP, benefits from prior initiatives will be constrained.
***	TAPs that are not directly linked to earlier initiatives but that either complement earlier initiatives or are now viewed as being critical to the realization of one or more overarching objective(s).
**	TAPs that can make a significant contribution to the realization of overarching objectives.
*	TAPs that contribute to overarching objectives but are not viewed as critical *at the present time.*

The application of these prioritization bases is presented below.

26. It should also be noted that in the prioritization process, impact on the GMS as a whole, as compared with individual GMS countries, is the critical consideration so that while TAPs may be initiated and implemented in individual countries, impact for prioritization purposes is relevant to GMS-wide themes - such as economic corridors or competitiveness.

27. It is emphasized that the star rankings applied to individual TAPs do not reflect their absolute level of importance but rather provide an indication of importance as at the time of preparation of this report and in relation to ongoing initiatives. These rankings reflect the time-sensitive nature of any prioritization process – priorities change over time so that today's criticalities are replaced as development progress is realized. Each of the TAPs identified is of great importance in its own right, but given resource constraints and implementation capacities, there is a need to adjust implementation sequencing in relation to both ongoing initiatives and contribution to overarching objectives as perceived at the current time. The applied star rating should therefore be viewed as indicative of current priorities and interlinkages rather than denoting any concept of absolute criticality within the broad array of TAPs.

2. Technical Assistance Project Prioritization

28. Table 9-6 sets out the technical assistance project ranking.

Table 9-6: Technical Assistance Project Ranking

TAP No.	Title	Prioritization Ranking	Comment
CBTA-Related			
TAP 1	Implementing the GMS Agreement to Facilitate the Cross-Border Movement of Goods and People, Phase 2	****	Direct follow-on to CBTA implementation
TAP 2	"Fine Tuning" of the GMS Cross-Border Transport Agreement	***	HRD content; direct follow-on to CBTA implementation
TAP 3	Processing and Facility Improvements at Border Crossing Points	***	Significant contribution to CBTA benefits
TAP 4	Updating or Improving Existing Bilateral Railway Agreements and/or Amending the GMS Cross-Border Transport Agreement (CBTA) To Cover Cross-Border Railway Transport	**	Potential contributions to economic and tourism developmen
TAP 5	Project to Establish a Legal Framework for Cross-Border Navigation on the Mekong River ["Navigation Without Frontiers", a motto adopted by the Mekong River Commission]	** / ***	Complementary to TAP8
TAP 6	Establishment of Issuing and Guaranteeing Organizations under the GMS Cross-Border Transport Agreement	****	Necessary for full benefits from the CBTA
TAP 7	Inclusion of a Substantive Health and Sanitary/Phytosanitary (SPS) Regime in the Cross-Border Transport Agreement	***	Associated with CBTA implementation
TAP 8	Phased Liberalization of Visa Regimes for Travelers	****	Direct follow-on to CBTA implementation
TAP 9	Specification of Transit Charges To Be Implemented Under Protocol 2 of the Cross-Border Transport Agreement	****	Direct follow-on to CBTA implementation
TAP 10	Establishment of a Third-Party Motor Liability Insurance Regime	***	Associated with CBTA implementation
TAP 11	Institutional Strengthening of National Transport Facilitation Commitees	****	HRD content; directly associated wuth CBTA implementation
TAP 12	Support for Harmonization of GMS Road Sighs and Signals	***	Associated with CBTA implementation.
Infrastructure-Related			
TAP 13	Practicalities of Private Sector Participation in Transport Infrastructure	***	Connectivity and Competitiveness
TAP 14	Cooperation between the ADB-ASEAN Regional Road Safety Program and the PRC	*	Can be addressed later in the planning period
TAP 15	HIV/AIDS Component for all Road Transport Projects in the GMS	****	Associated with CBTA implementation

Table 9-6: Technical Assistance Project Ranking (continued)

TAP No.	Title	Prioritization Ranking	Comment
TAP 16	Road Maintenance Initiatives for Cambodia, Lao PDR, Myanmar, and Viet Nam	**	Contribution to economic development and reduction in transport costs
TAP 17	Private Sector Participation in Road Maintenance	**	Contribution to economic development and reduction in transport costs
TAP 18	Revisiting of the Feasibility Study for the Singapore-Kunming [Nanning] Railway Link Project	*	Should not be undertaken until later in the planning period due to insufficient passenger and freight demand
TAP 19A	Upper (Lancang-) Mekong River Navigation Improvement Project	***	Supports connectivity and competitiveness objectives and complementary to tourism needs.
TAP 19B	Lower Mekong River Navigation Improvement Project	***	Supports connectivity and competitiveness objectives and complementary to tourism needs
TAP 20	GMS Airports Development Project	**	Potential contributions to economic and tourism development particularly given the relative importance of air travel in the region from the tourism and business viewpoint
TAP 21	Rail Maintenance in Cambodia	*	Contribution to economic development and reduction in transport costs – pending outcome of structural arrangements in Royal Cambodian Railway
TAP 22	GMS Andaman Sea/Indian Ocean Deep Sea Port Study for Myanmar	***	Connectivity – critical to completion of the East-West Economic Corridor
Transport Logistics-Related			
TAP 23	Training in Logistics	***	Contribution to economic development and reduction in transport costs

Table 9-6: Technical Assistance Project Ranking (continued)

TAP No.	Title	Prioritization Ranking	Comment
TAP 24	Development of Inland Container Freight Depots	*	Contribution to economic development and reduction in transport costs
TAP 25	Cambodia FF Competitiveness Project	N/A	Incorporated in TAP 21
Traning			
TAP 26	Training in Road (Passenger and Freight) Transport Operations (“Knowledge Across Frontiers”)	**	Contribution to economic development and reduction in transport costs
TAP 28	Cambodia /Myanmar Railways Management Improvement Project	*	Contribution to Economic eevelopment and reduction in transport costs
TAP 30	Development of Highway Engineering Capacity in Myanmar	Noted	Only applicable to Myanmar and limited impact elsewhere in GMS
TAP 31	Financial and Economic Assessment Expertise in Myanmar	Noted	Only applicable to Myanmar and limited impact elsewhere in GMS
Others/Cross-Cutting			
TAP 32	Transformation of Transport Corridors into Economic Corridors	****	Neceessary to assure maximum benefits from past, present, and future investment in corridor transport infrastructure
TAP 33	Futher Development and Enhancement of the GMS Transport Model	****	Vital contribution to efficient planning of infrastructure projects
TAP 34	Development of Scehduled Cross-Border Bus Routes	**	Contribution to connectivity
TAP 35	Marketing and Container Train Concessions between Laem Chabang Thailand and Thanaleng, Lao PDR	**	Contribution to economic development and reduction in transport costs – pending hardware completion to Lao PDR
TAP 36	Promotion of Marketing Functions for GMS Ports	**	Contribution to economic development and reduction in transport costs
TAP 37	Promotion of Short Sea Shipping Services	***	Contribution to economic development and reduction in transport costs

Table 9-6: Technical Assistance Project Ranking (continued)

TAP No.	Title	Prioritization Ranking	Comment
TAP 38	TA on Transport Requirements for the Development of Tourism	**	Tourism development
TAP 39	Sea Cruise Development in cooperation with ASEAN	*	Potential contributions to economic and tourism development
TAP 40	Phased Implementation of Open Skies	***	Complementary to existing connectivity developments

CHAPTER X: PRIORITY PROJECTS AND TRANSPORT STRATEGY

X. PRIORITY PROJECTS AND TRANSPORT STRATEGY

A. Introduction

1. Section B reviews the development and use of the GMS transport model (GTM) for project analysis and proposes further development of the model to achieve a robust analysis tool. The analysis of the *** investment projects (i.e., uncommitted projects, but prima facie of high priority) and their impact in achieving the transport strategy objectives is also covered in section B. The implementation of technical assistance projects is discussed in Section C.

B. Transport Model and Infrastructure Project Analysis

1. Model Development and 2004/15 Assignments

2. The Terms of Reference for this TA requires “analysis of demand-side factors and supply-side constraints affecting the establishment and effectiveness of a GMS transport network”. In order to achieve this objective, it requires “modeling of derived demand for transport services based on projected levels of economic activity and trade, particularly along major economic corridors”. A transport model was also required to assess the factors affecting modal performance and corridors as multimodal routes. In addition, the transport model was developed to assist in project prioritization.

3. The GMS Transport Model (GTM) considers both demand-side factors (e.g., economic development corridors) and supply-side issues (e.g., current transport costs and constraints on development) on the current network, for 2004 and the forecasting end-year 2015. By evaluating the changes (improvements) realized through implementing both “hardware” (infrastructure) and “software” (policy), the relative benefits of each may be assessed, in terms of: (i) travel time savings and (ii) vehicle operating cost savings.

4. The GTM has 254 zones, of which 216 are for areas within the GMS, 30 are ports and 8 are external land connections (to Malaysia, India, and Bangladesh, as well as Tibet, Sichuan, Guizhou, Hunan, and Guangdong Provinces/Autonomous Regions in the PRC). The network model covers key road, rail, and waterway links within the GMS and was coded to a level of detail consistent with the zoning. Nodes were coded representing key towns/cities and junctions, including interchanges between modal networks (i.e., road-rail, rail-water, road-water) and also borders.

5. The key data sources used for coding of road networks included the Asian Highway Database and the ASEAN Highway Database. Road standards were defined with reference to Asian Highway definitions. However, network definitions were not limited to those links within these two databases; other data sources included relevant study reports, maps, and discussions with officials in GMS countries. A similar approach was adopted for defining rail and inland water transport networks.

6. Planning data such as population, GDP, and/or vehicle ownership, were collected on a zonal basis, depending on data availability. In most cases the zoning was specified as finely as possible given the availability of planning data. In some cases, the zoning was aggregated (primarily for a few cases in Thailand and Viet Nam). In other cases, the zoning was finer than the definition of planning data, most notably in Myanmar. This approach enabled a reasonable overall definition of zoning.

7. Traffic counts were obtained from a variety of sources, such as the Asian Highway Database, the ASEAN Highway Database, previous study reports, and a variety of national sources.[1] In some instances, multiple traffic counts were available for a given link. In such cases the most recent data were generally taken. In those instances where a number of counts from the same source for the same link were available, for instance where a sequence of count data sites all corresponded with the same link in the GTM, that count site that appeared to best represent inter-urban rather than shorter-distance urban-suburban movements was taken.

8. In a few cases, preliminary trip matrices for some countries/modes were available. These were "growthed" to 2004 for use as prior matrices. In other cases, a set of initial prior trip matrices were obtained by benchmarking between/among countries and modes. Following initial assignment runs, comparisons were made between modeled and observed flows by country and the initial prior trip matrices were re-scaled accordingly. The 2004 trip matrices were ultimately generated using matrix estimation. As a consequence trip matrices are more reliable where there were more traffic count data.

9. Do minimum forecasts for 2015 were developed by including the **** committed projects into the coded network. For each project test, the project was added to the network. Forecast travel demand (trip matrices) were derived based on trip-end growth factoring on a zonal basis. The growth factors were defined by sector. While this provides a reasonable overall picture of demand growth and of cross-border growth, it was not possible to consider in detail growth resulting from specific projects.

10. For the initial forecasts, growth factors were adjusted to take account of expected future mode shifting from bus to car (in Thailand) and from bus to motorcycle and car (in other countries), for domestic traffic. A subsequent set of forecasts were generated without adjustments to growth factors, reallocating trips from the bus passenger matrix to the car and, where appropriate, also the motorcycle matrix, after Frataring.[2]

11. The 2004 base year volumes by country and mode are shown in Table 10-1 Table 10-2 shows forecast volumes for 2015.[3] Note that: (i) no IWT count data were available for Lao PDR; (ii) limited traffic count data were available for Guangxi; (iii) no link count data were obtained for the Chao Phraya/Tachin river systems in Thailand;

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[1] Including in some instances operator statistics for ports or railway links.

[2] The Frataring algorithm is a trip growthing technique that applies an iterative process to scale up the current origin-destination matrix according to forecast year growth factors on a zonal basis. The Fratering technqiue tends to preserve relative trip distributions between the base and forecast matrices.

[3] At the Workshop on the Draft Final Report held in Ho Chi Minh City on 8-9 December 2005, one delegation (Thailand) noted that there is usually a wide gap between forecast and actual traffic. The consultants concurred with this observation, but explained that what is important is to use actual information that becomes available in continually updating forecasts and analysis. Summary of Proceedings, paragraph 12(vi). Regarding project risks, these may now be best left to individual project feasibility studies, although this is a direction in which the GMS Transport Model could move in the future. Also at the Workshop, Thailand suggested that an assessment of the results of GMS transport development efforts be undertaken, and the assumptions and criteria of the model be made to reflect this assessment. Summary of Proceedings, paragraph 12(iv). The consultants noted that the model reflects trafic demand built up over the last decade, and concurred on the importance of monitoring results and fleixbly modifying and improving the GMS Transport Model.

and (iv) the only IWT link coded in the PRC was one connection to the Lancang-Mekong.

2. Development of the GTM

a. Introduction

12. The GTM is in the development stage. Some of the current problems encountered in project testing are discussed in Table 10-3. This table also addresses a number of issues and requests for future GTM functionality raised variously by the countries and ADB at and following the 12-13 December 2005 GMS Transport Sector Strategy Workshop in Ho Chi Minh City.

13. This section considers how the model may be upgraded to become a robust tool for GMS project prioritization and analysis. Given the number of potential upgrades and the large data requirements of some, it may be advisable to phase development of the GTM. For instance, by canvassing stakeholder views and evaluating the resource requirements of each proposed improvement in detail, functionality and robustness, a more detailed timetable for the development of future versions of the GTM may be formulated. Such phased development would also better facilitate the training of suitable staff from GMS countries' governments in the use and development of the GTM.

b. Zoning

14. A further developed GTM would have a more refined zoning system. The number would depend on data availability. While interim versions of the GTM would have gradually increased numbers of zones, ultimately around 2,000 zones could be coded, assuming sufficiently detailed and reliable socio-economic data can be obtained.

c. Freight Commodity Types

15. Due to current data limitations, the GTM does not distinguish among freight commodities. Ultimately, freight should be analyzed by commodity, where cost and demand characteristics vary, consistent with data availability, quality, and reliability. This analysis should also include differential treatment of bulk, break-bulk, and containerized commodity transport. Given that this work would require a substantial amount of additional and improved data collection, the modeling of different freight types would need to follow from improved data collection.

d. Road Networks

16. Road network definitions should be refined. This would enable the modeling of different link sections, wholly inter-urban, close to or within urban centers. This would improve capacity analysis of roads through or near urban centers and on which sections are most in need of upgrade/widening, including phasing within a project.

17. During the Workshop on the Draft Final Report held at Ho Chi Minh City in December 2005, it was also suggested that differences in nighttime drivability between countries could be considered, drivability being related to standards of street lighting. Given that the GTM models a 24-hour period, subject to data collection, different daily capacities could be estimated based on differences in nighttime drivability.

Table 10-1: Daily Traffic Volume 2004 (in '000km)

	Road-Based by Mode				Rail		IWT	
Country	**Motorcycle**	**Car**	**Bus**	**Truck**	**Pax-km**	**MT-km**	**Pax-km**	**MT-km**
Cambodia	7,339	2,303	3,832	4,216	0	569	309	448
PRC (Yunnan/ Guangxi)	39,310	24,735	260,884	72,923	46,972	220,984	0	8
Lao PDR	7,875	140	2,993	2,459	0	0	5,984	1,289
Myanmar	2,036	7,071	43,377	14,664	26,690	2,163	1,815	1,595
Thailand	28,158	81,303	932,901	245,030	31,802	9,810	1,853	143
Viet Nam	60,592	12,560	187,868	64,394	14,861	8,306	3,007	42,804
Total	145,310	128,111	1,431,855	403,686	120,325	241,832	12,968	46,286

Table10-2: Daily Forecast Traffic Volume 2015 (in '000km)

	Road-Based by Mode				Rail		IWT	
Country	**Motorcycle**	**Car**	**Bus**	**Truck**	**Pax-km**	**MT-km**	**Pax-km**	**MT-km**
Cambodia	14,751	5,052	7,993	12,299	0	1,476	583	1,146
PRC (Yunnan/ Guangxi)	110,685	81,929	472,858	182,808	78,605	543,396	0	26
Lao PDR	18,013	917	6,853	7,269	0	0	11,879	3,277
Myanmar	12,488	22,130	73,395	42,952	44,455	5,549	2,362	4,174
Thailand	49,336	307,618	1,470,051	540,901	39,480	23,668	2,801	293
Viet Nam	161,501	59,876	326,460	156,126	54,826	21,963	4,476	97,180
Total	366,775	477,523	2,357,612	942,354	217,366	596,053	22,101	106,096

Table 10-3: Refining the GMS Transport Model (GTM)

	Issue	Proposed Solution	Requirements
(1)	Projects wholly within a zone have low assigned volumes.	Finer zoning.	More detailed socio-economic/planning data. More detailed traffic counts at appropriate locations to calibrate flows at a more detailed level.
(2)	Unable to consider congestion around cities	Finer zoning (see (1) above) Plus more detailed network coding	More detailed highway inventory data. Traffic counts at appropriate locations to calibrate for different sub-links.
(3)	Some inter-zonal projects have very low assigned volumes.	Update model with recent traffic count data, re-calibrate and re-forecast.	Recent traffic count data along the scheme corridor as a minimum. Ideally a set of updated and more detailed traffic counts so that the GTM need be recalibrated and re-forecast once to establish a new more representative 2004 Base and 2015 Do Minimum.
(4)	Problems modeling IWT schemes	Improved data on IWT	Link flows required on many more IWT links (Lao PDR, Cambodia, Thailand, and elsewhere). More detailed port data (demand (throughputs) and costs, plus capacities). More detailed zoning. A review of the modeling method for IWT might also be advisable, including whether a wet-season/dry-season split to the model should be considered.
(5)	Induced traffic not modeled	Cost-comparison feedback to induce/suppress traffic (trade) levels and then re-assign	(a) More empirical data on transport costs between different zones and empirical demand data on origin/destination (OD) pairs to establish parameters for such an induction/suppression model. (b) Determine "value" of extra passenger and freight transport (to counter-act impacts of increased congestion from induced traffic offsetting time savings on existing traffic). (c) In order to fully automate procedure, other modeling software might need to be considered.[1] (d) Checking and re-validation of all cost elements associated with journeys by any mode or mode-to-mode interchange, to ensure proper treatment of impacts of costs savings in any generalized cost element (i.e., in proportion to its impact on overall generalized cost).

[1] While JICA STRADA has proven sufficient (and cost effective) for this TA, depending on what additional functionality is sought for the GMS Transport Model, a more powerful software suite might be considered for some potential model enhancements.

Table 10-3: Refining the GMS Transport Model (GTM) (continued)

	Issue	Proposed Solution	Requirements
(6)	Mode shift modeling at present is confined to the proportion of rail- and water-based trips using road/ rail/ water links. Full-blown formal mode choice modeling not currently considered.	Development of absolute or incremental mode choice models for passengers and freight[1], possibly by categories of passenger and/ or freight.	(a) More detailed empirical data on costs by different mode. (b) Substantially more count data including data specifically on inter-modal transport and consistent traffic count data by different mode within a corridor. Note: This would be considered quite a detailed enhancement and might be implemented no sooner than consideration of traffic induction, as this too might require use of more powerful modeling software.
(7)	Large-scale shifting of border crossings in some scheme tests, over and above what would be expected under the system of allocating cross-border transport permits.	Determine allocations of border permits in advance of model runs, possibly as part of the definition of a scheme test. (This assumes that vehicles will continue to require special permits for cross-border services.)	(a) This would require capacity restraint modeling at borders. (b) Detailed information on existing allocation of border permits. (c) Detailed assumptions on future allocations; however, these might prove prescriptive for demand modeling and perhaps should be considered only as part of a more detailed set of demand forecasts, rather than during scheme ranking. (d) Procedures to compare results with and without border permits would be useful, possibly in conjunction with traffic induction/ suppression routines (outlined above).
(8)	Testing for optimal project standard e.g., Class 1 or Class 2 or somewhere in between	With GTM a series of runs for Primary, Class 1, Class 2 upgrading etc. could be undertaken and compared.	Specify each alternative as a different scheme. Use GTM to test demand impacts. Estimate costs for each alternative.

[1] It is recommended to use incremental mode choice models where different modal choices currently exist. Absolute mode choice models should only be used where a wholly new mode appears (e.g., enabling passenger rail transport in Cambodia).

Table 10-3: Refining the GMS Transport Model (GTM) (continued)

	Issue	Proposed Solution	Requirements
		As an alternative, it might be desirable to test the ideal phasing for a scheme's implementation.	The question of scheme phasing in modeling terms is similar to the problem of congestion around cities. Refer to (2) above for requirements for GTM. Costs for each option/ phase would need to be estimated.
(9)	Integrating economic evaluation in the GTM	In principle it could be for the analysis of a single year's benefits.	(a) Upgrading to more powerful software, wherein travel costs can be skimmed, which may not have the same specification as behavioral path costs.[1] (b) The network data entered into the modeling software would need to explicitly include surface type/quality and terrain data. (c) HDM[2]-style relationships could then be coded into link data fields for skimming by vehicle type.
(10)	No distinction between freight types	Develop separate matrices and counts for different commodity types.	(a) Upgrading to more powerful software to facilitate modeling of more transport categories, including different commodity types. (b) Collection of demand data by commodity types. (c) Collection of demand data based on containerized, bulk, and break-bulk. (d) Collection of cost data for the above.
(11)	Link-based evaluation of transport costs distorts results when significant changes in routes between countries occur	Evaluate transport costs based on origin and destination, using a path-based (matrix-based) approach.	Upgrading to more powerful software to enable efficient, "batched"[3] runs, comprising assignment and a series of further manipulations of outputs from assignment.
(12)	Spatial analysis of results[1] not straightforward.	Evaluate transport costs based on origin and destination, using a path-based (matrix-based) approach - see (11) above.	See (11) above.

[1] While JICA STRADA has proven sufficient (and cost effective) for this TA, depending on what additional functionality is sought for the GMS Transport Model, a more powerful software suite might be considered for some potential model enhancements
[2] HDM refers to the Highway Development and Management System, developed by the World Bank, ADB, and others.
[3] "Batched" runs are where a number of analyses are run within one set of automated commands. Such runs are used either to execute multiple tests (model runs) in a single execution, or to enable complex runs to be undertaken, or both. "Batched" runs do not require the model user to be present to run individual steps of the model. As such they are a much more efficient and effective way of executing more sophisticated transport models.

Table 10-3: Refining the GMS Transport Model (GTM) (continued)

	Issue	Proposed Solution	Requirements
(13)	Sensitivity testing not performed	Define a range of possible values for key parameters/assumptions, so as to test the sensitivity of forecasts with respect to changes in uncertain parameters/ assumptions, such as economic growth.	a) Define ranges of values (forecast “envelopes” rather single values). (b) Upgrading to more powerful software to enable efficient, “batched” runs – see (11) above.
(14)	Model outputs not user-friendly to non-specialists	Upgrade transport modeling software and integrate with a Geographic Information System (GIS).	(a) Upgrading to more powerful software. (b) Develop a compatible GIS to integrate with GTM.

[1] Spatial analysis refers to analyzing which trips or zones benefit to what extent from a given project. In comparison, under the current TA analysis of costs and benefits are systemwide.

18. A related query also raised during the Ho Chi Minh City Workshop regarded the modeling of daytime bans on large vehicles on certain roads. The routes concerned are primarily urban and suburban highways and the daytime bans usually pertain either to goods vehicles as a whole, or to larger goods vehicles. The modeling of such bans to specific vehicle types in a 24-hour model is a little complicated given that the capacity for other vehicle types should not be reduced; indeed arguably it could be increased to reflect the spare daytime capacity resulting from the goods vehicle ban. While such an approach makes intuitive sense, the calibration of revised capacities is often harder in practice: it may be the case that goods vehicles simply re-time part of their journeys thus not greatly affecting 24-hour hour flows.[1] Consequently, it is recommended that such goods vehicle daytime bans be examined on a case-by-case basis, possibly with vehicle type-specific routing penalties assigned to concerned links; the values of such penalties to be determined city-by-city or if necessary link-by-link.

e. Rail and Water Transport Networks

19. Coding of railway and waterway networks should be refined. The GTM treats railways and waterways as a form of road. Actual schedules of railway and waterway services are not coded. However, in many transport models, railways are coded at two levels. First, rail links are coded (as in the current GTM). But second, train timetables are coded to take account of service frequencies; in some cases, different services reflecting express and local services are coded separately. A similar treatment may be suitable for IWT also, although a closer review of operating characteristics of IWT would be required to determine the best modeling approach. It might prove necessary to model “wet” and “dry” seasons separately, wherein waterway transport speeds vary (and some sections become impassable). However, this should be considered carefully as “wet” and “dry” seasons also affect the performance of roads. Further, “wet” and “dry” seasons also affect the agricultural cycle and hence freight transport patterns.

f. Assignment

20. The GTM algorithm is an incremental assignment, with eight matrices, namely: motorcycle, car, bus, rail passenger, IWT passenger, trucks, rail freight, and waterway freight. Assuming that rail and IWT would be coded with timetables/schedules/service frequencies in an improved GTM, there would be scope to expand the number of assigned transport types. In effect a highway assignment plus one or more public transport assignments would be performed (with rail and waterway haulage services coded analogously to public transport for passengers) while the assignment would assign fixed demand matrices, feedback incorporating costs into both mode choice, and trip induction/suppression could be included. However, the data requirements for timetable-based modeling also need to be carefully considered, especially when timetables may vary during the course of a year.

g. Mode Choice

21. The GTM road-based matrices (motorcycle, car, bus, truck) are confined to roads. Meanwhile, rail and water transport matrices use road as an access/egress mode. While the GTM gives an indication of mode shifting in terms of the proportions

[1] Indeed, logically nighttime capacities for other vehicle types should be reduced to take account of the greater number of goods vehicles using the road during nighttime. Hence, it could be argued that these effects may cancel one another out in terms of capacity.

of rail/water-based traffic on highways, a more formalized mode choice model may be desirable. In this way, changes in cost differences between modes following project implementation would feed through to the allocation of trips (passengers or freight) between modes and so give potentially better forecasts of outturn passenger-km/ tonne-km by mode, as well as of transport costs and hence of project benefits.

22. This would require calibrating a series of mode choice models for passengers and different freight types. To perform such calibrations across country borders would likely be challenging. It would therefore be advisable to specify models for each country in turn, plus a number of models for various cross-border movements. While such an approach would be "data hungry" and initially time-consuming to implement, it would also allow for the "patching" of data and relationships between countries where insufficient data in certain countries/modes exist.

h. Inter-Modalism and Cross-Border Constraints

23. While applying the same principles of mode choice modeling to intermodal interchange and analysis of delays at border crossings may be initially "data hungry" and time consuming, it would improve the evaluation of inter-modalism, as key locations for improved interchange facilities could be identified. It would also allow for a systematic evaluation of delays at border crossings and the evaluation of likely impacts of improvements either at individual border posts, or of "soft" initiatives affecting a number of border crossings.

24. The issue of cross-border transport permits might also be evaluated by specifying both a run free of such permits (somewhat akin to the implicit assumptions in forecast runs of the current GTM) and of a run with such permits in place, under a range of scenarios (through applying capacity restraint at borders and/or by "capping" certain movements in the matrices, as well as applying costs associated with obtaining cross-border licenses in the costs models).

i. Path-Based Cost Analysis: Matrix Based Approach

25. Costs were compared on a link basis between project tests and the 2015 do minimum (and between project tests and the 2004 do nothing for selected tests). That is, assigned networks were loaded into spreadsheets and costs on each link were determined based on link characteristics and assigned volumes. This approach enabled evaluation based on links by the country in which the link was located. It also facilitated scheme rankings on a pan-GMS basis.

26. This approach was also necessitated on the basis that the System for Travel Demand Analysis (STRADA, the transport modeling software applied in this TA, developed by the Japan International Cooperation Agency)[1] cost skims pertain to those modeled behavioral costs used within the assignment's path build. It is not possible to use assignment paths to skim different cost formulations, such as HDM-based vehicle operating costs (VOCs), unless these are the only costs considered during the path build.

27. However, more detailed scheme testing should be feasible in an enhanced GTM, based on skimmed paths, wherein economic costs are coded onto links and then these are skimmed based on behavioral paths. This approach would enable analysis of which trips benefit from cost savings. In turn this would enable trip suppression and induction to be considered.

[1] See http://www.intel-tech.co.jp/strada/stradae.html.

28. In STRADA, path files can be saved, so it is possible to use them in conjunction with spreadsheet databases of link economic costs to derive origin-destination economic and/or financial costs, separate from path-building behavioral values. However, given that path files are of approximately 2 gigabytes (GB) and the process is quite time consuming, so this approach is not practical when evaluating a large number of schemes.

j. Trip Induction and Suppression

29. By comparing costs on an origin-destination basis between a project test and do minimum (or do nothing 2004), it becomes possible to consider trip induction or suppression. Volume increases in response to cost decreases and vice versa. Such analysis needs to be considered at a zone-to-zone level. Also, for practicality, the approach should be fully automated, such that the assignment batching procedure takes the following steps: (i) assignment of Do Minimum; (ii) assignment of Scheme; (iii) comparison of costs; (iv) application of trip induction/suppression elasticity by origin-destination pair; (v) addition/subtraction of trips as appropriate; and (vi) re-assignment of new matrix to network.

30. This approach would require definition of induction/suppression elasticities. Also, a decision would be required as to whether induction/suppression is performed for each mode in turn, or as additional to mode choice. This would be based on data availability and the overall functional form required of improved versions of the GTM in other areas and would be seen as an important step. Indeed, it may be feasible to implement trip suppression/ induction before the time-consuming and data-hungry calibration of formal mode choice modeling.

k. Spatial and Sectoral Analysis of Time/Cost Savings

31. By comparing before and after costs by origin-destination pair, it becomes possible to readily identify which movements experience time and cost savings, in addition to the link-based analyses already implemented in the GTM. By aggregating zones, zone-to-zone cost comparisons can become area-to-area comparisons of costs, readily identifying which trips benefit most from a project.

l. Economic Appraisal

32. Economic analysis is performed outside the model, but preliminary appraisal could be undertaken within an enhanced GTM. With more sophisticated software, more data fields per link and with automated path-based and matrix-based analyses, by coding project costs on a link basis it would be possible to plot net benefits and/or costs, as a plot of benefit minus cost. Coupled with more detailed zoning and network coding, this would give a preliminary graphical analysis of which links yield the highest return, as well as identifying any access/egress routes that might need to be improved. Graphical analysis is also straightforward for non-specialists.

m. Sensitivity Testing and Risk Analysis

33. With more robust and detailed project analysis, it would be possible to also undertake a series of sensitivity tests on parameters such as economic growth, behavioral value of time etc This is possible within STRADA by developing a series of trip matrices and parameter files. However, it may be desirable to automate this process. A standard set of sensitivity test assumptions could be defined for this purpose.

34. Indeed, development of automated sensitivity testing in an enhanced GTM would yield parameters required for input into a separate traffic risk analysis model, should this be required. Such a risk analysis model would enable formalized and standardized analysis of uncertainty risks related to model parameters and forecasting assumptions. Risk analysis approaches are often used when assessing project financing and structuring requirements.

n. Social Impact Analysis

35. ADB's overarching goal is poverty reduction. [1] Transport projects (both invetsment and technical assistance projects) are seen as a means to this end. However, there is often a "disconnect" between transport models and assessments of transport projects' impacts on poverty reduction. Nevertheless, further development of the GTM could incorporate measuring policy reduction impacts, or at least in identifying the catchment areas[2] of projects that may benefit directly from a project, over and above benefits to existing interurban transport. Implicitly, some aspects of poverty reduction would be captured by investigating induced traffic (see (j) above). However, poverty reduction is broader than induced traffic alone. In some places the provision of basic healthcare, education, and law and order is constrained by poor transport infrastructure.

o. Testing Packages of Schemes and Partial Schemes

36. A further element of project risk and opportunity is when packages of schemes are promulgated for coordinated implementation. A number of different schemes may be identified which together achieve greater benefits than when implemented individually. This may well be the case when schemes connect with one another, such that omitting one or more projects result in a "missing link" within the corridor. Once the GTM is better automated, the impacts of one or more potential schemes on the attractiveness of others can be feasibly tested in a reliable and efficient manner.

37. Equally, it is sometimes the case that some sections of a scheme could be implemented before others. For example, where congestion at or near to urban centers constrains traffic growth or journey times in a corridor, it may be economically more efficient to construct bypasses first and interurban sections later. Such a phased implementation could result in a better use of funds: vital sections of two projects could be financed first, with other sections completed on an "as needed" basis, rather than constructing one project at the expense of another. One scheme could be defined as a series of "sub-schemes" (e.g., each link being a sub-scheme); then automated tests of the impacts of different combinations of sub-schemes could help identify the best implementation program for a project.

38. Likewise, given that transport demand tends to grow over time, it is not always necessary to upgrade a highway immediately to an ultimate target standard. Depending on construction and maintenance costs, it may be preferable to construct say, to Class Two standard first and then later to Class One. An automated approach to testing sub-schemes and packages of schemes could likewise be applied to identifying improved project implementation frameworks in terms of the timing of Class Two and Class One upgrades, for example.

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[1] Source: http://www.adb.org/poverty/default.asp
[2] Catchment areas refer to those locations which would be accessed via the proposed project, in the case of infrastructure projects, or those locations/movements affected by technical assistance projects.

p. Monitoring of Forecast Performance

39. At the Workshop on the Draft Final Report held 12-13 December 2005 at Ho Chi Minh City, a query was raised regarding the forecast performance of transport models. Given the dynamic changes in many GMS economies over the last 20 years, there has indeed been shown much uncertainty in the transport demand forecasting process.

40. One problem is that often a set of transport demand forecasts are produced with little intention of analyzing the transport model's performance after a scheme is completed. Unless there is an operator/financier who believes that they are able to use a transport model to better manage their project (typically though not necessarily through revising tolls), little attention is paid to improving the transport model as the modeling task is deemed "completed."

41. Given that a phased program of GTM development is advised, during this time it is recommended that "before and after" surveys be conducted to assess the performance of GTM forecasts. By analyzing the extent and reasons for under- or over-forecasting of outturn performance, ideally across a number of projects, GTM sensitivities and parameters can be revised, both to take account of any global discrepancies and to identify any specific local issues affecting outturn travel behavior. This has two benefits: (i) a better understanding of travel demand risks can be obtained to assist policy makers in the future in improving outturn scheme performance; and (ii) the GTM itself can be improved to better forecast performance of other schemes in future.

q. National Transport Models

42. A further opportunity with an improved GTM is to design in the capability to readily generate national, corridor, or other sub-area models. Such models could assist countries without operational national transport models and act as the starting point for detailed project analysis. Such detailed analyses might include providing the basis for infrastructure design models.

r. GTM as a Policy Tool

43. By further developing the model, it should be possible to develop a tool that can be used to assist with both cross-border and national inter-urban transport policy.[1] For example, testing the impacts of technical assistance projects in favor of certain sub-sectors or targeting intermodal interchanges. By enabling a variety of spatial analyses (zonal and link-based) and facilitating a variety of graphical analyses covering traffic, cost and economic benefits, use of GTM as a policy tool by non-specialists will be enabled.

s. Linkage with GIS

44. In order to make the GTM outputs more user-friendly to non-specialists, as well as to enable linkages with other development sectors, it is recommended that a

[1] At the Workshop on the Draft Final Report Study held in Ho Chi Minh City on 8-9 December 2005, it was suggested that the GMS Transport Model could be developed to examine local issues and accessibility/distributional aspects of projects, as well as phasing (e.g., urban bypasses put in before upgrades of less trafficked rural sections. Summary of Proceedings, Appendix 11, paragraphs 14(iii).

GIS be developed for the GMS. Using a GIS would enable graphical outputs to be readily output which are easily interpreted by non-specialists. Equally it would be a good basis from which to present project profiles for ADB projects and potential projects for a variety of sectors.

3. Project Priority and Transport Strategy

45. A feature of both the long list projects and of the *** projects is their diversity. Questions arising from this observation are: (i) how do the investment projects relate to the strategy's overarching strategic goals and (ii) how should priority be determined, given the number of agencies potentially involved in project implementation and the range of the investment projects.

46. The overarching goals, as detailed in Chapter VII, are to:

(i) Exploit synergies in the GMS transport system;
(ii) Move towards an open market for transport services;
(iii) Facilitate economic efficiency to reduce transport costs;
(iv) Complete the GMS network and improve links with South Asia; and
(v) Encourage multi-modalism.

These individually support the leitmotiv for transport sector strategy to 2015: "Towards seamless transport services on a fully connected and integrated GMS network." The primary focus of infrastructure initiatives is currently on the GMS network part of goal (iv). However, such investment projects may not always further goal (iii), for example providing expensive, low-quality rail connections, even if they are in accordance with goal (v). Thus, operationally, goal (iv) should be considered primarily in support of goal (iii), but with due regard to goal (v). Infrastructure projects per se do not in general directly contribute to goals (i) and (ii), these require supporting policy initiatives, but they do increase the benefits of such policy initiatives by widening their scope.

47. Prioritizing projects GMS-wide is considerably more complex than domestic prioritization, which itself is far from straightforward. There is, for example, no clear definition of what constitutes a GMS project. Cross-country prioritization has also not been evaluated operationally: how is the variation in the opportunity cost of capital between and among countries, which is considerable in the case of the GMS, to be taken into account? Cross-border projects also generally carry less traffic than purely domestic projects and so may have lower rates of return (although often compensated for by network connectivity benefits), should financing agencies give greater weight to such projects and if so how to justify the implied distortion in resource allocation. While there is a consensus that developing a GMS network is a "good idea", this may not necessarily be economically desirable (e.g., an integrated GMS rail network would be very expensive to achieve). Would such *grandes projects* be better treated *ex cathedra*, excluding them from the prioritization process, implementing them solely on the basis of policy decisions? There are, for example, undoubted intangible benefits from developing a GMS rail network. Perhaps the strategic goal might be limited to making transparent on a consistent basis the economic costs of every policy-based decision.

48. A further issue is project financing. Is prioritization to cover all GMS projects, irrespective of who will finance them, only projects to be considered for ADB financing or some intermediate group? Further, given the magnitude of the total investment involved, what constraints are imposed by available resources and should prioritization be based on notional budget allocations each year? If it is, the cut-off

rate of return would then be largely budget determined. Suppliers of capital also have very different minimum requirements, from a financial internal rate of return of over 20 per cent for the private sector, to an economic internal rate of return of 12 per cent in the case of ADB. Many such issues, practically beyond the scope of this study, remain to be considered and will need clarification as GMS transport strategy develops.

49. This study is clearly not able to be unduly prescriptive or able to set out a definitive timetable for investment projects. It is, however, possible to categorize the *** projects and to consider appropriate timings; Table 11-1 presents in the following chapter indicative timings of *** investment projects.

4. Categorization of *** Projects

a. Overview

50. The *** projects have been categorized as defined in Table 10-4. The project categorization is given in Table 10-5.

Table 10-4: * Project Category Definition**

Category	Definition
II	Immediate implementation required without further study (**I**mmediate **I**mplementation)
RS	Top priority based on results of other ranking studies (**R**anking **S**tudy)
FS	Currently under feasibility study, results available 2006 (**F**easibility **S**tudy)
NC	New corridor strategic project, implementation timing primarily policy dependent (**N**ew **C**orridor)
CP	Capacity-enhancement project, implementation timing primarily demand dependent (**C**apacity-enhancement **P**roject)

Table 10-5: Categorization of * Projects**

Category II

A2.1-3	Houei Sai-Chiang Khong Third International Mekong Bridge
A3.4-2	Route 13S - NR7 cross-border section
B1-11	Sisophon-Poipet/Aranyaprathet reinstatement
A3.2-3	NR33: Kampong Trach-Lork Viet Nam border missing 17km section

Category RS

A3.6-1	Route 14A: junction Route 16 – Cambodian border 170km paving/reconstruction. Section B.
A3.6-3	Pakse-Xekong Direct Route paving/reconstruction
A4-4	Mawlamyine-Mudon-Thanbyuzayat upgrading
A6-3	Route 4: (Lao PDR/Thailand Bridge at Nam Heuang) Ban Nakha-Ken Thao-Paklay-Sayaboury-Xieng Ngern
A6-4	Transport corridors in Lao PDR northern region

Table 10-5: Categorization of * Projects (continued)**

Category FS

A2.2-2	Hanoi-Lao Cai expressway
A6-9	Dau Giay-Lien Khuong
B1-10	Phnom Penh-Badeng-Sisophon/Phnom Penh-Sihanoukville rehabilitation
C1-1	Improvement of Savannakhet Airport for joint Thai/Lao PDR use
C1-3	Da Nang port upgrading, phase 2
C3.2-1	Channel, navigation and port improvements on Mekong and for access to port at Siem Reap; development of intermodal terminal at Khone Falls

Category NC

A2.3-1	Baise-Longlin expressway
A2.3-2	Baise-Debao-Longbang Viet Nam border expressway
A3.3-2	NR66: Siem Reap-Preah Vihear-Stung Treng
A4-3	Thaton-Payagyi-Bagan-Kalay-Tamu/Moreh (India)
A6-6	Thakhek-Nakhon Phanom Bridge
C3.2-3	Construction of floating port on Hamluong river
D19	Xieng Kok-Kyaing Lap Mekong Friendship Bridge

Category CP

A2.3-5	Chongzuo-Longzhou, upgrading to Class II
A3.1-4	Bien Hoa-Vung Tau expressway
A6-10	Dali-Lijiang upgrading
A6-11	Kunming-Wuding upgrading
C2.1-3	New Kunming International Airport
C2.1-5(a)	Expansion of Dali Airport
C3.2-4	Laem Chabang Phase 2, construction of C and D container terminals
D14	Guilin International Airport improvement
D21	Lancang-Mekong navigation channel improvement and maintenance project

b. Category II (Immediate Implementation)

51. The four **II** projects are all missing links connecting completed or under construction road/railway sections, the operation of which will be considerably improved with these projects.

A2.1-3 Houei Sai-Chiang Khong Third International Mekong Bridge (Lao PDR/Thailand)

52. The Third International Mekong Bridge will complete the NSEC Western Corridor Yunnan-Lao PDR-Thailand, which is being jointly financed by the PRC, Thailand, and ADB, with support from Lao PDR. The bridge will replace an existing ferry service, greatly improving the quality of service. The estimated cost is US$40 million. Remaining issues concern primarily project financing (Thailand has already agreed to provide 50 per cent of the project cost) and these are being addressed under the ADB TA 6227 REG: Coordinating the North-South Economic Corridor

Bridge Project. A quadripartite meeting to discuss financing among ADB, Lao PDR, the PRC, and Thailand was held in Kunming on 24 November 2005.

A3.4-2 Route 13S - NR7 Cross-Border Link (Lao PDR/Cambodia)

53. This is a 6km missing section linking the already improved (with ADB assistance) Route 13S in Lao PDR to Cambodia NR7, currently being upgraded with the support of the PRC. The missing section has been delayed pending resolution of a dispute between the two countries on the demarcation of the border. Construction of the link would complete the Vientiane-Phnom Penh-Sihanoukville corridor. There is no alternative route and immediate implementation is necessary. It was suggested during the consultants' prioritization mission that Cambodia might be willing to implement the project under a Memorandum of Understanding, in advance of border demarcation, with a road corridor defined in the MOU, without prejudice to the final border demarcation.

B1-11 Sisophon-Poipet/Aranyaprathet Railway Reinstatement (Cambodia/ Thailand)

54. The reinstatement of the abandoned 48km Aranyaprathet/Poipet-Sisophon railway line will become a high priority project once the rehabilitation of the adjoining Sisophon-Phnom Penh line is confirmed (see **B1-10** in Category 3 below). The right of way remains in place, although there is some encroachment in Poipet. The formation is in place in Thailand and the only work necessary is the strengthening of some wooden bridges. Used rail for the project has been stockpiled in Malaysia and the State Railway of Thailand has offered to deliver it. The only outstanding issue is the terms under which the rail will be supplied: concessionary or commercial. This low-cost project would have considerable benefits: connecting the two rail systems, allowing the resumption of the Bangkok-Phnom Penh passenger service, and freight service to the Thai Eastern Seaboard and elsewhere. Perhaps of most importance would be the demonstration that GMS rail connectivity is progressing.

A3.2-3 NR33: Kampong Trach-Lork Viet Nam Border (Cambodia)

55. This project would complete the upgrading of the SEC Southern Coastal Subcorridor. It is a 17km missing section complementing the ongoing project **A3.2-2** Veal Rinh-Kampong Trach rehabilitation. It has been proposed for financing by ADB.

c. Category RS (Ranking Study)

56. The five **RS** projects have been selected in other studies as top priority projects and all are important in terms of GMS connectivity.

A3.6-1 Pakxe-Watphu-Lao PDR/Cambodia border New Construction (Lao PDR)

57. This project, together with **A3.6-3,** was ranked of highest priority in the 2002 JICA *Study on Improvement of Roads in the Southern Region of Lao PDR.* Although priority was determined based on domestic considerations, both projects are also important in the GMS context. Route 14A runs south from Route 16 (the Chong Mek-Pakse road) on the west bank of the Mekong to the Cambodian border. It would be the first paved road south of Route 16, a populous area. Of prime international importance, the road provides access to the World Heritage Site of Wat Phou south of Champassack. The project involves new construction/reconstruction of 59km from the junction with Route 16 south to B. Soukhouma. The adjoining section south to the Cambodian border would be reconstructed as a second stage.

58. The financial cost (at 2002 prices) was estimated at US$33.1 million and the economic cost at US$31.7 million, with project implementation over 30 months. The EIRR for construction 2005-07 was calculated in the study to be 10.5 per cent. With construction delayed to 2007-09, the EIRR would be about 12 per cent. This project may be considered for financing by the Government of Japan on completion of the ongoing improvement of 30km of Route 1 Vientiane-Friendship Bridge project.

A3.6-3 Route 16A Reconstruction (Lao PDR)

59. Route 16A from Paksong-B. Lak forms part of the east-west route from Thailand to Viet Nam, Chong Mek-Pakse-Attapeu-Viet Nam Border. Project **A3.6-5** construction of Route 18B Attapeu-Border with assistance from Viet Nam is expected to be completed in December 2005. On completion of Route 18B, Thailand/Pakse-Viet Nam traffic will have to use a circuitous paved route via Sekong, on Routes 16 and 1J. This is some 70km longer than direct via Route 16A.

60. The financial cost (at 2002 prices) of the new construction/reconstruction of the 64km Route 16A was estimated at US$34.2 million, economic cost US$32.7 million. The EIRR for construction 2005-07 was calculated in the study to be 10.7 per cent. With construction delayed to 2007-09, the EIRR would be about 12 per cent. This project may be considered for financing by the Government of Japan together with project A3.6-1.

A4-4 Mawlamyine-Mudon-Thanbyuzayat Upgrading (Myanmar)

61. This project was ranked top priority in the 2003 Korea Transport Institute *Preparation Studies for the ASEAN Highway Network Development.* The 64km Mawlamyine-Thanbyuzayat section forms part of AH112, which is the only north-south route in Myanmar south of Yangon. Its GMS importance is that together with project **A4-5** it forms part of the proposed new direct route from Bangkok to Yangon via the Three Pagodas Pass and is one of the links on the new Northwestern Corridor connecting Thailand-Myanmar-India. The EIRR assuming a 36-month construction period 2006-08 was calculated in the study to be 22.0 per cent. Financial construction cost was estimated at Kyat 8.62 billion and economic cost at Kyat 7.32 billion.

A6-3 Route 4: Nam Heuang Bridge-Ban Nakha-Ken Thao-Paklay-Sayaboury-Xieng Ngern Construction/Reconstruction (Lao PDR)

62. This 350km project was rated top priority in ADB's TA 6193 REG *GMS Infrastructure Connections in Northern Lao Transport Final Report* of June 2005, which includes a draft TOR for a PPTA. The project is important for GMS connectivity providing a link between the EWEC and the NSEC.

A6-4 Lao PDR Northern Corridor Routes

63. A 2004 ADB staff consultancy reviewed all corridors in northern Lao PDR. In total 16 priority projects were identified, nine of total length 762km for construction/improvement by 2010, and a further six of length 1075km to be completed by 2020. Some high priority projects are important for GMS connectivity.

(i) Priority 1: B. Pakmong-M.Xai-B.Natuei/Route 13N DBST of 161km at an estimated cost of US$24.2 million would complete a missing link for traffic to the PRC via Natuei/Boten, also improving access to Route 3, the NSEC, which will be completed in 2007;

(ii) Priority 2: Namngeun (Lao PDR/Thailand border)-Pakbeng/Route2W DBST of 49km at an estimated cost of US$7.4 million, would provide an alternative to Route 3 and an improved Northern Lao PDR-Thailand connection;
(iii) Priority 6:M.Khoa-Taichang Viet Nam border/Route 2E DBST of 68km at an estimated cost of US$10.2 million (this is part of the **** project **A6-2**; and
(iv) Priority 11: M.Xai-M.Khoa/Route 2E DBST of 100km at an estimated cost of US$15 million with the Priority 6 project would connect the Lao PDR and Viet Nam networks improving access between the northern areas of the two countries. Priorities 2, 6 and 11 together provide a new Thailand-Viet Nam route of importance for tourism, accessing Dien Bien Phu.

d. Category FS (Feasibility Study)

64. The six **FS** projects are either under feasibility study or about to be subject to a feasibility study. They are all potentially of high GMS priority, to be confirmed by these studies.

A2.2-2 Hanoi-Lao Cai Expressway (Viet Nam)

65. The priority of this project will be reviewed under the ADB TA for the Kunming-Hanoi-Haiphong Corridor Study, which is expected to start late-2005/early-2006.

A6-9 Dau Giay-Lien Khuong Expressway

66. Based on a local (pre)feasibility study, this 189km expressway, with an estimated cost of US$600 million, has been placed in the *** classification, Category FS. It is proposed for construction 2007-10, subject to financing. At the Final Meeting on the GMS Transport Sector Study, the Vietnamese delegation strongly supported the project.

B1-10 Railway Rehabilitation (Cambodia)

67. Rehabilitation and restructuring of the Royal Railway is being addressed by two ADB studies: an 18-month advisory technical assistance (AOTA) on Railway Restructuring and a 7-month project preparation technical assistance (PPTA) on Railway Rehabilitation, both expected to start late-2005/early-2006. The PPTA will prepare for a proposed loan of US$40 million or more, to part finance the complete rehabilitation of the Phnom Penh-Sisophon and the Phnom Penh-Sihanoukville lines, which comprise the operational network. Loan implementation is expected to be 2007-09.

C1-1 Savannakhet Airport Improvement Project (US$3.5 million, Lao PDR/ Thailand)

68. The project will provide improvements to the existing airport, currently unserved by scheduled flights. The runway will be lengthened from 1630 to 2220m and facilities for joint use of the airport by Thailand and Lao PDR will be provided. The project complements **** project **A1-4**, construction of the Mukdahan-Savannakhet Second Mekong International Bridge, which is expected to open in 2006/7. On bridge completion, the catchment area of the airport will widen to include areas around Mukdahan, Thailand. Bridge opening is expected to result in rapid development of Savannakhet. (See Project Profile in Appendix 3.)

C1-3 Da Nang Port Upgrading Phase 2 (Viet Nam)

69. A local feasibility study of the project has been completed and it is proposed for JBIC financing.

C3.2-1 Mekong Navigation Improvement Project (Cambodia)

70. The scope of this project will be defined by the ongoing *Master Plan for Waterborne Transport in the Mekong River System in Cambodia.* It is expected to include improvements to the channel, navigation aids, port improvements, in particular to improve the distribution of petroleum products, to the port at Siem Reap and the development of an intermodal terminal in the Khone Falls area for IWT trade with Lao PDR.

e. Category NC (New Corridor)

71. The seven **NC** projects improve GMS connectivity by providing through new routes/connections.

A2.3-1 Baise-Longlin Expressway (Guangxi/Yunnan)
A2.3-2 Baise-Debao-Longbang Viet Nam Border Expressway (Guangxi)

72. These projects together would open up a new north-south corridor from Hanoi via Highway 3 providing access to Yunnan and Guangxi and with onward connections to Guizhou and Sichuan. **A2.3-2** is expected to be included in the 11^{th} Plan.

A3.3-2 Siem Reap-Preah Vihear-Stung Treng (Cambodia)

73. This project is under review as part of the ongoing JICA *Study on the Road Network Development.* It complements the **** projects **A3.1-1**, **D-12**, and **A3.3-3**. It would complete a new east-west corridor Thailand-Cambodia-Viet Nam and via north-south connecting routes also improve access to Lao PDR. The project would comprise new construction sections and rehabilitation sections. The recommended alignment and project priority will be determined in the JICA study. This project would significantly improve GMS connectivity and also complete a missing link in the Cambodian road network, which has no east-west through route north of Phnom Penh.

A4-3 Thaton-Payagyi-Bagan-Kalay-Tamu/Moreh Indian Border (Myanmar)

74. This is the core project for the establishment of a new Northwestern Corridor linking the GMS and South Asia and reconstruction of the route under the Thailand-Myanmar-India Transport Linkages Project that was agreed in April 2002. The agreement also covers the complementary **** project **A4-1** Mae Sot-Thaton. The project alignment was defined in April 2003, after joint investigation by the three parties and sharing of financing responsibilities by section was agreed at a meeting in New Delhi in December 2003.

75. Thailand has responsibility for projects **A4-1** and the second phase ** project **A4-2**, Kawkareik-Mawlamyine-Thaton. India has responsibility for the 128km Chong Ma-Pakkoku and the 132km Bagan-Meiktila sections and Myanmar for rehabilitating bridges on the 41km Pakkoku-Bagan section. Other sections have been completed to an acceptable standard for initial operation. Implementation timing has not been finalized.

A6-6 Thahkek-Nakhon Phanom Bridge (Thailand/Lao PDR)

76. The *Feasibility Study of the Third Mekong Bridge Construction Project (Nakhon Phanom)* is in progress with completion by mid-2006. This project offers the prospect of an additional east-west corridor Thailand-Lao PDR-Viet Nam via Route 12, which is to be improved as part of the Nam Ngum II project. The estimated cost is US$38 million, with construction requiring 42 months, to commence in 2008.

D19 Xieng Kok-Kyaing Lap Mekong Friendship Bridge (Myanmar/Lao PDR)

77. Bridge construction would open up a range of new routes for tourists in an area with manifold attractions.

C3.2-3 Hamluong River Floating Port (Viet Nam)

78. This project will facilitate trade between Viet Nam and Cambodia by permitting IWT vessels in the 250-800 tonne range to handle cross-border traffic, in place of the current use of seagoing vessels of 2000 tonnes from Vung Tau. It will complement project **C3.2-1**. The estimated cost is US$1.5 million. Early implementation is expected.

f. Category CP (Capacity-Enhancement Project)

79. The nine **CP** road projects increase the capacity of existing paved routes; the airport and port projects also add capacity to existing facilities, while the IWT project can also be viewed as capacity-enhancing, facilitating additional traffic flows.

A2.3-5 Chongzuo-Longzhou Upgrading (Guangxi)
A3.1-4 Bien Hoa-Vung Tau Expressway (Viet Nam)
A6-10 Dali-Lijiang Upgrading (Yunnan)
A6-11 Kunming-Wuding Upgrading (Yunnan)

80. The GTM assigned traffic volumes for these four road projects are given in Tables 10-6 and 10-7 for 2004 and for 2015. The “with project” volumes for 2004 are notional. In general volumes are unchanged by a project. Project **A2.3-5** shows some sensitivity NH322-Chongzuo city-proper. There is only limited sensitivity Chongzuo-Viet Nam border due to one-way traffic at the border, compared to the flow on the NH322-Chongzuo link. Apart from cross-border traffic, traffic between Chongzuo and towns along this route is “intra-zonal” and hence omitted from the model volumes. In order to model this project a refined zoning system would be required, together with supporting data, e.g., planning data and traffic counts to support the finer zoning.

81. Projects **A3.1-4** and **A6-10** effectively connect to an edge of the network. The latter serves traffic to/from Diqing, Lijiang, and Sichuan, which must use the project links to access the rest of the network. Project **A3.1-4** is the only highway links that connect to/from the Ba Ria/Vung Tau zone, as well as the Vung Tau zone. There is an alternative waterway connection to Vung Tau (a coastal route treated as IWT), but this does not have a significant impact on routing. It was not possible to represent flows at a finer level, given the model’s zoning.

82. Project **A6-11** Kunming-Wuding only serves demand from some zones (notably Kunming) to/from Sichuan. Wuding is at the border of Kunming and Chuxiong, but the Chuxiong zone centroid is coded at Chuxiong city, the routing to which from Kunming is via another link. As such, there is no routing response to this

project in 2004 and only a limited change in 2015, some shifting of traffic to/from Sichuan onto the Wuding route as a result of the upgrading.

Table 10-6: Daily Flows With/Without Project 2004 (vehicles/day)

From	To	Lgth km	Without Project				With Project			
			MC	Car	Bus	GV	MC	Car	Bus	GV
A2.3-5										
NH322	Chongzuo	75	0	547	518	631	0	1,279	518	631
Chongzuo	VN border	110	2	2	15	388	2	2	15	388
A3.1-4										
Bien Hoa	Ba Ria	62	18,575	2,405	3,004	4,019	18,575	2,405	3,005	4,019
Ba Ria	Vung Tau	24	18,575	2,405	3,004	4,019	18,575	2,405	3,005	4,019
A6-10										
Dali		138	2,647	2,293	2,248	3,587	2,647	2,293	2,248	3,587
		18	2,647	2,293	2,248	3,587	2,647	2,293	2,248	3,587
	Lijiang	34	2,587	1,788	1,746	2,771	2,587	1,788	1,746	2,771
A6-11										
Kunming	Wuding	76	1,021	885	870	1,395	1,021	885	870	1,395

Source: GTM

Table 10-7: Daily Flows With/Without Project 2015 (vehicles/day)

From	To	Lgth. Km	Without Project				With Project			
			MC	Car	Bus	GV	MC	Car	Bus	GV
A2.3-5										
NH322	Chongzuo	75	2,093	2,889	903	1,876	2,389	4,144	964	1,876
Chongzuo	VN border	110	5	5	19	985	5	10	25	985
A3.1-4										
Bien Hoa	Ba Ria	62	49,909	11,113	5,451	9,239	49,909	11,113	5,521	9,239
Ba Ria	Vung Tau	24	49,909	11,113	5,451	9,239	49,909	11,113	5,521	9,239
A6-10										
Dali		138	10,374	7,597	3,891	9,020	10,374	7,597	3,891	9,020
		18	10,374	7,597	3,891	9,020	10,374	7,597	3,891	9,020
	Lijiang	34	9,575	6,216	2,972	7,028	9,575	6,216	2,972	7,028
A6-11										
Kunming	Wuding	76	1,947	2,127	1,775	3,273	1,947	2,288	2,048	3,274

Source: GTM

83. The economic benefits in terms of reduced VOCs and travel time savings of the four projects will be obtained by all traffic using the routes. The modeled volumes exclude intra-zonal traffic, which is probably a critical component for project justification in each case. The inter-zonal volumes alone in 2004 on A2.3-5 and A6-11 are well below those required to justify major upgrading projects, but adding intra-zonal trips clearly might change the position.

C2-1.3 New Kunming International Airport

84. Already faced with saturation at its existing site 6.6 km from the downtown Kunming, General Administration of Civil Aviation of China (CAAC) and the Planning

Commission of Yunnan Province have proposed the construction of a new international airport at Xiao Xiao Gang Xiang, 24.5 km west of the city. The project is included the project in the 11th five-year airport construction plan (2006-2015). Current (2004) demand is the 8th highest in the PRC and rapid growth is forecast over the TA planning horizon. The project will facilitate rapid development in the tourism industry and connections with other GMS countries and beyond.

C2.1-5(a) Dali Airport Expansion Project

85. This project will develop an 1,800 m^2 terminal at the feeder airport in Dali (estimated cost of US$19 million) to serve rapidly growing tourism demand in this lakeside town west of Kunming.

C3.2-4 Laem Chabang Port Phase 2 (Thailand)

86. This project will cater for demand growth at Thailand's main port, the primary south facing GMS port. Currently, general cargo traffic volume at Laem Chabang is double that at Bangkok Port and container volume three times Bangkok's. Rapid growth is forecast to continue and existing terminals will not be able to cope. Phase 2 port development will involve the construction of Terminals C and D, seven berths of total length 3900m, as per the Port Master Plan. The four Terminal C berths are planned to be open by 2007. This demand-driven project has to be carefully phased so that the three Terminal D berths enter service before terminal delays occur. A Phase 3 expansion project will be subject to FS in 2006. Laem Chabang's role as a subregional hub port is increasing, with planned container train service to Lao PDR under **PI 25**. Thailand expects Laem Chabang to become the gateway port for the whole of the GMS. (See Project Profile in Appendix 3.)

D14 Guilin International Airport

87. The project will provide improvements to the existing international airport: runway lengthening from 2,800-3,200m and a 60 per cent increase in terminal area. It is primarily a tourism-related project, permitting larger aircraft to operate and reducing congestion in the terminal area. Current (2004) passenger volume is 2.9 million, the 24th highest in the PRC. The project will facilitate the rapid development of the tourism industry and GMS connectivity Thailand-Guangxi. (See Project Profile in Appendix 3.)

D21 Lancang-Mekong Navigation Channel Improvement and Maintenance Project

88. This project will provide navigation aids and other necessary facilities to facilitate passenger and freight use of the river, primarily north of Vientiane. It will also address maintenance issues, through the establishment of a maintenance fund (see Project Profile in Appendix 3).

5. Project Analysis with GTM

89. One of the study objectives has been to develop an analysis tool that would enable GMS projects to be evaluated on a consistent basis, taking into account their network impact and their impact on other modes. The GTM in its enhanced GTM2 version will be such a tool and this study has prepared the groundwork and highlighted the problem areas for further work. Creating a cross-country, multimodal model from scratch is a considerable task. Within the timescale and given the problems encountered in putting together the database of traffic flows, this task has

not been completed to the level of reliability required to make recommendations concerning project viabilities and scheduling. The GTM needs further testing and recalibration before this becomes possible. For the analysis of an individual project, model issues can generally be addressed by iterative adjustments. This however is a daunting process when a number of projects have to be ranked and the accuracy of the second order relativities becomes the critical factor.

90. In any event, the modeling issues have proved less significant than might have been expected. Most of the *** projects fall clearly into one of the five categories. Many have already been studied to FS or near-FS level and others are under FS or about have FSs. There are no “new” *** projects. Project implementation is being addressed in the context of these studies and in the preparation of five-year plans. With so many ongoing and committed **** projects, there is a window of opportunity for model development. There are no immediate issues of project prioritization that will be unaddressed by the other work in progress and by the recommended TAs and PIs. Performing pre-FS economic analysis on a project-by-project basis at this stage would in such circumstances be of little value for decision-making. The clear priority is to have by end-2006 the GTM developed to the stage where this project’s objectives can be fully achieved – a consistent assessment of each project’s impact on the GMS network. Once a robust model is in place, all ** and *** projects can be quickly evaluated and their GMS priorities be determined. Further, the networks can be tested for optimality together with medium to long tem project options. By 2010, the successor to the GTM should be one of the main tools for GMS planners. What is clear from this study is that there is no alternative to modeling if the GMS is to be developed into an integrated network in the most economic way.

6. Strategy and Risk Analysis

91. Given the timeframe covered by a strategic study, many risk factors may apply, most of which have no effective counter-risk strategy. The dominant risk is currently the human-to-human transmission of avian flu, to which the transport sector, and in particular the GMS transport sector, is particularly vulnerable. This may represent the greatest risk to transport operations since the war threat of the late-1930s and for the aviation sector, the greatest ever risk. A flu pandemic would lead to drastic travel restrictions, decimating tourism, inflicting a deflationary shock to the world economy, perhaps uncorrectable through monetary policy and might produce a quite deep depression. ADB has calculated the possible loss to Asian economies at US$280 billion. Clearly, if a pandemic should occur, none of the study’s traffic forecasts would be achieved in the short term and the impact could be far reaching. There are two scenarios:

(i) Scenario 1: this is the basic study assumption, that everything will continue much as over the previous decade, with any unpredictable shocks to the economic system localized and containable (as was SARS, 9/11, and the 2004 tsunami after their initial negative impacts dissipated).
(ii) Scenario 2: an uncontainable shock leading to a new economic paradigm of stasis or decline, perhaps worldwide instability, and unforeseeable consequences.

92. Although countermeasures for Scenario 2 are possible (stockpiling vaccine in the case of a flu pandemic), it is difficult to plan for in the case of the transport sector. If it is considered to have a significant probability, investment in major infrastructure projects: e.g., new airports might be deferred.

C. Evaluation of Technical Assistance Projects

1. Introduction

93. The evaluation of technical assistance projects (TAPs) on an *a priori* basis is fraught with both conceptual and practical difficulties. From the conceptual viewpoint TAP impact will essentially be determined by implementation methodology and coverage – simply identifying a potentially beneficial project leaves a broad array of impact questions unanswered as outcomes must be dependent on implementation rigor and localized responses. Similarly, TAPs, by their very nature, tend to create ripple effects which broaden the impact focus and hence, radically complicate the evaluation process.

94. From the practical viewpoint, evaluation of policy initiatives is dependent on the identification of suitable, cause and effect, impact indicators which typically, at best, constitute a "make do and mend" solution. While it is invariably feasible to identify plausible indicators, given the conceptual uncertainties noted above, delimitative output becomes questionable except in very precisely constrained terms.

95. With these observations in mind, this section seeks to evaluate the TAPs identified in Chapter VIII (Long List of Investment Projects and Technical Assistance Projects) and subsequently prioritized in Chapter IX. However, the evaluation comments applied to individual TAPs do not extend to numerical evaluation in terms of NPV (net present value) or IRR (internal rate of return). Rather, evaluation has been undertaken in relation to two primary considerations: gaining a deeper insight into the expected impact and coverage of the TAP, and establishing preliminaries for the subsequent monitoring and tracking of impact as a basis for ensuing determination of impacts and outcomes, for subsequent potential linkage to a GMS-wide results framework.

96. Work by UNESCAP has shown that logistics costs are currently about 19% of Thailand's GDP.[1] By way of comparison, rates for some more developed economies are shown below:

(i) Japan – 11 %;
(ii) United States – 10 %; and
(iii) European Union – 7 %.

97. The total cost of the TAPs is over US$30 million between 2006 and 2015. A spreadsheet analysis demonstrated that only very small reductions in the logistics percentage of GDP of GMS countries, if applied to the GMS GDP, as a whole would be required to justify the TAP program assuming that results begin to appear by 2010.

98. These evaluation themes are presented in Table 10-8; in each case, summary comments included in the table should be viewed in conjunction with the associated Project Concept Profiles presented in Appendix 4.

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[1] "UNESCAP's Regional Cooperation Framework for Trade Facilitation in Asia and the Pacific", presentation to IMO (International Maritime Organization)/Asian Development Bank Institute (ADBI) Workshop on Managing Regional Public Goods: Cross-Border Trade and Investment, Labor Migration and Public Health", 15 June 2005, Bangkok, Thailand.

D. Technical Assistance Project Evaluation

99. The evaluation of technical assistance projects is set out in Table 10-8. A GMS Transport Sector Strategy Results Framework has been provided in Appendix 5, including more details on milestones/tracking indicators to assess impacts on implementation of the strategy.

Table 10-8: Evaluation of Technical Assistance Projects

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
CBTA-Related				
TAP 1	Implementing the GMS Agreement to Facilitate the Cross-Border Movement of Goods and People, Phase 2	****	Key components comprise: (i) Implementation of CBTA at key border crossings; (ii) CBTA at a second set of border crossings; and (iii) Effective and sustainable implementation of CBTA. Anticipated output comprises shorter border crossing time for clearance, finalized CBTA arrangements, and recommendations for benefit maximization and constraint limitation and strengthened NTFCs. Implementation is proposed over the three-year period 2006-8 with a possibility of subsequent phases being necessary. No significant issues or constraints pertain to the TAP	The volume of cross border trade at selected border crossing points. Border crossing clearance time – targets to be set at key border points.
TAP 2	"Fine Tuning" of the GMS Cross-Border Transport Agreement	***	Precise implementation requirements will be dependent on monitoring and evaluation studies during the course of CBTA implementation, but specific measures currently identified comprise: (i) Establishment of a GMS visa-free scheme for travelers; (ii) Establishment of third party motor insurance scheme together with an increase in liability limits to international standards; (iii) Inclusion of a substantive health and SPS regime; (iv) Exchange of information on licensed carriers; (v) CBTA Depository; (vi) Impact and reconciliation of constraints with other agreements; (vii) Upgrading GMS to an organization having a real legal personality;	The volume of cross border trade at selected border crossing points. Border crossing clearance time – targets to be set at key border points. Tracking indicators focused on the realization of individual components.

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			(viii) Upgrading of the English language provision to an agreement provision; (ix) Removal of transition provisions; (x) Adoption of seven international conventions called for by UNESCAP resolution 48/11; and (xi) Extension of the facilitation regime to rail and inland waterways transport. Implementation is probable towards the end of the planning period No major implementation constraints have been identified.	
TAP 3	Processing and Facility Improvements at Border Crossing Points	***	The TAP is directed towards promotion of domestic (inter-Government agency) and international (between neighboring countries) integration at border crossing points. Domestic integration will focus on (i) Coordinated processing at border crossings; (ii) Integrated ICT facilities; and (iii) Inter-agency awareness building leading to shared responsibilities. International integration will be promoted through assisting neighboring countries to align and integrate common border formalities. The TAP will also: (i) train border, immigration, customs, and security staff in the handling of tourists; (ii) standardize immigration and customs fees, forms, and processing procedures; (iii) improve border tourism facilities; (iv) upgrade and landscape road access to border crossing poinSts; (v) upgrade and develop	After implementation, a monitoring program to measure performance and efficiency, measured by reduced costs and minimized time at points of entry, should be implemented. Specific indicators include: mean and median border entry and exit times, customs administrative cost as a percentage of revenue collected, customs officer productivity in terms of declarations processed, and corruption profiles.

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			tourist information, signage, food and beverage, transit accommodation, shopping, money exchange, toilet, and other facilities; and (vi) develop a fully functioning border facility between Cambodia and Lao PDR at Dom Kralor/Voen. Implementation is planned for 2006-11 with the possibility of a second phase as necessary. Major implementation constraint will be the garnering of support for required changes from senior Government officials to counter and override institutional lags.	
TAP 4	Updating or Improving Existing Bilateral Railway Agreements and/or Amending the GMS Cross-Border Transport Agreement (CBTA) To Cover Cross-Border Railway Transport	***	The specific objective of the RETA is to facilitate the cross-border transport of goods and people in the GMS by railway transport. To the extent that railways are to be developed in the GMS, existing bilateral agreements may be updated and improved, or the GMS CBTA amended to cover cross-border railway transport. A new Part to the GMS CBTA – Particulars on Rail Transport – could be drafted, involving two articles, one on Cooperation between Railways and the other on Rail Liability Regime. Implementation should preferably be realized before mid 2007 when the new rail link between Thailand and Lao PDR is due for completion.	Given the relatively short duration of the TAP and focused scope, monitoring and tracking indicators can be limited to the implementation of the agreement and the two noted components.
TAP 5	Project to Establish a Legal Framework for Cross-Border Navigation on the Mekong River ["Navigation Without Frontiers", a motto	** / ***	The aim of the Project would be to liberalize and harmonize legal, regulatory, and administrative conditions for cross-border navigation on the Mekong River in a manner similar to that of other international rivers worldwide.	The Project will result in an increase in cross-border trade and/or reduction in the border crossing clearance time targets at cross-border inland waterway checkpoints. Appropriate

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
	adopted by the Mekong River Commission]		As envisaged by MRC project formulation studies, the output of the Project would be a general navigation agreement or agreements along with harmonized rules, as well as assistance to the countries in the introduction of these rules. Specific project components may include: (i) undertaking of a comprehensive legal study of the Mekong river navigation regime, de lege lata (what the law is) and de lege ferenda (what the law ought to be); (ii) preparation of a draft framework for maritime and inland navigation and associated rules, and (iii) providing assistance to the countries in incorporating these laws and rules into national legal regimes. It is expected that negotiations between and among the riparian countries could be facilitated by the MRC along with ADB. The TAP is complementary to TAP 8 and as such should be completed by 2010. The TAP is not expected to have material environmental impacts.	indicators to benchmark performance in these areas will need to be developed.
TAP 6	Establishment of Issuing and Guaranteeing Organizations under the GMS Cross-Border Transport Agreement	****	The basic principle is that in order for Customs Administrations to relinquish full control (e.g., escorts, routine exhaustive physical inspection, bond deposit) from a customs duties perspective of transiting cargo, it requires some form of collateral security for the payment of the customs duties at risk. The goal of the TAP would be to (i) assist in the establishment of the guaranteeing organizations and (ii) elaborate their contractual relationships with the transport operators association, customs administrations, and direct guarantors/providers of collateral (e.g., banks, insurance companies), in order to facilitate the cross-border movement of goods, vehicles and containers) through the operation of customs transit regimes.	Results indicators will be dependent on methodologies adopted in terms of the technical structuring of the guaranteeing agreement but should focus on trade volumes and associated clearance costs.

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			The TA will result in establishment of issuing and guaranteeing organizations for the implementation of Annexes 6, 8, and 14. Pursuant to the national workshops held under RETA 6098 from December 2004 to March 2005, issues that will need to be addressed include: (i) terms and conditions of bank guarantee/guarantee insurance and insurance of defaulting on reimbursement; (ii) the required collateral for such guarantee; and (iii) ADB fee/insurance premium for these products. In addition, the TA will draft transport operator membership terms and conditions, agreement/approval conditions of customs authorities, and articles of incorporation/bylaws of transport operator organizations. The TA will also assess the possible role of risk guarantees that ADB might be able to provide to facilitate the process.	
TAP 7	Inclusion of a Substantive Health and Sanitary/Phytosanitary (SPS) Regime in the Cross-Border Transport Agreement	***	The objective of the TAP would be to protect human, animal, and plant health against the cross-border movement of diseases, while at the same time not adversely affecting the aim of cross-border transport facilitation. The TAP would draft and support negotiation of a (more) substantive health and SPS regime to be included in the CBTA and CBTA annexes drawing inspiration from international best practice as articulated in International health Regulations and other legal texts as appropriate.	The TAP will benefit health, animal, and plant health, with associated economic benefits, while minimizing adverse transport facilitation effects, i.e., without unduly increasing border crossing times. M&T indicators will be developed to monitor that impact.

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
TAP 8	Phased Liberalization of Visa Regimes for Travelers	****[1]	The goal of the TAP is to liberalize visa regimes for travelers, leading eventually to a visa-free regime. Objectives include: (i) the facilitation of the movement of travelers to and within the GMS, (ii) increasing revenues from tourism, leading to poverty reduction, and (iii) facilitating business travel within and to the GMS. Elements of the TA are likely to include: (i) inception and preparatory phase, involving TA design, surveys, preparatory studies, planning, and coordination; (ii) assessment of the enabling requirements for the recommended visa framework, including the design of a regional cross-border visa and information management capacity support project; and (iii) development of a detailed regional and country-by-country road map for the adoption of the recommended visa framework. Outputs of the TA will include: (i) information on the benefits and costs of a liberalized visa regime, and (ii) a framework for introduction of the liberalized visa regime leading ultimately to a visa-free regime.	M&T indicators will be developed to gauge results at each phase of the proposed implementation and subsequent impact on traffic and movements.
TAP 9	Specification of Transit Charges To Be Implemented Under Protocol 2 of the Cross-	****	The goal of the TAP is to establish a transit charges regime fully compatible with the principles of Protocol 2 (of CBTA), including nondiscrimination and transparency, but allowing the GMS countries to recover fully all costs occasioned by transit traffic.	The output would include a table of toll rates by vehicle class by transit route, both gross and net. M&T indicators are probably not

[1] At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City, Viet Nam on 8-9 December 2005, it was clarified that this TAP was ranked **** because it relates (broadly) to the subject matter of the CBTA. Summary of Proceedings, Appendix 11, paragraph 27.

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
	Border Transport Agreement		The TA will define the actual transit charges to be assessed in Step 1 under the CBTA. Specific tasks will include: (i) evaluating the economic and financial benefits and costs occasioned for each of the GMS countries by the opening of the transit routes identified in Protocol 1 of the CBTA; (ii) developing initial transit fee structure by route and vehicle category for Step 1 in accordance with the charging principles in Protocol 2 and propose an adjustment mechanism for inflation – to the extent possible, the transit fee structure will take into account factors such as: willingness to pay and affordability, operations and maintenance cost, cost recovery, and an equitable distribution of transport cost savings; and (iii) recommending a charging system and transit fee structure for each route in Protocol 2. In view of the concern expressed regarding axle loads at the Final Meeting on the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006, it may be useful for the recommended charging system to be based, at least in part, on axle loads.	necessary for this relatively short TAP as results will simply comprise the indicated table of charges and subsequent adjustment as associated costs are better understood.
TAP 10	Establishment of a Third-Party Motor Liability Insurance Regime	***	The goal of the TAP is to explore the feasibility of alternative approaches for establishing a third-party motor vehicle liability insurance regime in relation to the GMS CBTA, and draft the necessary agreement and/or amendment to the CBTA, for consideration by the Joint Committee established under Article 29 of the CBTA. The aim of such an agreement and/or CBTA amendment would be to assure compensation for victims of road traffic accidents, by: (i) guaranteeing a minimum compensation threshold, (ii) guaranteeing the solvency of the debtor, and (iii) facilitating the victim's access to compensation.	While facilitating transport, the TAP will help assure compensation for victims of road traffic accidents, by: (i) guaranteeing a minimum compensation threshold, (ii) guaranteeing the solvency of the debtor, and (iii) facilitating the victim's access to compensation. Impact will be determined by

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			Based on a GMS-wide conference and/or national workshops, the TA would draft the necessary agreement and/or CBTA amendment to establish a third-party motor vehicle liability insurance regime.	reference to associated M&T indicators.
TAP 11	Institutional Strengthening of National Transport Facilitation Commitees	****	The goal of the TA is to promote economic cooperation and integration in the Greater Mekong Subregion, consistent with the GMS Program vision of a more integrated, prosperous, and equitable subregion. The specific objective of the RETA is to prepare GMS government officials and representatives of the private sector to better implement the CBTA, e.g., by (i) creating an awareness of transport and trade issues among government officials and top executives from the private sector; (ii) creating a sound legal and institutional framework for the development of efficient transport and trade operations; (iii) suggesting instruments for the development of efficient transport and trade operations; and (iv) establishing the basis for adequate training programs in international trade and transport.	The TA would provide advice and training, both to the public and private sector, related to the implementation of the CBTA, e.g., incorporation of CBTA provisions into national laws and regulations, reduction in documentation and procedures, providing English-language translation of all documents used for cross-border traffic. Impact can be neasured by reduction in various components of transport cost.
TAP 12	Support for Harmonization of GMS Road Sighs and Signals	***	The goal of the TA is to promote economic cooperation and integration in the Greater Mekong Subregion, consistent with the GMS Program vision of a more integrated, prosperous, and equitable subregion. The specific objective of the RETA is to promote road safety by assisting GMS governments in their preparations to implement installation of new CBTA (and the Convention on Road Signs and Signals, Vienna, 1968) compliant signs, symbols, signals, and markings.	The TAP is expected to result in improved road safety, which can be assessed by % reduction in accident casulaties, fatalities, and property damage.
Infrastructure-Related				
TAP 13	Practicalities of Private Sector Participation in	***	To promote economic efficiency by providing Governments, GMS wide, with the capacity to rapidly assimilate the validity and capacity	Prime benefits to be realized from the project will be time and

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
	Transport Infrastructure		of investment proposals and subsequently undertaken the associated processing on a speedy and time effective basis. The project will comprise two primary components; first to establish screening and monitoring processes to rapidly ascertain the validity of investment applications (common to all GMS countries) and second, to specify systems and procedures for the subsequent processing, promotion and facilitation of investment activity in accordance with localized institutional structures and responsibilities (country specific). The project will not be simply restricted to derivation of procedural and system specifications but will also seek to directly facilitate implementation and practical training where necessary, to ensure that on completion, systems are fully activated and all officers charged with responsibility therein are fully able to meet the demands placed on them.	administrative savings in relation to investment proposal processing. Such savings will have a direct impact on economic development but will also foster an environment where investments can be promoted more effectively by speedy resolution of initial practicalities and hence a more focused application of subsequent procedural necessities. Such streamlining will provide a facilitating environment for enhanced investment performance. Benefits can be measures by comparison of costs and success rates on a “with and without” project basis.
TAP 14	Cooperation between the ADB-ASEAN Regional Road Safety Program and the PRC	*	The TAP seeks to significantly strengthen institutional capacity to address road safety issues through the training of local professionals, development of relevant tools/techniques, and through encouraging networking and sharing of experience on good practices across countries. In particular, this will be realized through specific tasks such as: (i) central development of modules (e.g., legislation on helmets, drunk driving) that will allow models to be prepared for easy adaptation;	Core impact can be determined in relation to both implementation status and consequential reduction in deaths and injuries arising from traffic accidents and associated incidents.

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			(ii) centralized "train the trainer" courses that will allow systematic development of safety professionals in each road safety subsector who can later become trainers in their own country; (iii) support for centrally trained persons to run local courses in their sector in their country in order to develop pools of local experts in each sector to enable more effective implementation of country plans; (iv) facilitation of exchange and cooperation between and among countries to enable sharing of best practices and expertise across the region; (v) creation of special interest groups via the internet to allow for creation of expert working groups in each subsector in which the key persons can easily exchange information, documents, and information with their counterparts in neighboring countries, to facilitate harmonization and make optimal use of regional expertise; (vi) creation of an internet-based knowledge database that will provide the technical information and references to assist implementers in each sector to find the information and references needed to help them implement their part of the action plan; (vii) establishment of a Road Safety Working Group to ensure coordinated implementation and regular reporting of progress in individual countries and across the region as a whole; and (viii) annual conferences/workshops on road safety action plans to allow exchanges of ideas and experiences and opportunities to provide advice/guidance in different subsectors; and ongoing availability of expertise to provide	

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			regular short advisory visits to action plan implementers in each country to keep the action plans on track for each subsector. Modalities of agreement between PRC and ASEAN/GMS countries will need to be established prior to activation of the TAP.	
TAP 15	HIV/AIDS Component for all Road Transport Projects in the GMS	****	The overall objective of the TAP will be to prevent an increase in the incidence of poverty by reducing the risk of transmission of HIV/AIDS and other sexually traansmitted diseases (STIs) resulting from road transport projects in the GMS. Specific objectives will include reduction in the risk of transmission of HIV and STIs among construction workers, commercial sex workers (CSWs), truck drivers and other crew members, and local resident communities, particularly the vulnerable poor and minority communities. Specific project elements for each road transport project in the GMS may include the following: (i) advocacy actions on HIV/AIDS and STIs organized through workshops targeting local resident communities in the project area, including contractors involved in road construction, transport enterprises; (ii) design of an HIV/AIDS information campaign to be imp[lamented along the road during the operation phase; (iii) information and education campaigns on prevention of HIV/AIDS and STIs through (a) posters, pamphlets, launch events, and focus group discussions at construction worksites and in local communities; (b) training of peer educators to be selected from construction workers, commerical sex workers (CSWs), and local communities; and (c) condom distribution;	The Project will result in a decrease in poverty incidence by reducing the risk of transmission of HIV/AIDS and other STIs that may result from road projects. M&T indicators will therefore need to be developed which focus on these considerations.

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			(iv) provision of comprehensive HIV/AIDS medical packages to construction workers and local communities, including voluntary testing and counseling (VTC), training of health workers in STI management and VTC, and introduction of improved STI treatment and VTC protocols following least-cost methodologies; and a project performance and monitoring system, with monitoring indicators to include measures of sexual behavior and treatment seeking.	
TAP 16	Road Maintenance Initiatives for Cambodia, Lao PDR, Myanmar, and Viet Nam	**	The TAP will establish road maintenance regimes in the less developed countries of GMS that will provide the support needed to bring maintenance practice up to the standard of the more developed GMS countries. Specifically the TAP will seek to identify, specify facilitate and formulate, action proposals for the best sustainable road maintenance framework. Such determination will focus on optimal funding arrangement (Road Maintenance Fund, self reliance or combinations thereof), planning, prioritization, implementation and technical standards required of the programs, institutional and HRD implications Previous experience suggests however that frameworks for the promotion of sustainability are the critical elements of these initiatives and as such the TA will identify the optimal structuring and agenda for change to meet identified status and conditions in individual countries - core requirement being to establish understanding and commitment beyond the period of the TA through such mechanisms as transformation forums, dialogue between countries and information exchange and recommendations on the required flexible support from Development Agencies.	This technical assistance is expected to reduce transport costs and make more effective use of existing road inventory, thus contributing to both economic growth and poverty alleviation. Evaluation of results will be fairly straightforward as indicators of maintenance activities actually undertaken in accordance with agreed standards will constitute prime sources.

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			The sustainability requirement will need to be further supported by specification of monitoring and assessment procedures, methodologies for the identification and application of remedial measures as maybe necessary and consistent stakeholder involvement.	
TAP 17	Private Sector Participation in Road Maintenance	**	In many of the GMS countries roads maintenance presents a serious constraint in network effectiveness – and even in the more developed member nations, road maintenance comprises a heavy burden on the national budget – one which is all too frequently deferred in the context of more “pressing” expenditure. Private sector participation (PSP) therefore represents a potential solution not just in terms of bridging the financing gap but also as a means of facilitating the realization of efficiency gains, broadening the revenue base in the context of direct tolling and re-allocating risk between parties best equipped to bear it. The project will assist Governments in the following areas identified as prerequisite for effective PSP, focusing initially on the road maintenance sub-sector: (i) Prepare the environment and procurement process for PSP including an appropriate PSP legal framework, securing competition for and within the market through appropriate regulatory instruments, concession agreements etc.; (ii) Broaden the understanding of the range of PSP options that exist in the roads sector; (iii) Assist with transport strategy formation which must be	The project is expected to result in a liberalized market for road maintenance services, with resulting gains in economic efficiency. The project is expected to produce net economic/financial benefits, as: (i) sustainable road maintenance is undertaken at reduced cost and higher efficiency; (ii) the road network is uitlized over a period of time; and (iii) material reductions occur in the burden on national budgets. Result indicators for monitoring and tracking purposes will be

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			consistent with stakeholder aspirations, identifies the package of policies and priority projects which best promote development objectives, and specifically highlights apt PSP project potentials; (iv) Assist in identifying priority projects as test cases for further elaboration. In each case the TAP would take the form of advisory assistance to national roads authorities with experience gained in one country being used as the basis for subsequent deployment in other countries – subject to localized needs. Primary difficulties will be experienced in ensuring an appropriate environment for PSP but the step by step approach to be adopted under the policy TAP will provide the groundwork for development of the required conditions.	focused on these performance components.
TAP 18	Revisiting of the Feasibility Study for the Singapore-Kunming [Nanning] Railway Link (Project)	*	The TAP is scheduled towards the end of the planning period and dependent on physical developments in the ensuing period. Both freight and passenger traffic forecasts are the critical elements that will need to be examined together with the impact of extending the line to Nanning. Critical constraints on impact are demand pressure for new links, associated institutional strengthening needs and cooperation as between GMS members re the timing of construction.	Physical infrastructure developments and associated institutional arrangements arising through the planning period will be the initial tracking indicators. Once the FS is revisited, subsequent project evaluation will be part of the integral economic and financial assessment.
TAP 19A	Upper (Lancang-)Mekong River Navigation Channel Improvement and	***	The TAP is proposed to be implemented mainly to address safety/efficiency constraints and provide necessary infrastructure to support the GMS Tourism Sector Strategy. Among other	The TAP component is restricted so that core tracking and monitoring indicators will be

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
	Maintenance Project		improvements, the Project would install navigation aids that meet adequate safety and efficiency standards, and perhaps to allow for night navigation. Also, maintenance will be improve through the development of a maintenance fund. Benefits would accrue from improved passenger and crew safety, and fewer accidents with environmental complications on the river. Implementation is proposed during the period 2006-2010 with satisfactory resolution of environmental issues being the only major identified constraint.	applicable to the hardware elements.
TAP 19B	Lower (Lancang-)Mekong River Navigation Channel Improvement and Maintenance Project	***	The TAP is proposed to be implemented mainly to address safety/efficiency constraints and provide necessary infrastructure to support the GMS Tourism Sector Strategy. Among other improvements, the Project would install navigation aids that meet adequate safety and efficiency standards, and perhaps to allow for night navigation. Also, maintenance will be improve through the development of a maintenance fund. Benefits would accrue from improved passenger and crew safety, and fewer accidents with environmental complications on the river. Implementation is proposed during the period 2006-2010 with satisfactory resolution of environmental issues being the only major identified constraint.	The TAP component is restricted so that core tracking and monitoring indicators will be applicable to the hardware elements.
TAP 20	GMS Airports Development Project	**	The TAP is primarily focused to upgrade the subregional air transport infrastructure to meet current and anticipated future traffic; and to support planned initiatives in tourism. The TAP will identify and evaluate the physical improvements needed to GMS airports and formulate recommendations for implementation.	The project will result in improvements of a number of GMS airports, thereby improving the overall subregional air transport infrastructure and increasing connectivity.

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			Main constraints or risks include the difficulty of procuring adequate funding, the need for a sustainable and adequate repair and maintenance budget, the requirement for user charges to be sufficiently high to cover costs, and institutional development issues.	Economic benefits from the Project would likely include the development of international trade and tourism, time benefits for flight passengers, increased safety, and increased economic activity in export-oriented high-value perishable manufactured and agricultural goods. Financial benefits of the Project would likely include increased revenue to the airport operating authorities. M&T indictors should reflect these developments.
TAP 21	Rail Maintenance in Cambodia	*	To promote economic efficiency by Royal Railway of Cambodia (RRC) with the practical and managerial experience to maintain all operational assets at a level consistent with network optimization in terms of both traffic flow and cost minimization. While precise coverage of the TAP will be dependent on findings and structural changes implemented as a result of pending TA CAM 37534-01, the TAP will focus on the practical (engineering) aspects of railway maintenance together with the associated management functions of planning and implementation. TA coverage will therefore comprise: (i) Examination of historical and current maintenance patterns, procedures, technical standards and capacities;	Primary M&T indicators for result determination will be average speeds realized on the network, operating costs, and continuity of maintenance operations.

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			(ii) Comparison of findings from the previous task with best practice applied to other comparable rail networks; (iii) Identification and detailing of maintenance activated needed for the RRC situation; (iv) Derivation of a maintenance manual and scheduling program; (v) Derivation of maintenance planning, prioritization and implementation procedures; (vi) Training and workshops to meet technical and management needs as indicated; and (vii) Procedures for monitoring and benchmarking maintenance activities and promoting sustainability.	
TAP 22	GMS Andaman Sea/Indian Ocean Deep Sea Port Study for Myanmar	***	Currently there are three projected locations for the deep sea port facility in Myanmar that will constitute the Myanmar terminus of the GMS East-West Economic Corridor. The potential for each of the locations has been studied at various points in the last decade but, predominantly for political reasons, further progress has been suspended. In order to complete the East-West Corridor, it is now desirable that a specific decision is made as to the location of the Myanmar deep sea port. The project will be focused on addressing the following issues: (i) Review existing feasibility studies and determine adequacy for the current situation; (ii) Evaluate the potential for additional sites through discussions with stakeholders and review of available documentation;	The project is expected to result in provision of a pathway to the completion of the East-West corridor and as such subsequently contribute to resulting gains in economic efficiency. Result indicators are limited to the completion of the FS and subsequent location decision.

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			(iii) Undertake detailed feasibility studies of all possible sites on a prioritized basis, to identify the optimal selection from financial/economic and operational viewpoints; and (iv) Discuss findings with stakeholders and formulate structured recommendations.	
Transport Logistics-Related				
TAP 23	Training in Logistics	***	The goal of the TAP will be promote the training and professional competence of multimodal transport operators following accreditation standards along the path set by FIATA. In this connection, the standard of accreditation under Annex 13b of the GMS Cross-Border Transport Agreement (CBTA) is anticipated to be in line with FIATA's standard trading conditions. The TAP will provide institutional support and resources to the Cambodian and Lao International Freight Forwarder Associations to prepare for their entry as members of FIATA. The TAP will also train existing freight forwarders (including freight forwarders in other countries) in international freight forwarding skills to prepare them for qualification into the their national freight forwarders associations and, by extension, vesting them with the authority to write FIATA bills of lading.	Core results will be in terms of training services delivery and membership of FIATA. Indicators to that effect will be developed and may be further augmented by reference to associated changes in multi-modal transport activity in the respective countries – although the rigor of that association will need to be evaluated carefully.
TAP 24	Development of Inland Container Freight Depots	*	To promote economic efficiency by reducing containerized freight shipping costs through the provision of ICDs providing the full range of receiving, marshalling, storing, distribution, and dispatching services. The project will identify suitable locations for ICDs throughout GMS by reviewing and analyzing current and projected traffic flows and stakeholder discussions.	The project is expected to result in an enhanced containerized freight shipping market as a result of upgraded logistical support and as such contribute to improved economic efficiency and development.

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			A series of potential locations will then be established and feasibility studies (FS) undertaken to determine their viability in the economic/financial context together with other relevant operating considerations. On the basis of these studies, recommendations for ICD positioning will then be formulated. The project will also address financing and structuring considerations for each ICD with a particular focus on fostering private sector participation and adoption of international best practice in terms of management and operations. The acquisition of related facilities and equipment, including ICT, will be addressed, to the extent possible.	Core result indicators will comprise numbers of viable ICDs identified, logistic cost profiles, and levels of consolidation service delivery.
TAP 25	Cambodia Freight Forwarders (FF) Competitiveness Project	N/A	Consolidated in TAP 21	See TAP 21
Training				
TAP 26	Training in Road (Passenger and Freight) Transport Operations ("Knowledge Across Frontiers")	**	The goal of the TAP will be to be promote the training and professional competence of transport operators and drivers and reinforce the quality of services offered by the road freight and passenger industry. The TAP will establish road transport training institutes in selected GMS countries, perhaps with accreditation by the IRU Academy of the Geneva-based International Road Transport Union (IRU) and offering a Certificate of Professional Competence (CPC), which would bring international recognition and transparency to the programs. Guide modules developed by the IRU and others may be adopted for use by the road transport training institutes established by the	A number of benefits will accrue to road transport operators including better qualified and more motivated staff; savings from reduced fuel costs, accident (repair) costs, and insurance premiums, with less damage to vehicles and loads; and increased reliability with fewer road accidents and less damage to goods increasing the availability of the vehicle fleet and reliability vis-à-vis customers. The larger society will also benefit, e.g.,

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			TAP. Such modules would include: (i) the promotion of “best industry practices”, to facilitate learning from leaders; (ii) a “well driven” campaign, aimed at improving vehicle safety standards and driver behavior, and offering benefits such as lower insurance costs, greater availability of vehicle fleets, and improved customer relations; and (iii) a driver training program focusing on road safety, fuel efficiency, and load securing, which would go beyond the basic acquisition of a driving license and obeying of laws and regulations, to include higher standards through additional and specific driver training, thereby adding real value to transport companies.	through reduced road accidents. Results of the TAP will therefore be determinable by reference to indicators benchmarking these developments.
TAP 27	Upgrading of Inland Water (Passenger and Freight) Transport Industry	**	The goal of the TAP will be to promote the training and professional competence of inland water transport operators in the GMS countries, to among other things, improve safety (resulting in fewer injuries and loss of cargo) and reduce river pollution. It will identify training requirements and a capacity building program for inland water transport, and enhance the capacity of line agencies, the private sector, and other stakeholders to manage and implement inland water transportation along the Mekong and other rivers in the GMS. The TAP will: (i) assess training needs (educational and vocational) for all inland water transport activities; (ii) assess all ongoing and planned navigation training programs (including training methods and facilities), and identify available training facilities; and (iii)	A number of benefits will accrue to inland water transport operators including better qualified and more motivated staff; savings from reduced fuel costs, accident (repair) costs, and insurance premiums, with less damage to vessels and loads; and increased reliability with fewer accidents and less damage to goods increasing the availability of the vessel fleet and reliability vis-à-vis customers. Indicators for each of these areas

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			identify beneficiaries and participants. The TAP will plan for education training programs for: (i) river pilots, (ii) port management, (iii) waterway designers and engineers, (iv) information technology specialists, (v) navigation-related environmental specialists, (vi) stevedores and port workers, (vii) surveyors and inspectors, (viii) shipbuilders and naval architects, (ix) freight forwarders, (x) transport planners, (xi) transport economists, and (xii) inland water transport legal specialists. The TAP will assess the potential of establishing a GMS Inland Water Transport Training Center A further project would be required to establish such a center, if deemed feasible.	can be developed to provide a meaningful determination of results.
TAP 28	Railways Management Improvement Project	*	To provide the railways with the necessary expertise to operate in a commercially successful manner while meeting public service obligations effectively and hence contributing to economic development. The TAP will be divided into two phases for each railway with Phase One initially structured to assess the specific needs of each railway in relation to core management functional responsibilities such as: (i) Business Objectives and Strategic planning; (ii) Financial Management particularly in relation to internal reporting capacities; (iii) Financial and Non-financial Management Information systems; (iv) Costing and Tariff Modeling; (v) Budgeting and profit/cost center management structures;	The project is expected to result radically enhanced railway management with associated improvements in profitability, passenger service, reduction in Government subsidies, and hence material contributions to economic development. Results impact will be determined by reference to indicators focusing on these benefits.

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			(vi) The role and potential for ICT applications and development in the railways; (vii) Planning and HR development functions; (viii) Marketing and business development; (ix) Public Service Obligation and implications; and (x) Non-core rail activities. In each case the central focus will be to determine strengths and weaknesses pertinent to the focus area, and to the entities' overall commercial operations, as a basis for formulating recommendations and action proposals for subsequent implementation. Phase 2 of the project will assist with implementation including the necessary training and human resource development work. Assistance to be provided to Royal Cambodia Railways will be dependent on findings and structural arrangements adopted as a result of the pending ADB TA.	
TAP 29	Development of Traffic Engineering Capacity in Myanmar	Noted	Noted but no further action proposed at this stage.	Not applicable
TAP 30	Development of Highway Engineering Capacity in Myanmar	Noted	Noted but no further action proposed at this stage.	Not applicable
TAP 31	Financial and Economic Assessment Expertise in Myanmar	Noted	Noted but no further action proposed at this stage.	Not applicable

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
Others/ Cross-Cutting				
TAP 32	Transformation of Transport Corridors into Economic Corridors	****	The TAP will foster development through the implementation of of transport corridors integrated with related initiatives, including both infrastructure and facilities ("hardware") as well as streamlined policies and procedures ("software"). The TAP will first prepare a methodology or approach for transforming transport corridors into economic corridors. This methodology/approach should draw on practical international experiences, including lessons from the GMS experience to date. Applying this methodology/approach to each GMS transport corridor, the project will specifically prepare: (i) a multi-sectoral facility/infrastructure development plan for each subject corridor; and (ii) a set of streamlined policies and procedures, e.g., for facilitation of investment, for facilitation of cross-border movement in line with the CBTA.	The project will benefit stakeholders residing and operating businesses in the subject corridors, as well as transport system users transiting the subject corridors. A series of indicators will therefore be required, focusing not only on benefits of the transport system users, but also residents (e.g., improved accessibility to social services, employment) and enterprises (e.g., sales, profits) in the subject corridors.
TAP 33	Further Development and Enhancement of the GMS Transport Model	****	The goal of the TAP is to promote economic cooperation and integration in the Greater Mekong Subregion, consistent with the GMS Program vision of a more integrated, prosperous, and equitable subregion. The specific objectives of the RETA are to promote: (i) coordination in infrastructure planning; (ii) improved forecasts of likely project benefits; (iii) project outturn performance monitoring, to further improve the planning and evaluation processes; (iv) better coordination between transport planning and economic and social appraisal; (v) technology transfer and capability development in the above; and (vi) optimization of	The TAP will improve the effectivenss of the planning of investment projects, which will lead to measureable benefits in various transport system performance indicators (e.g., reduce transport oiperating costs).

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			expenditure in the transport sector, for instance by enabling prioritization of phases of individual projects at an earlier stage in the project life cycle.	
TAP 34	Development of Scheduled Cross-Border Bus Routes	**	The TAP is directed towards the establishment of cross border bus routes that will link GMS (and ASEAN) capitals and provide services on other routes as dictated by demand. The implementation onus will be on respective national Governments.	Periodic monitoring of routes being operated.
TAP 35	Marketing and Container Train Concessions between Laem Chabang Thailand and Thanaleng, Lao PDR	**[1]	To promote economic efficiency by reducing transport costs through facilitation of container train concessions arrangements. The TA will focus on the following aspects: (i) Undertake a traffic forecast for the proposed routes and determine modal implications; (ii) Prepare detailed feasibility study based on identified traffic forecast to determine investment costs, economic and financial returns, and operating structures; (iii) Consider appropriate concessioning arrangements and formulate recommendations for financial arrangements; (iv) Prepare and facilitate concessioning bidding and assist with award process as necessary; (v) Devise and facilitate marketing strategy as indicated from feasibility study findings; and	The project is expected to result in a liberalized market for rail transport services, with resulting gains in economic efficiency and road decongestion. Primary result indicators will be based on transport cost reductions, the promotion of comparative competitive advantages as between modes, and the diversion of heavy and dangerous goods from road to the rail network.

[1] At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City, Viet Nam on 8-9 December 2005, it was clarified that the ** ranking of this TAP does not reflect importance but rather flexibility in implementation; the TAP is not contingent on other initiatives. Appendix 11, paragraph 29.

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			(vi) Examine potential for expansion of concessioning arrangements to other GMS rail corridors and routes. The acceptability of Concessioning arrangements in the two countries will need to be established during project preparation.	
TAP 36	Promotion of Marketing Functions for GMS Ports	**	The TAP is envisaged to determine the desirability of forming a GMS Ports Association which could present GMS ports' capacities in a more focused and proactive manner than is currently available. The TA will initially determine the potential support for the formation of a GMS Ports Association through discussions with the full range of stakeholders. Subsequent tasks will focus on: (i) Structuring and determining the Association's role and responsibilities; (ii) Developing the initial marketing plan; (iii) Building an Association web page and other forms of information dissemination; and (iv) Developing links with other transport associations and operators. Preliminary evaluation of national Port Authority interest in the proposal is required.	The project is expected to result in an enhanced awareness of GMS port facilities, and as such, better utilization of those capacities. Primary result indicators will be the establishment of the association and supporting web site, levels of port fees, and traffic profiles.
TAP 37	Promotion of Short Sea Shipping Services	***	The TAP will adopt a step-by-step strategy to promote S4 including: (i) Infrastructure – Ensuring that the transport infrastructure exists to support the effective and efficient operation of Intra-ASEAN shipping services; (ii) Integration – The development of a single integrated ASEAN market for shipping services in which all ASEAN	Economic benefits include lower transport costs through increased competition in the littoral areas of the GMS and contiguous non-GMS ASEAN members; increased choice for shippers in the littorals of participating

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			operators can operate without restriction; (iii) Harmonization – Ensuring that the single ASEAN Shipping Market is effective by ensuring that competition takes place on equitable terms and conditions; and (iv) Human resources and capacity development – developing and spreading throughout ASEAN the management capacity and technology required to manage shipping and port operations safely, efficiently and in an environmentally friendly manner. The development of port infrastructure is well in hand throughout the GMS. The TAP will therefore initiate discussions with ASEAN about a GMS contribution to the Integration and Harmonization elements, with a focus on the promotion of short sea shipping services.	countries; and potential opening of links to non-GMS BIMSTEC countries more quickly than might have been the case with opening of links on other surface modes These anticipated results can be relatively easily tracked and monitored by reference to appropriate performance indicators.
TAP 38	TA on Transport Requirements for the Development of Tourism	**	The objective of the TA would be to develop a comprehensive and integrated transport and tourism development plan, with the aims of alleviating poverty, generating employment, and catalyzing the provision of infrastructure and facilities by the private sector. The TAP will analyze the transport requirements of tourism, taking into account management capacity building, infrastructure and superstructure, and socioeconomic and cultural needs. The TAP will undertake a comprehensive assessment of the transport requirements of various proposed GMS Strategic Projects in the tourism sector. (e.g., the Mekong World Tourism River Corridor – An Endless Stream of International Cooperation, Development of the Tourism Potential of the North-South Economic Corridor Quadrangle Area, East-West Economic Corridor). The work will include market research in relation to each tourism corridor/project,	As international, subregional, and domestic tourists will be provided with a new tourism experience, the TAP will lead to increased tourism in the GMS, which in turn will increase the revenues of private enterprises serving tourism, increase governmental revenues, and provide jobs for local people, especially the poor. Each of these impacts can be measured and benchmarked by reference to M&T indicators that will be developed.

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			including exhaustive interviews with representatives of the travel trade. A key focus of the TA will be to examine how public sector funding can promote sector funding of facilities that would not otherwise be built.	
TAP 39	Sea Cruise Development in Cooperation with ASEAN	*	The TAP is directed towards innovations that promote tourism, with consequent economic development benefits expected to include increased employment and tax revenues in homeports/ports of call, and secondary benefits through tourist consumption in local communities, followed by “knock-on” multiplier effects. It is therefore recommended that the proposed GMS initiative be carried out in close collaboration with the ASEAN initiatives, but supplementing it with collaboration with ports in Guangxi Zhuang Autonomous Region. Elements of the current ASEAN initiatives for cruise development, which encompass a step-by-step strategy, include: (i) promotion of cruise-related information exchanges (e.g., the ASEAN-Japan cruise information center); (ii) joint marketing, including the holding of cruise forums to stimulate interest from the private sector, with attendees to include cruise lines from Europe, North America, and Japan, as well as travel agencies and airlines; (iii) implementation of pilot projects to, among other things, develop new routes and attract first-time cruise passengers to the (sub)region, with project elements to include cooperation with airlines for development of	Core indicators to be deployed would include port revenues and employment, cruise traffic and passenger levels, and associated tourist expenditures per visit. As this TAP is envisaged as an ongoing activity during the planning period, periodic M&T evaluation processes will need to be developed.

Table 10-8: Evaluation of Technical Assistance Projects (continued)

TAP No.	Title	Category	Implementation and Impact Evaluation	Monitoring and Tracking Indicators
			combined flight-cruise packages, improvements to improving cruise infrastructure, and liberalization of CIQ procedures; (iv) enhancement of cruise safety and security, with priority accorded to safe nighttime sailing, curbing piracy, and promoting environmental protection; and (v) encouragement private sector participation in cruise ports, as the GMS may require more dedicated cruise ports. In addition, it is noted that within the subregion, most countries could gain from better positioning cruise ship development within their economic development and tourism promotion plans. Also, there is a need for closer cooperation between and among tourism authorities, marine departments, and harbor improvement offices.	
TAP 40	<u>Phased</u> Implementation of Open Skies	**	To promote economic efficiency by reducing airline costs through competition and allowing airlines to design optimal networks. The project will strengthen air linkages between and among all GMS countries, and help implement the ASEAN "Roadmap for Integration of the Air Travel Sector". In particular, adoption of Open Skies policies involves: (i) removing investment and ownership controls, (ii) permitting multiple designations; (iii) removing route capacity controls, (iv) relaxing restrictions on gateways, and (v) allowing wet leasing. The TAP will focus on determining the best approach to realizing these objectives and formulate recommendations accordingly.	M&T indicators will comprise policy milestones in terms of their implementation. Subsequent results indicators will be in terms of traffic, service frequency, and transportation costs.

CHAPTER XI: ACTION PLANS, OUTSTANDING ISSUES, AND NEXT STEPS

XI. ACTION PLANS, OUTSTANDING ISSUES, AND NEXT STEPS

A. Introduction

1. This chapter presents an action plan for the *** infrastructure projects (Section B) and an action plan for the technical assistance projects (Section C), as developed in previous chapters. It also presents outstanding issues and next steps that need to be addressed for the proposed GMS transport strategy to be implemented effectively (Section D).

B. Action Plan for *** Investment Projects

2. Table 11-1 at the end of this chapter presents an implementation plan for the *** projects (i.e., uncommitted, but prima facie of high priority). The table does not include the ** projects, which would be expected to be implemented primarily from 2008-2015 and the * projects, some of which may be implemented post-2015. The table shows estimated project implementation cost, location, possible development partners, initiating responsibility, and indicative project implementation period. The development partners were mainly determined by reference to previous assistance and support and/or expectations of future assistance. It is however emphasized that the indications represent the consultants' initial assessment. The project categories are as follows:

Category	Definition
II	Immediate implementation required without further study (**I**mmediate **I**mplementation)
RS	Top priority based on results of other ranking studies (**R**anking **S**tudy)
FS	Currently under feasibility study, results available 2006 (**F**easibility **S**tudy)
NC	New corridor strategic project, implementation timing primarily policy dependent (**N**ew **C**orridor)
CP	Capacity-enhancement project, implementation primarily timing demand dependent (**C**apacity-enhancement **P**roject)

C. Action Plan for Technical Assistance Projects

3. Table 11-2 also at the end of this chapter presents a list of technical assistance projects (TAPs) along with their priority, an indication of who is responsible for implementation, and implementation timing.

4. It should be noted that the table has not been structured in a strictly chronological order given that proposed TAPs are not sequential and several constitute consolidated measures in respect of ongoing developments. However, the expected timeframe for each TAP is presented together with the format for implementation (e.g., continuous, periodic, phased).

5. Estimated costs have been included in the table for guidance purposes only – precise costing will be a function of the required TAP preparation work.

6. As with the preceding table, Table 11-2 also provides an indication of possible development partners that may be disposed towards participation in the focus TAP. But, again, these indications have been mainly determined by reference to earlier

assistance and support – for example, ADB's support for the GMS Cross-Border Transport Agreement (CBTA). It is emphasized that such demarcation is simply the consultants' preliminary assessment of potential and does not represent any form of binding commitment.

7. In terms of implementation responsibilities, once again the entities noted in the table constitute preliminary institutional identification, which will of course also be subject to revision during the course of TAP preparation work.

8 The basis for determination of implementation timings is also included in Table 10-2. At this juncture these are based on considerations such as the scope of work involved, established priorities, and the relationship with ongoing TAPs.

9. The action proposals are therefore represented by a finite set of initiatives that have been prioritized but for which it is not possible to provide ordinal properties, due to the need for implementation "in parallel" and the multi-structured nature of envisaged implementation structuring. There may be some scope for further "packaging" of individual TAPs into better, consolidated, projects, but this has not been currently addressed as decisions based on project preparation work are required before meaningful TAP consolidation can be undertaken.

D. Outstanding Issues and Next Steps

1. Role of the GMS

10. With an increasing number of bodies, domestic, bilateral, and multilateral, now involved in project initiation and financing, the recommended role for the GMS to 2015 is to play "maiden aunt": encouraging pursuit of agreed strategic goals and objectives, facilitating dialogue between bodies, raising analysis standards, providing technical support (e.g., through support of the transport model and associated database), while focusing projects on improving economic efficiency in transport infrastructure provision and service operation. A relatively small number of government technical staff are involved in GMS transport work, with the same individuals often serving as their country's representatives on a number of bodies. These staff members have a key role to play in implementing a coordinated transport strategy. They are, however, constrained by the policies of the agencies with prime responsibility for each body. These agencies may have differing and conflicting agendas. Disseminating GMS strategy to all bodies concerned and resolving conflicts in favor of economically efficient solutions is required. Clearly, technical staff may not be in a position to determine policy, but their active promotion of GMS strategy, goals, and initiatives (to the extent that they agree with them) at a working level, combined with ADB's top-down promotion, would provide the best chance for their realization.

2. Specification of a GMS Road Network

11. It has been suggested that the GMS road, rail, inland water transport, air transport, and sea transport networks need to be defined. At this stage, however, it may be premature to proscriptively define GMS networks, other than being the sum of road, rail, inland water transport, air, and sea networks[1] in each of the GMS countries. As part of the recommended further work in developing the GMS Transport Model, a more comprehensive and detailed database of the transport networks within

[1] Sea networks (e.g., coastal shipping) were not part of the terms of rerefence for the current study.

and between GMS countries would be obtained. Such an exercise would necessarily entail detailed collaboration with appropriate officials in each country, together with detailed data collection. Once such an exercise were completed, it would be theoretically possible to index each and every link and node. However, to make such an exercise worthwhile, extensive cross-referencing with other transport studies within the GMS (both ADB and non-ADB funded) would be required, as well as detailed cross-referencing with other data sources/data types (e.g., non-navigable waterways used for irrigation/fisheries, villages indexed in anti-poverty studies). If this were undertaken, it might be worth considering establishing a common database (possibly in GIS), which could serve as a basis for different sectoral studies within GMS.

3. Financing Issues

12. The envisaged transport strategy has material financing implications in terms of both investment and technical assitance projects. This study has not attempted to draw up detailed financing proposals as this will be dependent on a broad array of considerations beyond the terms of reference. It is however appreciated that given the breadth and magnitude of funding requirements, it will be critical to ensure that full funding potentials are mobilized. In particular, the study recognizes the need to foster active participation by the private sector and to that end TAP13: Practicalities of Private Sector Participation in Transport Infrastructure and TAP 17: Private Sector Participation in Road Maintenance have been included in the coverage of crucial technical assistance projects.

13. Mobilization of private sector participation in infrastructure projects depends on facilitating a business environment where risk apportionment is both transparent and focused on risk-bearing capacity. ADB and other development partners have already undertaken several initiatives within the GMS to foster such conditions in the various transport subsectors, and as such it will be critical for the respective GMS governments to take note of the lessons learned and move towards the implementation of indicated policies. The TAPs noted above will provide assistance and practical expertise in this regard.

14. In terms of development partner financing, the tables in this chapter provide an initial assessment of possible funding sources based on historical and perceived involvement, but this is provided for information purposes and not intended to be definitive. The governments at the highest levels will need to consider the financing spreads available to them in close consultation with their development partners, while the referenced TAPs will provide the necessary backdrop for enhanced private sector participation.

4. Role of Myanmar

15. Myanmar will play a key role in the future development of links to BIMSTEC and SAARC (South Asian Association for Regional Cooperation) countries. Ways will have to be found to further involve Myanmar in opening these links to the west when conditions are suitable. India and the PRC have both indicated willingness to bridge gaps between the GMS and the Indian Ocean via Myanmar.

5. Multimodal Transport

16. Mainly because of the weakness in GMS rail performance and connectivity, the share of multimodal transport may not increase by 2015. The dominance of road transport throughout the GMS is well entrenched and will be further encouraged by

an improving road infrastructure. The case for developing a low-quality GMS rail network is inherently weak, given the huge cost involved, but at some stage (probably post-2015) there may be a case for a high-quality, standard-gauge network; in the interim the focus should be mainly on the efficient operation of the domestic rail networks. There are some intermodal possibilities, e.g., container train services linking Laem Chabang-Thanaleng and on the Kunming/Nanning-Haiphong corridors. While inland waterway developments will offer increased opportunities for multimodal transport, these are primarily niche roles in specific markets, constrained by network geography. Airport and port development is primarily driven by non-GMS considerations. The role of logistics and optimization along the transport chain is growing, as is the necessity of efficient transport, driven by globalization. GMS support may, however, be most effective at the macro level, with strategy setting and focused support of enabling projects and policies.

6. Project Pipeline

17. It is particularly notable that all projects on the long list were proposed by the countries and that no additional projects to enhance capacity were identified during the modeling. With the main GMS corridors already well established, further project identification post-2010 may best be accomplished via detailed domestic studies, with economic efficiency then confirmed by model testing. Development of a supporting secondary network is the next stage in GMS infrastructure provision and this is primarily domestically driven, although with a robust model in place, it will be possible to test for network efficiency gains obtainable with additional cross-border links: some quite short links might prove effective.

7. Development of the GMS Transport Model (GTM)

18. The model developed *ab initio* (from the beginning) with 6-7 person-months' input during this study may be considered a demonstration version of what could become a GMS strategic tool. The limitations of the model and the database and proposals for its further development are set out in Working Paper 5, reproduced in Appendix 2 of this report. The study strongly recommends that further development be supported, in line with the program set out below. This represents the best available method to facilitate project appraisal on a common basis and it is expected that it would in due course substantially improve the economic efficiency of the GMS transport investment portfolio. The specific objectives of this development program would be to: (i) enable a robust methodology for identifying, appraising, and refining transport projects covering "hard" investment projects as well as a number of "soft" technical assistance projects, as well as enabling before-and-after studies of projects already implemented, so as to further validate and strengthen the GTM; and (ii) develop core competencies within GMS countries such that most (and ultimately all) of the work associated with project identification, evaluation, refining and out-turn analyses can be undertaken by these national teams.[1]

19. Appendix 2 of this Report as well as the TAP Profile in Appendix 4 on Further Development and Enhancement of the GMS Transport Model provides technical

[1] Similarly, the intention would be that national teams from two (or more) countries could work together on the proposal, assessment, and refinement of cross-border projects, with the ADB acting as an arbiter where required and as an auditor of resultant proposals, when ADB financing or other interventions are sought.

details of specific improvements that might be made to the GTM. In general terms, a proposed development program for the GTM is as follows[1]:

(i) By March 2006, each country to designate agency to have ownership of the model and draw up a "long list" of enhanced model functions and data collection requirements.

(ii) By April 2006, specify a program for updating traffic data and network databases, based on a prioritized list of technical modifications to the GTM; it is envisaged that this would mainly comprise increased spatial analysis (level of detail in zoning and network coding), as well as enhanced network coding and improved cost information. Concurrently to recommend a software platform on which to develop the GTM. It is recommended that ADB support workshop of designated agencies to be conducted by this study's Transport Modeler, to provide training in use of existing model; (b) specify program for updating of traffic and network database; and (c) agree on necessary technical modifications of the model and to assign responsibilities[2] (e.g., to include a list of prioritized functional upgrades to the model, as well as determining at what level of detail this can be feasibly attained within a Version 2 of the model and potentially in the longer term).[3]

(iii) From April to June 2006, first to purchase required software; then to conduct a further round of data collection, with an emphasis on attempting to overcome "gaps" in the current dataset, and where this is not possible, identifying data shortfalls with a view to commissioning more detailed surveys for Version 3 of the model (see below) - given likely requirements of enhancing network coding detail and zoning definition, close collaboration with nominated agencies from the various Governments will be required.

(iv) By end-2006, to develop model Version 2, recalibrated on an updated database and with improved specification. During the interim (i.e., between June and December 2006) close liaison with the nominated agencies in the GMS countries and ADB should be maintained. If required, follow-up country visits for further data collection and/or discussion of modeling issues would be undertaken; the aim would be that Version 2 of the GTM be developed with ongoing consultation with the nominated agencies. Assuming that ADB would require some form of Version 2 to be "mounted" for use/view by various parties (e.g., ADB, governments), some coordination with ADB technical staff in Manila should also be undertaken.

(v) At the end of 2006 or in early 2007, hold a further workshop to present Version 2 of the model to designated agencies, both to explain to them the

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[1] At the Final Meeting on the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006, it was stated that the proposed phased approach may be appealing, i.e., to start small and gradually expand capabilities as demand for the model's outputs increases. However, there is a minimum investment involved, in terms of effort, cost, the staff to be assigned to collect data and undertake maintenance work, and the like. Summary of Proceedings, paragraph 40. Any actual program and dates to be followed would of course depend upon accpetance of the program by the GMS governments.

[2] This workshop would thus serve to review and confirm or amend as necessary recommended model specifications.

[3] E.g., regarding demand characterizations and spatial level of detail (network and zoning definitions).

improvements and outstanding issues, and to canvass views on a further level of improvements. The workshop would also be used to discuss best means of disseminating the Version 2 of GTM and be followed up by dissemination as agreed during the Workshop.

(v) By early 2007 (but potentially earlier) to establish a series of national units to assist in further development of the GTM. These units would enable more devolution of model development to the GMS countries, as a means to ensure adequate capacity development. Such training would be in parallel with development of Version 3 of the GTM. Whether a central coordinating center is required, either at ADB headquarters in Manila or within the GMS may also be discussed, together with timing for implementation. Financing and other support requirements for the preceding items from ADB would be determined.

(vii) During 2007, ADB to commission a range of transport surveys to overcome any outstanding data shortfalls, especially with regards transport flows and transport costs. It is envisaged that data collection would be a tripartite effort in each country, involving nominated agency/national units in each country, ADB, and the transport modeling consultant (subject to review).

(vii) In 2007, develop Version 3 of the model; if feasible, components of the model would be developed by national units.

(viii) By late-2007, to have tested model on a range of projects covering all GMS countries and to have developed an operational Version 3 sufficiently accurate to supersede conventional economic analysis for GMS projects.

(ix) By late 2007, to assess the suitability and feasibility of using the GTM to generate national transport (Yunnan/Guangxi in the case of the PRC) models.

(x) By end-2007, ADB to convene a meeting of national modeling units and supervising transport agencies to demonstrate model capabilities and to agree a staged program for incorporating modeling in the appraisal of all GMS transport projects.

(xi) By end-2007, those countries (provinces) lacking their own transport models to agree on a staged program for the development of national transport models and ongoing training and support to appropriate agencies for the development and maintenance of their own national models.

(xii) By end-2008, to have national versions of the GNMS transport model operational in all countries (provinces) that do not have their own national models already, the aim being to enable countries to test and suggest schemes themselves and in so doing facilitate substantial technology transfer.

(xiii) By 2009, to have a model-tested infrastructure investment program 2010-15 in place.

(xiv) By late 2009, to have all countries able to propose, evaluate, and coordinate potential projects among themselves, although with ADB review – in addition, to have established working arrangements between and among executive and technical officials, so as to facilitate coordinated planning and appraisal.

8. Optimization of GMS Transport Investment

20. As the GMS transport networks come to be viewed as a single network, more consideration will be given to optimizing investment. This requires: (i) that the scope of GMS investment be defined and (ii) that the goals of that investment be agreed. While there are many GMS-related projects, there is no agreed definition of what constitutes such a project and therefore no particular basket of projects to be subject to consistent analysis. Actually defining the limiting conditions is quite difficult: many projects on GMS corridors, for example, do not end at a border and handle only a small proportion of cross-border traffic. For primarily domestic-oriented projects it is arguable that a common standard of analysis is inappropriate: where the marginal efficiency of transport investment varies between/among countries, as it clearly does in the GMS, ranking projects GMS-wide will suboptimize the total investment program. A two-stage process would be preferable: (i) applying a sieve by country with varying minimum EIRRs, or ENPVs calculated at varying discount rates; and (ii) optimizing the resulting basket of projects with an agreed macro-level distribution of the investment pie between/among modes and countries. Investment goals also need definition: (i) priorities between/among modes, areas, strategies, and the like; (ii) relative importance of opening new links against providing enhanced capacity on existing links; and (iii) specification of long-term strategic projects to be implemented irrespective of economic ranking.

21. In the short term, the best that can be hoped for is to raise awareness of tradeoffs and the economic costs involved in each decision. Making the decision-making process transparent would be an effective mechanism. If modeling results are published and the alternative projects that have to be abandoned by a decision to proceed are noted, the optimization process will be furthered. Currently, analysis is focused entirely within-project. There is no consideration given to alternative uses of funds and no cross-project comparison is required. Every economist is aware of techniques available to disguise the true viability of a project. What would be much more difficult to prove would be that there are no more viable alternative projects available.

22. It is recommended that:

(i) By June 2006, a working level meeting be convened by the Subregional Transport Forum of representatives of all official bodies involved in transport projects in the GMS and adjacent areas, to (i) develop common overarching goals for projects in the transport sector (drawing on the recommendations in this study's *Final Report*); (ii) develop guidelines for demarcating areas of responsibility between/among the bodies concerned; (iii) propose a coordinating mechanism for data and information exchange; and (iv) propose ways of furthering transport sector development in Myanmar.

(ii) By end-2006, agreement be reached by the GMS governments from all the bodies based as far as practicable on the results of the working level meeting.

(iii) By mid-2007, a small permanent GMS transport secretariat[1] or national units in each country be established, with responsibility for coordinating

[1] The Draft Final Report included a recommendation of Vientiane as the site of such a secreatriat (as it is at the geographic center of the GMS and is the capital of the country that has perhaps benefitted the least to date from the development of GMS corridors. However, at

development of the transport model, maintaining a traffic database and an investment and technical assistance project database, and for preparing quarterly updates for circulation to the GMS countries.

9. Training

23. The strategy presented in this report envisages training as an integral part of a number of specific TAP initiatives (e.g., Training in Logistics, Training in Road Operations, Railways Management Improvement Project, Further Development and Enhancement of the GMS Transport Model) rather than developing a detailed training-related theme. Given the wide variation in training needs, both as between and among GMS countries and within national entities, time and resource constraints precluded the initiation of a full training needs assessment. The core focus was therefore directed towards the resolution of specific transport-related needs (rather than seeking to identify and resolve generic issues). While this approach may not be ideal, the consultants took the view that it was preferable to link training to priority initiatives rather than seek to develop sectorwide training needs.

24. Having noted these constraints, the strategy presented herein recognizes the need for structured training and the benefits to be realized through cross fertilization between and among GMS countries. In that context, the proposed TAP 11 providing for Institutional Strengthening of National Transport Facilitation Commitees could well be expanded to include the development of mechanisms to promote and coordinate training programs between and within GMS countries.

10. GMS Transport Sector Strategy Results-Based Framework for Monitoring

25. At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, the development of a results framework for the proposed transport strategy was suggested, to show and monitor how the projects support the strategy. A Results Framework for the Strategy is included as Appendix 5.[1] The Framework is based on the Interim Greater Mekong Subregion Regional Cooperation Strategy and Program Update 2006-2008 Results Framework, which was issued in August 2005. In the preparation of the Strategy Framework, reference was also made to the recent ADB Project Performance Management System publication.

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the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City, Viet Nam on 8-9 December 2005, it was noted that there are too many secretariats and working groups now; that it will be necessary to carefully define the scope of work of proposed secretariat; and that each country already has a National Transport Facilitation Committee, which together comprise a Joint Ministerial Committee. The Co-Chair further noted that there may be "too many cooks spoiling the acronym soup," but some organization would need to look after the transport model. Summary of Porceedings, paragraph 19(vii).

[1] The indicators in Appendix 5 are consistent with the evaluation indicators for TAPs shown in Table 10-8.

Table 11-1: Action Plan for Investment Projects

Project No.	Project	Category	Estimated Cost / Location / Possible Development Partner	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
A2.1-3	Houei Sai-Chiang Khong Third International Mekong Bridge	II	**US$40 million/ Lao PDR and Thailand/ ADB and the Governments of the PRC and Thailand**	**ADB and relevant Road Authorites**										
A3.4-2	Route 13S - NR7 cross-border section	II	**US$5 million/ Lao PDR and Cambodia/ ADB**	**ADB and relevant Road Authorites**										
B1-11	Sisophon-Poipet/Aranyaprathet reinstatement	II	**US$4 million/ Cambodia/ ADB and/or Government of Malaysia and/or Government of Thailand**	**ADB and relevant Railway Authority**										
A3.2-3	NR33: Kampong Trach-Lork Viet Nam border missing 17km section	II	**US$4 million/ Cambodia/ ADB and/or IFI**	**ADB and relevant Road Authority**										
A3.6-1	Route 14A: Pakse-Wat Phu-Lao PDR/Cambodia border 170km paving/reconstruction. Section B.	RS	**US$33.0 million/ Lao PDR/ Government of Japan**	**ADB and relevant Road Authority**										
A3.6-3	Pakse-Xekong Direct Route paving/ reconstruction	RS	**US$34.0 million/ Lao PDR/ Government of Japan**	**ADB and relevant Road Authority**										
A4-4	Mawlamyine-Mudon-Thanbyuzayat upgrading	RS	**US$10 million/ Myanmar/ Government of the Republic of Korea**	**Relevant Road Authority**										

Table 11-1: Action Plan for Investment Projects (continued)

Project No.	Project	Category	Estimated Cost / Location / Possible Development Partner	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
A6-3	Route 4: (Lao PDR/Thailand Bridge at Nam Heuang) Ban Nakha-Ken Thao-Paklay-Sayaboury-Xieng Ngern	RS	**US$50 million/ Lao PDR/ ADB**	**ADB and relevant Road Authority**										
A6-4	Northern corridors in Lao PDR	RS	**US$47 million/ Lao PDR/ ADB**	**ADB and relevant Road Authority**										
A2.2-2	Hanoi-Lao Cai expressway	FS	**US$715.0/ Viet Nam/ ADB and other IFC**	**ADB, other IFC, and relevant Road Authority**										
A6-6	Thakhek-Nakhon Phanom bridge	FS	**US$38.0 million/ Lao PDR and Thailand/ ADB, JBIC, other IFC**	**ADB, JBIC, other IFC, and relevant Road Authorities**										
A6-9	Dau Giay-Lien Khuong expressway	FS	**US$600 million/ Viet Nam/ ADB, JBIC, or other IFI**	**ADB, JBIC, and relevant Road Authority**										
B1-10	Phnom Penh-Badeng-Sisophon/Phnom Penh-Sihanoukville rehabilitation	FS	**US$40.0 (loan element)/ Cambodia/ ADB**	**ADB and relevant Railway Authority**										

Table 11-1: Action Plan for Investment Projects (continued)

Project No.	Project	Category	Estimated Cost / Location / Possible Development Partner	Initiating Responsibility	Timing of Project 06	07	08	09	10	11	12	13	14	15
C1-1	Improvement of Savannakhet Airport for Joint Thai/Lao PDR Use	FS	**US$3.5 million/ Lao PDR and Thailand/ Government of Japan**	**ADB, Government of Japan, and relevant Civil Aviation Authorities**										
C1-3	Da Nang port upgrading, phase 2	FS	**To be determined/ Viet Nam/ JBIC**	**ADB, JBIC, and relevant Port Authority**										
C3.2-1	Channel, navigation, and port improvements on Mekong and for access to port at Siem Reap; development of intermodal terminal at Khone Falls (scope to be finalized)	FS	**To be determined/ Cambodia/ Mekong River Commission and Government of Belgium**	**Mekong River Commission**										
A2.3-1	Baise-Longlin expressway	NC	**To be determined/ PRC (Guangxi)/ ADB**	**ADB and relevant Road Authority**										
A2.3-2	Baise-Debao-Longbang Viet Nam border expressway	NC	**To be determined/ PRC (Guangxi)/ ADB**	**ADB and relevant Road Authority**										
A3.3-2	NR66: Siem Reap-Preah Vihear-Stung Treng	NC	**US$26.0 million/ Cambodia/ ADB**	**ADB and relevant Road Authority**										

Table 11-1: Action Plan for Investment Projects (continued)

Project No.	Project	Category	Estimated Cost / Location / Possible Development Partner	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
A4-3	Thaton-Payagyi-Bagan-Kalay-Tamu/Moreh (India)	NC	**To be determined/ Myanmar and India/ Governments of Myanmar, India, and Thailand**	**Governments of Myanmar, India, and Thailand including relevant Road Authorities**		■	■							
C3.2-3	Construction of floating port on Hamluong river	NC	**US$1.6 million/ Viet Nam/ Mekong River Commission and Government of Belgium or IFI**	**Mekong River Commission and relevant Waterways Authorities**	■									
D19	Xieng Kok-Kyaing Lap Mekong Friendship Bridge	NC	**US$34 million Lao PDR/Myanmar IFI**	**Governments of Lao PDR and Myanmar**		■	■	■						
A2.3-5	Chongzuo-Longzhou, upgrading to Class I	CP	**To be determoned/ PRC (Guangxi)/ ADB**	**ADB and relevant Road Authority**			■	■	■					
A3.1-4	Bien Hoa-Vung Tau expressway	CP	**US$679.0 million/ Viet Nam/ To be determined**	**IFI**			■	■	■					
A6-10	Dali-Lijiang upgrading	CP	**To be determined/ PRC (Yunnan)/ ADB**	**ADB and the relevant Road Authority**		■	■	■						
A6-11	Kunming-Wuding upgrading	CP	**To be determined/ PRC (Guangxi) ADB**	**ADB and the releavnt Road Authority**			■	■	■					

Table 11-1: Action Plan for Investment Projects (continued)

Project No.	Project	Category	Estimated Cost / Location / Possible Development Partner	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
C2.1-3	New Kunming International Airport	CP	**US$2.9 billion/ PRC/ IFI**	**IFI, relevant Civil Aviation Authority, and provincial Planning Commission**										
2.1-5(a)	Expansion of Dali Airport	CP	**US$19 million/ PRC/ IFI**	**IFI, relevant Civil Aviation Authority, and provincial Planning Commission**										
C3.2-4	Laem Chabang Phase 2, construction of C and D container terminals	CP	**To be determined/ Thailand/ Government of Japan and/or IFI**	**ADB, Government of Japan, and relevant Port Authority**										
D14	Guilin International Airport improvement	CP	**US$12.0 million/ PRC (Guangxi)/ IFI**	**IFI, relevant Civil Aviation Authority, and provincial Planning Commission**										
D21	Lancang-Mekong navigation channel improvement and maintenance project	CP	**US$30.0-30.5 million/ All GMS countries/ Mekong River Commission and IFIs**	**JCCCN, Mekong River Commission, and relevant Waterways Authorities**										

Table 11-2: Action Plan for Technical Assistance Projects

TAP No.	Project	Category	Estimated Cost / Location / Possible Development Partner/ Basis for Timing Determination	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
CBTA-Related														
TAP 1	Implementing the GMS Agreement to Facilitate the Cross-Border Movement of Goods and People, Phase 2	****	**US$0.86 million/ All GMS countries/ ADB/ Timing of related TAPs**	**ADB and Joint Committee of NTFCs**										
TAP 2	"Fine-Tuning" of the GMS Cross-Border Transport Agreement	***	**US$2.00 million/ All GMS countries/ ADB/ Timing of related TAPs/**	**ADB and Joint Committee of NTFCs**										
TAP 3	Processing and Facility Improvements at Border Crossing Points	***	**US$1.00 million for TA and US$20.00 for construction/ All GMS countries/ ADB/ Priority**	**ADB, Joint Committee of NTFCs and border control authorities.**										
TAP 4	Updating or Improving Existing Bilateral Railway Agreements and/or Amending the GMS Cross-Border Transport Agreement (CBTA) To Cover Cross-Border Railway Transport	***	**US0.10 million/ All GMS countries/ IFI/ Timing of related railway infrastructure projects and related TAPs**	**ADB and National Rail Authorities**										
TAP 5	Project to Establish a Legal Framework for Cross-Border Navigation on the Mekong River ["Navigation Without Frontiers", a motto adopted by the Mekong River Commission]	** / ***	**US$0.10 million/ Cambodia and Viet Nam (and possibly Thailand and Lao PDR)/ MRC/ Timing of related TAPs**	**National Waterway Authorities and MRC**										

Table 11-2: Action Plan for Technical Assistance Projects (continued)

TAP No.	Project	Category	Estimated Cost / Location / Possible Development Partner/ Basis for Timing Determination	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
TAP 6	Establishment of Issuing and Guaranteeing Organizations under the GMS Cross-Border Transport Agreement	****	**US$0.30 million/ All GMS countries/ ADB/ Timing of related TAPs**	**NTFCs and their Joint Committee**										
TAP 7	Inclusion of a Substantive Health and Sanitary/Phytosanitary (SPS) Regime in the Cross-Border Transport Agreement	***	**US$0.20 million/ All GMS countries/ IFI/ Priority**	**NTFCs and their Joint Committee and the Public Health and Agricultural Ministries of the six GMS Countries**										
TAP 8	<u>Phased</u> Liberalization of Visa Regimes for Travelers	****	**US$5.00 million/ All GMS countries/ ADB/ Intermittent throughout the planning period**	**NTFCs and their Joint Committee, Immigration and Tourism Departments of each country**										
TAP 9	Specification of Transit Charges To Be Implemented Under Protocol 2 of the Cross-Border Transport Agreement	****	**US$0.15 million/ All GMS countries/ ADB/ Priority**	**NTFCs and their Joint Committee**										
TAP 10	Establishment of a Third-Party Motor Liability Insurance Regime	***	**US$0.10 million/ All GMS countries/ ADB/ Timing of related TAPs**	**NTFCs and their Joint Committee**										

Table 11-2: Action Plan for Technical Assistance Projects (continued)

TAP No.	Project	Category	Estimated Cost / Location / Possible Development Partner/ Basis for Timing Determination	Initiating Responsibility	Timing of Project: 06	07	08	09	10	11	12	13	14	15
TAP 11	Institutional Strengthening of National Transport Facilitation Committees	****	**US$0.30 million/ All GMS countries/ ADB/ Timing of related TAPs**	**NTFCs**										
TAP 12	Support for Harmonization of GMS Road Signs and Signals	***	**US$0.12 million/ All GMS countries/ ADB/ Priority**	**NTFCs as well as national and provincial highway departments**										
Infrastructure-Related														
TAP 13	Practicalities of Private Sector Participation in Transport Infrastructure	***	**US$0.20 million/ All GMS countries/IFI/ Government of Japan/ Priority**	**National Ministries of Transport**										
TAP 14	Cooperation between the ADB-ASEAN Regional Road Safety Program and the PRC	*	**To be determined/ All GMS countries/ IFI/ Donor timetables in PRC**	**ADB and concerned agencies in the GMS and non-GMS ASEAN countries**										
TAP 15	HIV/AIDS Component for all Road Transport Projects in the GMS	****	**US$1.00+ million/ All GMS countries/ IFI/ADB/ Intermittent throughout the planning period**	**Transport/Communications and Public Health Ministries of the six GMS countries**										

Table 11-2: Action Plan for Technical Assistance Projects (continued)

TAP No.	Project	Category	Estimated Cost / Location / Possible Development Partner/ Basis for Timing Determination	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
TAP 16	Road Maintenance Initiatives for Cambodia, Lao PDR, Myanmar, and Viet Nam	**	**US$1.50 million/ All GMS countries/ ADB/ Priority**	**National Departments of Road/Ministries of Transport**		■	■	■						
TAP 17	Private Sector Participation in Road Maintenance	**	**US$0.90 million/ All GMS countries/ IFI/ Priority**	**National Roads Authorities.**		■	■	■						
TAP 18	Revisiting of the Feasibility Study for the Singapore-Kunming [Nanning] Railway Link (Project	*	**US$2.00 million/ All GMS countries/ ADB/ Priority**	**ADB and National Rail Authorities**							■	■		
TAP 19A	Upper (Lancang-)Mekong River Channel Navigation Improvement and Maintenance Project	***	**US$5.00 million/ PRC, Myanmar, Lao PDR, and Thailand / ADB and MRC/ Timing of related TAPs**	**National Waterway Authorities, ADB, and MRC**	■	■	■	■	■	■				
19B	Lower Mekong River Channel Navigation Improvement and Maintenance Project	***	**US$10.00 million/ Cambodia and Viet Nam/ MRC and ADB/ Timing of related TAPs**	**National Waterway Authorities, MRC, and ADB**	■	■	■	■	■	■				
TAP 20	GMS Airports Development Project	**	**To be determined/ All GMS countries/ IFI/ Phased implementation**	**National Civil Aviation Authorities**	■	■	■	■	■	■	■	■	■	■
TAP 21	Rail Maintenance in Cambodia	*	**US$0.30 million/ Cambodia/ ADB or other IFI/ Priority**	**Royal Railway of Cambodia**		■	■							

Table 11-2: Action Plan for Technical Assistance Projects (continued)

TAP No.	Project	Category	Estimated Cost / Location / Possible Development Partner/ Basis for Timing Determination	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
TAP 22	GMS Andaman Sea/Indian Ocean Deep Sea Port Study for Myanmar	***	**US$0.50 million/ Myanmar/ IFI/ Priority**	**Ministry of Transportation Myanmar Ports Authority**	■	■								
Transport Logistics-Related														
TAP 23	Training in Logistics	***	**US$0.30 million/ All GMS countries/ IFI/ Priority**	**National Transport Authorities**		■	■	■						
TAP 24	Development of Inland Container Freight Depots	*	**US$0.30 million/ All GMS countries/ IFI and/or Government of Japan/ Priority**	**National Ministries of Transport**		■								
TAP 25	Cambodia FF Competitiveness Project	N/A	**Consolidated with TAP 21**	**N/A**										
Training														
TAP 26	Training in Road (Passenger and Freight) Transport Operations ("Knowledge Across Frontiers")	**	**US0.30 million/ All GMS countries/ IFI and/or International Road Transport Union/ Priority**	**National Transport Authorities**				■	■	■				
TAP 27	Upgrading of Inland Water (Passenger and Freight) Transport Industry	**	**US$0.10 million/ All GMS countries/ MRC/ Priority**	**National Waterways Authorities and MRC**			■							
TAP 28	Railways Management Improvement Project	*	**US$1.50 million/ Cambodia and Myanmar/ IFI/ Priority**	**National Transport Ministries and Railways**		■	■	■						

Table 11-2: Action Plan for Technical Assistance Projects (continued)

TAP No.	Project	Category	Estimated Cost / Location / Possible Development Partner/ Basis for Timing Determination	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
TAP 29	Development of Traffic Engineering Capacity in Myanmar	Noted	**N/A**	**N/A**										
TAP 30	Development of Highway Engineering Capacity in Myanmar	Noted	**N/A**	**N/A**										
TAP 31	Financial and Economic Assessment Expertise in Myanmar	Noted	**N/A**	**N/A**										
Others/Cross-Cutting														
TAP 32	Transformation of Transport Corridors into Economic Corridors	****	**US$5.0 million/ All GMS countries/ ADB, JBIC, and other IFIs/ Priority**	**ADB, Transport/Eco-nomic Develop-ment Ministries**										
TAP 33	Further Development and Enhancement of the GMS Transport Model	****	**US$0.35 million for Version 2 and up to US$1.00 million for Version 3/ All GMS countries/ ADB/ Priority**	**ADB and National Transport Ministries**										
TAP 34	Development of Cross-Border Scheduled Bus Routes	**	**Cost from national budgets/ All GMS countries/ As demand warrants**	**National Transport Ministries**										
TAP 35	Marketing and Container Train Concessions between Laem Chabang, Thailand and Thanaleng, Lao PDR	**	**US$0.50 million/ Thailand and Lao PDR/ IFI/ Priority**	**State Railway of Thailand/ Lao PDR Railway Authority/ National Ministries**										

Table 11-2: Action Plan for Technical Assistance Projects (continued)

TAP No.	Project	Category	Estimated Cost / Location / Possible Development Partner/ Basis for Timing Determination	Initiating Responsibility	Timing of Project									
					06	07	08	09	10	11	12	13	14	15
TAP 36	Promotion of Marketing Functions for GMS Ports	**	**US$0.05 million/ All GMS countries but especially those with sea ports/ IFI/ Priority**	**ASEAN Secretariat and PRC and other national Port Authorities.**										
TAP 37	Promotion of Short Sea Shipping Services	**	**US$0.50 million/ All GMS Countries/ IFI/ Timing of related TAPs**	**National Ports and Shipping Authorities**										
TAP 38	TA on Transport Requirements for the Development of Tourism	**	**US$1.00-2.00 million/ All GMS countries/ IFI/ Timing of related TAPs**	**Transport/Com-munications and Tourism Ministries of the six GMS countries**										
TAP 39	Sea Cruise Development in Cooperation with ASEAN	*	**US$0.50 million/ All GMS countries/ IFI/ Priority**	**National Port Authorities**										
TAP 40	<u>Phased</u> Implementation of Open Skies	***	**US$0.50 million/ All GMS countries/ IFI/ Timing of related TAPs and ongoing ASEAN initiative**	**ASEAN Secretariat and separate arrangement with PRC National Civil Aviation Authorities**										

Key: Continuous Intermittent Possible 2nd, phase Phased Implementation

MAPS

Figure M-1: Existing and Proposed GMS Corridors

Legend

1	EWEC	East-West Economic Corridor	Mawlaymine – Da Nang
2.1	NSEC (W)	North-South Economic Corridor (West)	Kunming – Bangkok via Lao PDR/Myanmar
2.2	NSEC (C)	North-South Economic Corridor (Central)	Kunming – Hanoi – Haiphong
2.3	NSEC (E)	North-South Economic Corridor (East)	Kunming – Nanning – Hanoi
3.1	SEC (C)	Southern Economic Corridor (Central)	Bangkok – Phnom Penh – Ho Chi Minh – Vung Tau
3.2	SEC (SC)	Southern Economic Corridor (Southern Coastal)	Bangkok – Trat – Koh Kong – Kampot – Ha Tien – Nam Can
3.3	SEC (N)	Southern Economic Corridor (North)	Bangkok – Siem Reap – Stung Treng – Rattanakiri – O Yadov – Play Ku – Quy Nhon
3.4	SEC-NSEC	SEC-NSEC Inter-Corridor Link	Dong Kralor – Stung Treng – Kratie – Phnom Penh - Sihanoukville
3.5	SEC (WE)	Southern Economic Corridor (Western Extension)	Bangkok – Dawei
4	NC	Northern Corridor	Kunming – Dali – Ruili – Lashio – Mandalay – Tamu – Imphal
5	NWC	Northwestern Corridor	Bangkok –Mae Sot – Payagyi – Meiktila – Tamu – Imphal
6	NSC (L)	North South Corridor via Lao PDR	Kunming – Mohan – Luang Prabang – Vientiane – Thakhek – Pakse – Phnom Penh – Sihanoukville
7	NEC	Northeastern Corridor	Nanning – Hanoi – Vientiane – Bangkok/Laem Chabang

Figure M-1: Existing and Proposed GMS Corridors

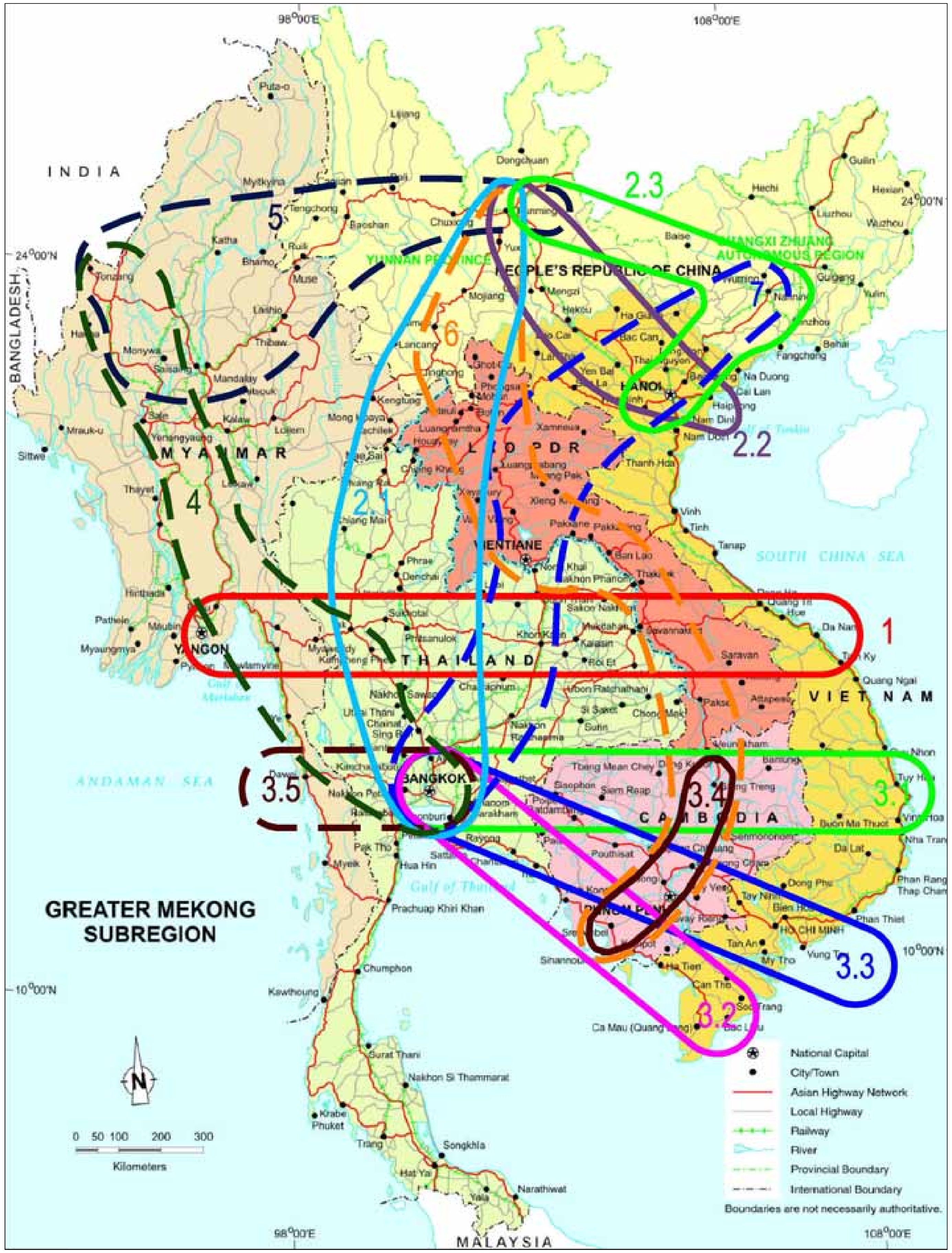

Figure M-1: Existing and Proposed GMS Corridors

Legend

1	EWEC	East-West Economic Corridor	Mawlaymine – Da Nang
2.1	NSEC (W)	North-South Economic Corridor (West)	Kunming – Bangkok via Lao PDR/Myanmar
2.2	NSEC (C)	North-South Economic Corridor (Central)	Kunming – Hanoi – Haiphong
2.3	NSEC (E)	North-South Economic Corridor (East)	Kunming – Nanning – Hanoi
3.1	SEC (C)	Southern Economic Corridor (Central)	Bangkok – Phnom Penh – Ho Chi Minh – Vung Tau
3.2	SEC (SC)	Southern Economic Corridor (Southern Coastal)	Bangkok – Trat – Koh Kong – Kampot – Ha Tien – Nam Can
3.3	SEC (N)	Southern Economic Corridor (North)	Bangkok – Siem Reap – Stung Treng – Rattanakiri – O Yadov – Play Ku – Quy Nhon
3.4	SEC-NSEC	SEC-NSEC Inter-Corridor Link	Dong Kralor – Stung Treng – Kratie – Phnom Penh - Sihanoukville
3.5	SEC (WE)	Southern Economic Corridor (Western Extension)	Bangkok – Dawei
4	NC	Northern Corridor	Kunming – Dali – Ruili – Lashio – Mandalay – Tamu – Imphal
5	NWC	Northwestern Corridor	Bangkok –Mae Sot – Payagyi – Meiktila – Tamu – Imphal
6	NSC (L)	North South Corridor via Lao PDR	Kunming – Mohan – Luang Prabang – Vientiane – Thakhek – Pakse – Phnom Penh – Sihanoukville
7	NEC	Northeastern Corridor	Nanning – Hanoi – Vientiane – Bangkok/Laem Chabang

Figure M-1: Existing and Proposed GMS Corridors

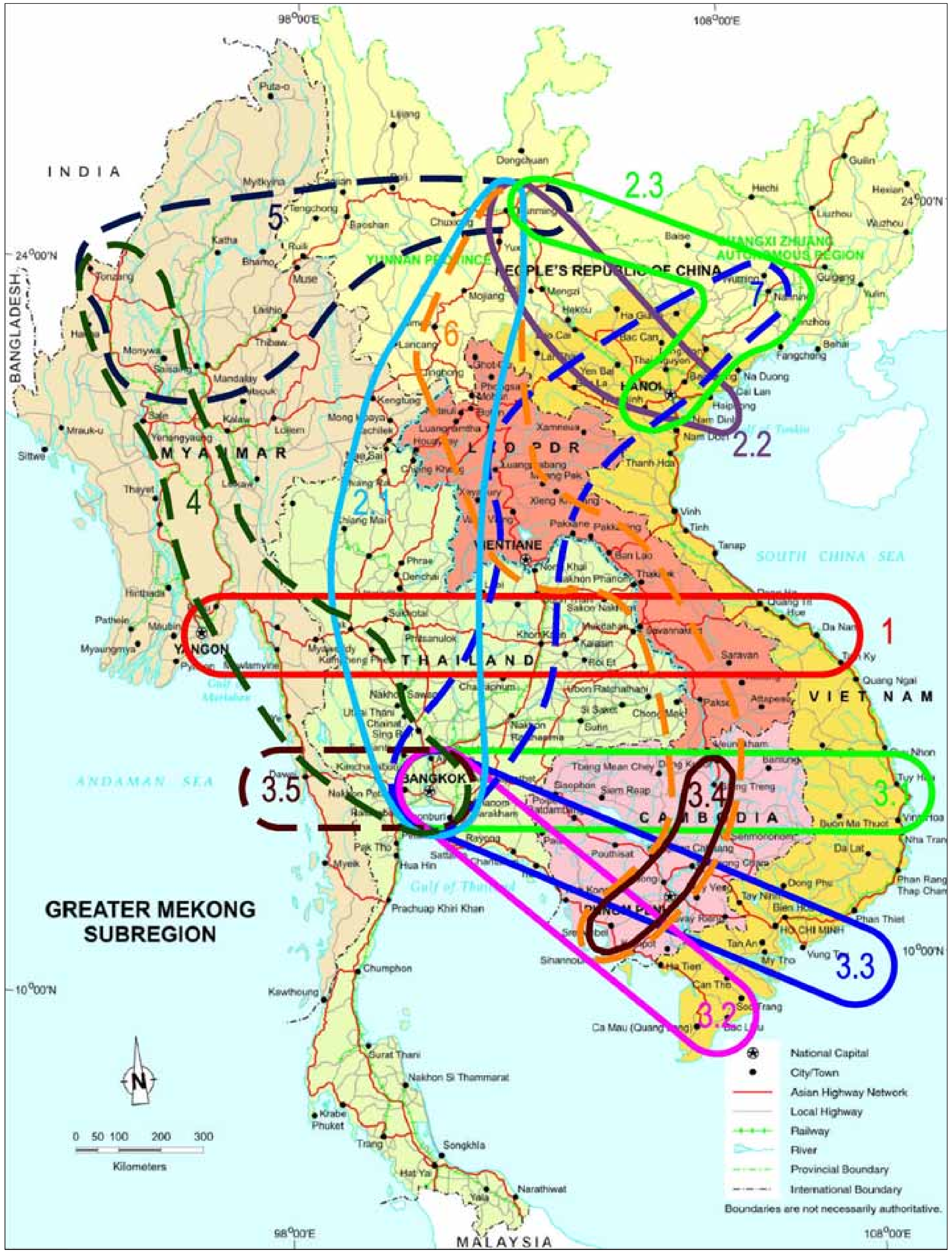

Figure M-3: GMS Road Projects: High Priority (***)

Legend

A2.1-3	Houei Sai – Chiang Khong Mekong Bridge
A2.2-2	Hanoi – Lao Cai expressway
A2.3-1	Baise – Longlin expressway
A2.3-2	Baise – Debao – Longbang expressway
A2.3-5	Chongzuo – Shuikou
A3.1-4	Bien Hoa – Vung Tau expressway
A3.2-3	Kampong Trach – Lork
A3.3-2	Siem Reap – Preah Vihear – Stung Treng
A3.4-2	Route 13S – NR7
A3.6-1	Pakse – Wat Phu – Lao PDR/Cambodia border
A3.6-3	Pakse – Xekong
A4-3	Thaton – Payagyi – Bagan – Kalay – Tamu/Moreh
A4-4	Mawlamyine – Mudon – Thanbyuzayat
A6.3	Ngam Heung – Meng Thai Friendship Bridge– Paklai – Xayaboury – Luang Prabang
A6.9	Dau Giay – Lien Khuong Expressway
A6.10	Dali – Lijiang
A6.11	Kunming – Wuding
D-19	Mekong Xieng Kok-Kyaing Friendship Bridge, access roads

Figure M-3: GMS Road Projects: High Priority (***)

Figure M-4: GMS Road Projects: Moderate Priority (**)

Legend

A1-1	Savannakhet – Seno
A1-6(a)	Cau Treo – Hong Linh
A1-6(b)	Na Meo – Do Len
A1-6(c)	Highway 49, Hue
A1-6(d)	Quy Nhon port – Binh Dinh
A1-6(e)	Dung Quat Port – Kon Tum
A1-6(f)	Highway 9 Phase 3
A1-6(g)	Cam Ranh port – Buon Ma Thot
A1-6(h)	Nam Giang – Giang bridge
A1-6(i)	Phan Thiet – Da Lat
A2.1-4	Pak Lay – Thai border
A2.3-3	Qinzhou – Chongzuo expressway
A2.3-6	Chongzuo – Napo – Funing expressway
A2.3-11	Hanoi – Lang Son
A3.3-4	Attapeu – Cambodian border
A3.3-5	Play Ku – Quy Nhon
A3.5-1	Kanchanaburi – Myitta – Dawei
A3.6-2	Rte 14B: jn Rte 16 – Cambodian border
A3.6-4	Rte 18A: jn Rte 13S – Attapeu
A3.6-6	Prachuap port – Bang Saphan – Bokpyin
A4.2	Kawkareik – Mawlamyine – Thaton
A4.5	Thanbyuzayat – Three Pagodas Pass – Kanchanaburi
A5.2	Stillwell Road
A6.1	Battambang – Pailin – Thailand border
A6.8(a)	Thanh Hoa – Lao PDR border
A6.8(b)	Vinh – Lao PDR border
D-13	Phimai – Phnom Rung – Siem Reap
D-15(a)	Vieng Kham – Vieng Thong

Figure M-4: GMS Road Projects: Moderate Priority (**)

Figure M-5: GMS Railway Projects

Legend

B1-1(a)	****	Kunming – Yuxi – Mengzi
B1-1(b)	**	Mengzi – Hekou
B1-2	**	Lao Cai – Yen Vien
B1-3(a)	****	Hanoi – Hai Duong
B1-3(b)	**	Hai Duong – Haiphong
B1-4	****	Yen Vien – Pha Lai – Ha Long – Cai Lan port
B1-5	****	Lao Cai – Yen Vien; Dong Dang – Hanoi (signalling and telecoms)
B1-6	**	Yen Vien – Hanoi
B1-7	**	Hanoi – Saigon
B1-10	***	Phnom Penh – Badeng – Sisophon; Phnom Penh – Sihanoukville
B1-11	***	Sisophon – Poipet – Aranyaprathet
B2-1	**	Tan Ap – Mu Gia
B2-2	**	Mu Gia – Thakhek – Vientiane
B2-3	**	Bouayai Junction – Roi Et – Mukdahan – Nakhon Phanom
B3-2	**	Vientiane - Thanaleng
B3-3	****	Thanaleng – Nong Khai
B4-1	****	Dali – Ruili
B4-2	**	Ruili – Muse – Lashio
B4-3	****	Mandalay – Yangon
B4-4	****	Mawlamyine – Thanbyuzayat
B4-5	**	Thanbyuzayat – Three Pagodas Pass – Nam Tok
B5-4	**	Denchai – Chiang Rai
B6-4	****	Nanning – Kunming
B6-5	****	Dali – Lijiang
B6-6	**	Zhanyi – Liupanshi
B6-7	****	Chengdu – Kunming
B6-9	****	Kyaw – Kalay
B6-10	**	Poipet – Siem Reap
B6-11	**	Saigon – My Tho

Note: **** Committed
*** High Priority
** Moderate Priority

Figure M-5: GMS Railway Projects

Figure M-6: GMS Water Transport Projects

Legend

C1-2	**	Mekong River ports between Vientiane and Savannakhet
C1-3	***	Da Nang port
C1-4	**	Lien Chieu port
C2.1-6	****	Chiang Saen port
C2.2-1	**	Lao Cai-Viet Tri
C2.2.2(a)	**	Hanoi port
C2.2.2(b)	**	Viet Tri port
C2.2.2(c)	**	Hoa Binh port
C2.2.2(d)	**	Ninh Phuc port
C2.2.2(e)	**	Da Phuc port
C2.2.2(f)	**	Bac Giang port
C3.1-1	****	Vung Tau port
C3.1-2	**	Can Tho port
C3.1-3	****	Cai Mep --Thi Vai port
C3.1.4(a)	**	Ho Chi Minh ports
C3.1.4(b)	**	Ca Mau port
C3.1.4(c)	**	Vinh Long port
C3.1.4(d)	**	An Giang port
C3.1.4(e)	**	Dong Thap port
C3.2-1	***	Siem Reap – Phnom Penh and Khone Falls terminal
C3.2-2	**	Tien River channel
C3.2-3	***	Hamluong River floating port
C3.2-4	***	Laem Chabang Phase 2
C3.3-1	**	Van Phong port
C3.4-2	****	Sihanoukville port
C3.5-1	**	New Dawei port
C4-2	**	New port at Kelgoke, Kyaukphyu or Bokpyin
C4-3	****	Ranong port
C4-4	**	Sittwe port
D-21	***	Lancang-Mekong navigation improvement and maintenance

Note: **** Committed
*** High Priority
** Moderate Priority

Figure M-6: GMS Water Transport Projects

Figure M-7: GMS Air Transport Projects

Legend

C1-1	***	Savannakhet Airport
C2.1.1(a)	**	Louang Namtha Airport
C2.1.1(b)	**	Houayxay Airport
C2.1.2	****	New Suvarnabhumi Airport, Bangkok
C2.1.3	***	New Kunming Airport
C2.1.4	****	Manshi Airport
C2.1.5(a)	***	Dali Airport
C2.1.5(b)	**	Lijiang Airport
C2.2.3	****	Wenshan Airport
C3.4-1	****	Sihanoukville Airport
C4-1	****	Nanning Airport
D-5	**	Myitkina Airport
D-7(a)	**	Kawthaung Airport
D-7(b)	**	Myeik Airport
D-8/ D-23(a)	**	Myaung Oo Airport
D-10	**	Udomxai Airport
D-11(a)	**	Rattanakiri Airport
D-11(b)	**	Stung Treng Airport
D-14	***	Guilin Airport
D-15(b)	**	Xam Nua Airport
D-16	**	Luang Prabang Airport
D-17	**	Pakxe Airport

Note: **** Committed
*** High Priority
** Moderate Priority

Figure M-7: GMS Air Transport Projects

Figure M-8: Extra GMS Transport Projects

Legend

Index	Priority	Transport Sub-Sector	Project Name	Location
E-1	**	Road	Phnom Penh Inner Ring Road, including New Monivong Bridge over Bassac River	Cambodia
E-2	**	Road	Phnom Penh Outer Ring Road	Cambodia
E-3	**	Road	New Bassac River Bridge at Prek Ho	Cambodia
E-4	**	Road	Second Mekong Bridge, near Neak Loueng	Cambodia
E-5	**	Water	Fangcheng port improvement project	Guangxi
E-6	**	Water	Beihai port improvement project	Guangxi
E-7	**	Water	Qinzhou port improvement project	Guangxi
E-8	**	Air	Hechi airport improvement project	Guangxi
E-9	**	Railway	Fangcheng-Haiphong railway project	Guangxi and Viet Nam
E-10	**	Road	Houay Kon (Thailand) – Muang Ngeun (Lao PDR) – Hongsa – Mekong Bridge – Luang Prabang	Lao PDR and Thailand
E-11	**	Road	Pak Thapan – Saravan – Route 15 – Lao PDR connect to Highway 49 in Viet Nam	Lao PDR and Viet Nam
E-12	**	Road	Vung Ang Deep Sea Port (Viet Nam) – Road 12 – Thakhek – Mekong Bridge – Nakhon Phanom	Lao PDR, Thailand, Viet Nam
E-13	**	Road	Muse – Mandalay road improvement project	Myanmar
E-14	****	Road	Meiktila – Taunggyi – Loilem road improvement project	Myanmar
E-15	****	Road	Sale – Sittwe road improvement project	Myanmar
E-16	**	Water	Vung Ang port improvement project, including container yard for Viet Nam and Lao PDR	Viet Nam
E-17	**	Air	Wenshan Airport	Yunnan
E-18	**	Air	Tengchong Airport	Yunnan
E-19	**	Air	Red River Airport	Yunnan

Note:
**** Committed
*** High Priority
** Moderate Priority

Figure M-8: Extra GMS Transport Projects

Asian Development Bank

T.A. No. 6195-REG: GMS Transport Sector Strategy Study

FINAL REPORT – VOLUME 3: APPENDICES

PADECO

PADECO CO., LTD.

May 2006

ADB TA 6195-REG: GMS TRANSPORT SECTOR STRATEGY STUDY

Volume 3 of the Final Report: Appendices

Table of Contents

List of Abbreviations and Acronyms

ABVT	Advisory Body for Vocational Training
ACMECS	Ayeyawady-Chao Phraya-Mekong Economic Cooperation
AC	asphalt concrete
ADB	Asian Development Bank
AFD	Agence Francaise de Developpement
AH	Asian Highway
AMTA	Agency for Coordinating Mekong Tourism Activities
APEC	Asia Pacific Economic Cooperation
AR	Autonomous Region
ASAs	air services agreements
ASEAN	Association of Southeast Asian Nations
ATA	Admission Temporaire/Temporary Admission
BIMSTEC	Bay of Bengal Initiative for Multi-sectoral and Technical Cooperation
BKK	Bangkok
BOT	build-operate-transfer
BST	bituminous surface treatment(s)
CAA	Civil Aviation Authority
CAAC	General Administration of Civil Aviation of China
CBTA	Cross-Border Transport Agreement
CIQ	customs-immigration-quarantine
CMLV	Cambodia-Myanmar-Lao PDR-Viet Nam
CMR	Convention on the Contract for the International Carriage of Goods by Road
CP	Capacity-enhancement Project
CPC	Certificate of Professional Competence
CSCMP	Council of Supply Chain Management Professionals
CSWs	commercial sex workers
DFID	Department for International Development (British Government Aid)
DG	Directorate-General
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EIRR	economic internal rate of return
ENPV	economic net present value
ESCAP	Economic Commission for Asia and the Pacific
ETO	Express Transport Organization
EU	European Union
EWEC	East-West Economic Corridor
FF	freight forwarders
FIATA	International Federation of Freight Forwarders Association, FIATA (Fédération Internationale des Associations de Transitaires et Assimilés)
FS	Feasibility Study
FTA	Free Trade Area
GB	gigabytes
GDP	Gross Domestic Product
GF	Growth Factor
GFP	Global Facilitation Partnership
GIS	geographic information system

List of Abbreviations and Acronyms (continued)

GMS	Greater Mekong Subregion
ha	Hectares
HAN	Hanoi
HCMC	Ho Chi Minh City
HIV/AIDS	human immunodeficiency virus/acquired immunodeficiency syndrome
HRD	human resource development
IATA	International Air Transport Association
IBRD	International Bank for Reconstruction and Development
ICD	inland container depot
ICT	information and communications technology
IFI	international financial institution
II	Immediate Implementation
IMF	International Monetary Fund
IRU	International Road Transport Union
IWRDM	Integrated Water Resources Development and Management Strategy
IWT	inland water transport
JBIC	Japan Bank for International Cooperation
JCCCN	Joint Committee on Coordination of Commercial Navigation
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
km	kilometers
KMG	Kunming
kph	kilometers per hour
Lao PDR	Lao People's Democratic Republic
LCV	Lao PDR-Cambodia-Viet Nam
LTWG	Land Transportation Working Group
M&T	monitoring and tracking
MCAT	Mukdahan City Air Terminal
MIS	management information system
MJC	Ministerial Joint Committee
MKOC	Mekong Operations Coordination Division
MKRD	Mekong Department
MOU	memorandum of understanding
MRC	Mekong River Commission
mt	metric ton(ne)(s)
NA	not applicable or not available
NC	New Corridor/Northern Corridor
NDF	Nordic Development Fund
NC	Northern Corridor
NGO	non-governmental organization
NNG	Nanning
No.	number
NR	Route National (Cambodia)
NSEC	North-South Economic Corridor
NSEDP	National Socio-Economic Development Plan
NSL	North-South via Lao PDR Corridor
NTFC	National Transport Facilitation Committee
NWC	Northwestern Corridor

List of Abbreviations and Acronyms (continued)

OAG	Official Airline Guide
ODA	Official Development Assistance
OIE	Office International des Epizooties (World Organization for Animal Health
OSZhD	Committee for the Organization for Cooperation between Railways, based in Warsaw
pa	per annum
PAT	Port Authority of Thailand
pax	passengers
pkm	passenger-kilometers
PNH	Phnom Penh
PRC	People's Republic of China
PSP	private sector participation
RETA	regional technical assistance
RGN	Yangon
RITES	Railway Technical and Economic Services
REG	Regional
RRC	Royal Railway of Cambodia
RS	Ranking Study
SS	Short Sea Shipping Services
SAPI	Special Assistance for Project Implementation
SARS	Severe Acute Respiratory Syndrome
SASEC	South Asia Subregional Economic Cooperation
SCA	Société Concessionnaire de l'Aéroport
SDR	Special Drawing Rights
SEC	Southern Economic Corridor
SE	Southeast
SEDP	Socio-Economic Development Plan
SIDA	Swedish International Development Agency
SKRL	Singapore-Kunming Rail Link
SPS	sanitary and phytosanitary
STIs	sexually transmitted infections
STOM	Senior Transport Officials Meeting
STRADA	System for Travel Demand Analysis
TA	technical assistance
TAP	technical assistance project
TAR	technical assistance report
TEDI	Transport Engineering and Design Incorporated
TIR	Transit International Routier (Customs Transit System)
tkm	ton(ne)-kilometer(s)
TSSS	Transport Sector Strategy Study
UIC	International Union of Railways (Union Internationale des Chemins de Fer)
UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business
UNDP	United Nations Development Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNLY	United Nations Layout Key

List of Abbreviations and Acronyms (continued)

US$	United States dollars
UXO	unexploded ordnance
VITRANSS	Study on the National Transport Development Strategy in the Socialist Republic of Vietnam
VND	Vietnamese dong
VOCs	vehicle operating costs
VTC	voluntary testing and counseling
VTE	Vientiane
WCO	World Customs Organization
WHO	World Health Organization
WTO	World Trade Organization
YGN	Yangon

ADB TA 6195-REG: GMS TRANSPORT SECTOR STRATEGY STUDY

Volume 3 of the Final Report: Appendices

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WTO	World Trade Organization
YGN	Yangon

APPENDIX 1

CONDUCT OF THE STUDY

APPENDIX 1: CONDUCT OF THE STUDY

1. The conduct of the study (up to the Draft Final Report stage) is summarized in Table 1.

Table 1: Summary of the Conduct of the Study

Mission/Activity and Objective	**Country/Region**	**Date(s) (all 2005)**	**Consulting Team Participant(s)**
Fact-Finding Mission: Assessment of GMS Achievements and Outstanding Challenges	Lao PDR	20-23 March	TL
	Cambodia	24-26 March	TL
	Viet Nam	27-29	TL
	Thailand	30 March – 8 April	TL
	PRC (Beijing)	9-11 April	TL, M
Main Missions: Formulation of Strategy for Development of GMS Transport Sector and of Long List of Proposed Interventions and Prioritization Criteria	PRC (Kunming)	12-13 April	TL, PTS, TM
	PRC (Nanning)	14-15 April	TL, PTS, TM
	Lao PDR	17-23 April	TL, PTS, TM
	Viet Nam	25 – 29 April	PTS. TM
		17-20 July	TL
	Myanmar	3-6 May	PTS, TM
	Thailand	4-7 May 20-24 June 16-19 August	TL, PTS, TM IPS
	Cambodia	8-16 May	TL, TM
Preparation of Interim Report	Lao PDR, Thailand, Hong Kong, Japan, Philippines	17 May – 31 July	TL, IPS, ISS, M, PTS, TM
GMS Country Workshops: To Present Interim Report	Myanmar	3 May	TL, PTS
	Cambodia	8 August	TL, PTS
	Lao PDR	10 August	TL, PTS
	PRC (Beijing)	15 August	TL, PTS
	Thailand	17 August	TL, IPS, ISS, PTS
	Viet Nam	23 August	TL, ISS
Prioritization Missions: To Confirm Projects and Interventions included in Draft Long List and Discuss and Develop Projects for the Period 2010-2015	Cambodia	27-31 August	TL, ISS
	Lao PDR	1-4 September	TL ISS
	PRC Yunnan, Guangxi Zhuang AR	5-10 September	TL, ISS, IPS
	Cambodia	18-21 September	IPS
	Lao PDR	22-24 September	IPS
	Viet Nam	25 September – 1 October	IPS
	Myanmar	3 – 9 October	ISS, IPS
	Thailand	19-29 October	TL, IPS

Source: TA Team

2. In addition to the above missions/activities, several other events were participated in by the TA Team and activities undertaken. These missions/activities, again up to the Draft Final Report stage, are shown in Table 2.

Table 2: Other Events and Activities Undertaken by TA Team Members

Event/Activity	Country/Region	Date(s) (all 2005)	Consulting Team Participant(s)
Submission of Inception Report	Lao PDR	20 April	TL, IPS, ISS, M, PTS, TM
9th Subregional Transport Forum: Presentations on Recommendations on Strategic Directions and Objectives for The Sector and on the CBTA	PRC (Beijing)	1-2 June	TL, PTS
Submission of Interim Report	Lao PDR	31 July	TL
Video Conference to Discuss Executive Summary of Interim Report, Sector Strategy and Workshop Findings	Cambodia, PRC, Lao PDR, Viet Nam, Manila	25 August	TL, ISS
Submission of Draft Strategy	Thailand	24 October	IPS

Source: TA Team
Legend: TL – Team Leader/Cargo Transport Specialist
IPS – Investment Program Specialist
ISS – Institutional Strengthening Specialist (Reform and Development Specialist in the TOR)
M – Macroeconomist
PTS – Passenger Transport Specialist
TM – Transport Modeler

3. In addition, a Workshop on the Draft Final Report was held in Ho Chi Minh City, Viet Nam, on 8-9 December 2005, and the Final Meeting on the GMS Transport Sector Strategy Study was held in Vientiane, Lao PDR, on 21 March 2006.

APPENDIX 2

WORKING PAPER 5: TRANSPORT MODEL SPECIFICATION AND TEST OUTPUTS

APPENDIX 2
WORKING PAPER 5: TRANSPORT MODEL SPECIFICATION AND TEST OUTPUTS

TABLE OF CONTENTS

I. Introduction

A. Background

1. The Greater Mekong Subregion (GMS) Program commenced in 1992 with an emphasis on subregional cooperation as an "important element of promoting economic growth and a better life for all" [1]. Further, it was emphasised that "by working together and sharing resources in mutually advantageous ways, participating countries can reduce poverty and ensure sustainable development in the region.€[2]35

2. During the first decade of GMS activities, interventions were focused on ten sectors including the transport sector. In 2002, after extensive consultations amongst GMS countries, the GMS adopted the following strategic thrusts:

- (i) Strengthen infrastructure linkages through a multisectoral approach;
- (ii) Facilitate cross-border trade and investment;
- (iii) Enhance private sector participation and improve its competitiveness;
- (iv) Develop human resources and skill competencies, and
- (v) Protect the environment and promote sustainable use of shared natural resources.[3]

3. The objective of the TA is to:

"develop a vision and strategy to develop a comprehensive Greater Mekong Subregion (GMS) transport network, which will link the GMS countries in an efficient and sustainable manner. The transport network will help realize GMS objectives, particularly to become competitive. The transport network will be established chiefly by developing GMS-wide multimodal transport systems encompassing all current and possible future modes in the GMS: road, rail, inland water, sea, and air.€[4]35

B. Reasons for Transport Modeling

4. The Study TOR requires "analysis of demand-side factors and supply-side constraints affecting the establishment and effectiveness of a GMS transport network." [5]

5. In order to achieve this objective, the TOR requires "modeling of derived demand for transport services based on projected levels of economic activity and trade, particularly along major economic corridors." [6]

6. A transport model is also required to assess the factors affecting the performance of different modes and corridors as multimodal routes. In addition, the transport model has been developed to help rank the attractiveness of different schemes.

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[1] Asian Development Bank, *Building on Success: A Strategic Framework for the Next Ten Years of the Greater Mekong Subregion Economic Cooperation Program*, Preafce, November 2002.
[2] Ibid.
[3] Ibid, p. 20.
[4] TA Terms of Reference, ADB, December 2004.
[5] Ibid.
[6] Ibid.

7. The GMS Transport Model thus constructed considers both demand-side factors (e.g., economic development corridors) and supply-side issues (e.g., current transport costs and constraints on development) on the current network, both in 2004 and for a forecast of 2015. Furthermore, by evaluating the changes (improvements) realised through implementing both "hardware" (infrastructure) and "software" (policy), the relative benefits of each may be assessed, in terms of:

- journey time savings; and
- monetary cost savings of journeys.

8. By multiplying these savings by the amount of demand for each Origin-Destination movement, total cost savings can be estimated for each scheme evaluated in turn. This enables a Social Net Present Value (NPV) to be calculated for each scheme. Such an approach (NPV) has been proposed as the least-biased method to rank the relative importance of different projects, given that the GMS member states are at different levels of infrastructural, social and economic development at present.

9. Having developed and calibrated a 2004 Base Year model, a forecast 2015 model was developed. This took into account expected growth in travel demand as well as committed transport projects. This is termed the 2015 "Do Minimum" model. Schemes are then tested against this "Do Minimum" by coding and running each scheme in turn.

C. Developments Since Working Paper 3

10. Feedback was been obtained on Working Paper 3 and the Interim Report. This was variously on discussions held by the Study Team both on subsequent Country Missions and in correspondence and tele-conferences with various GMS Government Officials and the ADB.

11. Pursuant to this feedback, in parallel with ongoing modeling work, the GMS Transport Model wasbeen revised and developed substantially. These developments are described in detail under the appropriate headings throughout this Working Paper (Appendix). However, key developments included the following.

12. Data collection was completed to enable traffic forecasts and economic analyses to be prepared and presented at the GMS Transport Sector Strategy Study Workshop in Ho Chi Minh City, Viet Nam in December 2005. There were still shortfalls in the data, but as far as possible these were worked around, as described in the appropriate sections of this Working Paper (Appendix).

13. Given requests from a number of GMS Government Officials to make use and possibly further develop aspects of the GMS Transport Model beyond the remit of this technical assistance project, the functionality of the model was strengthened between issuance of Working Paper 3 and of the initial Working Paper 5.

14. Following the Draft Final Report Workshop in Ho Chi Minh City on 8-9 December 2005, a further series of amendments to works and reporting thereof were undertaken. The subsequent technical works undertaken concentrated on updating some model outputs to take account of rapid traffic growth on roads in Cambodia following highway rehabilitation works, and updating some of the air traffic forecasts. In addition, a brief overview of the penetration of different modes by GMS country is also given.

15. In addition, this Working Paper (Appendix) outlines areas where further attention may be required in order to reliably and robustly apply the GMS Transport Model on further studies, such as:

- National transport models;
- Corridor modeling;
- More detailed border modeling; and
- Further development of the GMS Transport Model, in terms of overcoming continued data shortfalls.

16. These aspects are also discussed in more detail in the appropriate sections of this Working Paper.

D. Purpose of this Working Paper (Appendix)

17. This Working Paper sets out:

- the data collected for purposes of constructing the GMS Transport Model;
- the GMS Transport Model's functionality;
- the resultant structure, data inputs and parameters of the GMS Transport Model;
- a summary of model calibration;
- forecast year model data inputs and parameters;
- forecast results;
- specification of GMS Transport Model scheme test inputs and outputs;
- a discussion of the GMS Transport Model's strengths and weaknesses;
- a guide to GMS Transport Model usage; and
- recommendations on how the GMS Transport Model could be further developed, either for GMS as a whole, or to investigate specific countries and/or sectors and/or corridors.

E. General Approach to Transport Modeling

18. In order to fulfil the objectives of the transport modeling, a network assignment model was developed using the JICA STRADA software (System for Traffic Demand Analysis),[1] for the 2004 (Base) year.

19. This 2004 GMS Transport Model was then used as the basis for constructing a GMS Transport Model for 2015 ("Do Minimum" scenario), which in turn was used as the basis of constructing a series of further transport models to enable scheme testing and comparison.

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[1] See http://www.intel-tech.co.jp/strada/stradae.html.

20. The models developed contain data on highway, rail and waterway networks within the GMS. Interchange is possible between these surface transport modes within the network model, so as to enable an evaluation of the potential for inter-modal transportation, both for passengers and especially freight.

21. While an attempt has been made to reflect domestic travel patterns, in accordance with the aims of the study, the focus is on cross-border transport. The networks are of necessity strategic in nature.

22. Air transportation is also considered. However, as air transport characteristics are often different from surface transport and as its mode share as compared to surface modes is usually very small, air transport is being considered in a separate spreadsheet-based model.

23. The approach to transport modeling has been determined with specific reference to the Study TOR and within the constraints of which data were and were not available, as well as the reliability and format of those data which were available. Furthermore, as with any transport modeling exercise, the format of data inputs, behavioral parameters and data outputs need to be consistent with the modeling software and modeling structure employed.

24. The zoning system was developed to be consistent with the network models. The zoning has been defined to allow relatively detailed scheme testing during the latter stages of the transport modeling.

25. The transport model components are described in more detail in the remainder of this Working Paper (Appendix), as well as the model outputs.

F. Structure of this Working Paper (Appendix)

26. The remainder of this Working Paper is structured as follows:

- Chapter II describes the zoning system adopted for this Study.
- Chapter III sets out trip data collected on both passenger and freight transport.
- Chapter IV discusses specific modeling issues regarding the road subsector.
- Chapter V discusses specific modeling issues regarding the rail subsector.
- Chapter VI discusses specific modeling issues regarding the water transport subsector.
- Chapter VII proposes transport model test outputs, for surface transport modes.
- Chapter VIII discusses specific modeling issues regarding the air subsector and also model test outputs for the air subsector.

G. Overview of Transport Networks within the GMS

27. Current transport networks in the GMS are developed to widely differing degrees in different countries. Cross-comparisons can sometimes be difficult owing to different data collection and reporting regimes in different countries. Equally,

differing terrains should also be borne in mind when undertaking such cross-comparisons.

28. These caveats notwithstanding, Table 1-1 presents a comparison of network development between the different countries. Complete data were only available for the PRC.

29. The roads data were obtained from the International Roads Federation (IRF), with the exception of Myanmar, where data were only available from other sources. Comparing these numbers, it would appear that data for Viet Nam contain a substantial proportion of local and/or unpaved roads, given that the Viet Namese total exceeds that of Thailand.

30. Data on other modes (plus road data for Myanmar) were obtained from www.cia.gov/cia/publications/factbook, which provides data for a cross-comparison of sorts between countries. As can be seen, roads provide the most extensive transport networks in the GMS. Railways meanwhile have relatively little penetration. With the exception of Thailand, inland water transport has a larger network than rail in all cases.

Table 1-1: Comparison of Transport Networks in GMS Countries

	Cambodia	**PRC**	**Lao PDR**	**Myanmar**	**Thailand**	**Viet Nam**
Surface Area km^2 (1)	181,040	9,598,010	236,800	676,580	513,120	331,690
Land Area km^2 (2)	176,520	9,326,410	230,800	657,740	511,770	325,360
Population (2)	13,404,000	1,288,400,000	5,659,800	49,362,000	62,014,000	81,314,000
Roads: Comparative Data						
Estimate For Year/From Source	2000/ (1)	2003/ (1)	2002/ (1)	Not specified/ (2)	2000/ (1)	2000/ (1)
Total Length km	12,323	1,809,829	32,620	30,000	57,403	215,628
% Paved	16.20%	79.49%	14.07%	n/a	98.50%	n/a
km Paved	1,996	1,438,633	4,590	n/a	56,542	n/a
km Unpaved	10,327	371,196	28,030	n/a	861	n/a
Network Density: km per km^2	0.070	0.194	0.141	0.046	0.112	0.663
Paved Network Density: km per km^2	0.011	0.154	0.020	n/a	0.110	n/a
Railways (2)						
Total length km	602	71,898	0	3,955	4,071	2,600
Electrified km		18,155				
Standard Gauge km		47,953				178
Narrow Gauge km	602			3,955	4,071	2,169
Dual Gauge km		23,945				253
Network Density: km per km^2	0.003	0.008	0.000	0.006	0.008	0.008
Waterways (2)						
Total Length km	2,400	121,557	4,600	12,800	4,000	17,702
Network Density: km per km^2	0.014	0.013	0.020	0.019	0.008	0.054
Airports (2)						
Total Number	20	472	44	78	109	24
Number with Paved Runway	6	389	9	19	65	23

Data Sources: (1) IRF World Road Statistics 2005: Data 1999 to 2003
(2) www.cia.gov/cia/publications/factbook

II. Study Area Zoning System

A. Introduction

31. The zoning system relates spatial data, including trip origins and destinations to locations within the Study Area. Within the GMS Transport Model, each zone is represented as a single point corresponding to the centroid of that zone.

32. While a finer level of detail in zoning enables more detailed (refined) spatial analysis, there is a trade-off with model usability and constraint may be posed by data availability. Nevertheless, in order to enable the testing and evaluation of a wide array of infrastructural ("hardware") schemes, as well as policy/administration ("software") schemes at a number of locations (e.g., at particular border crossings) in addition to system-wide initiatives, a fairly refined zoning system is required.

33. In addition to allocating zones to different parts of the GMS, within each country a number of Sectors have been defined. These allow for differential economic growth rates (for instance) in different parts of each GMS country.

34. In addition, zones have been allocated to external connections to/from the GMS, as follows:

- Seaports: being key seaports or groups thereof; and
- External land connections: with Malaysia, Bangladesh, India and non-GMS Provinces of the People's Republic of China.

35. The zoning system and definitions for the various GMS countries are set out in this Chapter.

36. The locations of all zones with reference to the transport network model are shown in Annex Three, following description of the GMS Transport Model network model.

B. Zoning System

1. Zoning Within GMS

37. Zones were allocated within the GMS either by province/state/division, group of provinces, or sub-divisions of areas within provinces/states/divisions.

38. Within Lao PDR, zoning was based on Provinces, with 17 zones allocated.

39. Within Viet Nam, zoning was based on Provinces, with some aggregated; 49 zones were allocated to Viet Nam.

40. Within Cambodia, zoning was based on Provinces, with 24 zones allocated.

41. Within Thailand, zoning was based on Provinces, with some aggregated; 56 zones were allocated to Thailand.

42. Within Myanmar, zoning was based on States/Divisions, with some sub-divided to enable better spatial coverage within the Transport Model; 40 zones were allocated to Myanmar.

43. Within the PRC (Yunnan/Guangxi), zoning was based on city administrative districts (i.e., one level beneath provincial organization); 30 zones were allocated to Yunnan and Guangxi.

44. The zoning system covering the 216 zones within GMS (excluding seaports) is given in Table 2-1.

Table 2-1: Study Area Zones within GMS (excluding Seaports)

Zone	Country	Sector	Province/District/State/City
1	Lao PDR	Central	Vientiane Municipality
2	Lao PDR	North	Phongsali
3	Lao PDR	North	Louang Nam Tha
4	Lao PDR	North	Udom Xai
5	Lao PDR	North	Bokeo
6	Lao PDR	North	Louang Prabang
7	Lao PDR	North	Houa Phan
8	Lao PDR	Central	Xayaboury
9	Lao PDR	Central	Vientiane Province
10	Lao PDR	Central	Bolikhamxai
11	Lao PDR	South	Khammouane
12	Lao PDR	South	Savannakhet
13	Lao PDR	South	Salavan
14	Lao PDR	South	Sekong
15	Lao PDR	South	Champasak
16	Lao PDR	South	Attapeu
17	Lao PDR	Central	Xaysomboune, Xieng Khouang
18	Viet Nam	North	Hanoi
19	Viet Nam	North	Thai Nguyen
20	Viet Nam	North	Bac Kan, Cao Bang
21	Viet Nam	North	Lang Son
22	Viet Nam	North	Bac Giang, Bac Ninh
23	Viet Nam	North	Quang Ninh
24	Viet Nam	North	Hai Phong, Hai Duong
25	Viet Nam	North	Thai Binh, Hung Yen
26	Viet Nam	North	Nam Dinh, Ninh Binh
27	Viet Nam	North	Ha Nam, Ha Tay
28	Viet Nam	North	Phu Tho, Vinh Thuc
29	Viet Nam	North	Tuyen Quang
30	Viet Nam	North	Ha Giang
31	Viet Nam	North	Yen Bai
32	Viet Nam	North	Lao Cai
33	Viet Nam	North	Lai Chau
34	Viet Nam	North	Son La
35	Viet Nam	North	Hoa Binh
36	Viet Nam	North	Thanh Hoa
37	Viet Nam	Central	Nghe An
38	Viet Nam	Central	Ha Tinh
39	Viet Nam	Central	Quang Binh
40	Viet Nam	Central	Quang Tri
41	Viet Nam	Central	Tha Thienh Hue
42	Viet Nam	Central	Da Nang
43	Viet Nam	Central	Quang Nam
44	Viet Nam	Central	Quang Ngai
45	Viet Nam	Central	Kon Tum
46	Viet Nam	Central	Gia Lai
47	Viet Nam	Central	Binh Dinh
48	Viet Nam	Central	Phu Yen

Table 2-1: Study Area Zones within GMS (excluding Seaports) (continued)

Zone	Country	Sector	Province/District/State/City
49	Viet Nam	Central	Dak Lak
50	Viet Nam	Central	Khanh Hoa
51	Viet Nam	Central	Ninh Thuan
52	Viet Nam	Central	Lam Dong
53	Viet Nam	South	Binh Thuan
54	Viet Nam	South	Binh Phuoc
55	Viet Nam	South	Dong Nai
56	Viet Nam	South	Ba Ria Ving Tau
57	Viet Nam	South	Binh Duong
58	Viet Nam	South	Tay Ninh
59	Viet Nam	South	TP HCM
60	Viet Nam	South	Long An
61	Viet Nam	South	Tien Giang, Ben Tre
62	Viet Nam	South	Vinh Long, Tra Vinh
63	Viet Nam	South	Dong Thap
64	Viet Nam	South	An Giang
65	Viet Nam	South	Can Tho, Soc Trang, Bac Lieu
66	Viet Nam	South	Kien Giang, Ca Mau
67	Cambodia	South	Phnom Penh
68	Cambodia	South	Svay Rieng
69	Cambodia	South	Prey Veng
70	Cambodia	South	Kandal
71	Cambodia	South	Takeo
72	Cambodia	South	Kep
73	Cambodia	South	Kampot
74	Cambodia	South	Krong Preah Sihanouk
75	Cambodia	South	Koh Kong
76	Cambodia	South	Kampong Speu
77	Cambodia	West	Kampong Chhnang
78	Cambodia	West	Pursat
79	Cambodia	West	Battambang
80	Cambodia	West	Pailin
81	Cambodia	West	Banteay Meanchey
82	Cambodia	West	Oddar Meanchey
83	Cambodia	West	Siemreap
84	Cambodia	West	Preah Vihear
85	Cambodia	East	Stung Treng
86	Cambodia	East	Rattana Kiri
87	Cambodia	East	Mondul Kiri
88	Cambodia	East	Kratie
89	Cambodia	West	Kampong Thom
90	Cambodia	East	Kampong Cham
91	Thailand	Central	Bangkok
92	Thailand	Central	Ang Thong, Sing Buri, Suphanburi
93	Thailand	Central	Ayutthaya, Nonthaburi, Pathum Thani
94	Thailand	Central	Chainat
95	Thailand	Central	Kanchanaburi
96	Thailand	Central	Lopburi
97	Thailand	Central	Nakhon Nayok, Saraburi
98	Thailand	Central	Nakhon Pathom, Ratchaburi
99	Thailand	Central	Phetchaburi, Samut Sakhon, Samut Songkhram
100	Thailand	Central	Samut Prakan
101	Thailand	South	Prachuap Khiri Khan
102	Thailand	East	Chachoengsao, Prachinburi
103	Thailand	East	Chonburi

Table 2-1: Study Area Zones within GMS (excluding Seaports) (continued)

Zone	Country	Sector	Province/District/State/City
104	Thailand	East	Rayong
105	Thailand	East	Chanthaburi
106	Thailand	East	Trat
107	Thailand	East	Sa Kaeo
108	Thailand	South	Chumphon
109	Thailand	South	Ranong
110	Thailand	South	Surat Thani
111	Thailand	South	Phuket, Phang Nga
112	Thailand	South	Krabi
113	Thailand	South	Nakhon Si Thammarat
114	Thailand	South	Trang
115	Thailand	South	Phattalung
116	Thailand	South	Satun, Songkhla
117	Thailand	South	Narathiwat, Pattani, Yala
118	Thailand	Northeast	Nakhon Ratchasima
119	Thailand	Northeast	Buriram
120	Thailand	Northeast	Surin
121	Thailand	Northeast	Sisaket
122	Thailand	Northeast	Ubon Ratchathani
123	Thailand	Northeast	Chaiyaphum
124	Thailand	Northeast	Khon Kaen, Maha Sarakham
125	Thailand	Northeast	Roi Et, Yasothon
126	Thailand	Northeast	Amnat Charoen
127	Thailand	Northeast	Mukdahan
128	Thailand	Northeast	Kalasin
129	Thailand	Northeast	Loei, Nongbua Lamphu
130	Thailand	Northeast	Udon Thani
131	Thailand	Northeast	Nong Khai
132	Thailand	Northeast	Sakon Nakhon
133	Thailand	Northeast	Nakhon Phanom
134	Thailand	Central	Nakhon Sawan, Uthai Thani
135	Thailand	North	Kamphaeng Phet
136	Thailand	North	Tak
137	Thailand	North	Phichit
138	Thailand	North	Phetchabun
139	Thailand	North	Phitsanulok, Sukhothai
140	Thailand	North	Phrae, Uttaradit
141	Thailand	North	Nan
142	Thailand	North	Phayao
143	Thailand	North	Lampang, Lamphun
144	Thailand	North	Chiang Mai
145	Thailand	North	Mae Hong Son
146	Thailand	North	Chiang Rai
147	Myanmar	Central	Yangon (West)
148	Myanmar	Central	Yangon (East)
149	Myanmar	Central	Ayeyawady (North): Myanaung
150	Myanmar	Central	Ayeyawady (Central): Hinthada
151	Myanmar	Central	Ayeyawady (West): Pathein
152	Myanmar	Central	Ayeyawady (East): Nyaungdoun
153	Myanmar	Central	Bago (West)
154	Myanmar	Central	Bago (East)
155	Myanmar	South	Kayin
156	Myanmar	East	Kayah
157	Myanmar	South	Mon (North)
158	Myanmar	South	Mon (South)

Table 2-1: Study Area Zones within GMS (excluding Seaports) (continued)

Zone	Country	Sector	Province/District/State/City
159	Myanmar	South	Tanintharyi (North)
160	Myanmar	South	Tanintharyi (Central)
161	Myanmar	South	Tanintharyi (South)
162	Myanmar	West	Rakhine (West)
163	Myanmar	West	Rakhine (North)
164	Myanmar	West	Rakhine (South)
165	Myanmar	West	Chin
166	Myanmar	Central	Magway (SW): Magway
167	Myanmar	Central	Magway (South): Myede
168	Myanmar	Central	Magway (SE): Taungdwingyi
169	Myanmar	Central	Magway (Central): Chauk
170	Myanmar	Central	Magway (NE): Pakokku
171	Myanmar	Central	Magway (NW): Gangaw
172	Myanmar	North	Mandalay (Central): Mandalay
173	Myanmar	North	Mandalay (South): Meiktila
174	Myanmar	North	Mandalay (NE): Mogok
175	Myanmar	North	Mandalay (West): Myaung-U
176	Myanmar	North	Mandalay (Far South): Pyinmana
177	Myanmar	East	Shan (North)
178	Myanmar	East	Shan (West)
179	Myanmar	East	Shan (East)
180	Myanmar	East	Shan (South)
181	Myanmar	North	Sagaing (Central)
182	Myanmar	North	Sagaing (North)
183	Myanmar	North	Sagaing (South)
184	Myanmar	North	Kachin (Central)
185	Myanmar	North	Kachin (North)
186	Myanmar	North	Kachin (South)
187	Yunnan (PRC)	Central	Kunming
188	Yunnan (PRC)	Central	Chuxiong
189	Yunnan (PRC)	West	Liqiang
190	Yunnan (PRC)	West	Diqing
191	Yunnan (PRC)	West	Nujiang
192	Yunnan (PRC)	West	Dali
193	Yunnan (PRC)	West	Baoshan
194	Yunnan (PRC)	West	Lincang
195	Yunnan (PRC)	West	Simao
196	Yunnan (PRC)	West	Xishuangbanna
197	Yunnan (PRC)	Central	Honghe
198	Yunnan (PRC)	Central	Yuxi
199	Yunnan (PRC)	East	Wenshan
200	Yunnan (PRC)	East	Qujing
201	Yunnan (PRC)	East	Zhaotong
202	Yunnan (PRC)	West	Dehong
203	Guangxi (PRC)	South	Nanning
204	Guangxi (PRC)	South	Chongzuo
205	Guangxi (PRC)	South	Fangchenggang
206	Guangxi (PRC)	South	Qinzhou
207	Guangxi (PRC)	South	Beihai
208	Guangxi (PRC)	West	Bose
209	Guangxi (PRC)	West	Hechi
210	Guangxi (PRC)	West	Liuzhou
211	Guangxi (PRC)	East	Guilin
212	Guangxi (PRC)	East	Hezhou
213	Guangxi (PRC)	East	Wuzhou

Table 2-1: Study Area Zones within GMS (excluding Seaports) (continued)

Zone	Country	Sector	Province/District/State/City
214	Guangxi (PRC)	East	Laibin
215	Guangxi (PRC)	East	Guigang
216	Guangxi (PRC)	East	Yulin

2. Seaports

45. In addition to the internal zones outlined above, key seaports (or clusters thereof) were also defined. In the cases of Viet Nam and Thailand, these were also grouped by area of country. These are set out in Table 2-2.

Table 2-2: Seaport Zones

Zone	Country	Sector	Main Seaports in Group
217	Viet Nam	North	Quang Ninh
218	Viet Nam	North	Haiphong
219	Viet Nam	Central	Thanh Hoa
220	Viet Nam	Central	Vinh/Nghe Tinh
221	Viet Nam	Central	Vung Ang
222	Viet Nam	Central	Quang Binh
223	Viet Nam	Central	Thuan An
224	Viet Nam	Central	Da Nang
225	Viet Nam	Central	Qui Nhon
226	Viet Nam	Central	Nha Trang
227	Viet Nam	South	Vung Tau
228	Viet Nam	South	Bien Hoa/Dong Nai
229	Viet Nam	South	HCMC
230	Viet Nam	South	My Tho
231	Viet Nam	South	Dong Thap
232	Viet Nam	South	Vinh Long
233	Viet Nam	South	Can Tho
234	Viet Nam	South	Long Xuyen/My Thoi
235	Cambodia		Phnom Penh
236	Cambodia		Sihanoukville/Koh Kong
237	Thailand	Central	Map Ta Put
238	Thailand	Central	Laem Chabang
239	Thailand	Central	Bangkok
240	Thailand	South	Songkhla
241	Thailand	South	Phuket
242	Myanmar		Yangon
243	Myanmar		Sittwe
244	Guangxi (PRC)		Beihai
245	Guangxi (PRC)		Qinzhou
246	Guangxi (PRC)		Fangchenggang

3. External Land Connections

46. External zones are used to connect the GMS network with external areas. These comprise road connections between Myanmar and India and Bangladesh, between Guangxi/Yunnan and the rest of PRC, and between Thailand and Malaysia. These comprise connections by highway in all cases, as well as rail linkages between Thailand and Malaysia and between Yunnan/Guangxi and the rest of PRC. There are no rail connections between the GMS and India or Bangladesh.

47. Air transport is considered separately from surface transport. Likewise, external air connexions are handled separately. See Chapter VII of this Working Paper for further details.

48. Zones representing external land connections are shown in Table 2-3.

Table 2-3: Zones Representing External (Land) Connections

Zone	From (GMS)	To (ex-GMS)
217	Thailand	Malaysia
218	Myanmar	Bangladesh
219	Myanmar	India
220	Yunnan (PRC)	Tibet (PRC)
221	Yunnan (PRC)	Sichuan (PRC)
222	Yunnan and Guangxi (PRC)	Guizhou (PRC)
223	Guangxi (PRC)	Hunan (PRC)
224	Guangxi (PRC)	Guangdong (PRC)

III. Trip Data

A. Introduction

49. Trip data collected include the following:

- traffic count data on highways;
- traffic volume data on railways;
- traffic volume data on waterways, either on waterway sections ("links") or at ports;
- border crossing data, including seaport data and customs data;
- origin-destination survey data, including passenger and freight origin-destination matrices by mode and country (where available); and
- rail network passenger-kilometre and/or tonne-kilometer data.

50. Data were gathered from previous reports, databases and from information provided by various agencies during and subsequent to the Country Visits.

51. These data were in a number of formats and pertained to a number of years. A series of data reconciliations were therefore required.

B. Broad Approach to Reconciliation of Data from Different Sources

52. In order to be able to use data obtained from a number of different sources, which were often in different formats and for different years, these data needed to be reconciled with one another, both in terms of format and year. Ensuring consistency and compatibility of data between different sources was thus a prime concern.

1. Preferred Data Sources

53. Given that a wide variety of data were obtained, decisions were required as to which data to use, which data to not use and which data to factor before use, to ensure consistency.

54. While there were significant gaps in some of the data (see below), in other instances there were numerous data available for a given point (e.g., multiple traffic counts from different sources for a given link, or multiple records available on a given border crossing).

55. In general there were no "preferred" data sources per se. However, where a broad, potentially consistent data set was available, data there from were in general used in preference to partial data covering the same area. As such, the Asian Highway Database, augmented at a number of points by the ASEAN Highway Database[1], formed the primary data set for traffic counts across the GMS.

[1] Traffic counts in the ASEAN Highway Database included the same data as in the Asian Highway Database, plus data on a number of other routes, typically those Asian Highways with three-digit names.

56. However, in PRC no traffic count data were available in the Asian Highway Database and was excluded from the ASEAN Highway Database (PRC not being a member of ASEAN).

57. Other “rules of thumb” when selecting data included:

- More recent data were in general chosen over older data.

- For cross-border data, where one country typically had fuller data on its crossing (and/or data perceived as being more reliable), these were given a greater weight than data from countries where data in general seemed sketchier.

- Data on passengers and tonnes (or on vehicles) were in general preferred to data on value of imports/exports (also at border crossings).

- Explicit data were preferred to implicit data: so link-specific data were preferred to system-wide statistics from which certain link-specific counts might be inferred, in the case of domestic (non-cross-border) data; and, data specific to a border crossing were preferred to data pertaining to a series of border crossings from which specific border volumes might be estimated (e.g., total trade flows between two countries, without explicit disaggregation by border post).

58. However, in many instances data had to be reconciled with a certain amount of judgement. Such decisions were taken on the basis of GMS-wide consistency. As a consequence, the assumptions at a particular count site (or border crossing) might be disputed and might need revision should these data be applied to smaller area models (e.g., for a specific corridor, a particular border, or for a national or sub-national model).

2. Impacts of Missing, Incomplete, and Out-of-Date Data

59. Although a substantial volume of observed data were obtained, there were a number of instances where there were shortfalls in data. These included:

60. Instances where count data were not available. For example, Guangxi Zhuang Autonomous Region did not have traffic count data available. A few data could be gleaned from previous ADB Reports. Cross-border data were taken from Viet Nam (and previous reports).

61. In a number of instances, data were incomplete. For example, there was in general a dearth of cross-border passenger data.

62. Often cross-border freight data were in monetary format, sometimes with and at other times without indication of commodities or other methods of estimating tonnages. However, given the broad scope of this transport model, as well as constraints of project timing and often a lack of supporting, consistent data across the GMS, commodity-based modeling was not possible. Hence, case-by-case estimates of tonnages from monetary values were required in a number of instances. Once again, the assumptions made where appropriate to the pan-GMS nature of this model and might require further revision should more detailed modeling be undertaken subsequently on smaller areas.

63. Many data were from years earlier than 2004. The growthing of data to 2004 is discussed in the next sub-section. In most instances, growing data by a few years is not perceived as a significant problem. However, in other instances, much of the available count data were several years old.

64. This raises potential problems in that over a period of several years, it is quite likely that overall traffic patterns change, such that simple growth factoring of traffic counts might give a distorted estimate of existing traffic patterns. Specific concerns are:

- Cambodia: Aside from Asian Highway Database and ASEAN Highway Database data, the three other highway counts dated from 1997. In the case of Cambodia, where road rehabilitations have been ongoing, it was understood that traffic patterns have been evolving rapidly. As a road is rehabilitated, traffic volumes can surge. This was commented by a number of Government Officials and Foreign Experts in Cambodia. JICA were in the process of updating Cambodian traffic count data in parallel with the main works under this TA and their team also commented to this effect. However, unfortunately their latest traffic count data were not released in time for inclusion into the main GMS Transport Model. Traffic count data were however released to the Study Team in early 2006 and following discussions with the ADB, it was decided to update evaluations of Cambodian projects based on a growth factoring of GMS Transport Model output flows. It is however recommended that the GMS Transport Model be fully updated at an early opportunity to enable better treatment of Cambodia; this is discussed further in Section VII.E, 2 of the Report.

- PRC (Guangxi): Of the two traffic counts available in Guangxi, the one on NH322 (the road between Nanning and Friendship Pass) dated from 2000 and was also for total Medium Truck Equivalents only[1]. Thus recent changes in cross-border travel and its impacts on connecting roads might not be accurately reflected.

- Lao PDR: Aside from the 14 traffic counts available in the Asian Highway Database, the remaining 13 traffic counts used dated from 2000. While reckoned to be relatively reliable, updating these data with more recent traffic counts would increase the confidence in the GMS Transport Model's performance.

- Myanmar: Aside from Asian Highway Database and ASEAN Highway Database data, plus one traffic count on the Yangon-Bago-Mandalay Road (at Taukkyan), the remaining highway traffic count data were from 1993.

65. In some instances, there was also the danger of compounding errors, where for instance partial or vague data were also old.[2]

[1] This second data point came from the Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of China for the Guangxi Roads Development Project (ADB, September 2001). There were in fact flows given on four sections of this highway, but only one was used, due to (i) the zoning system employed; and, (ii) so as not to conflict with more recent cross-border data from Viet Nam at the border itself. These data in Medium Truck Equivalents can be readily converted into Passenger Car Units. However, from there the conversion to vehicles (by type) is based on arbitrary assumptions.
[2] E.g., in Guangxi (PRC).

66. The above concerns notwithstanding, it is still deemed preferable to have partial, estimated, and/or out-of-date traffic data rather than no traffic data. This is due to the fact that in most instances, reliable trip matrices did not exist, so any estimates of prior trip matrices would need updating using matrix estimation techniques (see Section VII.B.6).

67. Originally, it was intended to model containerised and bulk freight transport separately. Some seaport data differentiated between containerised and bulk transport, but such was not the case at all seaports. Similarly, data elsewhere differentiating between bulk and containerised freight were very scarce. Even data classifying commodity types (from which estimates of bulk and containerised transport might be made) were scarce. As such, it was simply not possible to distinguish between bulk and containerised freight, as originally intended.

68. For similar reasons, it was not possible to model freight on a commodity-type basis. Moreover, even if such data were available, it would not be practical to model commodities by too many categories across the area of the size of the GMS.

69. As a general recommendation, should the GMS Transport Model be used as the starting point to develop more detailed national or corridor models, then differentiating between bulk and containerised freight might be considered, if suitably detailed data could be obtained. Likewise, if data were available across a sufficient area on commodity types, then commodity type-based modeling might become feasible.

3. Data Growthing to 2004 Base Year

70. 2004 was chosen as the Base Year for transport modeling, being the last full year completed for data collection. However, in a number of instances count data were for earlier years and had to be growthed up to 2004.

71. In a number of instances, data sets with overlapping counts were available from different years. This made it possible to estimate traffic growth over the intervening period by mode and country. This also provided a basis on which to extrapolate traffic counts to 2004, when no 2004 traffic count data could be used for reference.

72. In most instances it was implicitly assumed that there were no major road upgradings (or deterioration), which would affect traffic patterns. As stated above, in the case of Cambodia where many roads are in the process of being rehabilitated, or have been rehabilitated in recent years, this assumption is not wholly accurate and may affect the robustness of traffic “counts” assumed. However, this assumption had to be made in the absence of any firm post-rehabilitation data being received at the time of GMS Transport Model calibration.

73. In Myanmar, a number of vehicular cross-river ferries had been replaced with bridges since 1993. On a few of these sites, count data were available for both 1993 and 2002. By comparing the traffic growth at these sites with the overall traffic growth elsewhere for which 1993 and 2002 data were available, an overall additional traffic growth rate could be estimated resulting from bridge construction. This additional factor was then applied to those sites with 1993 but no 2002 data where a ferry had been replaced with a bridge. While such estimates are unlikely to be wholly accurate on a case-by-case basis, this approach was the only feasible method to make use of earlier traffic count data.

4. Logical Consistency of Data and Implications of Zoning

74. The GMS Transport Model is strategic in nature. It was neither feasible nor desirable to adopt a particularly fine level of zoning detail. As such, in countries with substantial availability of traffic count data (most notably Thailand and Viet Nam), sometimes more traffic count data were available than could be reliably used within the model.

75. For example, where there were multiple traffic count sites on a single link within the GMS Transport Model, only a single traffic count could be taken. And where there were traffic counts on a series of links, with no major interchanges or zones in between, then typically a single traffic count would be taken. This was true for road, rail and water counts.

76. In particular, on links near to a major urban center, much of the traffic counted would likely be intra-urban, short distance traffic which would be within a single zone in terms of the GMS Transport Model. In such instances, traffic counts were either excluded or, in some cases, were factored down to remove distortions to inter-urban traffic levels resulting from matrix estimation trying to fit traffic to these counts. This was true in particular around Greater Bangkok (including the Eastern seaboard around Laem Chabang). Such factoring-down was an iterative process undertaken during model calibration/matrix estimation (see Section VII.B).

77. In some cases domestic traffic counts near to borders were excluded from analysis: where there was no zone between the last domestic site and the border. This was to ensure the integrity of the GMS Transport Model in handling cross-border data as accurately as possible.

78. The above assumptions and exclusions were consistent with the objectives of developing a pan-GMS transport demand model, with an emphasis on cross-border traffic. If applying the GMS Transport Model to specific corridors/borders/countries, then it might be recommended to insert additional zones to enable better treatment of domestic traffic near to border areas without compromising the accuracy of cross-border movements. However, this should be done on a case-by-case basis taking into account both the objectives of any such subsequent modeling exercise, as well as data availability (and quality), to ensure that any such changes do not compromise overall model performance.

5. Directionality of Traffic Counts

79. Some count data obtained differentiated volumes by direction, while others did not (i.e., a two-way total only was given). Given that STRADA allows modeling based on two-way flows, most traffic count data (including rail and water) were simply handled as two-way counts. Matrix estimation thus worked on the basis of such two-way counts in most instances (see Section VII.B.6).

80. Within trip matrices, it was assumed that passenger transport was symmetric. That is, the number of passengers (and hence passenger vehicles) travelling from Origin I to Destination J would equal the number of passengers (and passenger vehicles) travelling from Origin J to Destination I.

81. Given that commodity flows are predominantly directional, freight (and goods vehicle) matrices did not assume symmetry.

82. In addition, at borders and at seaports, freight movements were coded directionally. Hence, during matrix estimation directionality was ensured in the freight matrices (see Section VII.B.6).

6. Final Format of Count Data

83. The format of data needed to be consistent with the categories used within the trip matrices and the STRADA assignment model. Given that STRADA inputs matrices in terms of passengers (or tonnes).

84. The initial categorizations being as follows:

- Motorcycle passengers;
- Car passengers;
- Bus passengers;
- Rail passengers;
- Waterway passengers;
- Road freight (tonnes);
- Rail freight (tonnes); and
- Waterway freight (tonnes).

85. When STRADA assigns matrices, passengers/tonnes are converted first into equivalent vehicles, using average occupancy factors (one per matrix) and thence into PCUs (passenger car units; or equivalent small cars in terms of the vehicles' average congestion impact).

86. Therefore, in tandem with converting count data into passengers/tonnes, these were also converted into equivalent vehicles, corresponding with the eight travel types specified above. This required a “standard” vehicle to be defined for each of the eight transport types above.

87. Given that rail- and water-based transport were able to use road links for access and/or egress, vehicles for rail and water-based transport corresponded to road-based definitions. (Traffic counts on roads could contain road-based transport as well as road access/egress legs of rail and/or water-based trips.)

88. However, in estimating what these “standard” vehicle sizes should be, there were relatively little data available on occupancies (for passenger vehicles) or load factors (for goods vehicles). There was also the issue of the anomalous usage of pick-ups in different parts of the GMS, variously as a form of private car (for passenger transport) as well as a form of light goods vehicle.

6.1 Standard Goods Vehicles

89. In order to estimate average load factors for goods vehicles, average loads for the “standard” goods vehicle were estimated based on the split between pick-ups, rigid trucks and trailer vehicles. This analysis was based on all the traffic counts retained for use in model calibration/matrix estimation.

90. The assumed loads also take account of empty running of approximately half of goods vehicles on return legs of journeys (for cross-border journeys this figure may be higher). On this basis, pick-ups were assumed to have an average load of 0.3 MT per vehicle; rigid trucks of 7 MT per vehicles; and, trailers of 15 MT per vehicle.

91. In addition, the “standard” goods vehicles had to reconcile different PCU factors: taken to be 1 for pick-ups; 1.5 for rigid trucks; and, 3 for trailers.

92. On the basis of this analysis, an overall average of 6.2 MT per vehicle, corresponding to 3.46 MT per PCU was obtained. Freight counts were thus converted into “standard” goods vehicles based on these figures.

6.2 Standard Passenger Vehicles

93. Standard passenger vehicles were defined in three categories, namely:

- Motorcycles: assigned to road only, with a PCU factor of 0.3 and assumed average occupancy of 1.5.

- Cars: assigned to road only, with a PCU factor of 1.0 and assumed occupancy of 2.5.

- Buses: with a PCU factor of 2 and assumed occupancy of 30, which also takes account of a proportion of pick-ups being used for passenger transport.

94. Just as tonnages on rail and water were converted into equivalent standard goods vehicles, passenger flows on rail and water were converted into equivalent standard buses. Hence it is assumed that road access and egress legs of rail- and water-based passenger journeys are undertaken by bus. Given that the GMS Transport Model handles longer-distance traffic this is deemed a reasonable simplification; short-distance local access and egress legs (e.g within a city to/from railway stations) would not be expected to be modeled accurately within a strategic model such as this.

C. Summary of Traffic Count Data Used

95. As stated in III.B.5, passenger counts were two-way and symmetrical, while freight data were not. This required border crossings and seaport counts to be coded as two separate entries: one in each direction. While seaport passenger volumes were specified as naught, border crossing passenger volumes were entered separately in each direction, but with the same number in either direction.

96. Based on this approach (two-way counts being one site and one-way counts being two separate sites for a given location), a total of 659 count “sites” were employed. These comprised some 363 two-way counts and 302 one-way counts (i.e., 151 pairs of counts).

97. The count data used, together with a comparison with modeled volumes, is presented in Annex Four. However, count locations are summarized below:

1. Cross-Border Data

98. Cross-border traffic counts are summarized by border. The place names used are not to be inferred as definitive and in some instances a number of smaller border

crossings, which could not accurately be modeled separately are combined with nearby crossings.

1.1 Myanmar – Thailand

99. 5 sites (coded as 10 one-way counts):

- Kawthaung – Ranong;
- Three Pagodas Pass;
- Myawaddy – Mae Sot;
- Ponpartyin – Pungpakyem; and
- Tachilek – Mae Sai.

1.2 Myanmar – Lao PDR

100. No official border crossings currently operate, hence no count data were available or included on this border.

1.3 Myanmar – PRC

101. Based on data availability and network model definition, 6 border links were coded, combining some border posts for the purposes of this model (12 one-way counts):

- Wan Kong – Daluo;
- Mang'a – Mengma;
- Hopang – Mengding;
- Kyugok – Wanding;
- Muse – Ruili; and
- Lwejel – Zhangfeng.

1.4 Myanmar – Bangladesh

102. One border coded (2 one-way counts):

- Maungtaw.

1.5 Myanmar – India

103. One border coded (2 one-way counts):

- Tamu.

1.6 PRC – Lao PDR (including PRC to Mekong)

104. Two borders coded (4 one-way counts):

- Mohan – Boten; and
- Jinghong – Mekong.

1.7 PRC – Viet Nam

105. Nine border crossings coded (18 one-way counts), with some aggregation of smaller border posts:

- Jinping – Nam Cun;
- Hekou – Lao Cai (road);
- Hekou – Lao Cai (rail);
- Lao Shan – ThanhThu;
- Pingxiang/Friendship Pass (road);
- Pingxiang/Friendship Pass (rail);
- Dongxing – Mong Cai, Quang Ninh;
- Shiukou – Ta Lung, Cao Bang; and
- Longbang – Tra Linh, Cao Bang.

1.8 Thailand – Lao PDR

106. A total of seven border crossings were coded (14 one-way counts):

- Chiang Khong – Houayxay;
- Huai Kon – Muang Ngeun;
- Mao Nam Heung – Kenthao;
- Nong Khai – Vientiane (Friendship Bridge);
- Nakhon Phanom – Thakhek;
- Mukdahan – Savannakhet; and
- Chong Mek – Wang Tao.

1.9 Thailand – Cambodia

107. A total of seven border crossings were coded (14 one-way counts):

- Prasat Khao Phra – north of Chaom Khsan;
- Chong Phra Phlai – north of Phumi Roessi;
- Chong Chom – north of Samraong;

- Chong Sangam – north of Phumi Ampi;
- Aranyaprathet – Poipet;
- Pailin; and
- Ban Hat Lek – Krong Kaoh Kong.

1.10 Thailand – Malaysia

108. Given the distance from the Malaysian border to the rest of the GMS, and data availability, a single set of counts (one in either direction) was used at this border. This was deemed sufficient for the purposes of the GMS Transport Model.

1.11 Thailand – Mekong River

109. Data on two Mekong River ports were used (four one-way counts), namely:

- Chiang Saen; and
- Chiang Khong.

1.12 Viet Nam – Lao PDR

110. Data on eight border posts were used (16 one-way counts), namely:

- Lao Bao – Dan Savan;
- Mu Dia – Lang Khan;
- Cau Treo – Nam Phao;
- Nam Kanh;
- Na Meo;
- Southwest of Moc Chau – Panang;
- Dien Bien Phu – Taichang; and
- Bo Y – Ban Het.

1.13 Viet Nam – Cambodia

111. Data on eight border crossings were used (24 one-way counts), namely:

- Thang Duc – Ovadouy;
- Dak But So – southeast of Phumi Dak Dam;
- Quang Truc – Phumi Dak Dam;
- Thanh Hoa – south of Kaev Sima;
- Loc Ninh – southeast of Snuol;

- Xa Mat – Ponhaea Kraek;
- Moc Bai;
- An Phu (north of Chau Doc) – Kandal Province;
- Nha Bang (southwest of Chau Doc) – Takeo Province;
- Ha Tien – south of Kompong Trach;
- Mekong River; and
- Bassac River.

1.14 Lao PDR – Cambodia

112. Two border crossings were coded (4 one-way counts), namely:

- Voeun Kham – Dong Crorior; and
- Mekong River.

2. Seaports

113. In addition to the border crossings outlined above, count data (freight only) were coded at the seaport groups, as specified in Table 2-2. This served to ensure that export and import estimates were maintained through matrix estimation and model calibration (being effectively trip-end constraints).

114. There being a total of 30 seaports (or clusters thereof), a total of 60 one-way counts were employed at seaports.

3. Domestic Road Traffic Counts

115. A total of some 248 domestic road traffic counts were used. These were all two-way traffic counts. As stated above, these counts implicitly include road access and egress legs of rail- and water-based trips.

116. The locations given in Tables in this sub-section are indicative and do not necessarily correspond with formal count station names. The source specified refers to where count data are taken from prior to growthing, where this was required to obtain 2004 flow estimates. In a number of cases multiple traffic counts were available at a given point from different sources; the source stated refers to where the chosen count was taken from (prior to any final growth factoring).

3.1 Cambodia

117. Some 18 traffic counts were used in Cambodia, as shown in Table 3-1.

Table 3-1: Location of Domestic Road Traffic Counts in Cambodia

Source	From	To	Route No.
Asian Highway Database/ ASEAN Highway Database	Svay Rieng	Neak Loeung	AH1
	Neak Loeung	Phnom Penh	AH1
	Odong	Kampong Chhnang	AH1
	Kampong Chhnang	Pursat	AH1
	Pursat	Battambang	AH1
	Battambang	Sisophon	AH1
	Stung Treng	Kratie	AH11
	Kratie	Snuol	AH11
	Snuol	Phum Krek	AH11
	Phum Krek	Kampong Cham	AH11
	Kampong Cham	Skun	AH11
	Skun	Thnal Keng	AH11
	Phnom Penh	Kampong Speu	AH11
	Kampong Speu	Veal Rinh	AH11
	Cham Yeam	Sre Ambel (Chamkar Luong)	AH123
ADB TA 2722-CAM (Sep 1997)	Sisophon	Kralanh	
	Kralanh	Siemreap	
	Siemreap	Kampong Thom	

118. Given that traffic patterns in Cambodia are rapidly evolving in response to the rehabilitation of its road network, it is recommended that JICA's ongoing traffic counts be incorporated into the GMS Transport Model at the earliest opportunity. This would enable a clearer picture of Cambodia's inter-urban travel demand to be generated by the GMS Transport Model itself; however, some of these counts being conducted on a single day (and often over a 12-hour period only) may require some re-validation through site visits and selected traffic count re-surveys.

3.2 PRC

119. Some 27 traffic counts were used in PRC, as shown in Table 3-2.

Table 3-2: Location of Domestic Road Traffic Counts in PRC

Source	Province	From	To	Route No.
Data provided by Yunnan Government	Yunnan	Pangxieqing	Wuding	108
	Yunnan	Maliuwan	Zhaotong	213
	Yunnan	Zhaotong	Daibu	213
	Yunnan	Songming	Mohei	213
	Yunnan	Mohei	Xiaomengyang	213
	Yunnan	Gejiehe	Zhongdian	214
	Yunnan	Zhongdian	Lijiang	214
	Yunnan	Lijiang	Dali	214
	Yunnan	Dali	Lincang	214
	Yunnan	Lincang	Simao	214
	Yunnan	Simao	Xiaomengyang	214
	Yunnan	Shengjingguan	Qujing	320
	Yunnan	Qujing	Kunming	320
	Yunnan	Kunming	Baoshan	320
	Yunnan	Baoshan	Ruili	320
	Yunnan	Luocunkou	Yanshan	323
	Yunnan	Yanshan	Kaiyuan	323
	Yunnan	Kaiyuan	Anding	323
	Yunnan	Anding	Pu'er	323

Table 3-2: Location of Domestic Road Traffic Counts in PRC (contintued)

Source	Province	From	To	Route No.
	Yunnan	Pu'er	Lincang	323
	Yunnan	Zhaokua	Xiaoshiba	324
	Yunnan	Shanmuqing	Qujing	326
	Yunnan	Qujing	Shilin	326
	Yunnan	Shilin	Mile	326
	Yunnan	Mile	Kaiyuan	326
ADB RRP PRC 35337 (Sep 2004)	Guangxi	Nanning	Bose	324
ADB (Sep 2001)	Guangxi	Banli		

120. While coverage is reasonable in Yunnan, there is very little coverage within Guangxi. It is strongly recommended that Guangxi institute a program of traffic counts to better assess demand for future highway infrastructure projects.

3.3 Lao PDR

121. Some 25 traffic counts were used in Lao PDR, as shown in Table 3-3.

Table 3-3: Location of Domestic Road Traffic Counts in Lao PDR

Source	From	To	Route No.
Asian Highway Database	Nateuy	Center Namtha	AH3
	Center Namtha	Houayxay	AH3
	Vientiane	Pakxan	AH11
	Pakxan	Ban Lao	AH11
	Thakhek	Seno	AH11
	Seno	Muang Khongxedon	AH11
	Pakse	Veunkham (Border of Cambodia)	AH11
	Nateuy	Oudomxai	AH12
	Oudomxai	Pakmong	AH12
	Pakmong	Center Phrabang	AH12
	Center Phrabang	Phou Khoun	AH12
	Phon Hong	Vientiane	AH12
	Muang Khoua	Oudomxai	AH13
	Muang Phin	Seno	AH16
Traffic Counts Conducted by MOCTPC/JICA (April 2000)	Pakmong	Phoulao	R13N
	Pakmong	Louangprabang	R1C
	Meung Kham	NamNeun	R7
	Meung Kham	Phonsavanh	R7
	Pakkhone	Thadeua	R13N
	Salaphoukoun	Xiengkhouang	R7
	Salaphoukoun	Vientiane	R13N
	B. Sixomxeun	Vientiane	R13S
	Gnommalat	Thakhek	R12
	M. Phin	Salavan	1G
	Lak 35	Xeno	R13S

122. Given that the most recent traffic counts in Lao PDR, aside from Asian Highway Database counts, were conducted in 2000, it is advisable that a new set of traffic counts be commissioned shortly.

3.4 Myanmar

123. Some 38 traffic counts were used in Myanmar, as shown in Table 3-4.

Table 3-4: Location of Domestic Road Traffic Counts in Myanmar

Source	From	To	Route No.
Asian Highway Database/ASEAN Highway Database	Kawkareik	Paan	AH1
	Paan	Thaton	AH1
	Thaton	Kyaikhto	AH1
	Bago	Yangon	AH1
	Nyaunglebin	Toungoo	AH1
	Toungoo	Pyinmana	AH1
	Pyinmana	Pyawbwe	AH1
	Meiktila	Myittha (Yewun)	AH1
	Myittha (Yewun)	Mandalay	AH1
	Mandalay	Sagaing	AH1
	Gangaw	Kalemyo	AH1
	Kalemyo	Tamu (Border of India)	AH1
	Loilem	Taunggyi	AH2
	Kalaw	Meiktila	AH2
	Muse (Border of PRC)	Hsenwi	AH14
	Hsenwi	Lashio	AH14
	Lashio	Kyaykme	AH14
	Kyaykme	Pyin U Lwin	AH14
	Thaton	Mawlamyine	AH112
	Ye	Kaleinaung	AH112
Myanmar Government, 2005	Yangon	Taukkyan	
UNDP MYA/86/012 Myanmar Comprehensive Transport Study (1993)	Shwebo	Kawlin	
	Mandalay	Mogok	
	Myingyan	Meiktila	
	Meiktila	Kyaukpadaung	
	Pyay	Myayde	
	Pyay	Thandwe	
	Taungoo	Loikaw	
	Bago	Thanylin	
	Yangon	Pyay	
	Pathein	Hinthada	
	Yangon	Pathein	
	Monywa	Nyaungbingyi	
	Nyaung-U	Kyunchaung	
	Chauk	Seikpu	
	Magwe	Minbu	
	Thayet	Myayde	
	Pyay	Sinde	

124. Given the size of Myanmar, use had to be made of 1993 traffic count data to augment Asian Highway Database and ASEAN Highway Database data. It is recommended that traffic counts be updated to better understand inter-urban travel patterns within Myanmar.

3.5 Thailand

125. Some 85 traffic counts were used in Thailand, as shown in Table 3-5.

Table 3-5: Location of Domestic Road Traffic Counts in Thailand

Source	From	To	Route No.
Asian Highway Database/ ASEAN Highway Database	Sa Kaeo	Kabinburi	AH1
	Prachinburi (Jct.R33/R320)	Nakhonnayok	AH1
	Jct. Hin Kong	Bangkok North (Bang Pa-in)	AH1
	Bangkok North (Bang Pa-in)	Angthong	AH1
	Sing Buri	Chai Nat	AH1
	Chai Nat	Nakhon Sawan	AH1
	Nakhon Sawan	Jct. Khanu Woralaksaburi	AH1
	Kampheng Phet	Tak (Jct. R1/R105)	AH1
	Hat Yai (Jct. B.Kho Hong)	Phatthalung	AH2
	Phatthalung	Thungsong	AH2
	Thungsong	Waing Sa	AH2
	Waing Sa	Jct. R41/R401	AH2
	Jct. R41/R401	Chumphon	AH2
	Tha Sae	Bang Saphan Noi	AH2
	Pranburi	Chah-Am	AH2
	Pak Tho (Jct. R4/R35)	Nakhon Pathom	AH2
	Tak (Jct. R1/R105)	Thoen	AH2
	Ngao	Phayao	AH2
	Phayao	Chiang Rai	AH2
	Jct. Ban Phue	Udonthani	AH12
	Udonthani	Nam Phong	AH12
	Banphai	Phon	AH12
	Sikhui	Muaklek	AH12
	Saraburi	Jct. Hinkong	AH12
	Nakhon Phanom	Jct. R22/R223 (B.That Na Weng)	AH15
	Sawang Dan Din	Udonthani	AH15
	Mukudahan	Nong Sung	AH16
	Som Det	Kalasin	AH16
	Yang Ta Lat	Khonkaen	AH16
	Jct. Nam Nao	Jct.R12/R21 (Lom Sak)	AH16
	Wang Thong	Phitsanulok	AH16
	Sukhothai	Tak (Jct. R1/R105)	AH16
	Bypass Pattani	Hat Yai (Jct. R43/R4-B. Pru)	AH18
	Pak Thong Chai	Kabin Buri	AH19
	Plaeng Yao	Jct. R331/R344	AH19
	Chonburi	Bangkok East (ORR Jct. R7/R9)	AH19
	Mukdahan	Amnat Charoen	AH121
	Yasothon	Suwannaphum	AH121
	Phayakkhaphum Phisai	Buriram	AH121
	Buriram	Nang Rong	AH121
	Kanchanburi	Nakhon Pathom	AH123
	Chonburi	Laem Chanbang	AH123
	Klaeng	Chanthanburi	AH123
	Chanthanburi	Trat	AH123
MOT 2004 Traffic Counts	Jct Tha Miram	Trang District	
	Rama V Monument	Kra Buri	
	Jct To Pha To	Ka Poh	
	Bang Prachuan Bridge	Pak Tho (R4)	
	Bangkok	Pathum Thani	
	Chanthaburi		

Table 3-5: Location of Domestic Road Traffic Counts in Thailand (continued)

Source	From	To	Route No.
	Bypass Chachoengsao	Bypass Chachoengsao	
	Jct to PNSA	Jct to Ang Thong	
	Ban Mi	Lop Buri	
	Phu Khan	Lamhuai Phu Khan	
	ta Pa	Chai Nat	
	Nakhon Sawan	Khlong Ban Phalang Bridge	
	Nakhon Sawan	Chum Sahng	
	Kamphaeng Phet	Phichit	
	Phichit	Phitsanulok	
	Phitsanulok	Uttaradit	
	Rong Kwan	Nan	
	Rong Kwan	Huai Bo Thong	
	Lampang	Lamphun	
	Ban Sop Ngao	Amphoh Mah Sariang	
	Chiang Mai	Amphoh Mah Sariang	
	Chiang Mai	Ban Mah Na	
	km77	Ban Ping Khong	
	km20	Pang Namthu	
	Tha Ton	Chiang Rai	
	Prakhon Chai	Prasat	
	Kra Sang	Surin District	
	Tha Tum (Yasothon)	Chom Phra	
	Sikhoruphum	Samrong Thap	
	Chaiyaphum	Nong Wahng	
	Wang Katha	km159+700	
	Ban Thum	Mancha Khiri	
	Huai Pha Nang Bridge	Loei	
	Nong Bong	km30	
	Kalasin	Lam Chi	
	Ban Kok Tum	km82+620	
	Roi Et	Suwannaphum	
	Roi Et	Amphon Phon Thong	
	Roi Et	Maha Sarakham	
	Muang Samsip	Ubon Ratchathani	
	Renu Nakhon	Ban Tong	

126. A comprehensive set of traffic count data is available for Thailand. Indeed, a number of available data points were not used as the GMS Transport Model is not sufficiently detailed to incorporate all available traffic data for Thailand. In particular, the dense highway network around Greater Bangkok was simplified, meaning that not all traffic counts could be used. Similarly, the zoning system was such that a number of traffic counts had to be excluded to avoid effective duplication.

127. A number of traffic counts, particularly around Bangkok contained a substantial amount of intra-urban, shorter-distance traffic that would distort modeled longer-distance, inter-urban flows if retained. Thus some traffic counts were factored down.

128. Therefore if converting the GMS Transport Model for more detailed investigation of travel patterns within Thailand (or a part thereof), the level of network coding detail, together with zoning could be increased. This would enable use to be made of more of the available traffic counts and thus a more detailed reflection of inter-urban and possibly of some key urban-suburban travel within Thailand.

3.6 Viet Nam

129. Some 55 traffic counts were used in Viet Nam, as shown in Table 3-6.

Table 3-6: Location of Domestic Road Traffic Counts in Viet Nam

Source	From/At	To	Route No.
Asian Highway Database/ ASEAN Highway Database	Dien Chau	Vinh	AH1
	Dong Hoi	Dong Ha	AH1
	Dong Ha	Hue	AH1
	Quang Ngai	An Nhon	AH1
	An Nhon	Tuy Hoa	AH1
	Ninh Hoa	Nha Trang	AH1
	Bien Hoa	Ho Cni Minh	AH1
	Xuan Mai	Hoa Binh	AH13
	Son La	Tuan Giao	AH13
	Hanoi	Phuc Yen	AH14
	Viet Tri	Doan Hung	AH14
	Dong Ha	Lao Bao (Border of Lao PDR)	AH16
	Giang	Dak To	AH17
	Khe Ve	West of Vung Ang Port	AH131
	Kon Tum	Quang Ngai	AH132
The Study of Following-Up on VITRANSS (December 2004 surveys)	North of Thuan Chau		
	South Bao Yen		
	North of Ham Yen (Tan Yen)		
	Dong Phu (South of Cho Moi)		
	South of Pho Yen (Ba Hang)		
	North of Kep		
	East of Sao Do (Chi Linh)		
	East of Dinh Lap		
	North East of Tong Dau		
	Thoung Bang la		
	South of Dong Van		
	South of Nghin Bridge		
	East of Du Nghia		
	East of Kien Bridge		
	South of Nhu Nguyet Bridge		
	North of Bim Son		
	Lang Co		
	North of Tam Ky		
	East of An Khe pass (Phu Pong)		
	East of Phuong Hoang pass		
	South of Ham Thuan		
	Bai Vot		
	North of Buon Ma Thuot		
	South of Nha Trang		
	North of Xuan Son Bridge		
	Phu Dong 3-arm Junction		
	South of Tuy Hoa		
	North of Dong Xoai		
	South of Ma Da Gui		
	North of Phu My (Tan Thanh)		
	South of Ho Nai		
	South of Thu Dau Mot		
	North of Tan An		
	East of Trang Bang		
	Can Tho Ferry		

Table 3-6: Location of Domestic Road Traffic Counts in Viet Nam (continued)

Source	From/At	To	Route No.
	South of Thach Hung (Lap Vo)		
	Rach Goi		
	South of Trung Luong Junction		
	Thot Not		
	Long Xuyen		

130. Viet Nam had a comprehensive set of traffic count data. Indeed, a number of traffic count sites from "The Study of Following-Up on VITRANSS" were not used, as the network and zoning were not sufficiently detailed to make use of all of them.

131. There would thus be scope to expand model detail within Viet Nam, for the purposes of more detailed investigation of areas within Viet Nam, or of specific corridors partially or wholly within Viet Nam.

4. Domestic Rail Traffic Counts

132. A total of 140 domestic rail traffic counts were used. These included some 50 one-way counts in Viet Nam (25 pairs) and 90 two-way counts in other countries. Many of these counts were obtained directly from authorities and/or Reports.

133. However, in other instances these "counts" were derived from other sources, such as inter-provincial rail origin-destination matrices, or applying system-wide rail statistics to estimate both rail counts and prior rail matrices simultaneously (see Section III.D on prior trip matrices).

134. The locations of counts given in Tables in this sub-section are indicative and do not necessarily correspond with formal count station names. The source specified refers to where count data are taken from prior to growthing, where this was required to obtain 2004 flow estimates.

4.1 Cambodia

135. Presently, Cambodia's railway network does not cater for passengers. Thus passenger "counts" were set to naught. However, rail traffic counts were applied for freight transport at some 5 locations, as shown in Table 3-7. Data were obtained from "Assessment of Modal Competitiveness and Traffic Potential of Rehabilitated Railway in Cambodia, Final Report," (January 2004).

136. This Report gave data on the North and South lines for 1998-2002, from which 2004 data were estimated by link, in the form of two-way flows.

Table 3-7: Location of Domestic Rail Traffic Counts in Cambodia

From	To
Battambang	Sisophon
Tuek Phos	Pursat
to/from	Phnom Penh
Angkor Chey	Doun Kaev
Sihanoukville	Prey Nob

137. These data cover the entirety of Cambodia's currently operational rail network. However, traffic patterns over the period 1998-2002 were not particularly stable. Thus traffic data on Cambodia's rail network should be continually monitored.

4.2 PRC

138. No link-based rail counts were available in PRC. However, it was known from transport statistics in both Yunnan and Guangxi that rail plays a major rôle in both inter-urban and inter-provincial transportation. This includes access to and egress from seaports in Guangxi.

139. It was thus resolved to estimate rail link flows to be used as “counts” in the model calibration/matrix estimation process. Indeed, rail prior trip matrices for PRC were generated simultaneously with the estimation of link “counts.€ 35

140. The inputs into this procedure were as follows:

- rail system-wide passenger and tonne kilometrages in Yunnan and Guangxi, from Provincial Statistical Yearbooks;
- rail link lengths from the Network Model (see Section VII.B.1);
- planning data by Administrative City (equivalent to zones) to assist with distribution of rail traffic; and
- cargo throughputs at seaports (for freight), cross-border rail flows (to/from Viet Nam) and estimates of inter-provincial rail flows, to provide trip-end constraints.

141. A rail matrix was then “fitted” to match system-wide passenger and tonne throughputs while generating rail link flows simultaneously. Two-way rail link flows were thus estimated, with some 32 links being selected for inclusion into matrix estimation/model calibration routines, at locations shown in Table 3-8.

142. Links are defined by the City where they start and end; where both are the same, this refers to a link wholly within one City’s administrative boundaries. There are also flows specified on a number of links to/from other Provinces, as well as on links in Guizhou which connect Yunnan and Guangxi.

143. It should be noted that this approach is far from ideal, especially given the importance of rail transport within PRC. It is thus strongly recommended that both rail link volumes and city-to-city rail transport matrices be collected and used to update the GMS Transport Model.

Table 3-8: Location of Domestic Rail Traffic Counts in PRC

From City/Province	To City/Province
Dali	Chuxiong
Chuxiong	Chuxiong
Chuxiong	Sichuan
Chuxiong	Chuxiong
Kunming	Kunming
Kunming	Kunming
Kunming	Honghe
Kunming	Kunming
Qujing	Qujing
Guizhou	Zhaotong
Zhaotong	Zhaotong
Bose	Bose

Table 3-8: Location of Domestic Rail Traffic Counts in PRC (continued)

From City/Province	To City/Province
Bose	Bose
Chongzuo	Nanning
Nanning	Nanning
Nanning	Qinzhou
Qinzhou	Fengcheng
Qinzhou	Qinzhou
Qinzhou	Nanning
Nanning	Nanning
Nanning	Nanning
Nanning	Guigang
Guigang	Yulin
Nanning	Laibing
Laibing	Liuzhou
Liuzhou	Liuzhou
Guilin	Hunan
Liuzhou	Liuzhou
Liuzhou	Liuzhou
Liuzhou	Hechi
Hechi	Guizhou
Hechi	Guizhou

4.3 Lao PDR

144. Lao PDR has no rail network in operation. As such there were no rail count data for Lao PDR.

4.4 Myanmar

145. Myanma Railways provided data on passenger-miles and ton-miles by railway section (link) at a number of locations, for 2001 to 2003[1]. From these data, link flows for 2004 were estimated.

146. Concentrating on inter-city services, 23 count locations were identified for use in calibrating the GMS Transport Model. These locations are listed in Table 3-9.

Table 3-9: Location of Domestic Rail Traffic Counts in Myanmar

Section
Yangon - Mandalay
Amarapura - Myitkina
Naungpattaya - Mawlamyaine
Kyimyindaine - Pyay
Langwa - Katha
Ngalontin - Tawgyangyi
Kaunghmudaw - Budalin
Sagaing-Monywa
Tonbo - Lashio
Tada-U - Sanpya

[1] In fact, 2001 refers to fiscal 2001-2002, 2002 to fiscal 2002-2003, etc., and 2003 to fiscal 2003-2004. However, the data were deemed close enough to use for 2001, 2002, and 2003, respectively.

Table 3-9: Location of Domestic Rail Traffic Counts in Myanmar (continued)

Section
Tawma - Myingyan
Hlaingdet - Shwenyaung - Yaksauk
Inwon - Loikaw
Taunggyi - Banyin
Pyudwin - Dlangyun
Nyaungwaing - Tharrawaw
Mawlamyaine South - Ye
Tavoy - Yephyu
Henzada - Pathein
Tagwa - Kyangin
Kalay - Gangaw
Saka - Pagan
Obauk - Kyeni

4.5 Thailand

147. Passenger and freight (tonne) rail origin-destination matrices were obtained from State Railways of Thailand, via the Thai Statistical Yearbook. By analyzing these data together with the Thai railway network it was possible to estimate flows on a link-basis for use in calibrating the GMS Transport Model.

148. Some 30 rail link flows were identified, as shown in Table 3-10.

Table 3-10: Location of Domestic Road Traffic Counts in Thailand

From	To
Hat Yai	Phattalung
Phattalung	Ron Phibun
Nakhon Si Thammarat	Ron Phibun
Trang	Thung Song
Thung Song	Wiang Sa
Surat Thani	Chumphon
Chumphon	Prachuap Khiri Khan
Prachuap Khiri Khan	Phetchaburi
Pak Tho	Nakhon Pathom
Kanchanaburi	Nakhon Pathom
Nakhon Pathom	Bangkok
Sattahip	Chon Buri
Chon Buri	Chachoengsao
Sa Kaeo	Kabin Buri
Chachoengsao	Bangkok
Bangkok	(rail junction)
Udon Rathchatani	Si Saket
Si Saket	Surin
Surin	Buriram
Buriram	Nakhon Ratchasima
Nong Khai	Udon Thani
Udon Thani	Khon Kaen
Khon Kaen	Bua Yar
Saraburi	rail jn
Lamphun	Lampang
Lampang	Den Chai

Table 3-10: Location of Domestic Road Traffic Counts in Thailand (continued)

From	To
Den Chai	Phitsanulok
Nakhon Sawan	Lop Buri
Lop Buri	(rail junction)
Phra Nakhon Si Ayuttahya	(rail junction)

4.6 Viet Nam

149. From The Study of Following-Up on VITRANSS, rail link data on passengers and tonnes were available for 2003 at a number of locations covering most of Viet Nam's rail network. These data were growthed to 2004.

150. These data were coded one-way at 25 sites (so 50 count records in total), as shown in Table 3-11.

Table 3-11: Location of Domestic Road Traffic Counts in Viet Nam

From	To
Lao Cai	Lang Giang
Lang Giang	Yen Bai
Yen Bai	Viet Tri
Viet Tri	Dong Anh
Dong Anh	Yen Vien
Yen Vien	Gia Lam
Gia Lam	Ha Noi
Quan Trieu	Dong Anh
Bang Tuong	Dong Mo
Dong Mo	Kep
Bac Giang	Yen Vien
Co Thanh	Chi Linh
Hai Phong	Gia Lam
Nam Dinh	Ha Noi
Thanh Hoa	Nam Dinh
Vinh	Thanh Hoa
Dong Hoi	Vinh
Hue	Dong Hoi
Da Nang	Hue
Quang Ngai	Da Nang
Dieu Tri	Quang Ngai
Nha Trang	Dieu Tri
Thap Cham	Nha Trang
Muong Man	Thap Cham
Sai Gon	Muong Man

5. Water Traffic Counts

151. In general, data were far scarcer on IWT than on rail or road. This is partially because much water transport is short-distance, especially for passengers. Nevertheless, some data were collected, as presented below.

152. It should be noted that vehicular cross-river ferry services, connecting roads are considered as part of the road network and discussed under the appropriate section.

153. Similarly, seaborne transport is considered as external transport.

154. Waterborne transport for the purposes of the GMS Transport Model refers to travel along river systems.

5.1 Cambodia

155. Some data were available on passenger river services in Cambodia, covering number of voyages per month and typical passenger loading. These were used to estimate link flows 6 locations, with freight being estimated in proportion to passenger flow estimates.

156. These six locations are shown in Table 3-12.

Table 3-12: Location of Water Traffic Counts in Cambodia

From	To
Kampong Chhnang	Siem Reap
Phnom Penh	Kampong Chhnang
Phnom Penh	Kratie
Kratie	Stung Treng
Phnom Penh	Chau Doc (Mekong)
Phnom Penh	Chau Doc (Bassac)

157. Given the importance played by water transport in Cambodia, as well as its potential to offer economically efficient transportation of goods, it is strongly recommended that more meaningful surveys of waterborne traffic be undertaken at the earliest opportunity. Incorporation of same into the GMS Transport Model would enhance any assessment of waterborne transport in Cambodia.

5.2 PRC

158. Due to a lack of data, the treatment of waterborne transport in PRC was limited. In any event, Guangxi's water channels concentrate on east-west trade to/from the Pearl River Delta.

159. There is some navigability of the Lancang in Yunnan. However, usable data on waterborne traffic were not available.

160. The only water-based link (excluding the seaports of Guangxi) coded, is the link from Jinghong into the Mekong. This link is treated as a cross-border link (see Section III.C.1).

5.3 Lao PDR

161. At present, navigability of much of the Mekong is limited. The majority of transport is short-distance, and as such would fall outside the scope of the GMS Transport Model, as trips would be considered intra-zonal.

162. In any event, no count data for waterborne transport in Lao PDR were available.

163. However, in order to better understand the waterborne subsector, it is recommended that surveys of passenger and freight movements along the Mekong through Lao PDR (and indeed longitudinal traffic between Lao PDR and Thailand) be undertaken.

5.4 Myanmar

164. Playing a significant rôle in inter-urban transportation in Myanmar, especially for freight, data on freight loadings and unloadings at several river ports along the Ayeyawady and Chindwin rivers were available. However, no data on waterborne passenger transportation were available.

165. Reconciling the data received with the coded network, data at some 31 ports were selected for use in matrix estimation and the calibration of the GMS Transport Model. Data were specified separately for loadings and unloadings.

166. The 31 ports for which count data were coded are shown in Table 3-13.

Table 3-13: River Ports in Myanmar with Loading/Unloading Data

River Port	
Bhamo	Minbu
Katha	Magwe
Thabeikkyin	Minhla
Kyaukmyaung	Myayde
Mandalay	Thayet
Sagaing	Pyay
Mawlaik	Myanaung
Kalewa	Hinthada
Monywa	Danubyu
Myingyan	Nyaungdone
Pakokku	Einme
Nyaung-U	Myaungmya
Kyunchaung	Pathein
Chauk	Ngathainggaung
Sinbyugyun	Yangon – All River Ports
Yenangyaung	

167. Given the importance of waterborne transport within Myanmar, it is recommended that data on waterway links be collected to augment ports' data. In addition, data on passenger movements should also be collected. This would enable a more robust investigation of potential waterway projects.

5.5 Thailand

168. Aside from data on cross-border ferries to/from Lao PDR that are not considered in this Section, only very limited data were obtained on IWT in Thailand, namely the counts at the Mekong ports of Chiang Sean and Chiang Khong. These were described in Section III.C.1.

169. As stated above, under Lao PDR, it is recommended that surveys of waterborne transport along the Mekong be undertaken to better ascertain current travel patterns. However, such might require a more detailed model to be built, given the short distance of many trips currently undertaken along the Mekong.

170. In order to better investigate and assess transport demand within Thailand, it would also be useful to include data on the Chao Phraya and other waterways in Thailand, outwith the Mekong system. No patronage data on these other river systems were collected on this TA.

5.6 Viet Nam

171. River transport plays an important role within the Red River and Mekong Delta systems in Viet Nam. From “The Study of Following-Up on VITRANSS” data on 9 river links and 11 ports were obtained, relating both to passengers and freight. The locations of these data are shown in Table 3-14.

Table 3-14: Location of Domestic Water Traffic Counts in Viet Nam

Location	Mainline/Port
Yen Hung	Mainline
Duong Ha	Mainline
Son Tay	Mainline
Viet Tri	Mainline
Phu Nha	Mainline
Phuoc Dong	Mainline
Binh Duc	Mainline
Lap Vo	Mainline
Cao Lanh	Mainline
Hanoi	Port
Viet Tri	Port
Dap Cau	Port
Hoa Binh	Port
Ninh Binh	Port
Nam Dinh	Port
My Tho	Port
Vinh Long	Port
Long Xuyen	Port
Binh Tri	Port

D. Prior Trip Matrices

1. Introduction

172. In addition to assembling traffic counts on links, a set of prior trip matrices corresponding to the eight travel types described in Section III.B.6 were required. These were for initial input into the matrix estimation/model calibration process.

173. In a few cases, modal trip matrices were available for some countries. Where such matrices were available, they had to be factored to 2004 and the zoning system reconciled with that used in the GMS Transport Model (as described in Chapter II).

174. However, in most cases no suitable data were available and hence prior trip matrices had to be created.

175. In both instances, the trip matrices were refined based on routeing and the traffic count data outlined in Section III.C.

176. This section outlines the approach undertaken to obtain these prior matrices.

2. Domestic Matrices

177. The broad approach, where no prior trip matrices were available was as follows, undertaken for each country and mode in turn.

178. First, socio-economic data were assembled for each zone, such as population, GDP and vehicle ownership. These data did not necessarily have to be for 2004, as it was the relative proportions of each indicator within a country which was of importance. These data are presented in Annex One.

179. Based on these data, percentage splits between zones were determined. Where available, these splits were based on population and vehicle ownership, or on population and GDP.

180. A total number of passengers or tonnes to be allocated were then calculated. This was done with reference to those countries and modes for which data totals were available. Thailand was used as the basis for comparison, with initial ball-park estimates of the number of passengers and tonnes in other countries based on a comparison of total GDP between countries.

181. The obtained trip totals were then multiplied by the row and column factors based on percentage splits of population/GDP/vehicle ownership (as appropriate) between zones. This gave the first set of matrices, which did not take into account the distance between zones.

182. Based on seaports count data, freight trips (tonnes) were also added to seaport zones and distributed on a pro rata-basis to the domestic freight matrices.

183. The next step was to input initial distance skims between zones. These were obtained from an early, non-capacity restrained assignment. These distances were then used to generate deterrence factors, such that in general terms the number of trips would decrease with trip length. Having applied such deterrence factors (creating a series of “Gravity Models”), the matrices were repeatedly re-calculated until the row (origin) and column (destination) totals “balanced” and were consistent with the initial trip allocations to zones (based on GDP/population/vehicle ownership).

184. In the case of Myanmar, prior matrices already existed, so these were factored to 2004, rather than using the above method.

185. At this stage, six sets of matrices (one for each GMS country) existed, for each of six travel types: road, rail, water for both passenger and freight. However, in some instances (e.g., Lao PDR rail and PRC water, these matrices contained deliberately small values).

3. Cross-Border Flows

186. Having developed initial prior matrices by mode (in passengers and tonnes) for domestic transport, cross-border flows were estimated based on the cross-border traffic counts at locations listed in Section III.C.1.

187. These trips were then added onto the respective matrices, in order to merge the six domestic matrices in a single set of pan-GMS trip matrices (three modes; passengers and tonnes). Trips were added to zones on a pro-rata basis.

188. A Gravity Model approach could have been used to better distribute cross-border trips. However, given that cross-border transport demand in most instances was very small as compared to domestic transport, this was not deemed necessary.

189. Also, it could be argued that the domestic matrices ought to have been reduced in size to maintain matrix totals after the addition of cross-border trips. Once

again, the small size of most cross-border demand, coupled with the fact that matrix estimation was to be used to finalise the matrices in any case, meant that this too was not deemed necessary.

4. Allocation to Vehicle Types

190. Having thus obtained passenger and tonne matrices, these were allocated to different vehicles. In the case of freight, there was only one “vehicle type” (and the matrices already differentiated between road-, rail- and water-based transport).

191. In the case of passengers, as stated earlier, rail- and water-based passengers were assumed to use bus as their road access/egress mode and as such no sub-division was necessary. However, for highway-based passengers, these were subdivided into motorcycles, cars and buses.

192. These subdivisions were determined taking into account available traffic count data and also trip length. For example, in general motorcycle trips were assumed to be short distance, so very low percentages only were allocated to motorcycles in the case of trips over 150km in length.

193. At this stage one further factoring was undertaken. As JICA STRADA deals in integers only, fractional trips would normally be lost. Given the low volumes on many cross-border movements and the number of zones, as well as conversions between passengers/tonnes and vehicles, it was likely that a significant number of fractional trips might be “lost” during assignment. This would be further reinforced by the use of multi-iteration capacity-restrained assignment, wherein only a part of each trip matrix is assigned on any single iteration.

194. Therefore, output trip matrices were multiplied by 10. Thus trip matrices were in units of implied tenths of passengers/tonnes.

5. Iterative Adjustment

195. As stated above, having obtained initial estimates of prior matrices, these were assigned once the network model was completed.

196. Prior to undertaking matrix estimation, an initial set of comparisons between modeled and observed flows were undertaken, with the overall fit by country/mode analysed. Based on these initial comparisons, the matrices were adjusted on a sector-to-sector basis, wherein a “sector” referred to a country (or a given country-to-country movement), a mode and a transport type (e.g., Thailand – Lao PDR highway car passengers).

197. This procedure was undertaken a number of times, in order to improve the initial comparison of modeled and observed flows on such a “sector” basis.

IV. The Road Subsector

A. Description and Key Issues

198. The road subsector is the predominant mode within the GMS and road has the greatest geographic penetration of any mode.

199. Nevertheless, the road networks of different GMS countries are of quite different standards.

1. Cambodia

200. While much of Cambodia's road network has been rehabilitated in recent years, significant links such as Siem Reap-Sisophon-Poipet have yet to be fully rehabilitated.

201. Cambodia's road network remains a mixture of Class II, Class III and Below III standard roads. The highest specification road in the country is the Phnom Penh-Sihanoukville Highway (Route 4), but this is also classified as Class II.

202. Consequently the capacity of roads within Cambodia is limited as compared to Thailand and Viet Nam. This may hinder the development of and reduce the attractiveness to potential drivers of road-based schemes within the Southern Economic Corridor (Central Sub-Corridor or Southern Coastal Sub-Corridor).

203. There is strong evidence to suggest that traffic levels have surged on an number of Cambodian roads following their rehabilitation.

204. Given the scale of rehabilitation recently completed, underway or committed, and its impacts on travel demand, it is likely that road-based travel patterns will change markedly within Cambodia over the next 5-10 years. This of itself might create sufficient demand to justify the further upgrading of roads within Cambodia, which in turn would make the Southern Economic Corridor routes more attractive.

2. PRC

205. During the last 10 years, PRC has greatly enhanced its highway network. In many instances new tolled expressways have been constructed parallel and in addition to longer-established National Highways. PRC has one of the most developed road networks within the GMS.

206. Furthermore, both Guangxi and Yunnan have a number of major Class 1 and Expressway projects committed. On completion of these projects, it is not foreseen that there will be major constraints on cross-border transport within GMS emanating from PRC's roads.

3. Lao PDR

207. The road network in Lao PDR is predominantly of Class III standard on key links and Below III on many other roads. In addition, there are a number of vehicle ferries in operation.

208. It is generally recognised that the relatively low standard of Lao PDR's roads, together with its often mountainous terrain (particularly in the East, bordering Viet Nam) acts as a bottleneck in trans-GMS trade.

209. However, given its relatively low population density and income level, upgrading Lao PDR's highway network might not achieve particularly attractive cost-benefit ratios or sufficient NPV to justify schemes in strict economic terms. Furthermore, given terrain conditions in many places as well as UXO problems in many areas bordering Viet Nam, construction of roads would be relatively slow and expensive.

210. However, without upgrading key routes then the Lao PDR's road network would act as a constraint on road-based trading between, for instance, Thailand and PRC and Thailand and Viet Nam.

4. Myanmar

211. Myanmar has some high quality (Class I and Class II) roads near to Yangon. However, in most parts of Myanmar, roads are of Class III standard or lower. Several vehicle ferries are also in operation.

212. The terrain in Myanmar is a mixture of flat, rolling and mountainous sections.

213. During discussions in Myanmar it was acknowledged that Myanmar lacks funding for much road network upgrade work that the Government deems important.

214. Unless a solution can be found to financing Myanmar's road infrastructure development, it seems unlikely that surface-based transportation between South Asia and PRC and Southeast Asia would be able to develop.

5. Thailand

215. Thailand has probably the best-developed road networks within the GMS. With the exception of a few small border roads, including a number of "missing links" with Myanmar, Thailand's roads are generally of reasonable standard and in good repair. Road connexions with Laos are currently being upgraded, e.g., Mukdahan-Savannakhet Bridge.

6. Viet Nam

216. Viet Nam's road networks are being rapidly developed and upgraded. While National Highway 1 is typically of Class II standard (Class I near Hanoi), mountain roads, especially those connecting with Lao PDR are often of a poorer standard. Nevertheless, it is some of these links that are likely to be more crucial to cross-boundary trade within the GMS.

217. In the Mekong Delta there are still a number of "missing links" in the road network currently served by vehicular ferries. These reduce overall capacity and slow journey times within the Mekong Delta. However, a number of ferries have already been replaced with bridges and a number of other bridges are committed.

218. While not a constraint currently, a possible future constraint is Highway 1. Given Viet Nam's geography there is at present only one major highway connecting the length of the country, Highway 1. Much of this has been upgraded in recent years. However, as domestic trade grows increasing pressure would be put onto this single link, which might constrain traffic growth. In GMS terms, potential congestion along Highway 1 would constrain any cross-border traffic along the Southern Economic Corridor from continuing further north within Viet Nam. Under such circumstances, the importance of east-west links through Lao PDR would increase.

219. Another highway running broadly parallel for part of Highway 1's length is under construction, namely "duong Ho Chi Minh Tay." This may serve to relieve congestion on Highway 1, although the purpose of this parallel route is more to improve accessibility and north-south transport through the Highlands.

7. Summary

220. The quality of road networks within GMS varies greatly. Thailand's network is generally good. PRC's continues to develop and once the committed projects are completed, Guangxi and Yunnan will also have comprehensive networks of high quality roads. Viet Nam's network is generally of reasonable standard, with the exception of some highland routes, particularly near/connecting to Lao PDR and also of some "missing" bridges in the Mekong Delta (although many of these are being addressed).

221. However, the road networks in Cambodia, Lao PDR and Myanmar are deemed to be sub-standard in many places. This constrains growth in road-based trade between Thailand and Viet Nam, Thailand and PRC and between the GMS and South Asia. In addition, the poor standard of roads serves to increase road transport costs.

222. While an alternative route for PRC-Thai trade is available through Myanmar, via Mae Sai/Tachilek, customs clearance is often very time consuming in Myanmar (see below).

B. Modeling Requirements for the Road Subsector

1. Link Standards

223. The key data sources used for coding of road networks included the Asian Highway Database and the ASEAN Highway Database. Road standards were defined with reference to Asian Highway definitions, which are shown in Table 4-1. However, the road network definitions were not limited to those links within the Asian Highway Database and ASEAN Highway Database. Other data sources included relevant study reports, maps and discussions with officials in GMS countries.

224. In some instances, links were coded as being part of two different standards. In order to cope with this, some link standards were created between two official standards, such as "Class I/Class II." Furthermore, some links were coded as "Below III", so the classifications employed had to extend to lower standard roads also.

225. As the highway networks coded included additional links, these were coded with reference to the databases, maps and any pertinent reports, so that other links could also have standards, terrain types and surface qualities specified.

226. As can be seen from Table 4-1, a range of speeds were available for each link standard; and these ranges vary according to terrain. In addition, the highway databases contain data on the surface quality of different links.

227. Consequently, a "default" freeflow speed for each link standard was defined, together with speed modifiers depending on terrain and surface conditions, as shown in Table 4-2.

228. In addition to "default" freeflow speeds, in order to enable a capacity restrained assignment, a set of default link capacities were specified. These are daily

two-way capacities, specified in passenger car unit equivalents (PCUs) and are shown in Table 4-3.

229. Primary Plus was used around urban centers such as Bangkok, where not every link was coded, to signify major corridors.

230. As with default freeflow speeds, these capacities were varied for roads of poorer surface quality and/or rolling/mountainous terrain. A 20% reduction was coded for links wholly rolling, or 40% if wholly mountainous. A 30% reduction was coded for links in fair condition or a 60% reduction for links that were wholly poor. These capacity reduction factors were multiplied together before being applied to the default capacity. Hence the maximum capacity reduction factor (for a wholly mountainous, wholly poor section of road) was 76%, being (100% - ((100%-40%) * (100%-60%))).

231. In addition, to facilitate capacity restraint relationships between speed and a link's operating Volume-Capacity Ratio (VCR) were defined. These relate increasing congestion to decreasing speeds. Within the assignment algorithm, these make congested links relatively less attractive so that on subsequent assignment iterations traffic may be more likely to use other links, should a link get too congested.

232. VCR's were defined in accordance with industry standard practice. It is generally held that higher standard, higher capacity links do not suffer from decreased speeds in response to light traffic flows. However, as they approach capacity, speeds may then decrease relatively markedly.

233. Conversely, lower standard, lower capacity links may experience decreasing speeds with relatively low VCR's. However, their speed decline is generally more consistent and gradual at higher VCR's than is the speed decline on higher capacity links.

234. Table 4-4 shows the Modeling adopted in the GMS Transport Model. Items labelled "Q" refer to the quantity of traffic in terms of the VCR: "0.0" is freeflow (no traffic), 0.5 means traffic volume is at half of capacity, etc. Items labelled "V" relate to speed, wherein a speed of "1.0" refers to the freeflow speed, while 0.5 means half the freeflow speed.

235. Speeds for Modeling in between specified points are interpolated. Speeds greater than Q4 remain at the level specified at a VCR equal to Q4 (which in this instance is 1.5 in all cases).

Table 4-1: Asian Highway Design Standards

Highway Classification	Primary	Primary	Primary	Class I	Class I	Class I	Class II	Class II	Class II	Class III	Class III	Class III
Terrain classification[1]	L	R	M	L	R	M	L	R	M	L	R	M
Design Speed (kph)	100-120	80-100	60-80	80-110	60-80	50-70	80-100	60-80	40-60	60-80	50-70	40-60
Width (m) Right of Way	Rural 50-70 Urban 40-60			Rural 50-70 Urban 40-60			Rural 40-60 Urban 30-40			30-40		
Width (m) Lane	3.75	3.75	3.75	3.5	3.5	3.5	3.5	3.5	3.5	3.00 but 3.25 desirable		
Width (m) Shoulder	3	2.5-3	2.5	3	2.5-3	2.5	2.5	2-2.5	2	1.5 (2.0 desirable)		1.0 (1.5 desirable)
Min. horizontal curve radius	390	230	120	220	120	80	200	110	50	110	75	50
Type of pavement	asphalt/cement concrete			asphalt/cement concrete			asphalt/cement concrete			double bituminous treatment		
Max. super-elevation (%)	Rural 7 Urban 6			Rural 8 Urban 8			Rural 10 Urban 6			Rural 10 Urban 6		
Max. vertical grade (%)	4	5	6	5	6	7	6	7	8	6	7	8
Min. vertical clearance (m)	4.50 (ideally 5.00)			4.50 (ideally 5.00)			4.5	4.5	4.5	4.5	4.5	4.5
Structure loading (minimum)	HS20-44	HS20-44	HS20-44	HS20-44	HS20-44	HS20-44	HS20-44	HS20-44	HS20-44	HS20-44	HS20-44	HS20-44

[1] Terrain Classification: L = Level; R = Rolling (or hilly); M= Mountainous

Table 4-2: Highway Speeds by Road Standard, Terrain and Quality

Standard	Freeflow Speed (100% Rolling; 100% Fair)	Maximum Terrain & Quality Adjustment									Adjust to Typical Speed
		Good Quality			Fair Quality			Poor Quality			
		L	**R**	**M**	**L**	**R**	**M**	**L**	**R**	**M**	
Primary	80	40	20	0	20	0	-20	0	-20	-40	75%
Class I	60	50	20	10	20	0	-10	-10	-20	-30	75%
Class I/ Class II	60	45	20	5	20	0	-15	-5	-20	-35	80%
Class II	60	40	20	0	20	0	-20	0	-20	-40	80%
Class II/ Class III	55	35	20	5	15	0	-15	-5	-20	-35	80%
Class III	50	30	20	10	10	0	-10	-10	-20	-30	80%
Class III/Below IIII	45	30	20	10	10	0	-10	-10	-20	-30	80%
Below IIII	40	30	20	10	10	0	-10	-10	-20	-30	80%

Table 4-3: Default Link Capacities

Link Class	Daily Two-Way Capacity (PCUs)
Primary	102,900
Primary Plus	171,400
Class I	80,000
Class I/II	60,000
Class II	23,500
Class II/III	20,000
Class III	16,000
Class III/Below III	9,300
Below III	7,000

Table 4-4: Speed-Flow Relationships

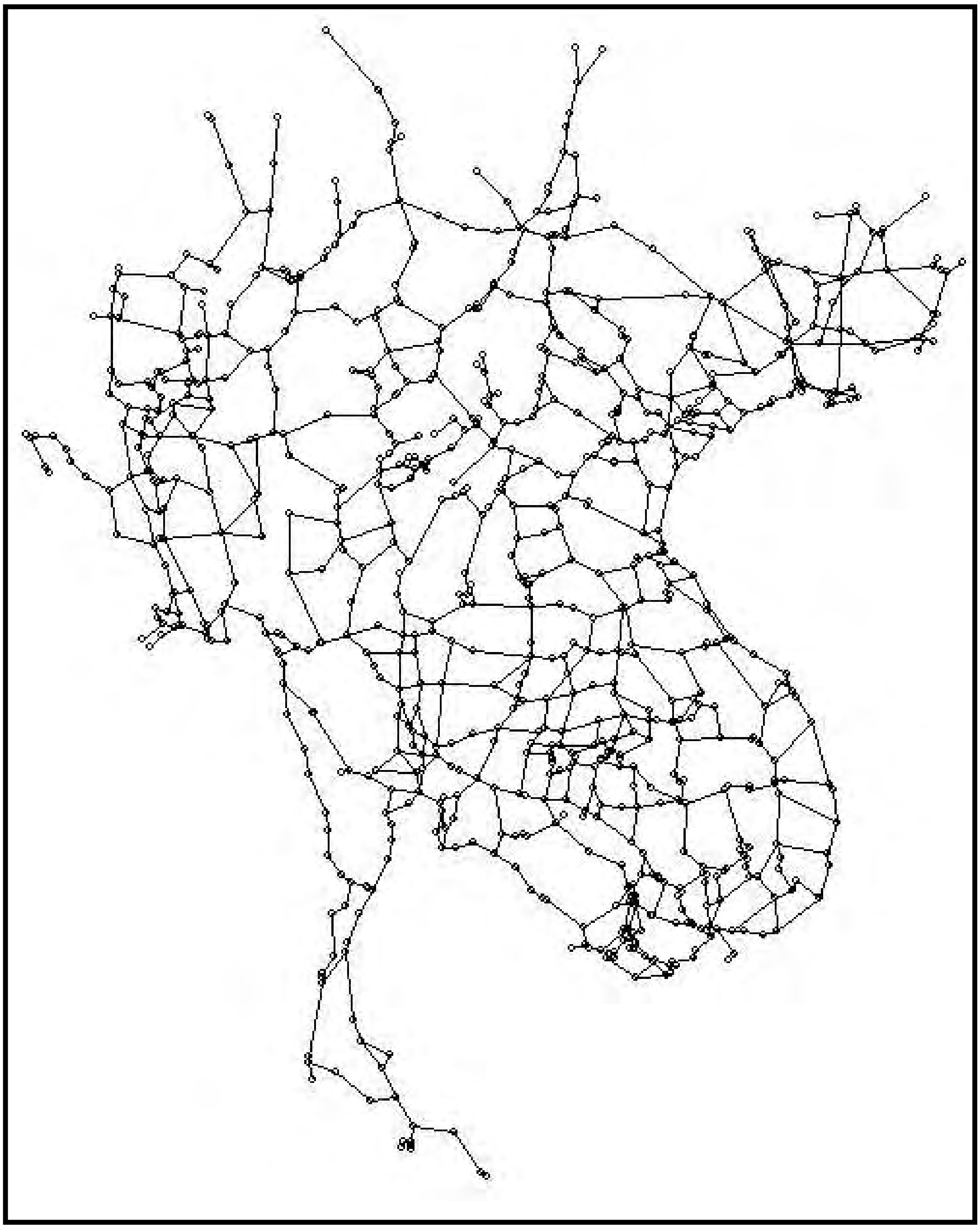
Link Standard	Q0	V0	Q1	V1	Q2	V2	Q3	V3	Q4	V4
Primary	0.00	1.00	0.20	1.00	0.75	0.80	1.20	0.35	1.50	0.200
Primary Plus	0.00	1.00	0.20	1.00	0.75	0.80	1.20	0.35	1.50	0.200
Class I	0.00	1.00	0.20	1.00	0.75	0.75	1.20	0.35	1.50	0.250
Class I/II	0.00	1.00	0.15	1.00	0.75	0.75	1.20	0.35	1.50	0.250
Class II	0.00	1.00	0.25	0.90	0.75	0.70	1.20	0.35	1.50	0.250
Class II/III	0.00	1.00	0.25	0.85	0.75	0.70	1.20	0.375	1.50	0.275
Class III	0.00	1.00	0.20	0.85	0.70	0.60	1.20	0.40	1.50	0.30
Class III/Below III	0.00	1.00	0.20	0.80	0.70	0.50	1.20	0.40	1.50	0.325
Below III	0.00	1.00	0.25	0.75	0.80	0.50	1.20	0.40	1.50	0.35

2. Network Topology

236. Figure 4-1 shows the intra-GMS highway network as coded into the GMS Transport Model. While it might be restrictive to define a GMS road transport network per se, should such definition be required then the coding of the GMS Transport Model could be used as such, or at least form part of the basis of any such definition.

237. As can be seen, the highway network coded is fairly comprehensive. It has adequate interfaces (interchange) with road and rail networks also.

Figure 4-1: GMS Highway Network



C. Road Transport Costs

238. Empirical road transport cost data have been obtained from Cambodia and Viet Nam. In addition, some benchmark international costs have also been obtained.

239. Within Cambodia, road freight costs are estimated at USD0.0663 per tonne-km for untolled roads (with a typical speed of 25 kph). For tolled roads, these are estimated at USD0.0697 per tonne per km.[1]

240. From the same source, an international benchmark, with specific reference to Thailand gives road haulage costs at USD0.0660 per tonne-km.[2]

241. VITRANSS estimated economic operating costs are VND264 per passenger-km for cars and VN94 per passenger-km for buses.[3]

242. The same source estimated road haulage costs at VND546 per tonne-km, plus VND55,000 per ton for mobilisation/loading/unloading.[4]

243. Section VII.B.3.2 describes how distance-based road transport costs where entered into the GMS Transport Model.

D. Border Crossings

244. Currently, border crossings within the GMS can be characterised by delay. There is little published information on how long it takes to cross borders within the GMS. However, from anecdotal evidence for goods vehicles the process normally takes a several hours.

245. A recent study for the ADB of the Poipet (Cambodia)-Aranyaprathet (Thailand) by Le Drew suggests that at present import checks often take in excess of 4 hours for freight and passenger checks take an average of 40 minutes.

246. However, customs clearance for goods vehicles entering Myanmar can take substantially longer. During the Country Mission to Myanmar in May 2005, the Study Team were told that it typically takes 48 hours for trucks to enter Myanmar from Yunnan (PRC).

247. This is in part due to a lack of modern equipment, such as passport scanners and X-ray machines for the checking of cargoes. It is understood that PRC is granting one such X-ray machine to Myanmar costing approximately US$5 million, for use at Muse (Ruili being the equivalent Chinese border post). It is expected that this would reduce customs clearance times to within 24 hours.

248. Myanmar also stated that many customs officials could benefit from international training to speed up customs clearance.

249. The volumes passing through Ruili-Muse alone are substantial: estimated at approximately 500,000 MT of cargo two-way and over 2,500,000 people each way in

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[1] Source: *Assessment of Modal Competitiveness and Traffic Potential of Rehabilitated Railway in Cambodia, Final Report*, January 2004
[2] Ibid.
[3] Source: *The Study on the National Transport Development Strategy in the Socialist Republic of Vietnam (VITRANSS) Final Report Main Text*, Volume 2, p. 4-14.
[4] Ibid.

2004. Thus the value of lost time through customs and immigration delays is enormous.

250. It may also infer that there is substantial suppressed cross-border travel demand, which could be unleashed should customs and immigration procedures be sped-up.

251. An issue at most borders is that the majority of trucks are not permitted to operate within a second country. Hence a truck from the exporting country has to have its cargo de-stuffed and then re-stuffed into a lorry from the importing country. This is typically a manual exercise.

252. This procedure adds time and expense to trading. Furthermore, such arrangements make it very difficult logistically to arrange for trans-shipment through a third country (e.g., Thailand-Viet Nam via either Lao PDR or Cambodia) as three lorries would need to be scheduled to meet.

253. While there are some permits for operators to deliver (but rarely if ever to collect) in another country, they are limited in number. Relaxing the availability of these permits however needs to be weighed against the concerns of some countries that their domestic trucking industries could be wiped-out by competition from richer, better-organized neighbors. While such a move may well reduce transport costs for shippers, the concern is that it would also increase unemployment, at least in the short-term, within the poorer countries, where unemployment is already a major issue.

254. Thus it seems likely that the issue of relaxing cross-border permit restrictions may eventually be resolved. However, there will likely be a transitional phase of several years, while domestic trucking industries prepare themselves for competition.

255. As an aside, this also suggests that there may be requirements for international assistance in developing and enhancing the necessary skills/human resource requirements for such firms to prosper against foreign competition. If this were achieved, then once competition came, it would be more sustainable.

V. The Rail Subsector

A. Description and Key Issues

256. The rail subsector is currently present in all GMS countries with the exception of Lao PDR, although Lao PDR is expected to have a small line operational within a few years, connecting to Thailand.

257. While Thailand's network connects with Malaysia's network offering services as far south as Singapore, at present there are no cross-border rail services with other GMS countries.

258. While both Cambodia and Myanmar have domestic railway networks, neither country's rail network connects to any other country.

259. PRC's rail network is extensive nationwide and Yunnan and Guangxi connect to this. In addition, there is one line each between Yunnan and Viet Nam and between Guangxi and Viet Nam. These constitute the two external connections to Viet Nam's network.

260. In most instances rail speeds are relatively slow as compared to road.

261. Also, in most instances lines are single-tracked, further constraining the growth of the rail subsector.

1. Cambodia

262. Cambodia's rail network comprises two routes, one running south from Phnom Penh to Sihanoukville (264 km) and one running north to Sisaphon (337 km).

263. Cambodia's railway network has 1,000 mm track gauge and is single-track throughout. At present Cambodia's railway network handles freight but not passengers.

264. The performance of Cambodia's railway network is currently constrained due to poor track quality. However, rehabilitation works are in progress.

265. Cambodia's railway network formerly ran to Poipet, but the track between Sisophon and Poipet has been disused for some time. Furthermore, within Poipet much of the railway embankment has been built on. This complicates the issue of reclaiming the railway's alignment.

2. PRC

266. Rail has long been the backbone of PRC's national transport system. While the network in Guangxi is fairly extensive, the network in Yunnan is limited, relative to much of the rest of PRC.

267. PRC's national railway system uses 1,435 mm track gauge. However, the 468 km line from Kunming to Hekou uses 1,000 mm track gauge. This line is presently freight-only and connects to the Viet Nam railway system via Lao Cai. However, a new standard gauge alignment is being built between Kunming and Hekou/Lao Cai.

268. In addition to the Hekou-Lao Cai cross-border line, freight and passenger services operate between Guangxi and Viet Nam via the Friendship Pass. However,

the Nanning-Friendship Pass line uses 1,435 mm track gauge, as opposed to Viet Nam's 1,000 mm gauge.

3. Lao PDR

269. At present, Lao PDR does not have any operational railway.

270. It is anticipated that Lao PDR will have a railway spur connecting Thannaleng across the Friendship Bridge to Nong Khai, Thailand. It is expected that contractors will be appointed by the end of 2005 to commence construction work.

271. The State Railway of Thailand will manage this spur line. However, if and when Lao PDR's railway network expands, then Lao PDR may manage her own railways.

4. Myanmar

272. Myanmar has an extensive railway network, with a total route mileage of 2,974 miles (4,785 km) and a total track mileage of 3,860 miles (6,210 km). There are 739 stations in all.

273. Myanmar's railway operates a track gauge of 1,000 mm and is predominantly single-tracked.

5. Thailand

274. Thailand's railway network extends to over 4,000 km. It is predominantly single-track.

275. Thailand operates 1,000mm track gauge.

276. Once the spur line across the Friendship Bridge to Lao PDR is completed, it is envisaged that State Railway of Thailand will manage and operate all services on this track.

277. The average operating speed of Thailand's railways is 27kph for freight trains.

6. Viet Nam

278. Viet Nam's railway network has approximately 2,600km of track, mainly single-track.

279. Most of Viet Nam's rail network has a 1,000mm track gauge. However, the Hanoi – Dong Dang (162 km) and Hanoi – Quan Trieu (75 km) tracks are mixed gauge, offering both 1,000mm and 1,435mm track gauge. In addition, the Kep – Uong Bi – Ha Long (106km) and Kep – Luu Xa (57km) tracks have a 1,435mm track gauge.

7. Summary

280. Rail offers the possibility of efficient long-distance transportation, especially for freight. However, aside from PRC-Vietnamese trade, this cannot happen until such time as the GMS's rail networks link across borders.

281. However, rail infrastructure requires large upfront capital investment (especially as compared to road). Furthermore, substantial human resource

development is required to successfully, efficiently and effectively operate a rail network. The human resource issue may be critical in Cambodia and on any future Lao PDR rail systems.

B. Modeling Requirements for the Rail Subsector

1. Connectivity with Other Modes

282. While rail has reasonable coverage in several areas of the GMS, to get freight (and passengers) to and from loading yards/railway stations still requires connectivity to road networks.

283. Equally, rail can serve as a feeder to water transport.

284. At each railway station a link is coded between the railway and the adjacent highway and/or water node as appropriate. This link then holds those costs associated with inter-modal transfer to/from rail.

2. Link Classifications

285. Rail links were classified based on whether they are single or double-track. While track gauge is not considered explicitly, these data were recorded in the network inventory.

286. Estimated operating speeds were set by groups of track sections (rail links), typically corresponding to different lines.

287. No speed-flow relationships were coded for rail. Rail lines were assumed to operate at a given speed irrespective of traffic levels. This is a common assumption in transport modeling. It was also necessary as in most instances data on rail lines' capacity were not available.

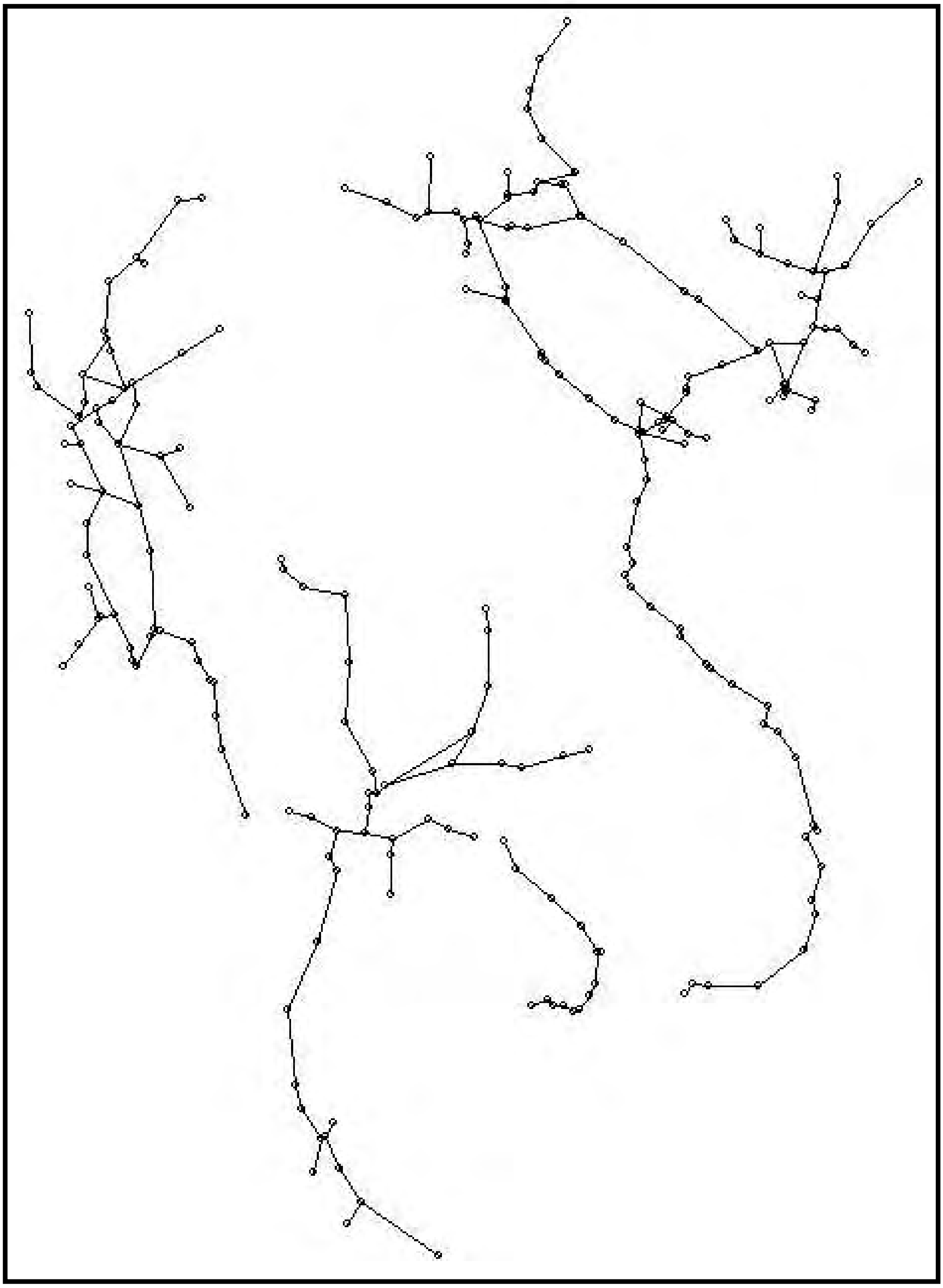
288. Freight haulage/passenger charges/fares per km were coded onto the rail links and these are considered during the assignment model's path building. Rail costs are discussed in Section 5.C below.

3. Network Topology

289. The GMS railway networks are shown in Figure 5-1, as coded into the GMS Transport Model.

290. The lack of cross-border connections (excepting PRC-Viet Nam) results in there being four different networks in the rail subsector.

Figure 5-1: GMS Railway Network



C. Rail Transport Costs

291. This section outlines some of the rail tariff and fare data collected.

292. Section VII.B.3.2 describes in more detail how these were used in the GMS Transport Model.

1. Cambodia

293. At present, distance dependent costs for freight trains are assessed to be USD0.0062 per tonne per km, with a time dependent cost of USD0.402 per tonne per hour, giving an overall cost of USD0.033 per tonne per km.[1]

294. It is expected that following full rehabilitation transport costs will reduce to USD0.018 per tonne per km.[2]

295. Freight transfer between truck and rail costs about USD0.50 per tonne.[3]

2. PRC

296. Both passenger and freight tariffs were obtained from Guangxi; these are shown in Tables 6-1 and 6-2 respectively.

297. These values (for Guangxi) will also be applied to rail services in Yunnan.

Table 5-1: Guangxi Rail Passenger Tariffs (RMB per passenger per km)[4]

	Old Trains		Air-conditioned					
			Published Fare		Discount #1		Discount #2	
Fare	Ordinary	Fast	Ordinary	Fast	Ordinary	Fast	Ordinary	Fast
From	0.116	0.128	0.19	0.208	0.176	0.192	0.165	0.181
To	0.121	0.133	0.196	0.214	0.182	0.198	0.17	0.186

Note: Discount #1 is the best representation of fares usually received.[5]

Table 5-2: Guangxi Rail Freight Tariffs (RMB per Tonne)[6]

Tariff Component	Amount
Fixed Component	RMB13.00 per Tonne
Distance-Based Component	RMB0.755 per Tonne per km

3. Lao PDR

298. Given that State Railway of Thailand are expected to be responsible to running Lao PDR's railway when it opens, the same costs from Thailand will be applied.

[1] Source: *Assessment of Modal Competitiveness and Traffic Potential of Rehabilitated Railway in Cambodia, Final Report*, January 2004
[2] Ibid.
[3] Ibid.
[4] Source: Liuzhou Railway Bureau
[5] From spoken clarification of fares by official from Guangxi.
[6] Source: Liuzhou Railway Bureau

4. Myanmar

299. Rail freight tariffs in Myanmar are about 6 kyats per ton-mile.

300. Rail passenger fares in Myanmar are calculated as about 3.8 kyats per passenger-mile.[1]

5. Thailand

301. Freight tariffs are approximately USD0.0101 per tonne per km.[2]

6. Viet Nam

302. The economic operating costs of Viet Nam's railways are VND209 per passenger-km and VND263 per tonne-km, with a VND91,000 per tonne loading/unloading charge in addition.[3]

D. Border Crossings

303. At present there are only two rail border crossings within the GMS, namely Hekou (Yunnan) – Lao Cai (Viet Nam) and Friendship Pass (Guangxi – Viet Nam).

304. Cargoes arriving by rail in Viet Nam from Guangxi (PRC) for destinations beyond the immediate border have to be transferred from one train to another; and this too is usually a time-consuming, manual exercise.

305. If cross-border rail services do expand elsewhere, in order to maximise the benefits of any such connections, there would need to be appropriate agreements in place allowing in the first instance, railway operators from either country to pick-up and set-down passengers and cargo in either country. Having to transfer between trains at borders would be economically wasteful and reduce the potential benefits of any such connections.

306. However, in the longer term more complicated arrangements would also need to be considered. For example, should Bangkok-Phnom Penh-Ho Chi Minh City services be launched, then all three operators should have rights to operate in one another's' territory on those routes, presumably with a charging mechanism for use of track. This would allow, for example, Cambodia to charge Thai and Vietnamese trains for use of Cambodian permanent way and use these proceeds to upgrade and maintain their rail network.

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[1] As requested by Myanmar at the Final Meeting on the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006, railway costs in Maynmar have been expressed in kyat(s). See Summary of Proceedings, paragraph 25. Miles have also been used instead of km, as is customary practice in the country.
[2] Source: Assessment of Modal Competitiveness and Traffic Potential of Rehabilitated Railway in Cambodia, Final Report, January 2004
[3] The *Study on the National Transport Development Strategy in the Socialist Republic of Vietnam (VITRANSS) Final Report Main Text*, Volume 2, p. 4-14.

VI. The Water Transport Subsector

A. Introduction

1. Overview

307. The water transport subsector offers the possibility of cheap, bulk freight transport along those corridors where this is feasible. However, by the very nature of waterways and the terrain in the GMS, the water "network" in fact breaks down into a number of separate systems, namely:

- Lancang Mekong: which itself can be broken down into the Chinese sections, the sections running alongside/through Lao PDR (Upper Mekong) and the Lower Mekong (through Cambodia and Viet Nam);
- Red River System in northern Viet Nam;
- Ayeyawady and Lower Chindwin Rivers, in Myanmar; and
- Chao Phraya and Tachin River Systems, in Thailand.

308. As a consequence, most of the IWT network serves domestic transport, or in the cases of cities such as Yangon, Phnom Penh, Bangkok and Ho Chi Minh City, riparian access to maritime routes. However, by-and-large the IWT system is under-developed, in that it serves primarily short-distance traffic, which is largely domestic.

309. Data on these short-distance journeys are also hard to obtain.

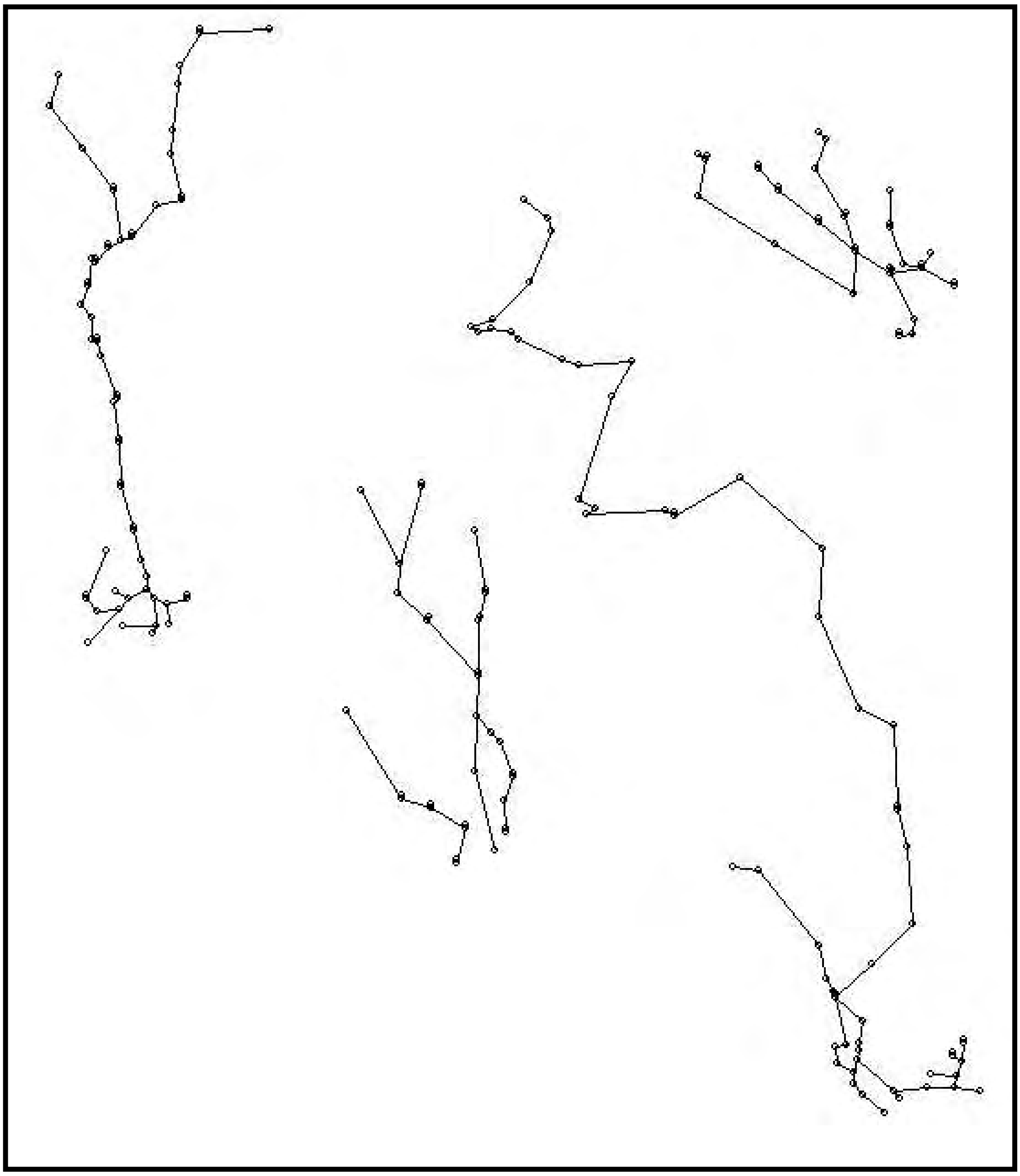
310. A further consideration with IWT is that, even more so than rail, inter-model interchange is critical to developing the sector. Unless the origins and destinations of cargoes (especially bulk cargoes) happen to be near ports, road or rail connectivity to modern, efficient ports are essential. Without these the catchment areas for water transport are limited.

311. It is perhaps not surprising therefore that the areas where waterways are most used are typically also those areas with fairly dense transport networks of other modes, such as in the Mekong Delta, the Red River Delta and in Central Thailand.

312. Figure 6-1 shows the Inland Waterway Transport network as coded in the GMS Transport Model. This illustrates the separation of IWT into a number of separate networks within the GMS.

313. This figure does not show seaport connections per se, unless a seaport happens to also be represented as a node on one of the IWT networks.

Figure 6-1: GMS IWT Network



2. Lancang-Mekong River

314. While the Lancang-Mekong River itself is international, crossing or bordering all six GMS countries, at present there is minimal international traffic from PRC. Likewise, there is negligible official traffic to/from Myanmar on the Mekong.

315. While there are programs to dredge the Lancang-Mekong in PRC and Lao PDR (including the sections abutting Thailand and Myanmar) at present, traffic is overwhelmingly short-distance and domestic above the Khone Falls. The Khone Falls themselves, near the Lao-Cambodian border make navigation between the Lower and Upper Mekongs impossible at present.

316. Recently, Thailand has been developing port facilities on the Upper Mekong in its northern Chiang Rai Province. Chiang Khong port has been operational since December 2003 (officially opening in January 2004). In addition, a port at Chiang Saen is currently being evaluated. These ports are intended to boost Yunnan-Thailand trade, as the Upper Mekong is dredged.

317. However, the programs to dredge the Upper Mekong in particular need to take into account impacts on the river’s biodiversity, as many rely on the river’s varied fish stocks for sustenance.

318. Given that at present channel navigability (in terms of dry season constraints and maximum vessel size constraints) are the main constraints on riparian transport, any quantum improvements in navigability could substantially improve the economics of transport along the Upper Mekong. This in turn could potentially lead to substantial increases in the volumes of river trade.

319. There is substantial shipping in the Lower Mekong, primarily from Phnom Penh downstream towards the Delta and within the Mekong Delta in Vietnam.

320. There is also some traffic between the Tonle Sap River and the Mekong in Cambodia (the two converge at Phnom Penh). Likewise, the Mekong and Bassac Rivers split near Phnom Penh and there is traffic between the two.

321. Similarly, there is significant traffic between the Mekong, Bassac and other delta tributaries within Viet Nam.

322. However, there is a dearth of reliable statistics on the domestic river transportation within Cambodia and within Lao PDR.

3. Red River

323. Although originating in the PRC, at present there is no international navigation between PRC and Viet Nam along the Red River. The Red River is navigable as far upstream as Lao Cai, near the border with PRC.

324. The Red River Delta system provides riparian connectivity within northern Viet Nam. While there are significant traffic volumes within the Red River System, much of this appears to be for domestic Viet Nam traffic, although there is connectivity with seaports, such as Hai Phong and Ha Long.

4. Ayeyawady and Chindwin River System

325. Myanmar’s riparian traffic is concentrated on the Ayeyawady and Chindwin River Systems.

326. However, certain key sections of these rivers are either passable only seasonally, or barely at all. For example, the section of the Chindwin between Monywa and its confluence with the Ayeyawady is passable only in the high water season. Similarly, the Government of Myanmar views the Ayeyawady north of Bhamo as a missing link.

327. Officials in both Myanmar and Yunnan mentioned the possibility of linking southwest PRC to the Gulf of Martaban and the Indian Ocean through opening up both the upper reaches of the Ayeyawady and land bridges between Yunnan and Myitkyina and/or Bhamo. However, for the time being at least, Myanmar’s navigable waterways offer only domestic transport routes. Maintenance is required to obtain at least two-meter depth for the linking of southwestern PRC to the Inidan Ocean.

5. Chao Phraya and Tachin River Systems

328. While Thailand has access to the Mekong, as previously mentioned, these sections of the Mekong cannot access the sea. In addition, capacity is constrained by current dimensions, including seasonal limitations on navigation along much of the Mekong. Hence Thailand’s riparian transport concentrates on the Chao Phraya and Tachin River Systems.

329. The Chao Phraya and Tachin River Systems are augmented by a number of smaller tributaries, such as the Khwae Noi and Maeklong Rivers, as well as by a number of canals.

330. These waterway systems form an important component of Thailand’s transport system, and enable access to the Gulf of Thailand. However, they do not offer transport to/from other GMS countries.

6. River Systems in Guangxi and Yunnan

331. The Lancang-Mekong’s headwaters are in PRC and there is limited short-distance navigation within PRC. However, there is not at present large-scale navigation from PRC south to Lao PDR, although the benefits of this are being actively discussed.

332. The Red River is not currently navigable from Yunnan into Viet Nam.

333. Guangxi’s river transport system is more closely tied to southern PRC, offering some connectivity with the Pearl River via Guangdong. As such, this does not directly serve the rest of the GMS.

334. While land transport to southern PRC via Guangxi is possible, water-based transport to southern PRC is better suited to coastal or maritime transport. An exception is Yunnan, which is linked to Guangxi by both road and rail, from which Yunnanese cargoes could proceed by river to southern PRC. However, Guangxi’s riparian transport systems are not seen as critical to the rest of the GMS.

B. Modeling Requirements for the Water Transport Subsector

1. Connectivity with Other Modes

335. As previously discussed, while water offers an economical means to transport goods and people, without connecting road or rail services its traffic catchment area is severely curtailed. Thus the success of water transport is often dependent on good inter-modal interchange.

336. In addition, at present in many places IWT is predominated by short-distance, local traffic, which is not a focus of this Study.

337. Consequently, those ports coded into the network are those where longer-distance transport is either existing or anticipated. Such ports have connecting highway and/or railway links.

338. At each port a link is coded between the port and the adjacent highway and/or rail node as appropriate. This link then holds those costs associated with inter-modal transfer to/from IWT.

2. Link Classifications

339. Waterway links are differentiated based on any constraints on transport on the link (e.g., depth, width, and seasonality).

340. The assignment modeling for waterways relied on typical journey speeds, rather than on capacity-restraint speed-flow relationships, as was the case for rail links. As such, capacity per se is not used in the link coding. However, penalties are placed on specific links reflecting those sections where flow is hindered, e.g., where larger vessels may not pass.

341. In addition, freight haulage/passenger fares per km are coded onto the waterway links and these are considered during the assignment model's path building.

3. Treatment of External Legs of Shipping Routes

342. In some instances IWT overlaps with maritime transport. For example, some ports along the Lower Mekong serve both riparian and ocean-bound ships. However, for consistency with the modeling system used in the rest of the GMS Transport Model, external sea connections were assumed to be via seaports.

343. Consequently some ports were coded both as IWT and separately as a seaport (via another node linked to the riparian port).

C. Water Transport Costs

344. Given that much IWT traffic is short-distance and not always captured in statistics, transport costs for IWT are likewise not always easy to identify. Nevertheless, some data were gleaned from reports and discussions during country visits, as outlined below.

345. Section VII.B.3.2 describes how these data were applied within the GMS Transport Model.

1. Cambodia

346. A 2004 study[1] commented that the most important IWT movements in Cambodia are between Phnom Penh and the Viet Nam border. Furthermore, as such movements are typically just part of a longer haul, it can be difficult to isolate the IWT component of cost reliably, so "it was not possible to obtain the price for the trip between Sihanoukville to Singapore or Phnom Penh and Ho Chi Minh.€[2] 35

347. While that study did get a quote of USD7 per tonne for cement from Thailand to Sihanoukville, this excluded port handling charges and feeder transport costs. In addition, it was noted that discounts of 10%-20% are commonplace, subject to negotiation. [3]

348. Subject to the above provisos, that Study estimated a fare of USD0.88 per tonne for a 100km maritime journey, travelling at 20kph or USD1.17 per tonne for a 100km coastal or inland waterway journey, travelling at 5kph. These figures were based on underlying rates of USD0.1755 per tonne per hour for maritime transport and USD0.0585 per tonne per hour for coastal/river transport. [4]

349. In addition, cargo handling charges for both containers and bulk cargo were obtained, as shown in Tables 6-1 and 6-2.

350. While much IWT passenger transport is also short-distance, during the country visits, some data on passenger boat fares were collected. Travel from Phnom Penh to Siem Reap cost USD22 per passenger one-way and from Phnom Penh to Chau Doc (Viet Nam) cost USD15 per passenger one-way. These fares are notably higher than equivalent bus fares; these boat fares might not be wholly representative as these are services frequented by and aimed at tourists rather than locals.

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[1] *Assessment of Modal Competitiveness and Traffic Potential of Rehabilitated Railway in Cambodia, Final Report*, January 2004.
[2] Ibid.
[3] Ibid.
[4] Ibid.

Table 6-1: Container Handling Charges at Sihanoukville and Phnom Penh Ports, 2004 (USD)[1]

	Sihanoukville				Phnom Penh			
	Ship to Warehouse		Lift-on and Lift-off		Ship to Warehouse		Lift-on and Lift-off	
Container	Ship Gear	Crane	Warehouse-Truck	Warehouse-Wagon	Ship Gear	Crane	Warehouse-Truck	Warehouse-Wagon
20' full	57	73	46	57	57	72	46	57.5
20' empty	30	40	23	28	30	38	23	28.75
40' full	85	110	62	78	85	115	62.5	78
40' empty	45	55	44	55	45	61	44	55

Table 6-2: Stevedoring Charges at Sihanoukville and Phnom Penh Ports, 2004 (USD per Tonne)[2]

	Sihanoukville					Phnom Penh				
	Base Cost	Ship to		Warehouse to		Base Cost	Ship to		Warehouse to	
		Jetty	Warehouse	Truck	Wagon		Jetty	Warehouse	Truck	Wagon
Bulk Cargo	1.46	2.48	2.77	1.83	2.04	1.46	2.92	2.92	1.97	2.19
Cargo in bags	1.58	3.16	3.5	2.5	2.68	1.58	3.16	3.16	2.13	2.37
Fresh fruit	2.92	4.96	5.55	3.65	4.09	2.92	4.84	5.84	3.94	4.38

[1] Source: *Assessment of Modal Competitiveness and Traffic Potential of Rehabilitated Railway in Cambodia, Final Report*, January 2004
[2] Ibid.

2. PRC

351. IWT in PRC at present either relates to small-scale local shipping in Yunnan or routes from Guangxi east to Guangdong.

352. No IWT traffic or cost data were received and these modes have not been considered in Yunnan or Guangxi within the transport model.

3. Lao PDR

353. As previously discussed, IWT in Lao PDR along the Mekong tends to be by small vessels on local trips. No data on costs were available.

4. Myanmar

354. Inland water freight tariffs in Myanmar are 6 kyats per ton-mile[1], or USD0.008287 per ton-km[2].

355. Inland water passenger fares are calculated at 3.8 kyats per mile[3], or USD0.005248 per passenger km[4].

5. Thailand

356. No data on waterway transport tariffs/fares in Thailand were collected.

6. Viet Nam

357. IWT cost data for Viet Nam were obtained.

358. Vessels are typically charged VND150 per DWT to enter ports.

359. Average distance-based tariffs are VND300 per tonne-kilometre for containerised cargo and on average AVD214 per tonne-kilometre for bulk cargoes.

360. In addition, cargo handling charges at ports average VND8,000 per tonne for bulk.

D. Cross-Border Inland Water Transport

361. As stated above, aside from the Lancang-Mekong system (Bassac River included therein), there are few navigable cross-border water routes. Furthermore, current volumes between PRC, Myanmar, Lao PDR, Thailand and Cambodia on the Upper Mekong are currently very small.

362. The main constraint on waterway transport at present thus appears to be channel navigability rather than cross-border issues.

363. Nevertheless, in the event that channel navigability issues are resolved (some dredging programs are in progress and others under consideration), then more

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[1] Source: Government of Myanmar
[2] This assumes an exchange rate of USD1=450 kyats, which is the approved exchange rate. At the market exchange rate, this figure becomes approximately USD0.0041 per ton-km.
[3] Source: Government of Myanmar
[4] Based on USD1=450 kyats.

attention would need to be given to facilitating legitimate cross-border riparian transport, as well as enforcement against smuggling operations. Indeed, improving riparian transport on the Mekong, in terms of increasing vessel size (particularly during the dry season) could markedly change the economics of riparian transport. This in turn could accelerate the development of cross-border riparian trade.

364. Within the Lower Mekong, there is substantial traffic between Cambodia and Viet Nam, as well as shipping traffic to/from Phnom Penh using the Lower Mekong for access/egress.

365. However, during discussions with the Mekong River Commission, it emerged that there are constraints on maritime vessels using the Bassac River, which in fact would offer a more direct route to the South China Sea. This is despite the fact that the Bassac River is suitable for navigation by maritime vessels.

366. As trade volumes increase restricting Cambodian shipping to the Mekong may place capacity constraints on the River.

367. Furthermore, the expected growth on Can Tho (situated on the Bassac) into a major port, it would make more sense to enable shippers to offer services calling at Phnom Penh and Can Tho to/from other international ports (e.g., Hong Kong, China; Singapore).

368. Indeed a further specific concern regards the Vam Nao Pass, linking the Mekong and Bassac rivers south east of Chau Doc. The Mekong River Commission expressed concern that this might become a capacity constraint on traffic both between the Mekong and Bassac rivers and, as a consequence, on shipping to/from Cambodia.

E. Seaports

1. Cambodia

369. Cambodia's main seaport is Sihanoukville. In addition, via the Mekong and Bassac Rivers, sea-going vessels serve the port of Phnom Penh.

370. Cambodia has one further, small seaport at Koh Kong, near the Thai Border. This port handles small boats and annual throughput is estimated at under 150,000 MT per annum.

2. PRC

371. Within the GMS, PRC has a number of ports in Guangxi. These include Beihai, Fangchenggang and Qinzhou.

372. Data on cargo throughputs at these ports were obtained from the Guangxi Statistical Yearbook.

3. Lao PDR

373. Without a maritime coastline and given that the Khone Falls make navigation between Lao PDR and the South China Sea impossible, Lao PDR does not have any seaports.

4. Myanmar

374. Myanmar has a number of coastal ports, particularly in the south of the country, the major port location remains the capital, Yangon. Sittwe in the west serves as a secondary, far smaller seaport.

5. Thailand

375. Thailand has a number of seaports as named in Section III.F. The most important, in terms of volumes are Rayong and Chon Buri. In addition, sea-going vessels can travel pat of the Chao Phraya River System, for instance to/from Bangkok.

6. Viet Nam

376. Given its geographic location and long coastlines, Viet Nam has numerous seaports along its coast. These are in addition to those ports connected to inland waterways, such as Ha Long and Ho Chi Minh City.

VII. Transport Modeling Approach and Test Outputs

A. Introduction

377. The approach to transport modeling must satisfy the objectives of the TA as spelt out in Chapter I, within the confines of the quality and quantity of data available, as described in Chapter III.

378. JICA STRADA Version 2.1 was used for the development of the main transport model components, in conjunction with spreadsheet-based modeling and evaluation components.

379. The model developed covers both passenger and freight traffic, with eight matrices assigned, namely:

- Motorcycle passengers;
- Car passengers;
- Bus passengers;
- Rail passengers;
- Waterway passengers;
- Road freight (tonnes);
- Rail freight (tonnes); and
- Waterway freight (tonnes).

380. Section VII.B outlines the modeling approach and structure to develop the Base Model (for the current situation in year 2004).

381. Section VII.C describes the approach for the forecast model (year 2015).

382. Section VII.D describes the approach for scheme testing.

383. Section VII.F describes the approach for scheme evaluation.

384. As previously mentioned, air transport will be considered separately for a number of reasons, including the following:

- Air traffic volumes (both passenger and especially freight) are typically very low as compared to surface modes;
- Cost structures are typically very different;
- Air transport typically serves very different market segments to long-distance surface transportation; and
- Air transport is often influenced by regulatory factors (e.g., air services agreements) and commercial factors (e.g., presence or absence of discount

air lines) to a much greater extent, relatively speaking, than surface transportation.

385. Air transport modeling and test outputs are described in Chapter VIII.

B. Modeling Approach and Structure for Base Year (2004)

386. The approach and structure to develop the base year (2004) model comprises the following components:

1. Network Data

1.1 Introduction

387. In their simplest form, network data are links between nodes; wherein nodes represent towns and cities, or key junctions, and links represent stretches of road/rail/ waterway between these nodes. This is the network topology.

388. Annex Two shows a plot of the multi-modal surface transport network coded.

1.2 Network Topology

389. The network topology defines the coverage of the network model, both in terms of how wide an area is covered and in how much detail it is covered.

390. Given that highways tend to have the most geographic coverage (or penetration) it is normal for the highway network to contain the greatest number of nodes and links. The railway and waterway networks are then defined primarily with reference to the highway network, although the coding of the highway network must also take into account key railheads and ports, to ensure adequate coverage and connectivity across the entire network model.

391. The network topologies for highway, railway and waterway were defined with reference to:

- Discussions held during the Country Visits, regarding the relative importance of different routes to the various countries;

- The relative importance of different network sections to cross-border transport within the GMS; as a number of border crossings are currently on "back roads" these nevertheless had to be included within the networks; and

- Future network plans; the base year network had to be developed with future infrastructure schemes in mind, both those that would be included in the future year "Do Minimum" case (see Section VII.C) and schemes which may be evaluated as part of this transport sector strategy study.

392. These network topologies were then defined on base-maps and with reference also to other documents and data obtained during the Country Visits, such as the Asian Highway Database and ASEAN Highway Database (in the case of highways) as well as both schematic diagrams and more formal maps or rail and waterway networks.

1.3 Nodes

393. Nodes were coded for each mode, representing:

- Towns and junctions: for highways;
- Ports and channel confluences, for waterways; and
- Key stations and railway junctions, for railways.

394. Where there is interchange possible between modes (e.g., at ports, or railway stations), the nodes corresponding to different modes at the same location were related to one another, such that an interchange link could be coded (see below).

1.4 Links

395. Links connect these nodes, representing sections of road, rail and waterway as appropriate.

396. The properties associated with these links include:

- Length (distance between nodes).
- Standard: in the case of highway links, related to Asian Highway definitions; in the case of railway links, whether single- or double-track and operating speed; in the case of waterway links, a transport speed and whether the link is passable year-round or seasonally and whether the size of vessels is constrained; these definitions are explained in more detail in Chapters IV, V and VI for road, rail and waterway links respectively.
- Terrain: in the case of road links, where data were available, terrain varies between 1 (100% level), 0 (100% rolling) and -1 (100% mountainous). Although these numbers are not ported into STRADA they are used to determine other values of other link characteristics that are input into STRADA.
- Surface quality: in the case of road links, where data were available, terrain varies between 1 (100% good condition), 0 (100% fair) and -1 (100% poor). Although these numbers are not ported into STRADA they are used to determine other values of other link characteristics that are input into STRADA.
- Link capacity in terms of PCUs per day: or rather in implied tenths of PCUs to allow for the multiplication of trip matrices by 10 to take account of JICA STRADA's handling of trips as integers rather than floating point variables. For rail, water and interchange links, these capacities are wholly notional.
- Freeflow (uncongested) speed in kph: which for highway links varies by standard, terrain and quality; for rail, water, border and interchange links, the freeflow speed is taken as the speed throughout the assignment procedure.
- An index to a Speed-Flow Curve: wherein the volume-capacity ratio is related to a delay factor, by which freeflow speed is in turn multiplied to obtain a link speed which takes account of congestion.

- Travel costs on either a passenger-km or tonne-km basis (where appropriate separate values for containers and bulk were entered), which could refer to distance-based or fixed costs as appropriate.[1]

- Which mode(s) can use the link. Highway-based trips can use only road links. Railway-based trips can use both road and rail links (although passengers are barred from freight-only railways). Water-based trips can use all links.[2]

397. The Asian Highway Database and ASEAN Highway Database contain information on road standards, terrain and surface quality and section lengths. Data on links included in these databases were thus extracted from these databases. For other highway links included in the network, lengths and other data were taken from reports or notes of meetings from the country visits (if available) or from maps, with benchmarking checks made against data on those links nearby which were included in reports or the highway databases.

1.5 Interchange Links

398. In addition to the links representing transport routes, interchange links were coded between road, rail and waterway nodes as appropriate. The purpose of these links is twofold, namely:

- To permit intermodal interchange between road, rail and waterway as appropriate; and

- To store costs associated with such interchange as appropriate, which may relate to loading/unloading or other costs of transfer.

2. Zoning and Initial Trip Matrices

399. Chapter II outlined the zoning system developed. With over 200 internal zones, relatively detailed analysis is facilitated. However, by grouping zones into groups (zoning sectors; as outlined in Chapter II), efficient data processing is still possible.

400. Trip matrices are defined in terms of persons (for passenger transport) and tonnes (for freight transport). Furthermore, for consistency with the structure of the network models and to allow for testing of the impacts of schemes on individual transport subsectors, in addition to inter-modal transport, separate trip matrices are prepared for road-based transport, rail-based transport and water-based transport. The process used to define initial prior matrices was described in Section III.D.

401. Trip matrices refer to Annual Average Daily Total traffic movements.

402. It should be remembered that intrazonal traffic (that which both originates and destinates within the same zone) cannot be modeled. Such movements are thus set to naught within the matrices.

[1] Fixed costs were specified on a passenger or tonne basis, rather than by passenger-km/ tonne-km.

[2] However, road distance costs for rail- and water-based transport and rail distance costs for water-based transport are arbitrarily increased to encourage those trips to be assigned to their “base mode.€35

403. The zoning system and trip matrices constitute the demand side of the GMS Transport Model. Annex Three contains a plot of the 2004 network with zone centroid locations overlayed, showing a relatively dense coverage of zones.

3. Behavioral Parameters

404. In order to enable the trip matrices to be assigned onto the transport networks, a number of behavioral cost parameters are required, specifically:

- Distance-based costs, such as vehicle operating costs (e.g., for private cars/motorcycles), passenger fares/freight tariffs for transportation; and

- Value of time, which is used to determine the equivalencing of time-based and money-based transport costs.

405. It is normally advisable to base these costs on empirical values, if available. However, empirical data on these parameters were sparse.

406. For freight transportation, where its commercial nature arguably ensures a close match between financial and behavioral values, some freight rates were collected.

407. Those behavioral parameters adopted are outlined below.

3.1 Values of Time

408. STRADA applies one Value of Time (VOT) per matrix. Thus while eight separate VOTs could be applied (corresponding with the eight trip matrices assigned), in each case the value chosen should reflect the average VOT across the GMS.

409. In order to derive the most representative VOTs, in each case the relative proportions of vehicle kilometres within each country were extracted from early assignment model runs. This was done for each mode in turn.

410. Furthermore, passengers using different modes typically have different Values of Time, in line with differences in wealth. Consequently, while mean VOTs were calculated for each country in turn based on wage data, these were factored up or down depending on the vehicle type. Car passengers were deemed to have a higher VOT than motorcycle passengers, who in turn had a higher VOT than bus passengers.

411. In addition, road-based passengers (and freight) were assumed to have a higher VOT than rail-based ones, who in turn were assumed to have a higher VOT than water-based ones.

412. The VOTs applied in the GMS Transport Model for the 2004 Base Year are shown in Table 7-1, in USD per hour.

Table 7-1: 2004 Values of Time by Trip Matrix

Matrix	VOT (USD per hour)
Motorcycle Passenger	0.777
Car Passenger	2.331
Bus Passenger	0.825
Rail Passenger	0.452
Water Passenger	0.461
Road Freight (per Tonne)	0.208
Rail Freight (per Tonne)	0.044
Water Freight (per Tonne)	0.018

413. That water passengers have a higher average VOT than rail passengers is due to the relative proportions of passenger kilometres from different countries in either group (based on preliminary assignments of the GMS Transport Model).

414. Given the differences in wealth between different countries, inevitably this means that in particular countries the VOT used may be quite different from those that would be applied in the case of a single-country model.

415. Similarly, aside from specifying different VOT by vehicle type (see below), it was not feasible to sub-divide travelers further into wealth cohorts. Such an approach might be recommended for further investigation of transport schemes within the context of corridor models, especially in the case of high-speed rail or tolled highway projects.

416. In order to generate “true” behavioral VOTs, Stated Preference surveys are usually required, which can be resource-intensive. But they might be worthwhile for countries lacking such data, especially in evaluating travelers’ willingness-to-pay for new tollways, or when replacing a ferry with a tolled bridge.

417. However, given the low-income levels in some countries in the GMS, there may be other problems in measuring VOTs. A study in Lao PDR found a car user’s value of time to be around USD1.00 per hour, while passenger values of time for users of other modes was “estimated to be insignificant.”[1] The same study was unable to determine a value of time for freight transport. Similarly, a behavioral value of time for freight transport does not appear to be given in VITRANSS[2].

3.2 Behavioral Distance-Based Costs

418. Distance-based costs relate to different costs, depending on the trip matrix in question. For motorcycle and car passengers these relate to vehicle operating costs. For bus, rail and water passengers, these relate to public transport fares. For freight, they relate to freight transport tariffs.

419. Whereas VOTs pertain to trips and so are coded per matrix, distance-based costs are dependent upon and coded onto links within the model. As such, they can vary by country, as well as by link standard. For example, a higher distance-based cost can be entered onto lower grade links (e.g., those of lower class, poorer quality and/or less level terrain).

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[1] Source: *Transit Fee and Tolling for Routes 3 and 9 Lao PDR TA 3348, Final Report*, April 2003.
[2] Source: *The Study on the National Transport Development Strategy in the Socialist Republic of Vietnam (VITRANSS)*.

420. It should be noted that the distance-based costs discussed here are not necessarily the same as those economic costs used post-assignment to evaluate schemes.

421. Behavioral costs are discussed here; as such they do not necessarily require an empirical basis, other than assisting the assignment model in generating accurate routeings across the network. However, it is generally preferable if they can be derived with reference to empirical sources.

422. Also, in the case of freight it is sensible that these bear a reasonably strong correlation with freight haulage costs. Although given that these can vary by journey length, some approximation may be required.

423. The starting point in estimating distance-based costs was to use data on road haulage from Cambodia, Thailand and Viet Nam. These were taken to be USD0.0663 per tonne-km and USD0.0697 per tonne-km on tollroads in Cambodia[1]. Road haulage costs in Thailand were estimated at USD0.0660 per tonne-km[2]. Road haulage costs in Viet Nam were estimated at USD0.0585 per tonne-km[3].

424. These rates were applied to good quality, level Class 2 roads. Coded costs increased with poorer road quality and with steepness of terrain. Costs decreased with roads of a higher class and increased on lower class roads.

425. Motorcycle, car and bus behavioral distance-based costs were estimated with reference to these goods vehicle costs also.

426. For rail transport, rail fares/tariffs collected were applied to the GMS Transport Model. However, rail tariffs and passenger fares sometimes vary with journey length and often a variety of passenger fares are available.

427. The rail fares adopted are given in Table 7-2.

428. Where ranges are given, different fares/tariffs are specified for different lines. Cambodia's rail network does not presently transport passengers. Lao PDR does not currently have rail services.

Table 7-2: Rail Fares and Tariffs Adopted

Country	Passenger Fare (USD per passenger-km)	Freight Tariff (USD per tonne-km)
Cambodia	n/a	0.033
PRC	0.024	0.091
Lao PDR	n/a	n/a
Myanmar	0.011 – 0.017	0.027 – 0.047
Thailand	0.009 – 0.011	0.010
Viet Nam	0.010 – 0.019	0.013 – 0.024

[1] Source: *Assessment of Modal Competitiveness and Traffic Potential of Rehabilitated Railway in Cambodia, Final Report*, January 2004.
[2] Ibid.
[3] Source: *The Study on the National Transport Development Strategy in the Socialist Republic of Vietnam (VITRANSS) Final Report Main Text*, Volume 2, p. 4-14.

429. Data on waterborne passenger fares and freight tariffs were sparse. Some data available for the Lower Mekong on freight tariffs[1] and some data for passenger fares were applied for five of the six GMS countries (there was very little IWT coded for PRC). As separate values were available for Myanmar, these were used for Myanmar. The values adopted are given in Table 7-3.

430. It seems likely that there are a variety of fares and tariffs available for waterborne transport. However, these data were not available. In any event the values used are sufficient for a strategic model such as the GMS Transport Model. However, should the GMS Transport Model be converted for use in a more detailed study of a smaller area, then water-based fares and tariffs might be more closely examined.

Table 7-3: Waterway Fares and Tariffs Adopted

Country	Passenger Fare (USD per passenger-km)	Freight Tariff (USD per tonne-km)
Cambodia	0.004	0.012
PRC	0.004	0.012
Lao PDR	0.004	0.012
Myanmar	0.005	0.008
Thailand	0.004	0.012
Viet Nam	0.005	0.015

3.3 Other Fixed Costs

431. In addition to distance-based costs, a number of fixed costs and penalties were coded into the network model. These included monetary and time penalties for conducting inter-modal interchange. This was to minimise the prevalence of trips switching back-and-forth between different modes, which can happen in routeing (assignment) models when there is no coded interchange penalty, even though such behaviour would be deemed counter-intuitive.

432. In addition, borders were also penalised. Primarily these penalties reflect genuine delays at borders, for customs and immigration clearance, often queuing beforehand, as well as the frequent need to trans-ship cargo between vehicles at border crossings. However, they serve an additional purpose of preventing paths from criss-crossing borders unnecessarily (and unrealistically).

3.4 Review of VOTs and Coded Costs

433. Given that the VOTs and costs coded were not always wholly empirical, it was necessary to monitor the performance of the network assignment model to ensure that the values chosen produced reasonable paths.

4. Network Assignment

434. Having established initial trip matrices, network models and behavioral parameters, the trip matrices were assigned to the network.

435. As already indicated this was in part an iterative process, as for instance the generation of initial trip matrices required distance "skims" to enable Gravity models

[1] *Assessment of Modal Competitiveness and Traffic Potential of Rehabilitated Railway in Cambodia, Final Report*, January 2004.

to be applied. Thereafter, subsequent assignments were undertaken to test the behavioral parameters adopted.

4.1 Assignment Method

436. A multi-class, generalized cost, capacity restrained assignment was performed:

- Eight trip matrices were assigned;
- Routes were chosen based on a combination of journey times and monetary costs, with VOTs (one per matrix) used to equivalence time and money; and
- Having assigned part of the matrices (one iteration), speeds on the network are updated [1] and then another iteration of assignment takes place, progressively taking into account congestion on the network.

437. The capacity restraint method used was incremental assignment with 10 iterations, wherein on each iteration 10% of each trip matrix is assigned.

438. JICA STRADA inputs trip matrices in terms of passengers. An occupancy factor is specified for each matrix to convert into vehicles. In turn a PCU factor then converts from vehicles to PCUs to reflect the congestion impact of each vehicle on the network.

439. Tonnages were also input and treated in the same way as passengers, i.e., converting 6.2 tonnes to one vehicle, then one vehicle to 1.8 PCUs.

440. On completion of assignment, loadings are then checked for reasonableness. Where necessary, paths were also checked.

441. Generalized costs are calculated on a link-by-link basis, equivalencing time and money based on the formula:

LGC = ((Length/Speed) * Value of Time) + (Length * Distance Cost) + Fixed Cost

Where:	LGC	is the Link Generalized Cost for a particular transport type (e.g., bus passenger, one MT of rail freight); under the definition used cost=time, but it can equally be expressed in monetary terms
	Length	is the length of the link (in km)
	Speed	is the congested speed on the current assignment iteration (kph)
	Distance Cost	is the cost per km on the link per passenger/MT of the transport type in question
	Fixed Cost	is the additional cost on the link per passenger/MT of the transport type in question
	Value of Time	equivalences time and money and is typically expressed in US$ per hour

[1] Strictly speaking, highway speeds only are updated, as railway and waterway links, as well as external and interchange links, are not capacity restrained.

5. Traffic Counts

442. Chapter III described the traffic count data received and the procedures employed to reconcile these data and growth them to 2004.

443. As stated in Section III.D.5, having completed initial assignments, modeled flows were compared against these traffic counts to identify areas where adjustment to the initial prior trip matrices might be required. These comparisons were done on total modeled versus observed flows by mode and country.

444. For consistency with the assignment model and trip matrices, counts refer to Annual Average Daily Total values.

445. Similarly, initial checking of the assignment with reference to traffic count data also included identifying any aspects of the network model and/or behavioral parameters that might require adjustment.

446. Once these initial checks were completed, the next stage was to employ the traffic counts in the matrix estimation procedure.

6. Matrix Estimation

447. Once routes (“paths”) between origin-destination pairs were been checked for reasonableness and once major sectoral discrepancies between modeled and observed flows had been resolved, the prior trip matrices were then refined using matrix estimation techniques.

448. The matrix estimation was accomplished using Visual Basic macros. The steps of this process are as outlined below.

449. Count data (on links) were specified with the following data:

- I-node and j-node defining each link for which there is data;
- The count on each link for which there is data, in terms of vehicles by vehicle type (or equivalent vehicles in the case of rail and waterway links); and
- Whether the count is one-way or two-way.

450. Paths saved from JICA STRADA assignments were then read in. These were analysed to determine which paths traverse which links with count data on and what proportion of which movement traverses a given count site.

451. The initial (“prior”) trip matrices were read in.

452. Now, iteratively and for each transport type in turn the following steps were undertaken:

- For the first count, calculate the modeled flow, being the product of the three trip matrices (as appropriate; road-, rail- and water-based) multiplied by the proportion of each movement/mode traversing each count site;
- Calculate the adjustment factor, being the ratio of observed to modeled data;

- Apply this adjustment factor to all appropriate cells in the trip matrices, to those proportion of trips which traverse the given count site;

- Repeat for all counts; and

- Repeat the process the specified number of times. The aim being to iterate a sufficient number of times to get an acceptable goodness-of-fit between modeled and observed flows overall.

453. Once the matrix estimation has been completed, the results were reviewed. Sometimes, especially when a wide variety of count data were input as controls (as is the case in the transport modeling for this TA), some inconsistencies between count data on links traversed by a single path may result. Under such circumstances, either the count data input need to be reviewed, or the paths built need to be reviewed, or both.

7. Model Calibration

454. Once matrix estimation had been completed, the revised trip matrices were re-assigned to test their goodness-of-fit once again. Given that the trip matrices had changed, there was likely to be some change in routeing patterns.

455. Following a number of experiments with the matrix estimator, the best results were obtained by assigning the final set of prior matrices, estimating new matrices, which in turn were assigned and then re-estimated. Given that in general few robust input trip matrix data were available, such a “double estimation” approach was deemed acceptable.

456. The summary model calibration results are presented in Table 7-4 for passengers and Table 7-5 for freight. Data on rail and waterway are in equivalent standard vehicles (i.e., equivalent busses/trucks as appropriate).

Table 7-4: Summary GMS Transport Model Calibration Results: Passengers

	Observed	Modeled	M - O	% difference
Motorcycles				
Lao PDR	13,371	14,251	880	7%
Viet Nam	376,210	374,364	-1,846	0%
Cambodia	51,675	51,597	-79	0%
Thailand	149,247	151,042	1,795	1%
Myanmar	5,005	7,690	2,685	54%
PRC	43,413	43,065	-348	-1%
All Countries	638,618	641,658	3,040	0%
Cars				
Lao PDR	854	750	-104	-12%
Viet Nam	52,035	51,666	-368	-1%
Cambodia	9,423	9,529	106	1%
Thailand	249,300	254,242	4,942	2%
Myanmar	15,475	19,366	3,890	25%
PRC	38,243	35,474	-2,768	-7%
All Countries	364,027	369,553	5,526	2%
Buses				
Lao PDR	869	784	-85	-10%
Viet Nam	61,489	60,271	-1,217	-2%
Cambodia	1,554	1,467	-87	-6%
Thailand	281,050	272,186	-8,864	-3%
Myanmar	7,963	7,935	-28	0%
PRC	38,535	36,207	-2,328	-6%
All Countries	388,526	376,171	-12,355	-3%
Rail (Bus Equivalents)				
Lao PDR				
Viet Nam	5,785	6,045	260	4%
Cambodia				
Thailand	9,534	9,851	317	3%
Myanmar	2,625	2,483	-142	-5%
PRC	17,264	17,281	17	0%
All Countries	35,207	35,660	454	1%
Water (Bus Equivalents)				
Lao PDR				
Viet Nam	1,081	726	-355	-33%
Cambodia	86	116	30	35%
Thailand				
Myanmar				
PRC				
All Countries	1,128	805	-323	-29%
Total Passengers				
Lao PDR	48,255	46,768	-1,486	-3%
Viet Nam	2,745,042	2,701,997	-43,045	-2%
Cambodia	150,271	148,696	-1,575	-1%
Thailand	9,564,643	9,323,286	-241,357	-3%
Myanmar	363,814	372,486	8,672	2%
PRC	1,834,702	1,757,923	-76,779	-4%
All Countries	14,613,808	14,265,463	-348,345	-2%
Total PCU (& equivalents)				
Lao PDR	6,603	6,593	-10	0%
Viet Nam	301,607	298,061	-3,546	-1%
Cambodia	28,205	28,173	-32	0%
Thailand	875,243	863,629	-11,613	-1%
Myanmar	38,151	42,508	4,357	11%
PRC	162,865	155,370	-7,495	-5%
All Countries	1,405,333	1,387,323	-18,010	-1%

Table 7-5: Summary GMS Transport Model Calibration Results: Freight

	Observed	Modeled	M - O	% difference
Trucks				
Lao PDR	4,239	4,291	52	1%
Viet Nam	153,471	151,928	-1,543	-1%
Cambodia	9,005	9,910	905	10%
Thailand	583,927	570,517	-13,410	-2%
Myanmar	21,279	21,400	121	1%
PRC	74,089	69,753	-4,335	-6%
All Countries	840,357	822,530	-17,827	-2%
Rail (Truck Equivalents)				
Lao PDR				
Viet Nam	24,725	24,312	-413	-2%
Cambodia	904	891	-13	-1%
Thailand	19,137	18,848	-289	-2%
Myanmar	789	771	-18	-2%
PRC	354,916	354,212	-704	0%
All Countries	399,967	398,540	-1,426	0%
Water (Truck Equivalents)				
Lao PDR	0	1	0	51%
Viet Nam	50,521	48,003	-2,519	-5%
Cambodia	551	434	-117	-21%
Thailand	460	423	-38	-8%
Myanmar	993	749	-244	-25%
PRC				
All Countries	52,432	49,608	-2,824	-5%
Total Tonnes				
Lao PDR	26,285	26,609	324	1%
Viet Nam	1,418,047	1,390,301	-27,746	-2%
Cambodia	64,848	69,659	4,811	7%
Thailand	3,741,851	3,656,685	-85,165	-2%
Myanmar	142,985	142,112	-873	-1%
PRC	2,659,831	2,628,586	-31,245	-1%
All Countries	8,015,083	7,878,201	-136,882	-2%
Total PCU (& equivalents)				
Lao PDR	7,631	7,725	94	1%
Viet Nam	411,691	403,636	-8,055	-2%
Cambodia	18,827	20,224	1,397	7%
Thailand	1,086,344	1,061,618	-24,725	-2%
Myanmar	41,512	41,258	-254	-1%
PRC	772,209	763,138	-9,071	-1%
All Countries	2,326,959	2,287,220	-39,740	-2%

457. Traffic counts on border posts are included in the totals for both countries; the “All Countries” totals thus do not necessarily total to the sum of values for all countries, as border posts are included only once.

458. In most cases, modeled and observed flows for passengers (Table 7-4) compare well.

459. In Lao PDR motorcycles are slightly over-represented in the model and cars and buses slightly under-represented in percentage terms, although the numbers in all cases are small. Overall, however, the fit is acceptable in terms of passengers (3% low) and on average fits very well in PCU terms.

460. The goodness-of-fit in Viet Nam on roads and rail is good. The goodness-of-fit on waterways is not as good; however, in absolute terms the error is quite small. Overall, in terms of passengers and PCUs, the fit is good.

461. In percentage terms, the goodness-of-fit in Cambodia is good overall, excepting waterways, but here the numbers are small anyway.

462. Thailand has the most passenger traffic and as such is central to the GMS Transport Model's overall goodness-of-fit. The largest percentage discrepancy is just 3%.

463. There is an over-modeling of motorcycles and cars in Myanmar, reflected in an over-modeling of PCUs and PCU equivalents in general (11%), although in terms of passengers the error is just 2%. Given that much of Myanmar's count data was growthed from the early 1990's, such errors are perhaps to be expected and do not compromise the performance of the model elsewhere. Updated traffic counts to augment data in the Asian Highway Database have been recommended earlier in this Working Paper/Appendix.

464. Within PRC, a reasonable goodness-of-fit overall was also attained. However, the sparseness of road traffic counts in Guangxi should be borne in mind.

465. Freight volumes also compare quite well between modeled and observed flows.

466. Within Lao PDR the error between modeled and observed flows is just 1% (aside from a very small observed flow at one point on the Mekong, where the absolute error is less than one truck per day equivalent).

467. Within Viet Nam, there is a slight (5%) under-representation of waterborne-modeled freight, but overall the discrepancy is just 2% (low).

468. Modeled road-based freight in Cambodia is 10% higher than traffic counts. However, given the ongoing rehabilitation of roads and its impact on traffic levels, this is not necessarily of concern; the absolute numbers involved are small also. Waterborne freight is 21% low, but once again the absolute difference (117 truck equivalents per day) is small in terms of overall freight levels in the GMS Transport Model.

469. Thailand's modeled freight is 2% lower than counts overall. Only on water is this figure worse (8% low), but with small absolute numbers (38 truck equivalents being the discrepancy). As observed data were not available on the Chao Phraya or Tachin Rivers, these could not be considered in this comparison of modeled and observed flows.

470. In Myanmar it is once again waterborne freight which has the worst goodness-of-fit. However, the absolute difference of 244 truck equivalents per day is not large when compared to the total daily freight movement (primarily road-based within the count data set).

471. Within the PRC, modeled road freight is 6% lower than observed overall. But overall the difference between modeled and observed flows is approximately 1%. However, the lack of observed road data in Guangxi means that few data comparisons were possible here.

472. Table 7-6 presents a regression fit of the equation:

Modeled = Constant + Slope × Observed

473. A "perfect fit" would have Constant=0, Slope=1 and R2=1.000, signifying that each count is perfectly matched with modeled data. One regression is performed for each of the eight vehicle types. Data are specified in standard vehicles.

Table 7-6: Regression Fit of Modeled to Observed Counts

	Constant	Slope	R^2
Passengers			
Motorcycles	36.1	0.98	0.968
Cars	101.7	0.90	0.886
Bus	41.3	1.00	0.968
Rail (Equivalent Bus)	-2.9	1.00	0.982
Water (Equivalent Bus)	7.3	1.16	0.673
Freight			
Trucks	24.2	1.01	0.994
Rail (Equivalent Trucks)	9.7	1.00	1.000
Water (Equivalent Trucks)	39.1	1.01	0.989

474. As can be seen, the overall fit for all categories is close to the "ideal" fit, with the exception of waterborne passengers. This reflects issues with waterborne transport outlined above, which in turn is symptomatic of a relative lack of data on this subsector in general.

475. This is further illustrated in Figures 7-1 and 7-2 showing the goodness-of-fit in terms of passengers and tonnes respectively.

Figure 7-1: Passenger Goodness-of-Fit

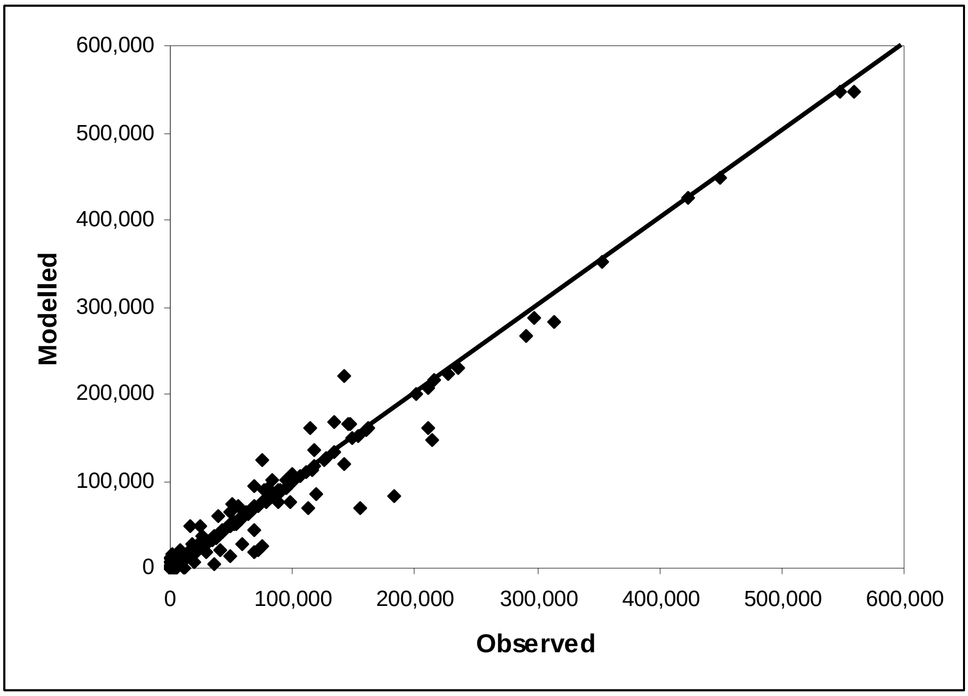
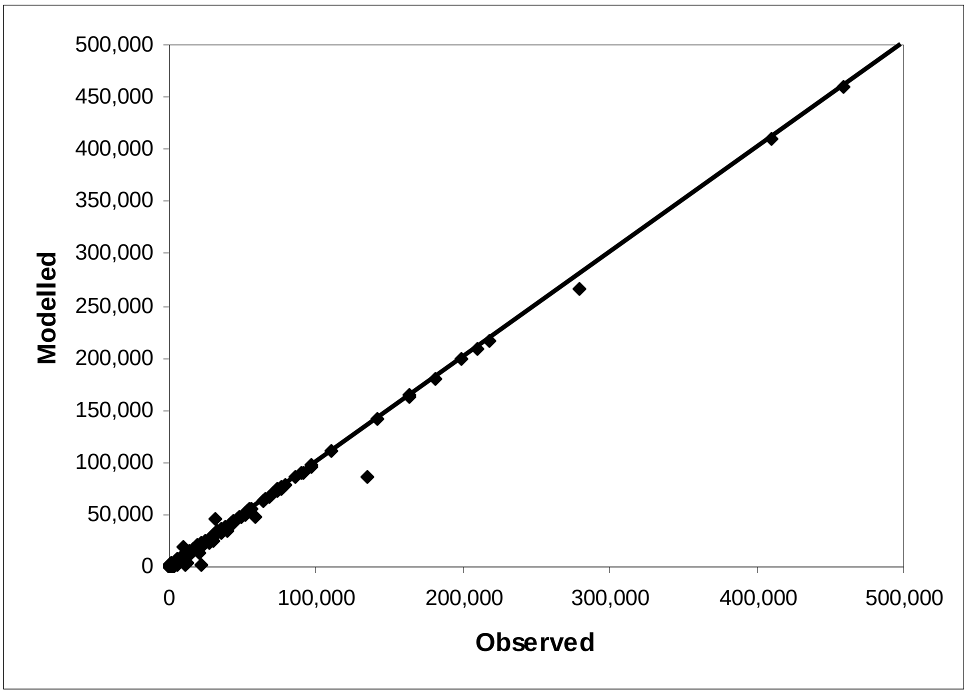


Figure 7-2: Tonnes Goodness-of-Fit



476. More detailed results are shown in Annex Four.

477. On the basis of these results, the GMS Transport Model was deemed to have been satisfactorily calibrated for the purposes of this TA.

C. Approach to Forecast Modeling for 2015

478. Having calibrated the 2004 Base Year model, its various components were updated to create a 2015 "Do Minimum" GMS Transport Model.

479. This Section outlines these updates undertaken.

1. Network Data

480. For the 2015 "Do Minimum" forecasts, the network data were revised to take account of committed schemes, such as infrastructure upgrades/rehabilitation and the implementation of new infrastructure.

481. Many of the committed projects are contained in Economic Corridors previously established by the ADB, while others are part of new corridors. These were illustrated in Figure 6-1 in the main text.

482. The following committed schemes were incorporated into the 2015 Do Minimum network:

1.1 East-West Economic Corridor: Mawlamyine-Da Nang (GMS R2)

483. Myanmar: Route 58: Tanowsri-Myawaddy-Mae Sot section 18 km, reconstruction.

484. Thailand: Highways 105/12/209/213/2042: Mae Sot-Mukdahan 770km, progressive widening to 4-lane, 233km completed; 75km under construction, additional 262km to be widened in 10th Plan 2007-11.

485. Thailand/Lao PDR: Mukdahan-Savannakhet Second Mekong International Bridge and approach roads 6km (bridge length 1.6km).

486. Viet Nam: Highway 9: Dong Ha-Lao Bao 83km, improvement under ADB Loan No1278-VIE completion end-2005.

1.2 North-South Economic Corridor: Western Corridor: Kunming-Bangkok via Lao PDR/Myanmar

487. Lao PDR: Route 2: Huay Kone Thailand border-Pakbeng 49km, reconstruction.

488. Lao PDR: Route 3: Bo Ten-Houayxay 228km (GMS R3A), construction/rehabilitation in progress, completion 2007. Financed by ADB, PRC and Thailand.

489. Lao PDR/Thailand: Route 3/Highway 1020: Houei Sai-Chiang Khong Third International Mekong Bridge.

490. Myanmar: Route 4: Mongla-Kengtung-Tachileik 256km (GMS R3), upgrading in progress.

491. Thailand: Highway 1020: Chiang Khong-Chiang Rai 115km, rehabilitation/widening in progress. Further upgrading expected in 10th Plan 2007-11.

492. Yunnan (PRC): Kunming-Mohan Viet Nam border 687km: Kunming-Mohei section 348km, expressway open; Mohei-Simao section 71km, class II road to be upgraded to expressway 65km by end-2009.

493. Yunnan (PRC): Simao-Xiaomenyang section 98km, upgrading to expressway in progress, completion end-2006; Xiaomenyang-Mohan section 175km, class IV road being upgraded to predominantly class I, some class II sections, completion end-2007.

1.3 North-South Economic Corridor: Eastern Corridor: Kunming-Hanoi-Haiphong (GMS R5)

494. Viet Nam: Highways 2/70: Noi Bai-Vinh Yen section 32km, improved 2-lane under BOT scheme 2005-7; Den Hung-Lao Cai section 228km, improved 2-lane under Government bond 2005-8.

495. Yunnan (PRC): Kunming-Hekou expressway 407km: Kunming-Shilin section 79km open; Shilin-Mengzi section 183km, upgrading class II road to expressway 2005-7; Mengzi-Xinjie-Hekou section 141km, upgrading to expressway 2004-7.

1.4 Southern Economic Corridor: Central Subcorridor: Bangkok-Phnom Penh-Ho Chi Minh City-Vung Tau (GMS R1)

496. Cambodia: NR5/6: Poipet-Sisophon-Siem Reap 145km, rehabilitation under ADB Loan 1945-GMS US$77 million, under tendering for construction 2005-8.

497. Cambodia: NR1: Phnom Penh-Neak Loueng 56km, under tendering for construction 2005-10, grant from Japan; Mekong Bridge at Neak Loueng, FS in progress, construction 2008-10, grant from Japan.

498. Thailand: Highway 33: Kabinburi-Sa Keaw section 54km widening to 4-lane 2006: Sa Keaw-Aranyaprathet-Khlong Louek Cambodia border 55km widening in progress.

1.5 Southern Economic Corridor: Southern Coastal Subcorridor: Bangkok-Trat-Koh Kong-Kampot-Ha Tien-Ca Mau-Nam Can (GMS R10)

499. Cambodia: Cham Yeam-Koh Kong-Sre Ambel 151km, paving/bridge construction, Thai loan/grant, completion 2007.

500. Cambodia: Veal Rinh-Kampot-Lork 105km, under rehabilitation by World Bank/Korea ICA 65km complete, remaining sections 2007.

501. Thailand: Highway 3: Trat-Hat Lek Cambodia border 89km, widening to 4-lane in 10th Plan 2007- 11.

502. Viet Nam: Highways 80/63: Ha Tien-Ca Mau-Nam Can 222km, Tac Cau bridge and bypasses, proposed for ADB loan, PPTA 2005, construction from 2007.

503. Viet Nam: Highway 1: Can Tho-Nam Can reconstruction, completion 2006 (World Bank project); Can Tho Bridge under construction, completion 2007 (financed by JBIC).

1.6 Southern Economic Corridor: Northern Subcorridor: Bangkok-Siem Reap-Stung Treng-Rattanakiri-O Yadov-Play Ku-Quy Nhon

504. Cambodia: Poipet-Sisophon-Siem Reap 150km, rehabilitation under ADB Loan 1945-GMS, 2005-7.

505. Cambodia: Stung Treng-Ban Lung 130km, study completed under Viet Nam technical assistance; Ban Lung-Ou Ya Dav Viet Nam border 69km, to be upgraded with loan from Viet Nam, FS in progress, project completion expected 2010.

1.7 Southern Economic Corridor: Inter-Corridor Link: Dong Kralor-Stung Treng-Kratie-Phnom Penh-Sihanoukville (GMS R6)

506. Cambodia: NR7: Dong Kralor-Stung Treng-Kratie 187km, rehabilitation under PRC, completion end-2006.

1.8 Southern Economic Corridor: Other Projects

507. Lao PDR: Route18B: Attapeu-Viet Nam border 123km, paving/reconstruction, completion expected December 2005, financed by Viet Nam.

1.9 Other Road Projects

508. Guangxi (PRC): Chongzuo-Daxin upgrading to Class II, completion 2006; Daxin-Jingxi upgrading to Class II in 11th Plan, in total 200km.

509. Guangxi (PRC): Fangcheng-Dongxin Viet Nam border 55km, upgrading to Class II, completion 2006.

510. Guangxi (PRC): Longzhou-Shuikou Viet Nam border, 50km upgrading to Class II, completion 2006.

511. Guangxi (PRC): Nanning-Baise expressway 189km, construction 2005-8.

512. Guangxi (PRC): Nanning-Youyiguan expressway/Class I 136/43km, completion late-2005, under ADB and EIB loans.

513. Myanmar: Route 3: Lashio-Muse (GMS R4) 176km, to be upgraded from BST to AC.

514. Myanmar: Route 4: Lashio-Thibaw-Loilem-Kengtung (GMS R7) 666km: Lashio-Thibaw 70km, BOT construction 2-lane; Thibaw-Loilem 238km, being upgraded by Public Works; Loilem-Kengtung 358km, 107km section being upgraded to 1-lane bituminous pavement.

515. Thailand/Lao PDR: Third Mekong Bridge Nakhon Phanom: FS by Department of Highways (Thailand).

516. Viet Nam: Highway 6: Hanoi-Tay Trang Lao border 522km, reconstruction to be completed 2006.

517. Yunnan (PRC): Kunming-Dali-Ruili Viet Nam border expressway 729km: Kunming-Anlong section 22km under construction, opening 2006/7; Aning-Chuxiong section 130km opened June 2005; Chuxiong-Dali-Baoshan section 345km open; Baoshan-Longling section 78km under construction (ADB loan) opening 2007; Longling-Ruili section 154km proposed for ADB loan, completion expected 2008.

518. Yunnan (PRC): Luliang-Funing expressway, construction started 2005.

519. Viet Nam: new North-South highway: Duong Ho Chi Minh Tay

1.10 Singapore-Kunming/Nanning Rail Link: Eastern Route via Viet Nam/Cambodia/Thailand

520. Yunnan (PRC): Kunming-Hekou replacement of existing metre gauge line, currently operating as freight only with passenger service suspended in 2002, by new standard gauge line: Kunming-Yuxi section completed, Yuxi-Mengzi section 141km, construction started 1st September 2005. Mengzi-Hekou (Viet Nam border) section 165km proposed for 12th Plan. Pre-FS completed.

521. Viet Nam: Lao Cai-Yen Vian 285km, rehabilitation of metre gauge line. Second stage: double track line partly on new alignment. Pre-FS of standard gauge line option made in 2002/3. ADB TA Kunming-Hanoi-Haiphong Corridor Study December 2005-June 2006 will evaluate options (for all modes).

522. Viet Nam: Hanoi-Haiphong Phase 1 rehabilitation, electrification and double tracking planned for 2006-2012, 38km section Hanoi - Hai Duong, proposed for financing by Japan. FS in progress, completion mid-2006.

523. Viet Nam: Yen Vien-Pha Lai-Ha Long-Cai Lan port 130km construction of dual gauge line started April 2005, completion 2009 (financing from state budget). Yen

Vien-Lim 20km is existing dual gauge, Lim-Pha Lai 35km new alignment, Pha Lai-Ha Long 70 km existing standard gauge to be upgraded to dual gauge, Ha Long-Cai Lan 5km new construction.

524. Viet Nam: Yen Vian-Hanoi-Km11 south improvement (24km) under Hanoi Elevated Railway Project 2007-2015, dual gauge double track. Expected to be financed by Japan. Double track Red River bridge programd for 2010-2012. Three phase project Hanoi-Km11 south in phase 1, Hanoi-Gialam 8km in phase 2 and Gailam-Yen Vien 5km in phase 3.

525. Viet Nam: Improvement of Hanoi-Saigon line (1726km). Km11-Vinh double tracking (300km), long-term project to start after 2010, pre-FS completed. Nha Trang-Saigon double tracking, long term project (420km). 500 small bridges to be improved. Reconstruction of 44 large bridges on Hanoi-Saigon line 2005-2011 to increase axleload from 13.5 to 15.0 tonnes.

526. Cambodia: Badeng-Sisophon rehabilitation, to be financed by ADB loan of US$40 million under Track Rehabilitation and Upgrading and Restructuring of Railway Authority projects, which also include rehabilitation of Badeng-Phnom Penh and Phnom Penh-Sihanoukville sections.

1.11 Singapore-Kunming/Nanning Rail Link: Western Route via Myanmar/Thailand

527. Myanmar: Mandalay-Yangon double tracking in progress, 250km north from Yangon complete, 130km remaining.

528. Myanmar: Mawlamyine-Thanbyuzayat upgrading in progress. Thanlwin railway bridge 3.2km to open end-2006.

1.12 Other Rail Projects

529. Yunnan (PRC): Guizhou-Kunming double tracking planned.

530. Yunnan (PRC): Chengdu-Kunming 150km, double tracking to start 2006.

1.13 Waterway Projects

531. Viet Nam: Floating port to be constructed on Hamluong river for trade with Cambodia using inland waterway vessels.

1.14 Tourism-Related Projects

532. Cambodia: NR67 Chong Sa Ngum-Anlong Veng-Siem Reap (124km) road rehabilitation 2005-7, under loan from Thailand.

2. Trip Growthing

533. This section describes the growthing of the 2004 trip matrices to predicted 2015 trip levels.

534. Different factors were applied by country, vehicle/travel type and for domestic, cross-border intra-GMS and external travel, with different import/arrival and export/departure factors being specified.

535. These were based on a number of assumptions regarding growth in GDP, population, exports, imports and tourism arrivals. These assumptions were derived from Working Paper 9. Table 7-7 shows the growth factors assumed in these socio-economic indicators to 2015.

536. The tourism arrival growth factors were taken as the average of Scenario 1 and Scenario 2 figures from the GMS Tourism Sector Strategy Study. Guangxi was assumed to have the same growth factors as Yunnan.

Table 7-7: Assumed Growth Factors for Socio-Economic Indicators to 2015

	GDP	GDP per Capita	Population	Exports	Imports	Tourism Arrivals
Cambodia	2.09	1.53	1.28	2.85	2.74	3.72
Yunnan (PRC)	2.02	1.94	1.04	2.85	2.85	3.72
Guangxi (PRC)	1.81	1.70	1.06	2.85	2.85	3.72
Lao PDR	2.23	1.75	1.26	3.48	2.61	3.11
Myanmar	1.90	1.56	1.22	2.99	2.47	1.38
Thailand	1.85	1.67	1.03	2.33	2.53	2.14
Viet Nam	2.15	1.98	1.09	2.85	2.97	2.95

537. Based on these growth factors, it was assumed that domestic passenger traffic would increase by the product of the growth factors for GDP per Capita and Population. Furthermore, to take account of the impact of rising wealth, it was assumed that 15% of bus passengers would shift to motorcycle or car (7.5% to each), with the exception of Thailand, wherein 10% of bus passengers would shift to car (no shift to motorcycle).

538. For domestic freight transport, it was assumed that goods movements would increase at 1.2 times the growth rate in GDP, with the exception of Thailand where the domestic freight elasticity of demand with respect to GDP was taken to be 1.0.

539. For cross-border passenger transport, it was assumed that this would grow at 80% of the product of the growth factors for GDP per Capita and Population, plus 20% of the tourism arrival growth factor.

540. For cross-border freight transport, it was assumed that this would grow at the average (mean) of Import/Export Trade Growth Factors and of 1.2 times the Trade Growth Factor.

541. Regarding passenger trip end growth factors for external zones, growth in trips to/from Malaysia adopted the same values as Thailand cross-border. Bangladesh and India adopted the same values as Myanmar cross border. Non-GMS provinces of PRC adopted the average of Guangxi and Yunnan domestic factors.

542. For seaport (freight) trip end growth factors, these took the same factors as those used in the respective country. However, whereas cross-border origins from “normal” domestic zones represented exports, origins from seaports represented imports, hence row and column factors were reversed when matrix balancing was performed (see below).

543. For land-based external freight, traffic to/from Malaysia was assumed to grow in line with Thai general cross-border traffic. Similarly, Bangladesh and India adopted factors from Myanmar and non-GMS provinces of PRC adopted the average of Guangxi and Yunnan domestic factors.

544. The resultant trip end growth factors are presented in Tables 7-8 to 7-10, showing factors for domestic travel, exports/departures and imports/arrivals respectively.

545. These trip end factors were applied using an industry standard "matrix balancing" technique. This was accomplished in Excel/Visual Basic. The steps undertaken for each matrix in turn were as follows:

- The calibrated 2004 trip matrix was read-in.
- An initial set of target row (origin) totals was obtained by multiplying cells by their respective growth factors, based on trip cell origins.
- An initial set of target column (destination) totals was obtained by multiplying cells by their respective growth factors, based on trip cell origins.
- The total target row and column totals were compared and they were factored such that the total of all target row totals equalled the total of all target column totals.
- Then for 50 iterations:
    - The row (origin) totals for each zone were calculated.
    - These were compared against the target row total.
    - All cells in that row were multiplied by the factor of target row total to current row total.
    - The column (destination) totals for each zone were calculated.
    - These were compared against the target column total.
    - All cells in that column were multiplied by the factor of target column total to current column total.
- After 50 iterations of "balancing", the trip matrices were then output for use in the 2015 assignments.

Table 7-8: Domestic Trip Growth Factors by Mode

	Intra-GMS							
	Passenger					**Freight**		
	M'cycle	**Car**	**Bus**	**Rail**	**Water**	**Road**	**Rail**	**Water**
Lao PDR	2.28	5.62	1.88	2.21	2.21	2.68	2.68	2.68
Viet Nam	2.68	4.52	1.83	2.15	2.15	2.15	2.15	2.15
Cambodia	2.05	2.25	1.66	1.95	1.95	2.51	2.51	2.51
Thailand	1.72	3.57	1.54	1.72	1.72	1.85	1.85	1.85
Myanmar	4.61	2.69	1.62	1.91	1.91	2.28	2.28	2.28
Yunnan	2.94	3.44	1.63	2.02	2.02	2.43	2.43	2.43
Guangxi	2.94	3.44	1.63	1.81	1.81	2.17	2.17	2.17

Table 7-9: Exports/Departures Trip Growth Factors by Mode

	Intra-GMS								To Outwith GMS							
	Passenger					Freight			Passenger					Freight		
	M'cycle	Car	Bus	Rail	Water	Road	Rail	Water	M'cycle	Car	Bus	Rail	Water	Road	Rail	Water
Domestic Zones																
Lao PDR	2.44	5.12	2.12	2.39	2.39	3.05	3.05	3.05	2.44	5.12	2.12	2.39	2.39	3.05	3.05	3.05
Viet Nam	2.73	4.21	2.05	2.31	2.31	3.90	3.90	3.90	2.73	4.21	2.05	2.31	2.31	3.62	3.62	3.62
Cambodia	2.38	2.55	2.07	2.31	2.31	3.48	3.48	3.48	2.38	2.55	2.07	2.31	2.31	3.34	3.34	3.34
Thailand	1.80	3.28	1.66	1.80	1.80	2.85	2.85	2.85	1.80	3.28	1.66	1.80	1.80	3.09	3.09	3.09
Myanmar	3.96	2.43	1.57	1.80	1.80	3.32	3.32	3.32	3.96	2.43	1.57	1.80	1.80	2.74	2.74	2.74
Yunnan	3.10	3.49	2.05	2.36	2.36	3.80	3.80	3.80	3.10	3.49	2.05	2.36	2.36	3.80	3.80	3.80
Guangxi	3.10	3.49	2.05	2.19	2.19	3.80	3.80	3.80	3.10	3.49	2.05	2.19	2.19	3.80	3.80	3.80
Seaports																
Viet Nam	n/a	n/a	n/a	n/a	n/a	3.31	3.31	3.31	n/a	n/a	n/a	n/a	n/a	3.23	3.23	3.23
Cambodia	n/a	n/a	n/a	n/a	n/a	3.15	3.15	3.15	n/a	n/a	n/a	n/a	n/a	2.83	2.83	2.83
Thailand	n/a	n/a	n/a	n/a	n/a	2.56	2.56	2.56	n/a	n/a	n/a	n/a	n/a	2.78	2.78	2.78
Myanmar	n/a	n/a	n/a	n/a	n/a	3.06	3.06	3.06	n/a	n/a	n/a	n/a	n/a	2.51	2.51	2.51
PRC	n/a	n/a	n/a	n/a	n/a	3.31	3.31	3.31	n/a	n/a	n/a	n/a	n/a	3.31	3.31	3.31
Externals																
Malaysia	1.80	3.28	1.66	1.80	1.80	2.43	2.43	2.43	1.80	3.28	1.66	1.80	1.80	2.43	2.43	2.43
South Asia	3.96	2.43	1.57	1.80	1.80	2.73	2.73	2.73	3.96	2.43	1.57	1.80	1.80	2.73	2.73	2.73
Rest of PRC	2.94	3.44	1.63	1.92	1.92	2.30	2.30	2.30	2.94	3.44	1.63	1.92	1.92	2.30	2.30	2.30

Table 7-10: Imports/Arrivals Trip Growth Factors by Mode

	Intra-GMS								From Outwith GMS							
	Passenger					Freight			Passenger					Freight		
	M'cycle	Car	Bus	Rail	Water	Road	Rail	Water	M'cycle	Car	Bus	Rail	Water	Road	Rail	Water
Domestic Zones																
Lao PDR	2.44	5.12	2.12	2.39	2.39	3.05	3.05	3.05	2.44	5.12	2.12	2.39	2.39	3.05	3.05	3.05
Viet Nam	2.73	4.21	2.05	2.31	2.31	2.72	2.72	2.72	2.73	4.21	2.05	2.31	2.31	2.84	2.84	2.84
Cambodia	2.38	2.55	2.07	2.31	2.31	2.81	2.81	2.81	2.38	2.55	2.07	2.31	2.31	2.33	2.33	2.33
Thailand	1.80	3.28	1.66	1.80	1.80	2.28	2.28	2.28	1.80	3.28	1.66	1.80	1.80	2.47	2.47	2.47
Myanmar	3.96	2.43	1.57	1.80	1.80	2.80	2.80	2.80	3.96	2.43	1.57	1.80	1.80	2.29	2.29	2.29
Yunnan	3.10	3.49	2.05	2.36	2.36	2.83	2.83	2.83	3.10	3.49	2.05	2.36	2.36	2.82	2.82	2.82
Guangxi	3.10	3.49	2.05	2.19	2.19	2.83	2.83	2.83	3.10	3.49	2.05	2.19	2.19	2.82	2.82	2.82
Seaports																
Viet Nam	n/a	n/a	n/a	n/a	n/a	3.23	3.23	3.23	n/a	n/a	n/a	n/a	n/a	3.23	3.23	3.23
Cambodia	n/a	n/a	n/a	n/a	n/a	2.83	2.83	2.83	n/a	n/a	n/a	n/a	n/a	2.83	2.83	2.83
Thailand	n/a	n/a	n/a	n/a	n/a	2.78	2.78	2.78	n/a	n/a	n/a	n/a	n/a	2.78	2.78	2.78
Myanmar	n/a	n/a	n/a	n/a	n/a	2.51	2.51	2.51	n/a	n/a	n/a	n/a	n/a	2.51	2.51	2.51
PRC	n/a	n/a	n/a	n/a	n/a	3.31	3.31	3.31	n/a	n/a	n/a	n/a	n/a	3.31	3.31	3.31
Externals																
Malaysia	1.80	3.28	1.66	1.80	1.80	2.43	2.43	2.43	1.80	3.28	1.66	1.80	1.80	2.43	2.43	2.43
South Asia	3.96	2.43	1.57	1.80	1.80	2.73	2.73	2.73	3.96	2.43	1.57	1.80	1.80	2.73	2.73	2.73
Rest of PRC	2.94	3.44	1.63	1.92	1.92	2.30	2.30	2.30	2.94	3.44	1.63	1.92	1.92	2.30	2.30	2.30

546. These output matrices thus contained the origin-destination-based forecasts of 2015 travel levels, by eight modes.

3. Behavioral Parameters

547. Behavioral parameters also had to be updated to forecast 2015 levels.

548. Behavioral parameters were changed on the basis of:

- Increased wealth affecting some behavioral parameters; and
- Changed transport costs as a consequence of committed transport schemes.

549. Monetary values per se were not however changed. The GMS Transport Model operates with 2004 prices; hence it is assumed there is no price inflation, or put another way that all prices would change in line with the same price inflation index, hence cancelling one another out.

550. In reality different commodities and services typically experience different changes in price. However, it is neither easy nor practical to predict price rise differentials. Furthermore, with a Study Area the size of the GMS it is also likely that there would be different price trends in different countries, but once again it would not feasible to attempt to forecast pricing differentials to 2015 with any accuracy.

551. This assumption of “price neutrality” is industry-standard. Should the GMS Transport Model be updated in the future, then prices would need to be adjusted at that time.

552. The approach taken to updating behavioral parameters was as follows:

3.1 Values of Time

553. As explained in Section VII.B.3.1, VOTs are defined in relation to wealth. Thus, given forecast economic growth, VOTs should be updated.

554. The updated VOTs used for 2015 are shown, by matrix in Table 7-11.

Table 7-11: Assumed 2015 Values of Time by Trip Matrix

Matrix	VOT (USD per hour)
Motorcycle Passenger	1.166
Car Passenger	3.497
Bus Passenger	1.238
Rail Passenger	0.678
Water Passenger	0.692
Road Freight (per Tonne)	0.312
Rail Freight (per Tonne)	0.066
Water Freight (per Tonne)	0.027

3.2 Behavioral Distance-Based Costs

555. Given the assumption of “price neutrality”, distance-based behavioral costs are assumed not to change. Thus as incomes increase, travel becomes more affordable in line with increases in VOT.

556. However, where roads are upgraded the behavioral distance-based costs may decrease, in line with improvements in surface condition and highway standard (class). It is assumed that road improvements would normally result in a highway being of good quality throughout, i.e., it has been assumed that any upgraded or new highway will be fully maintained.

557. Specific estimates of railway cost improvements resulting from the committed rehabilitation of Cambodia's railways were available[1]. Consequently, as part of the coding of this committed scheme, the reduced journey costs associated with this scheme were reflected in the GMS Transport Model for 2015.

3.3 Other Fixed Costs

558. In line with price neutrality, other fixed costs were assumed to remain unchanged, unless a specific committed scheme was likely to reduce these.

559. Where a border crossing was due to be upgraded, e.g., through replacing a ferry with a bridge, a notional time saving in crossing was assumed.

4. Assignment

560. Having updated the networks, trip matrices and behavioral parameters, the 2015 "Do Minimum" forecast model is assigned.

561. As with 2004, a ten-iteration, eight-class generalized cost, incremental capacity restrained assignment is used.

5. Review of Results

562. The results of the 2015 "Do Minimum" assignment were first compared against the results of the calibrated 2004 model, with reference to changes in link volumes. This was to get an idea of where the main traffic growth is likely to occur.

563. These results were also reviewed to help identify schemes for testing. Where links were approaching or exceeding capacity, they would be considered for inclusion in scheme tests, particularly if these high volume-capacity ratios occurred near to borders.

564. A series of comparisons between 2004 and 2015 Do Minimum, based on passenger-km and tonne-km by country are presented as follows:

5.1 Road Subsector

565. Tables 7-12 and 7-13 show a comparison of 2004 and 2015 passenger- and tonne-km on roads by GMS country respectively.

[1] Source: *Assessment of Modal Competitiveness and Traffic Potential of Rehabilitated Railway in Cambodia, Final Report*, January 2004.

Table 7-12:2004 and 2015 Annual Passenger-km (millions) on Roads

	2004	2015	Compound Growth	Annual Growth
Cambodia	1,399	2,861	105%	6.7%
PRC	95,223	165,812	74%	5.2%
Lao PDR	1,092	2,415	121%	7.5%
Myanmar	15,833	26,026	64%	4.6%
Thailand	340,509	536,037	57%	4.2%
Viet Nam	68,572	122,523	79%	5.4%
Total	522,627	855,674	64%	4.6%

Table 7-13: 2004 and 2015 Annual Tonne-km (millions) on Roads

	2004	2015	Compound Growth	Annual Growth
Cambodia	1,539	4,492	192%	10.2%
PRC	26,617	66,726	151%	8.7%
Lao PDR	897	2,662	197%	10.4%
Myanmar	5,352	15,677	193%	10.3%
Thailand	89,436	197,413	121%	7.5%
Viet Nam	23,504	56,990	142%	8.4%
Total	147,345	343,961	133%	8.0%

5.2 Rail Subsector

566. Tables 7-14 and 7-15 show annual passenger-km and tonne-km on railways, by country.

567. The 2015 data on Lao PDR refer to the Nong Khai-Thannaleng link, which does not exist in 2004. It has been assumed that this link will be freight only.

568. Similarly, in Cambodia it has been assumed that the railway system will continue to provide only freight services.

569. The potential impact of the committed upgrades to Viet Nam's railway system can be clearly seen in the anticipated growth in system-wide passenger kilometres.

Table 7-14: 2004 and 2015 Annual Passenger-km (millions) on Railways

	2004	2015	Compound Growth	Annual Growth
Cambodia	0	0	n/a	n/a
PRC	17,145	32,779	91%	6.1%
Lao PDR	0	0	n/a	n/a
Myanmar	9,742	19,070	96%	6.3%
Thailand	11,608	15,984	38%	3.0%
Viet Nam	5,424	22,199	309%	13.7%
Total	43,919	90,032	105%	6.7%

Table 7-15: 2004 and 2015 Annual Tonne-km (millions) on Railways

	2004	2015	Compound Growth	Annual Growth
Cambodia	208	539	160%	9.1%
PRC	80,659	198,339	146%	8.5%
Lao PDR	0	0	n/a	n/a
Myanmar	789	2,025	157%	8.9%
Thailand	3,581	8,639	141%	8.3%
Viet Nam	3,032	8,021	165%	9.2%
Total	88,269	217,564	146%	8.5%

5.3 Water Transport Subsector

570. Tables 7-16 and 7-17 show annual passenger-km and tonne-km on waterways, by country. The small amount for the PRC is attributable to the single coded IWT link, from Jinghong (Yunnan) to the Mekong between Myanmar and Lao PDR.

571. Observed counts were available neither on the Chao Phraya/Tachin River Systems in Thailand, nor on the Mekong between Thailand and Lao PDR/within Lao PDR (aside from data on Chiang Saen and Chiang Khong Ports in the north of Thailand, serving primarily PRC-Thai trade). As such, statistics on inland waterway transport in Lao PDR and Thailand should be treated with caution.

572. Furthermore, given the coding structure of the GMS Transport Model and the definition of Phnom Penh as both a river port and a seaport, maritime traffic to/from Phnom Penh Port is excluded from these numbers. Similarly, maritime traffic to/from seaports in the Vietnamese Mekong Delta are also excluded from these numbers.

573. These data refer to inland water transportation only.

Table 7-16: 2004 and 2015 Annual Passenger-km (millions) on Inland Waterways

	2004	2015	Compound Growth	Annual Growth
Cambodia	113	229	103%	6.6%
PRC	0	0	n/a	n/a
Lao PDR	2,184	4,476	105%	6.7%
Myanmar	662	1,010	52%	3.9%
Thailand	676	1,142	69%	4.9%
Viet Nam	1,098	1,812	65%	4.7%
Total	4,733	8,668	83%	5.7%

Table 7-17: 2004 and 2015 Annual Tonne-km (millions) on Inland Waterways

	2004	2015	Compound Growth	Annual Growth
Cambodia	164	418	156%	8.9%
PRC	3	10	233%	11.6%
Lao PDR	471	1,196	154%	8.9%
Myanmar	582	1,523	162%	9.1%
Thailand	52	107	105%	6.7%
Viet Nam	15,623	35,471	127%	7.7%
Total	16,894	38,725	129%	7.8%

D. Approach to Scheme Testing

574. Having completed the 2004 “Base” run and the 2015 “Do Minimum” forecast, schemes could be tested.

575. The steps undertaken to perform scheme tests are outlined below.

1. Network Data

576. The network data were updated to include the scheme to be tested. The scheme was added to the 2015 “Do Minimum” network to create a new network.

2. Trip Growthing

577. For the scheme tests undertaken, trip growthing rates remained the same as in the “Do Minimum” case.

578. However, should additional scheme tests be required wherein the impacts of changes to demand are required, then a new set of trip growthing rates and hence trip matrices would need to be generated.

579. Issues regarding traffic induction and suppression are not considered within the GMS Transport Model, given that this TA is in effect concerned with the pre-feasibility evaluation and identification of potential schemes.

580. However, for more detailed scheme testing, the potential impacts of schemes on demand might be required.

3. Parameter Updates

581. As with trip growthing, it is usually the case that parameters do not need to be altered.

582. However, when a scheme being tested included a real change to some cost component (e.g., lowering of tolls or tariffs) then these parameters would be updated as part of the scheme testing process.

583. As stated in Section VII.C.3, where a road is upgraded the monetary deterrences coded onto that road are typically reduced within the GMS Transport Model.

4. Assignment

584. Assignment is run in the normal way, comprising the trip matrices being assigned onto updated networks using the appropriate behavioral parameters.

5. Initial Analysis and Interpretation of Results

585. The results of any scheme test are compared against the 2015 “Do Minimum” scenario, in order to determine the scale of savings accrued from:

- Reductions in travel times across the model, quantified using Economic Values of Time (EVOTs); and
- Changes in Vehicle Operating Costs (VOCs).

586. Savings may thus be defined as ((Phraya time costs in Do Minimum – System wide time costs in Scheme Test) + (Phraya VOCs in Do Minimum – Systemwide VOCs in Scheme Test)).

587. Systemwide time costs and VOCs are calculated link-by-link. The journey time on each link is multiplied by the flow on that link.

588. These values may then be combined with estimated scheme costs and the time profile of costs and benefits to determine the scheme's Net Present Value. An explanation of EVOTs and VOCs is presented in the following subsection.

5.1 Economic Values of Time

589. Economic Values of Time (EVOTs) used in the economic evaluation of journey are not the same as the behavioral VOTs used in the assignment model and described in Sections VII.B.3.1 and VII.C.3.1.

590. EVOTs were calculated separately for each country. In the case of Thailand, work and non-work Values of Time for 2000 were obtained from a previous Report[1] and then growthed-up to 2005 to take account of changes in the price index and in GDP per capita over the period 2000-2005.

591. For Lao PDR, data were also available from a previous report[2], which gave an overall EVOT for 2005.

592. For Cambodia, PRC and Viet Nam, EVOTs were calculated based on wage data. In each case the estimated average monthly industrial wage was divided by four times the average number of hours worked per week to obtain a work-based EVOT. The non-work EVOT was taken to be one quarter of this.

593. Having obtained work and non-work EVOTs, these were blended to obtain an overall EVOT, based on 30% of the work EVOT and 70% of the non-work EVOT. This was done for Cambodia, PRC, Thailand and Viet Nam.

594. In the case of Myanmar, EVOTS's were pro rataed from the results for PRC and Lao PDR, based on the relative levels of GDP per capita.

595. Given that the analysis of schemes was based on 2015, these 2005 EVOTs were then growthed to forecast 2015 levels. Given that the GMS Transport Model uses current prices (see Section VII.C.3), price inflation was not taken into account when growthing EVOT to 2015 levels. Changes in GDP per Capita were used to growth 2005 EVOTs to 2015 levels. The assumed changes in GDP per Capita were as given in Table 7-6. Given that these are Economic parameters, an income elasticity of 1.0 was adopted (i.e., 2005 EVOTs were multiplied directly by the GDP per Capita indices for each country in turn).

596. Table 7-18 shows the Economic Values of Time adopted. These are average values per person and are applied to passenger flows (time costs are included in VOCs for freight movements).

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[1] *Feasibility Study on Economic Engineering and Environmental Impact Assessment for the Motorway between Hai-Yai - Malaysian Border*.
[2] *GMS Infrastructure Connections in Northern Lao PDR: ADB TA No. 6193*.

Table 7-18: Economic Values of Time (2015 in 2005 prices)

Country	EVOT (US$/hour)
Cambodia	0.364
PRC	0.434
Lao PDR	0.449
Myanmar	0.140
Thailand	1.164
Viet Nam	0.469

5.2 Vehicle Operating Costs

597. In order to monetise costs associated with the distance travelled and the quality of road network traversed, vehicle operating costs (VOCs) were defined per km and by vehicle type for each link. These take into account:

- Vehicle type;
- Road terrain; and
- Road'surface quality.

598. In addition, the cost characteristics of the country in which the link (road) is situated were taken into account. This allows for differences between countries in cost elements, such as vehicle purchase cost, maintenance (and spare part replacement) costs and fuel costs.

599. In the case of goods vehicles, the VOCs also considered time-based costs associated with freight transportation. Hence, time costs for goods vehicles were not considered under the EVOT calculations described in Section VII.D.5.1.

600. In the cases of Cambodia, PRC and Lao PDR, VOCs were determined effectively from first principles with the input of appropriate costs data into an HDM-III Vehicle Operating Costs Module.

601. Costs were obtained separately for three road qualities and three terrains, namely:

- Road qualities: equivalent to Good, Fair, and Poor in the GMS Transport Model input network coding, taking IRI values of 3, 5 and 10, respectively; and
- Terrains: equivalent to Flat, Rolling and Mountainous as defined in the Asian Highway Database.

602. In the case of Viet Nam, VOC's were available from The Study of Following-Up on VITRANSS (2005 Report). Although it should be noted that these took IRIs of 3, 6 and 9 for Good Fair and Poor.

603. Initial VOC data were also available from Thailand and these were taken from the Feasibility Study for Economic, Engineering, and Environmental Impact Assessment for the Motorway between Hai Yai - Malaysian Border. However, as these did not give different values for Good, Fair and Poor pavement conditions, VOCs for Fair and Poor were derived from those for Good, based on an analysis of the cost differentials in other countries.

604. For Myanmar, insufficient dollarised data were available to calculate VOCs on a like-for-like basis with other GMS countries.[1] Consequently, VOCs were taken to be the same as those in Lao PDR.

605. Section IV.B.1 explained how capacities and freeflow speeds varied in accordance with terrain and road quality. A similar interpolation was undertaken to generate VOCs by link, based on the initial values obtained as described above.

E. Determining Attractiveness of Schemes

1. Approach Adopted

606. Following discussions with the ADB, it was resolved to use Social Net Present Value (NPV) as the primary means of evaluating and ranking schemes.

607. As a consequence, quantitative outputs from the transport models form the bedrock of the evaluation process.

608. The key determinants of a scheme's attractiveness are thus:

- The extent to which its implementation reduces journey times and other costs within the GMS (i.e., savings in origin-destination generalized costs multiplied by the amount of traffic on those movements). This may include traffic decongestion benefits on other routes resulting from a schemes implementation (non-user benefits), in addition to time/cost savings realised by those using the new scheme (user benefits); and

- In the case of new infrastructure projects, the amount of traffic on them, as this might enable toll revenues to be raised to capitalise some of the scheme's benefits and hence reduce project risk (within the limits of toll affordability.

609. It should be remembered that while the traffic assignment procedure uses behavioral costs, the economic evaluation should use actual (economic or financial) cost savings. Hence, earlier in this Section economic VOTs were presented as distinct from those behavioral values used within JICA STRADA for purposes of traffic assignment modeling.

2. Post-Model Re-Analysis of Cambodian Schemes

610. During the May 2005 Country Mission to Cambodia, the consultants received much anecdotal evidence of rapid growth in traffic levels throughout Cambodia resulting in part from the country's ongoing economic recovery but more significantly from the rehabilitation of the country's road networks. Given that the majority of traffic count data collected (e.g.,, from the Asian Highway Database, ASEAN Highway Database, various reports) were a few years old, such rapid growth in inter-urban traffic levels were not captured within those data. However, at the time of constructing the GMS Transport Model, more recent traffic count data were not available to the consultants.

611. In the Draft Final Report and subsequent workshop in Ho Chi Minh City in December 2005, it was pointed out that the economic assessment of proposed ("***") projects in Cambodia could be significantly affected. Following a recommendation to

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[1] Part of the problem ia also associated with the prevailing triple exchange rate regime, complicating any United States dollar conversions and comparisons with other countries.

collect more up-to-date traffic count data in Cambodia at the earliest opportunity, in early 2006 the Study Team received data from 2005 traffic counts for Cambodia conducted by JICA. (The Study Team had met with the JICA team in May 2005, but the data were not ready for release at that time and attempts to obtain those data up until the issuance of the Draft Final Report had been unsuccessful).

612. Given the timing of receipt of the updated data from Cambodia and following discussions with ADB, it was decided that it would not be recommended to recalibrate the GMS Transport Model in full to take account of the full JICA data set; time would be limited before the issuance of the Study Report and the Vientiane Workshop in March 2006. Rather, a growth factoring approach was identified as the most appropriate way to incorporate the impacts of these new data.

613. Thus, having received the updated traffic count data an initial check was made to relate the JICA traffic count sites to the locations of traffic counts used in the development of the GMS Transport Model. Of the 19 road traffic counts used for calibrating the GMS Transport Model in Cambodia, 16 had equivalent traffic counts in the JICA data set.

614. However, several of these JICA traffic counts had to be expanded from 12- to 24-hour counts. This was done by analyzing 12-hour flows as a proportion of 24-hour flows at those count locations where 24-hour traffic counts were undertaken. Once this expansion was complete, the overall uplift in traffic levels resulting from highway rehabilitation could be determined. Note however, that this might have resulted in a slight over-estimate of traffic levels, as 24-hour traffic counts appear to have generally been carried out on those roads with most traffic.

615. In addition, it should be noted that with the exception of one traffic count site, data were only available for a single day; or as explained above more often for a single 12-hour period. As such a certain amount of caution should be advised in interpreting results at single locations.

616. For consistency, this uplift analysis was undertaken using the four vehicle categories assigned in the GMS Transport Model, namely motorcycles, cars, bus and goods vehicles. Furthermore, the analysis was conducted in terms of PCUs for each vehicle type in turn. As the vehicle categories used by JICA were not wholly consistent with those used in the GMS Transport Model, assumptions had to be made regarding the proportions of a number of JICA's counted categories assigned to vehicle types based on GMS Transport Model definitions. As such, a certain level of error could be expected within the patterns shown for any individual vehicle class.

617. Nevertheless, the overall changes in traffic levels by vehicle type are shown in Table 7-19. As can be seen, very substantial uplifts in Cambodian traffic levels are suggested, especially for buses.

Table 7-19: Overall Traffic Uplift Suggested by Vehicle Type

Vehicle Type	% Increase in Overall Traffic Level
Motorcycle	33.6%
Car	162.1%
Bus	110.0%
Goods Vehicle	83.2%
Total (in PCUs)	83.6%

618. While these data could be validated with longer-term traffic counts, or the derivation and application of meaningful annualization factors, a significant under-modeling of traffic within Cambodia by the current GMS Transport Model is indicated. While the JICA traffic count data were not annualized, given that the traffic count data collected cover a wide range of sites and were conducted over a two-month period (April and May 2005), at this aggregate level the traffic demand uplifts suggested for Cambodia are perhaps not that unreasonable, even if the growth rates do appear to be high. (Such growth rates indeed bear out the anecdotal evidence received regarding post-rehabilitation traffic growth escalation.)

619. A second stage of analysis was undertaken, whereby JICA traffic counts at or near to the locations of proposed Cambodian road projects (i.e., A3.2.2, A3.2.3 and A3.4.2) were compared with link flows from the modeled Base Year ("Do Nothing") assigned networks. This was to determine whether the uplifts could be fine-tuned for each of the three projects.

620. However, in absolute terms small numbers were often involved and counts were conducted on an individual day (often multiple counts within one area in the vicinity of a proposed project were conducted within the same week or on the same day). As such, a comparison of suggested change by vehicle type did not produce meaningful results. At the levels of total passengers, tonnages and PCUs, the suggested uplifts are as shown in Table 7-20.

Table 7-20: Possible Suggested Uplifts by Project (%)

Comparison	A3.2.2	A3.2.3	A3.4.2
Passengers	110%	85%	42%
Tonnes	-51%	-59%	-82%
Total (in PCUs)	47%	43%	-47%

Note: Tonnage and Passenger estimates based on "standard" definitions of vehicle types as used in the GMS Transport Model. These do NOT necessarily correlate with the vehicles and their load/occupancy factors at these locations.

621. As can be seen, data for A3.4.2 suggest a decrease in traffic on what is already a corridor with relatively small existing traffic flows. For the other two projects, substantially smaller uplifts are suggested than for Cambodia as a whole. This may be additionally due to many of the traffic count sites associated with project A3.2.2 are on links still awaiting rehabilitation. In the case of project A3.4.2 the associated traffic counts (both JICA and those originally used in the GMS Transport Model) are quite low. Both projects A3.2.3 and A3.4.2 are also associated with border crossings (to Viet Nam and Lao PDR, respectively). Existing operating constraints at these borders may be further suppressing traffic levels. Furthermore it may be the case that the "standard" vehicle definitions used in the GMS Transport Model (across the GMS as a whole) are not that appropriate on certain locations above, especially regarding goods vehicles.

622. It would therefore be more reasonable to attempt to gauge the levels of traffic post-rehabilitation and as such the uplifts identified in Table 1 were proposed to uplift traffic flows forecast by the GMS Transport Model.

623. The JICA traffic counts were undertaken at a variety of locations, only some of which had been rehabilitated between the collection of earlier traffic counts (as used in the GMS Transport Model) and the JICA surveys, and others of which had been previously rehabilitated or are still awaiting rehabilitation. This being the case, an

argument could be made to investigate all the data again in more detail than was possible given time constraints on the revision of scheme analyses for Cambodia. This might include site visits and possibly some supplemental traffic surveys at some of the JICA traffic count locations. Such further investigation of traffic patterns in Cambodia (and indeed elsewhere) is strongly recommended as part of the further updating and enhancement of the GMS Transport Model.

F. More Detailed Approaches: Enhancement of GMS Transport Model

624. Within the scope of this TA, a straightforward forecasting and evaluation approach was adopted. The aim was to prioritise schemes, relative to one another for implementation, together with providing an initial assessment of their likely benefits.

625. However, there are a number of other approaches that might be advisable to consider when testing any schemes in more detail. These include the following:

1. Sensitivity Testing

626. To test the robustness of any given scheme, a series of forecasts should be undertaken, wherein values of various modeling parameters are varied.

627. The first of these is usually the economic growth forecast, as this also feeds through trip generation, behavioral VOTs, and economic VOTs.

628. This TA has concentrated on a single forecast of future economic growth. Given the wide area covered by the GMS Transport Model and the objectives of this TA, this was deemed sufficient to enable the identification and provisional ranking of schemes for further investigation by the ADB and other Agencies.

629. However, it is recommended that when schemes are taken forward for further investigation that a number of demand scenarios be tested. These might simply be “High” and “Low” variants on the baseline economic growth tested under this TA. Alternatively (or indeed additionally), other scenarios could be tested, such as the impacts of differing growth rates in different countries or parts of countries.

630. Other parameters, such as inter-modal interchange penalties could also be varied. For instance to determine whether a project would benefit or lose-out from a change in inter-modal transfer arrangements and costs.

2. Induced Traffic

631. A further benefit that may result from a scheme’s implementation is that of traffic induction. Where a previously arduous journey is substantially quickened, both passenger and freight volumes making that journey tend to increase.

632. The extent of traffic induction is often hard to quantitatively predict. While traffic induction functions used should be sensible, as this TA is concerned with ranking alternative schemes against one another, what is most important is that the same approach is taken to calculating traffic induction in all cases.

633. This being the case, induction is not explicitly considered within the GMS Transport Model. Rather, where the potential for traffic induction is identified, this is commented on and potentially given a preliminary evaluation outwith the GMS Transport Model.

634. It is recommended that traffic induction be included in any subsequent versions of the GMS Transport Model, or more specifically in corridor or smaller area models which may be derived from the GMS Transport Model.

635. Assessing traffic induction of a scheme covering only a small part of a modeled network (as is the case with the individual schemes under investigation) is not always reliable. A more focussed and controlled treatment is required, which is beyond the scope of the current TA, wherein the emphasis is on identifying schemes for further investigation.

636. Two aspects of traffic induction that might be later incorporated into the GMS Transport Model are modal shift and induced travel.

637. Regarding modal shift, where a given scheme benefits a certain mode of transport, such that transport costs for that mode (e.g., rail) improve with reference to the alternative modes (say, road and water), then it is reasonable to assume that some trips which would otherwise have used road or water will divert to rail. These diverting passengers and cargo might serve to help decongest their original transport modes benefiting travelers in addition to themselves.

638. Induced travel is where trips that would not otherwise have been made now take place. A "rule of thumb" is to use an elasticity of 1.0 with respect to generalized cost to evaluate the extent of traffic induction.

3. Testing of Packages of Schemes

639. Within this TA, packages of schemes were not tested collectively. However, this might be a useful exercise when examining some schemes and scheme "packages" in further detail.

640. If this were required, then multiple schemes would be coded into the network model simultaneously.

641. Equally, once an identified scheme has been selected for implementation, then this could be included into a revised "Do Minimum" against which remaining schemes could be tested.

642. This can be useful when there are a number of alternative but similar schemes which all rank highly on the initial analyses. Once one of these is selected, it may obviate the need for those schemes similar to it. In other instances, the completion of one "missing link" may increase the attractiveness of further "missing links" connecting to it, which would not rank highly unless and until the first "missing link" was solved.

4. Monitoring of Forecast Performance

643. The accuracy and reliability of transport forecasts are affected by the uncertainties surrounding outturn values of underlying forecasting parameters and assumptions. Given the dynamism and volatility of economies in East Asia, this has previously raised concerns as to the reliability of transport demand forecasts in general.

644. The GMS Transport Model represents the first transport model on this scale. This is also the first version of the GMS Transport Model and as discussed earlier,

this model was constructed using the best available data. However, this meant that a separate set of count data was not available for model validation following calibration.

645. Likewise, as the model was fitted to a mixture of 2004 data and earlier data growthed to 2004 and with a few exceptions, more recent data are not likely to be available immediately, transport model outputs may need to be treated with some caution.

646. Indeed, it was noted that a number of data used to calibrate the GMS Transport Model were quite old. In some cases the traffic forecasts are suspected to have not been as robust as would be preferred.

647. As discussed in Section VII.E., 2, a specific case-in-point was Cambodia where traffic counts received subsequent to the original issuance of Working Paper 5 and the Draft Final Report confirmed anecdotal evidence of rapid traffic growth following the rehabilitation of certain roads.

648. Given the ongoing rehabilitation of the Cambodian road network, as well as plans to upgrade currently sub-Class III roads in other countries, it is recommended that a rolling program of transport data collection be undertaken across the GMS. This would enable periodic validation and/or correction of the GMS Transport Model as appropriate.

649. Such an exercise would over time enable a better understanding of changing transport patterns and as such, should enable the robustness of transport forecasts to improve in parallel with improvements to the functionality (including level of detail) of the GMS Transport Model.

650. In particular, it is recommended that “before and after” surveys be conducted where possible when a significant transport link is being improved (or a new one constructed and opened). Such improvements would include both infrastructure projects and technical assistances, as well as other policy changes. Such monitoring would be especially important where cross-border transport is improved, be it through upgrading links leading to/from a border post, improvements to customs and immigration clearance procedures at a border post (e.g., in line with CBTA) and when a new border post opens.

651. Such “before and after” surveys can be especially useful to improving model parameters. By undertaking such surveys and data analysis, followed by re-examination of the transport model, forecasts for future schemes can be improved.

652. Note however, that “after” surveys should either be conducted for some time following the opening/upgrading of transport links/facilities, or after a period of time since the opening/upgrading. There are two reasons for this.

653. Firstly, like-for-like comparisons may entail surveys a year apart, so that seasonal patterns (especially wet and dry season effects) do not distort analyses.

654. Secondly, new projects typically endure a “ramp up” period, during which time travel patterns slowly adjust to the new link/facility. Consequently, it may take some time for demand to stabilise. Indeed, while ramp up profiles (length and amplitude) often vary quite considerably between projects, a program of ongoing surveys to monitor ramp up on a number of schemes could enable an improved understanding of the concept.

655. A better understanding of ramp up, which could be used to modify demand forecasts for a scheme, would be important in better analyzing project risk. Typically transport infrastructure projects are most “cash flow negative” when they open: often quite considerable capital expenditure has been made and on opening returns (either in the form of revenues from users, or benefits to communities) are relatively small, until travel patterns adjust.

656. Comparing ramp up profiles would therefore be useful in both project risk analysis and for finance structuring.

5. Project Phasing and Modeling of Urban Areas

657. Within the context of this TA, projects have been evaluated on “all or nothing” basis, namely wherein the entire project is considered.

658. During more detailed examination of a particular infrastructure project (e.g., at the scheme detailed feasibility stage), the phasing of a particular project could be investigated. For example, in some cases most traffic congestion may occur within and near to urban settlements. In such cases the demand for bypasses of upgrading/widening of links on the approaches to urban settlements may be more pressing than the upgrading of certain inter-urban sections.

659. By providing infrastructure projects in phases, it may be possible to make better use of investment funds. For example, rather than proceeding with one project in its entirety and thereafter another project in its entirety, it may be preferable from both financial and social perspectives to provide the key sections of both projects first and then complete the less urgent sections later on, when there is sufficient demand.

660. During the Draft Final Report Workshop in Hoc Him Minh City in December 2005, the Cambodian delegation for instance raised concerns as to the potential impacts of completing inter-urban corridors connecting through Phnom Penh when traffic congestion in and around Phnom Penh is worsening.

661. Specifically, Cambodia enquired whether the Phnom Penh Ring Road and associated Mekong Bridge could be assessed within the current GMS Transport Model, and whether replacement of the Bassac Bridge near Phnom Penh could also be investigated. Within the current GMS Transport Model intra-urban traffic, which constitutes the majority of likely traffic on the Phnom Penh Ring Road and associated Mekong Bridge cannot be modeled. As such, enhancement of the GMS Transport Model would be required. Similarly, replacing an existing bridge with another would not generate noticeable benefits within the current GMS Transport Model, as its level of zoning definition, although fairly detailed, is not sufficient to enable analysis of local traffic.

662. The current level of spatial detail in the GMS Transport Model, in terms of zoning and network definition (section of coded link lengths) does not allow for the detailed analysis of which sections of which projects ought to be prioritized over others. And differences in traffic levels within, near to and away from urban centers in most cases cannot be considered either. Urban centers are typically coded as single nodes (with no turn penalties[1] through them) and a single link typically represents highway sections near to and between urban centers.

[1] A turn penalty is a delay coded onto nodes (e.g., an intersection between links, or where a zone centroid connects to the network, both of which may occur at an urban center). These

663. Depending on the feasibility of more detailed data collection in the future, covering both networks and planning/socio-economic (zonal) data, it may be feasible to increase the level of detail in the GMS Transport Model. The aim would be to enable at least a preliminary examination of phasing for individual projects.

664. There are some modeling issues inherent in attempting to model urban and inter-urban environments simultaneously; some key issues are listed below. Nevertheless, it should be possible to provide a simplified form of transport modeling in and around urban centers, so as to give improved guidance to model users and stakeholders alike as to improved phasing of infrastructure project implementation.

665. Since the primary purpose of the GMS Transport Model is to investigate long-distance and especially cross-border transport patterns, the aim of improving congestion analysis in and near urban centers is not to provide transport modeling within the GMS Transport Model in lieu of proper urban modeling where this is required. Instead, it is to better reflect the effects of traffic congestion in and around urban centers on inter-urban transport routeing and costs.

666. A number of likely potential issues in modeling urban and inter-urban environments simultaneously are given below, together with a commentary on possible solutions from the Transport Modeler's experience.[1] The approach to be adopted is probably best decided at a later date, following some further development of the GMS Transport Model. This would also be determined by stakeholder priorities, data and other resource availability (e.g., budget, time).

5.1 Unequal Zoning Definitions

667. Within the current GMS Transport Model, within any given country the zones adopted relate to administrative districts. While there are differences in the geographic size, demographic and economic characteristics of different zones, these relate primarily to differences between different areas (e.g., provinces) within each country.

668. When modeling urban and inter-urban environments simultaneously, typically urban areas are subdivided into a number of smaller zones that are usually relatively very small in geographic size, while rural zones usually cover relatively large areas.

669. Axiomatically, this gives more emphasis (i.e., more detailed treatment) to urban areas than to rural areas. There may be relatively large differences in demographic, economic, social and transport characteristics within a rural zone, as compared to urban areas. Should more detailed analysis of accessibility or other social impacts of a proposed project be required, such an analysis may therefore be less detailed and robust in urban areas.

670. One potential solution would be to construct a more detailed project impact profile based on more detailed spatial data (see VII.F., 7 and 8 below).

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delays are typically coded onto specified movements, such as from Route A to Route B through Town C of D minutes.

[1] However, it should be remembered that a solution that works within one transport model may not necessarily be appropriate in another. Likewise, given the scale of the GMS Transport Model it may prove preferable to adopt slightly different "solutions" in different parts of the GMS; such should be decided on a case-by-case basis during model development and where appropriate in consultation with concerned stakeholders (e.g., government officers of the country in question in each case, as well as ADB).

671. Alternatively, it might be possible to use the GMS Transport Model for an initial assessment of a number of projects and having shortlisted a number for further investigation, then refine the GMS Transport Model in the appropriate corridors.

672. Either of these approaches would enable more detailed analyses of selected projects and it should be feasible to update areas of the GMS Transport Model on such an "as needed" basis.

673. However, when testing a large number of schemes it may be desirable to have consistent comparisons, possibly requiring the coarser GMS Transport Model coding to be retained so as not to bias results of scheme comparisons according to which schemes have or have not had the network and zoning refined around them.

5.2 Difference beyween Short- and Long-Distance Trip Characteristics

674. Depending on the extent of modeling within and around major urban areas, another problem sometimes arises. Much inter-urban and cross-border traffic is not greatly constrained by departure timing and in the case of express freight movements, these often occur overnight when transport networks have least congestion. In contrast, short-distance urban traffic is often highly time constrained, such as journeys between home and work or home and school.

675. As such a greater premium is likely to be placed on small delays on shorter movements than on longer, inter-city or cross-border trips. Indeed a number of transport models specify generalized cost elements and parameters[1] differently for short- and long-distance movements, as well as by trip purpose[2]. Mode choice models[3] may also be specified separately for different trip lengths and purposes.

676. Given that the GMS Transport Model is based on daily transport assignment[4], and that the emphasis is on long-distance and cross-border transport, values pertaining to longer-distance transport should take precedence. Indeed, as urban networks would still be much simplified in the GMS Transport Model (even after zone splitting and increased network definition as compared with the current GMS Transport Model version) routeing impacts of using less accurate values for short distance movements should not be great.

677. Nevertheless, some areas of the network may still require special attention. For example, the Greater Bangkok area extending down to Laem Chabang and beyond contains much traffic and accessibility to Laem Chabang port will have implications on transport movements across large areas of the GMS.

678. One possible solution, depending on the software used to further develop the GMS Transport Model, as well as its ultimate specification would be to allow different

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[1] These could include generalized (and economic) Values of Time, generalized inter-modal interchange penalties, and the like. In some instances, tolls/fares may also vary by time of day.

[2] Typical passenger trip purposes include home-to-work, home-to-school, home-to-leisure (and vice versa). For cargo trips, characteristics may be determined by commodity type and whether it is bulk, break-bulk or containerised transport.

[3] Mode choice models are used to split aggregate demand between for example, road, rail and water-based transport modes.

[4] I.e., transport patterns are considered on a 24-hour period with speed-volume delays (in the case of roads) being based on 24-hour flows, rather than being based on peak hour flows and speeds (as is typically the case in urban models).

behavioral generalized cost parameters for different origin-destination movements. Alongside general values (or values by country or country-to-country pair) for each transport type,[1] values for certain origins, destinations and/or origin-destination pairs might be specified separately. However, the calibration of both behavioral and economic values on such a basis could be relatively data hungry and time consuming.

679. Another possible solution, depending on the software used would be to assign short- and long-distance transport separately, using different sets of generalized costs. This may be a “work around” if origin-destination pair-specific values are not possible. However, given the number of transport types used in the current GMS Transport Model (let alone if the number of transport types is expanded), to double the number of trip matrices required could become unwieldy.

5.3 Balancing Delays

680. A common problem in traffic assignment of an urban area with orbital bypass is getting the correct balance between traffic travelling through and traffic travelling around the urban area itself. Behaviorally, such a decision in traffic routeing may occur “strategically”, with some drivers preferring orbital versus cross-city travel (or vice versa) even when the alternative is slightly quicker.

681. Within a future version of the GMS Transport Model with enhanced treatment of delay in and around urban centers this same phenomenon may create discrepancies between modeled and actual routeing, in terms of the percentage of vehicles travelling near urban centers versus those travelling on “back roads” to avoid them altogether.

682. From the TA Transport Modeler’s experience, in such instances it may be best to “distort” some delay characteristics on (relatively shorter) urban links so as to ensure more realistic loadings and journey times on (relatively longer) inter-urban links.

683. If such adjustments to the model are felt to distort economic evaluation, then it should be possible to use an unmodified set of parameters to calculate skimmed cost values[2]. Such use of different behavioral (for routing) and economic (for evaluation) parameters is often used. However, there are instances where the routeing (assignment) model optimizes with the result that economic values do not optimize[3].

684. The ultimate solution to any such issues is usually best decided on a case-by-case basis. However, within the context of the GMS Transport Model it would be preferable if a consistent approach to such questions is maintained. This suggests the need for a coordinating agency (e.g., ADB) to oversee the model’s future development.

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[1] In terms of the current GMS Transport Model, transport types would be motorcycle, car, bus, rail passengers, inland water passengers, road freight, rail freight, and inland waterborne freight.

[2] Skimmed cost values are obtained by following routeings generated during traffic assignment and adding-up costs on all links traversed. Depending on the software and settings used, the costs so “skimmed” do not necessarily have to be the same as the costs used in determining routeings.

[3] Optimize in this context means that the minimum behavioural costs for the network as a whole are obtained. In this instance a shift to more optimal (more efficient; “cheaper”) routes based on behavioural costs results in slightly higher economic (evaluation) costs.

5.4 Reminder

685. It should be remembered that improving the GMS Transport Model to investigate project phasing does not obviate the requirement for more detailed project-specific feasibility studies. Rather, such improved analyses from the GMS Transport Model should assist the feasibility studies. For example, in order to save time and provide continuity in analysis, it may be possible to “cordon out€[1] 35 sub-area from the GMS Transport Model as the starting point in the development of transport models for individual feasibility studies.

6. Matrix-Based Economic Assessment (by Interzonal Pairs)

686. The current GMS Transport Model obtains cost data from links in the model. As such, all passenger and freight flows on a link in Viet Nam are evaluated based on Vietnamese economic parameters, even if some of the traffic is cross-border, e.g., between Viet Nam and PRC or between PRC and Lao PDR.

687. Consequently, where trips reroute in response to changes in infrastructure (links or border points) to the extent that a trip is routed through a different country (e.g., from Thailand-Myanmar-PRC to Thailand-Lao PDR-PRC) , then different costs are used to “price” the trip. This creates some distortions in the economic analyses.

688. It is recommended that future versions of the GMS Transport Model allow for costs to be specified at the inter-zonal level (i.e., a trip between Thailand and PRC is costed based either on an average of costs in Thailand and PRC, or based on specific costs for PRC-Thai travel). Such an approach was not practicable in the current GMS Transport Model, partially due to software constraints, but also due to a relative lack of data differentiating cross-border from domestic costs.

689. Adopting such a “matrix based” approach to economic generalized costs would also enable differential cost parameters[2] to be applied for different regions of countries where appropriate. For example, average incomes in Bangkok are significantly higher than the national average, so it would be desirable to take account of this.

690. Another dimension to matrix-based analysis would be to more readily enable a better understanding of distributional aspects of benefits accruing from infrastructure projects and technical innovations. “Before” and “after” cost matrices could be compared to identify which areas (zones) benefit most from a scheme and also identify any movements that lose out. An example of certain movements losing in response to a change is where re-routeing resulting from an infrastructure project results in increased congestion on some links; those movements using those links both before and after the change may face increased time delay. This in turn could assist in analysis of the phasing of projects (see VII.F.5 above).

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[1] Cordoning is where a sub-set of links representing a section of the overall model are extracted from the main model (in this case the GMS Transport Model). Data extracted include network coding, planning, economic and trip data on zones within the cordon and transport flows both on links within the cordoned area and on links defining the cordon. Such data are sometimes termed “boundary conditions” and are used as either the starting point or as calibration constraints on the development of more detailed local models, wherein for instance the zoning and network coding levels of detail are increased. On a case-by-case basis it may be decided either to use the same assignment algorithms and behavioural parameters or to adjust these to better match local conditions within the study area of the feasibility study in question.

[2] E.g., Values of Time, distance-based costs, fixed costs.

7. Social Impact Analysis

691. ADB's overarching goal is poverty reduction [1]. Transport projects (both infrastructure and technical assistance projects) are seen as a means to this end. However, there is often a "disconnect" between transport models and assessments of transport projects' impacts on poverty reduction.

692. Transport models can be used to estimate changes in accessibility to different areas and by extension can be used as a basis from which to estimate poverty reduction effects. However, transport modeling is often an esoteric specialist field of practice, with relatively few non-specialists conversant with the use of transport models and how to interpret their outputs.

693. Within the current TA, social impact analysis of projects is limited. This is in part due to the nature of the TA and the fact that the GMS Transport Model developed under this TA is a first generation model for the GMS, which of necessity is concerned with transport over and above other aspects.

694. Nevertheless, further development of the GMS Transport Model could incorporate measuring policy reduction impacts, or at least in identifying the catchment areas[2] of projects which may benefit directly from a project, over and above benefits to existing inter-urban transport.

695. Implicitly, some aspects of poverty reduction would be captured by investigating induced traffic (see VII.F.2 above). However, poverty reduction is broader than induced traffic alone. In some places the provision of basic healthcare, educational and law and order services are constrained by poor transport infrastructure.

696. In order to enable broader assessment of social impacts of projects, it would be useful to include in a database of demographic, socio-economic and development data, possibly alongside or ideally integral to the GMS Transport Model. Such data would be at least at a level of detail consistent with GMS Transport Model zoning[3] and would readily enable project catchment areas to be obtained in terms of population as well as trips.

697. Depending on what data are available, it may also be possible to relate data on how far from highways certain communities are. However, to do this it may be preferable to use a Geographic Information System (GIS), as explained in VII.F.8 below.

698. Within the context of a future version of the GMS Transport Model wherein economic appraisals of projects are undertaken within rather than outwith the transport model environment (see VII.F.,10 below), such social data could be added to the appraisal process.

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[1] Source: http://www.adb.org/poverty/default.asp.
[2] Catchment areas refer to those locations that would be accessed via the proposed project, in the case of infrastructure projects, or those locations/ movements affected by technical assistance projects.
[3] A possible exception would be in urban areas, where data may relate to all zones in the urban area assuming these are subdivided as per Section VII.F., 2.5. Within urban areas, it would often be more appropriate to study the urban context in its own context, rather than as part of the far broader GMS.

8. Linkage with GIS

699. In order to make the GMS Transport Model outputs more user friendly to non-specialists, as well as to enable linkages with other development sectors, it is recommended that a GIS be developed for the GMS.

700. Such a GIS could contain more detailed demographic, socio-economic and other data than are strictly required for the GMS Transport Model. Likewise, such a GIS could include hydrological and geological data, as well as data on energy, telecommunications and water supply.

701. Using a GIS would also enable graphical outputs to be readily output which are easily interpreted by non-specialists. Equally it would be a good basis from which to present project profiles for ADB projects and potential projects for a variety of sectors.

702. Assuming such a GIS were developed, this could also be used to generate data for transport models, through specifying zones and links with reference to the GIS.

9. Assessment of Policy Appraisals

703. Within the current GMS Transport Model, policy changes are not explicitly considered. Given that testing of such can require quite detailed model specification (and input data) it was not appropriate to incorporate such within the current TA.

704. Nevertheless, there are some strategic transport models that can test certain policy changes, including technical assistances. It would thus be desirable to be able to do this within the GMS Transport Model also.

705. In order to achieve such functionality, more extensive and detailed data would need to be collected than was possible within the current TA While it might not be possible to accurately model the implications of all possible policy changes, those with likely explicit impacts, such as speeding up border clearance or transhipment times, or reducing effective transit charges should be able to be modeled.

706. It is recommended that any discussions on future model development detail what policy variables stakeholders would like to have included. As far as practicable such suggestions could then be incorporated into subsequent versions of the GMS Transport Model.

10. Economic Appraisal within the GMS Transport Model

707. Under the current TA the GMS Transport Model is used to generate outputs that are then used in the economic appraisal of schemes.

708. While a full and proper economic analysis of a project should still require a separate expert view, it may nevertheless be possible to facilitate at least preliminary economic analyses of projects within an enhanced GMS Transport Model. This is especially true if the model enhancements suggested above are implemented.

709. Indeed, the GMS Transport Model could be used for an initial screening of projects, to help identify which should be investigated in more detail.

710. Depending on the software chosen for further development of the GMS Transport Model, such economic appraisal calculations could be generated either within the transport model or within a spreadsheet application linked to the transport model. Linkage to the GIS to enable preliminary quantification of other social aspects might also be possible.

11. Consideration of Time Periods

711. The GMS Transport Model deals with transport flows on the basis of Annual Average Daily Totals, with a 24-hour assignment period. The capacities and speed-flow relationships adopted are based on 24-hour relationships.

712. Implicitly these take account of lower quality roads being substantially less driveable at night due to reduced visibility. Implicitly lower quality roads also have a lower average daily capacity due to wet and dry season effects.

713. Due to data and time constraints and the nature of this first version of the GMS Transport Model, there is not explicit treatment of wet and dry season effects on individual roads. Nor are differences in nighttime lighting standards between countries considered. Some account was taken of wet and dry season effects on inland waterway navigability, but it is acknowledged that further investigation of this phenomenon may be useful.

714. Subject to data availability and the functionality of software used for future versions of the GMS Transport Model, at a minimum it is recommended that country-specific link capacities be incorporated, taking account of differences in night time lighting.

715. It has also been suggested that certain daytime bans on truck movements in and around certain urban areas also be considered. Such should also be considered in future GMS Transport Model development, albeit with reference to the issues highlighted in SectionVII.F.5 above.

716. Whether or not to construct a separate model for wet and dry seasons might also need to be discussed. Given that both network characteristics for certain links (e.g., unpaved roads, smaller waterway links) and travel demand patterns vary between wet and dry seasons there is a technical argument for doing this. On the other hand, construction of two models would be more time consuming. A preliminary recommendation would therefore be to move towards a two-season model at a later date, concentrating on other GMS Transport Model enhancements first. Review of the assumptions made to deal with wet and dry season effects in a single model would need to be undertaken, to see if they can be improved upon. However, the issue of whether or not to proceed with wet and dry season modeling and with what priority may be best decided following discussion amongst stakeholders.

VIII. The Air Transport Subsector

A. Introduction

717. Air transport represents a small percentage of overall travel, for both passengers and freight. Nevertheless, it is of strategic importance, as it facilitates business travel and tourism, while air freight enables is also becoming increasingly important.

718. Air transport offers the possibility of direct point-to-point travel, rather than needing to pass through a network, in times far shorter than attainable by surface transport.

719. The infrastructure required for air transport is also qualitatively different from surface transport. Traditionally the sector has been highly regulated. In addition to airports and air traffic control services, licensing requirements are strict and financial barriers to entry are far more significant than for most surface transportation.

720. Furthermore, there are often further restrictions on where services may be offered. Both destinations and flight frequencies are typically controlled by Air Services Agreements.

721. However, it is increasingly generalized that over-regulation has constrained the growth of air transport leading to:

- Often continued loss-making by flag carriers without the threat of competition;
- Reduced international connectivity, relative to countries with more liberal air transport environments; and
- Consequently reduced status as a business destination.

722. As a result, air transport is liberalising to varying extents throughout the GMS, with Thailand having probably the most liberal operating environment. Nevertheless, several GMS countries are lagging many of their non-GMS Asian neighbors.

723. Air Services Agreements both between GMS countries and between GMS and non-GMS countries are generally opening up the industry to further growth.

724. A number of air transport statistics were presented in Chapter III.

725. The remainder of this Chapter will describe the approach to air transport modeling, which of necessity is quite different from the approach adopted for surface transport (and explained in Chapter VII).

B. Approach to Air Transport Modeling

726. The capacity of airports and their infrastructure, of air traffic control and air services agreements act as constraints on the growth of air transport. Nevertheless, as many of these constraints gradually loosen, the subsector is likely to experience substantial growth.

727. Air transport demand is very closely linked to economic performance. The approach adopted therefore sought to predict future air travel demand with reference to existing air traffic levels and economic growth.

728. Air freight volumes are generally very small. As such, they are not seen as particularly important in evaluating air transport schemes quantitatively.

729. Indeed, while some quantitative analysis of aviation-related schemes was possible, much of the analysis of necessity had to be qualitative. This was due in part to data scarcity in some instances, a high degree of uncertainty regarding air traffic forecasts, plus the very nature of air transportation (as described above) in providing linkages for business and tourism not always readily quantifiable from forecasts of air passenger throughputs alone.

C. Air Transport Models

730. The air transport demand models constructed for various GMS countries to give demand projections to 2015 are explained below.

1. Lao PDR

731. The main source of data on Lao PDR was the Civil Aviation Master Plan 2004-2013 (ADB TA 3968-LAO, October 2003).

732. This contained data for Vientiane airport from 1990-2002, as well as data on other airports from 1998, or in some cases 1999.

733. Moreover, this Civil Aviation Master Plan contained air traffic forecasts by airport to 2013, based on three growth scenarios, namely High, Medium and Low. Given that on this TA, travel demand forecasts were prepared for a single demand scenario, the Medium Growth case was adopted from the Civil Aviation Master Plan.

734. In order to obtain air traffic forecasts for 2015, for consistency with the other modes modeled, air traffic forecasts for 2013 were extrapolated to 2015 based on the growth rate from 2002.

735. The one exception was Phongsaly airport (a domestic facility), which reopened in 2003. No annual average air traffic growth rates were given. The methodology adopted to obtain air traffic forecasts for Phongsaly was as follows: The average relationship at other airports between the 2015 forecast and the 2013 “High” forecast was determined, in the form of a ratio. This ratio was then applied to the “High” 2013 forecast for Phongsaly to obtain a “Medium” forecast for 2015.

736. As can be seen, freight volumes are not significant, with Vientiane expected to have throughput of slightly more than 10MT per day by 2015.

737. The data in the Civil Aviation Masterplan 2004-2013 for Lao PDR was deemed to be a useful reference in forecasting air traffic levels elsewhere in the GMS, where suitable local data were not available.

738. The Civil Aviation Masterplan 2004-2013 also noted that at present around 80% of international passengers are tourists, the remainder being on business or official activities of some kind.

739. Based on the data in Tables 8-1 and 8-2, a set of annual average growth rates suitable for application in other countries were obtained, as presented in Table 8-3.

Table 8-1: Passenger Air Traffic Forecasts for Airports in Lao PDR

	2002 Actual	2015 Forecast
Vientiane		
Domestic	183,787	471,505
International	216,060	799,448
Total	399,847	1,270,953
Louang Prabang		
Domestic	79,233	176,390
International	20,034	69,162
Total	99,267	245,552
Pakse		
Domestic	24,466	57,170
International	3,354	36,735
Total	27,820	93,906
Louang Namtha	10,634	26,280
Oudomxay	9,449	23,460
Houeixai	11,182	25,741
Sam Neua	6,271	23,725
Sayaboury[1]	1,898	23,073
Xieng Khouang	36,175	93,970
Savannakhet	4,897	9,171
Phongsaly[2]	0	4,115

Table 8-2: Freight Air Traffic Forecasts (Tonnes) for Airports in Lao PDR

	2002 Actual	2015 Forecast
Vientiane	1,524	3,923
Louang Prabang	94	255
Pakse	37	100
Louang Namtha	37	100
Oudomxay	43	117
Houeixai	46	125
Sam Neua	19	51
Sayaboury[3]	3	46
Xieng Khouang	197	535
Savannakhet	30	82
Phongsaly[4]	0	13

Table 8-3: Annual Average Air Traffic Growth Rates in Lao PDR 2002-2015

Type	Annual Growth
Passengers – Domestic	7.4%
Passengers – International	10.8%
Passengers – Total	8.9%
Freight – Total	7.7%

[1] Sayaboury Airport was closed for six months in 1998.
[2] Phongsaly Airport reopened in 2003.
[3] Sayaboury Airport was closed for six months in 1998.
[4] Phongsaly Airport reopened in 2003.

2. Cambodia

740. Current data on Cambodia's airports were taken from Statistical Yearbooks for passengers and from data obtained from Cambodia customs for freight.

741. Table 8-4 shows data (in tonnes) for freight imported at and exported through Phnom Penh's Airport. The reason for the reduction in imports from 2003 to 2004 is not known, althought overall imports also declined during this period (albeit not as markedly in percentage terms as witnessed by air).

742. Customs data for Siem Reap airport were not available.

Table 8-4: Customs Data for Phnom Penh Airport 2003-2004

Annual Throughputs (MT)			
2003 Imports	**2003 Exports**	**2004 Imports**	**2004 Exports**
58,065	8,027	6,507	10,519

743. From the Statistical Yearbook, Table 8-5 shows visitor arrivals to Cambodia by air from 1998-2002. Departures are not given, but can be reasonably assumed to be roughly equal to arrivals.

Table 8-5: International Visitor Arrivals to Cambodia by Air 1998-2002

	1998	**1999**	**2000**	**2001**	**2002**
Phnom Penh	175,910	234,382	264,649	274,689	320,187
Siem Reap	10,423	28,525	87,012	133,688	202,791
Total	186,333	262,907	351,661	408,377	522,978

744. Data in Table 8-5 thus suggest an annual average growth rate over the period 1998-2002 of 29.4%. This may in part be attributable to the rapid growth in arrivals at Siem Reap, in response to rapid growth in direct services. It also reflects Cambodia's great progress in recent years both in terms of economic and civic recovery and as a tourist destination.

745. However, data in Table 8-5 do not include the number of Cambodians arriving by air. And there was no other source from which to estimate the ratio of Cambodians to non-Cambodians flying internationally.

746. Based on the GMS Tourism Sector Strategy Study and other analysis of traffic growthing (see Section VII.C.2), Cambodia's overall tourism arrivals are expected to grow 272% by 2015, versus 211% in Lao PDR However, cross-border travel in general is expected to grow quicker in Lao PDR than in Cambodia.

747. It was thus assumed that these two factors would cancel one another out, such that forecast aviation traffic growth rates in Lao PDR could be applied to Cambodia also.

748. But first the proportion of Cambodian to non-Cambodian travelers had to be estimated. Based on the observation in Lao PDR of 80% of international air passengers being tourists, who can be assumed non-local, it is assumed that at least half of the business travelers would also be non-local. This suggests increasing international air passenger arrivals by 11% (i.e., 100/90) to allow for Cambodian travelers in the base year.

749. Thus factoring up flows from 2002 (in Table 8-5) by 11% and then by a further 10.8% per annum (Table 8-3) to 2015 gives air passenger traffic forecasts for Cambodia as set out in Table 8-6. Given the ongoing growth in traffic at Siem Reap relative to Phnom Penh, separate forecasts for either airport should be treated with some caution, however.

750. Similarly, international freight data were growthed at 7.7% per annum and are also presented in Table 8-6, although only for Phnom Penh, as no data on Siem Reap were available.

751. Data on domestic air travel within Cambodia were not obtained.

Table 8-6: International Air Traffic Forecasts for Cambodia in 2015

	Passenger		**Freight (MT)**	
	Arrivals	**Departures**	**Imports**	**Exports**
Phnom Penh	1,348,167	1,348,167	14,715	23,788
Siem Reap	853,864	853,864		
Total	2,202,030	2,202,030	14,715	23,788

3. PRC

3.1 General

752. In addition to specific data collected for Guangxi and Yunnan (see Sections VIII.C.3.2 and VIII.C.3.3 below), air passenger forecast data were obtained from CAAC as shown in Tables 8-7 and 8-8.

753. Discussions with CAAC also indicated that more rapid air traffic growth was anticipated in Yunnan than in Guangxi.

754. These data were used to revise the air transport forecasts for airports in Guangxi and Yunnan.

Table 8-7: PRC Air Passenger Throughput Forecasts from CAAC: Passengers

	2004	**2005**	**2010**	**2015**	**2020**
Southwest	34,910,000	40,640,000	81,650,000	137,250,000	227,200,000
Nationwide	241,930,000	278,060,000	536,300,000	899,650,000	1,396,700,000

Table 8-8: PRC Air Passenger Forecasts from CAAC: Annual Growth Rates (%)

	2006-2010	**2011-2020**	**2006-2020**
Southwest	15%	10.8%	12.2%
Nationwide	14%	10%	11.4%

3.2 Guangxi

755. Data were obtained on passenger and freight throughputs at Guilin, Nanning, Beihai and Liuzhou airports from 1991 to 2004. The passenger data, together with implied annual average growth rate are shown in Table 8-9. Table 8-10 shows the freight data.

Table 8-9: Historic Air Passenger Traffic Data in Guangxi

	Guilin	Nanning	Beihai	Liuzhou	Total
1991	1,450,000	140,000	14,000	11,000	1,615,000
1992	1,730,000	270,000	55,000	7,000	2,062,000
1993	1,560,000	370,000	210,000	0	2,140,000
1994	1,420,000	540,000	280,000	0	2,240,000
1995	1,670,000	720,000	320,000	90,000	2,800,000
1996	1,710,000	790,000	310,000	110,000	2,920,000
1997	1,760,000	750,000	330,000	80,000	2,920,000
1998	1,810,000	770,000	340,000	86,000	3,006,000
1999	2,050,000	750,000	340,000	62,000	3,202,000
2000	2,320,000	810,000	370,000	63,000	3,563,000
2001	2,440,000	920,000	310,000	47,000	3,717,000
2002	2,670,000	1,030,000	340,000	52,000	4,092,000
2003	1,970,000	1,220,000	240,000	68,000	3,498,000
2004	2,900,000	1,650,000	260,000	110,000	4,920,000
Average Annual Growth	5.5%	20.9%	25.2%	19.4%	8.9%

Table 8-10: Historic Air Freight Data (Tonnes) in Guangxi

	Guilin	Nanning	Beihai	Liuzhou	Total
1991	16,431	1,858	67	93	18,449
1992	20,287	2,992	251	45	23,575
1993	18,935	4,404	1,388	0	24,727
1994	16,711	7,284	2,091	0	26,086
1995	18,731	9,129	2,710	657	31,227
1996	18,335	11,457	2,770	895	33,457
1997	18,889	11,782	2,925	515	34,111
1998	19,992	10,744	2,478	543	33,757
1999	27,861	11,211	2,953	452	42,477
2000	39,215	13,954	3,482	456	57,107
2001	43,359	14,748	3,466	298	61,871
2002	54,872	17,204	3,935	421	76,432
2003	33,298	19,977	1,919	740	55,934
2004	38,784	27,071	2,475	1,092	69,422
Average Annual Growth	6.8%	22.9%	32.0%	20.9%	10.7%

756. For Guangxi, the average annual air traffic growth rates achieved since 1991 (8.9% for passengers and 10.7% for freight) were uplifted to 11.5% and 12.5% respectively and projected until 2015, applied equally at all four airports. The resultant air passenger and freight forecasts are shown in Table 8-11.

Table 8-11: Air Passenger and Freight Forecasts for Guangxi in 2015

	Guilin	Nanning	Beihai	Liuzhou	Total
Passengers (people p.a.)	9,603,323	5,463,960	860,988	364,264	9,603,323
Freight (tonnes p.a.)	141,687	98,897	9,042	3,989	141,687

3.3 Yunnan

757. Data were obtained from Yunnan Airport Group Company as shown in Table 8-12.

Table 8-12: Data on Yunnan Airports 2001-2004

Unit	Figures	2004	2003	2002	2001
Kunming	Movements	91,851	78,263	78,898	69,167
	Passengers	9,791,929	7,432,596	7,041,676	6,391,431
	Freight	170,939	136,899	122,405	107,526
Xishuang-banna	Movements	10,804	9,253	9,388	9,222
	Passengers	1,174,006	951,341	900,409	922,006
	Freight	4,925	3,887	5,690	5,482
Lijiang	Movements	8,772	6,723	7,818	5,956
	Passengers	888,708	607,761	673,129	541,966
	Freight	692	816	1,110	474
Dali	Movements	2,694	2,236	3,721	3,329
	Passengers	276,442	198,218	296,531	286,168
	Freight	554	781	994	803
Shangri-la	Movements	2,004	1,460	1,498	1,232
	Passengers	167,522	110,558	124,501	98,681
	Freight	450	356	331	403
Dehong Mengshi	Movements	2,004	1,558	1,562	1,478
	Passengers	217,469	150,593	151,249	163,912
	Freight	1,202	1,221	1,405	1,718
Simao	Movements	514	786	782	132
	Passengers	25,158	85,510	76,473	12,212
	Freight	156	394	338	39
Zhaotong	Movements	578	809	919	686
	Passengers	37,935	66,920	62,725	58,929
	Freight	188	192	183	206
Baoshan	Movements	696	682	896	719
	Passengers	52,828	42,239	55,782	66,849
	Freight	178	221	176	270
Lincang	Movements	702	704	892	251
	Passengers	70,249	66,617	60,908	21,957
	Freight	216	339	56	3
Total	Movements	120,619	102,474	106,374	92,172
	Passengers	12,702,246	9,712,353	9,443,383	8,564,111
	Freight	179,500	145,106	132,689	116,925

Note: Movements refer to aircraft movements. Passengers refer to Passenger Turnover. Freight refers likewise to turnover (in tonnes).

758. Overall these show 14.0% per annum growth in passengers and 15.4% per annum growth in freight. These figures seem slightly aggressive for forecasting until 2015. However, CAAC's comments regarding above-trend growth for airports in Yunnan were also borne in mind. Hence growth rates of 13.0% per annum for passengers and 14.0% per annum for freight were adopted for Yunnan.

759. The resultant passenger and freight throughput forecasts for 2015 are shown in Table 8-13.

Table 8-13: Air Passenger and Freight Forecasts for Yunnan in 2015

	Passengers p.a.	Freight (tonnes) p.a.
Kunming	37,560,480	722,426
Xishuangbanna	4,503,324	20,815
Lijiang	3,408,960	2,922
Dali	1,060,393	2,341
Shangri-la	642,591	1,903
Dehong Mengshi	834,181	5,080
Simao	96,503	659
Zhaotong	145,513	796
Baoshan	202,641	753
Lincang	269,465	912
Total	48,724,052	758,608

4. Myanmar

760. From the Myanmar Statistical Yearbook historical trends in domestic air transport were obtained, as shown in Table 8-14. Data are by Financial Year (April to May). From 1990/91 to 2001/02, these show an annual average growth rate of 1.3% in air passengers, 2.9% in air passenger-km and an annual average decline of 2.1% per annum.

761. Table 8-15 shows historical data on international tourist arrivals by air at Yangon and Mandalay airports. As 1990-1991 appears unusually low, the growth rate from 1995 was analysed, showing an annual average increase of 6.4% in international tourist arrivals by air.

762. Table 8-16 shows historical data on overseas visitor arrivals, both by mode and tourist/non-tourist. Once again considering data since 1995, overall visitor numbers have increased on average by 13.3% per annum. However, much of this increase is attributable to tourism arrivals by land and users of border passes (who are included in the overall total but in none of the other columns). Non-tourists (defined as those on entry, business and multi-entry visas) increased by just 4.2% per annum.

Table 8-14: Historical Trends in Domestic Air Transport in Myanmar

	Passengers	Passenger-km	Tonne-km
1980-1981	566,000	224,844,878	2,074,001
1985-1986	466,000	211,258,482	1,945,281
1990-1991	416,000	180,571,634	1,106,992
1995-1996	637,000	293,068,087	775,538
1996-1997	598,000	279,994,962	1,105,383
1997-1998	430,000	210,223,895	1,457,754
1998-1999	386,000	195,829,781	1,509,242
1999-2000	410,000	208,207,818	1,061,940
2000-2001	448,000	231,342,020	1,134,345
2001-2002	479,000	247,045,860	873,687

Table 8-15: Historical Data on International Tourist Arrivals at Yangon and Mandalay Airports

Year	International Tourist Arrivals by Air
1980-1981	27,587
1985-1986	35,948
1990-1991	8,446
1995-1996	81,428
1996-1997	110,038
1997-1998	117,049
1998-1999	119,159
1999-2000	113,940
2000-2001	121,016
2001-2002	118,325

Table 8-16: Historical Data on Visitor Arrivals to Myanmar

Year	Total	Tourists				Other Visitors
		Total	By Air	By Sea	By Land	
1990-1991	25,261	8,806	8,446	360	-	16,455
1995-1996	170,143	120,205	81,428	1,978	36,799	49,938
1996-1997	310,298	251,501	110,038	1,603	139,860	58,797
1997-1998	329,379	265,122	117,490	3,288	144,344	64,257
1998-1999	345,829	287,394	119,159	1,116	167,119	58,435
1999-2000	309,985	246,574	113,940	990	131,644	63,411
2000-2001	325,042	260,616	121,016	2,960	136,640	64,426
2001-2002	359,404	295,354	118,325	1197	175,832	64,050

763. In terms of market share for international air transport, Yangon is overwhelmingly dominant. On this basis, air traffic forecasts were prepared for Yangon International Airport, also because this is the airport for which most data were readily available.

764. More recent data for Yangon International Airport were provided, covering both passengers and freight. In terms of the primary international linkage with Yangon, this is overwhelmingly Bangkok. Table 8-17 shows passenger and cargo data from Thai Airways International, Phuket Airlines and Bangkok Airways from 2000 to 2004 on the Yangon-Bangkok route. These data show an annual average increase in passengers of 8.4% per annum, but an annual decrease in air freight of 4.4%.

765. Total traffic through Yangon International Airport is shown in Table 8-18.

766. Determining a growth rate for Yangon International Airport was not wholly straightforward, as there have been periods of decline in air traffic. Indeed, air cargo appears to have declined recently.

767. With reference to Section VII.C.2, Myanmar is expected to have slower growth in overseas visitors than other countries in the GMS (see Table 7-6). Therefore passenger and freight growth figures from Lao PDR were factored downwards for application to Myanmar. It was assumed that international air passenger traffic would grow at three-quarters of the rate in Lao PDR and that freight would grow at half the rate.

768. The annual average growth rates assumed for international air passenger and freight traffic to/from Myanmar were therefore 8.1% per annum and 3.9% per annum,

respectively. It was further assumed that air passenger arrivals and departures would balance by 2015 (i.e., arrivals equal to departures).

769. The resultant air traffic forecasts for Yangon International Airport are shown in Table 8-19.

770. The consultants acknowledge that there is perhaps greater uncertainty (both upside and downside) surrounding air traffic forecasts in Myanmar than elsewhere in the GMS.

Table 8-17: RGN-BKK Passenger and Freight Data from Selected Airlines

Year	Passengers		Freight (Ton)		Aircraft Movements
	BKK-RGN	RGN-BKK	BKK-RGN	RGN-BKK	
2000	110,020	107,820	4,020	3,453	729
2001	120,705	118,429	3,530	2,977	730
2002	133,650	135,140	4,008	4,202	730
2003	128,191	127,969	3,112	3,756	730
2004	150,568	149,739	3,050	3,193	1,064

Table 8-18: Yangon International Airport Throughputs 2004

Year	Passengers		Freight (Tonnes)		Aircraft Movements
	In	Out	In	Out	
2004	297,272	329,078	4,253	4,716	3,153

Table 8-19: Forecast Yangon International Airport Throughputs 2015

Year	Passengers		Freight (Tonnes)	
	In	Out	In	Out
2015	737,683	737,683	6,478	7,184

5. Thailand

771. Comprehensive data on air traffic levels at Thailand's airports for 2003 were obtained from the Thai Statistical Yearbook, as shown in Table 8-19. Data on Bangkok, Chiang Mai, Phuket, Hat Yai, and Chiang Rai comprise both domestic and international data. Breakdowns into international and domestic traffic are given in Table 8-21.

772. In determining forecast growth rates for air travel to/from and within Thailand, it could be argued that as a more mature market than Lao PDR, the growth rates adopted should be lower than those used in Lao PDR.

773. However, Thailand (and in particular Bangkok) remains the main air-hub within the GMS to international travelers. Also, a new airport is due to open in Bangkok, probably in 2006. This new Suvarnabhumi Airport would elevate Bangkok's status as an international hub and is likely that this in turn will increase air traffic levels in Thailand in general. It should also be noted that to date Thailand has the most open skies in the GMS and is a developing hub for budget airlines also.

774. On the basis of the above, it was resolved that in the absence of more specific independent air traffic demand forecasts and for the purposes of this TA that the growth rates estimated for Lao PDR probably constitute a reasonable set of assumptions for air travel in Thailand also.

775. Thus international passenger flows have been assumed to grow 10.8% per annum, domestic passenger flows at 7.4% per annum and freight at 7.7% per annum until 2015.

776. Table 8-22 presents the resultant forecasts for the international airports (Bangkok and Suvarnabhumi are combined) and Table 8-23 present forecasts for domestic airports. Once again, it may be safest to view forecasts at individual airports as indicative, especially with regards smaller domestic airports.

Table 8-20: 2003 Thai Airports Traffic

Airport	Aircraft Movements	Passengers				Freight (MT) inc. Mail			
		Total	Embarked	Disembarked	Transit	Total	Inbound	Outbound	Transit
Bangkok International Airport	198,381	30,040,130	14,277,016	14,220,383	1,542,731	1,052,872	392,496	571,249	89,127
Chiang Mai International Airport	16,030	2,054,399	983,355	1,025,155	45,889	25,530	9,682	15,635	213
Phuket International Airport	24,460	3,606,403	1,769,537	1,781,295	55,571	24,144	6,331	10,355	7,457
Hat Yai International Airport	5,177	745,303	362,739	375,034	7,530	9,683	6,183	3,031	469
Chiang Rai International Airport	3,528	419,954	209,793	210,161	-	4,180	1,718	2,462	-
U-Ta Pao International Airport	5,533	109,405	54,652	53,510	1,243	6	0	6	-
Trat Airport	796	15,160	7,245	7,915	-	-	-	-	-
Hua Hin Airport	46,245	22,507	6,428	8,487	7,592	1	0	0	-
Tak Airport	25	-	-	-	-	-	-	-	-
Nan Airport	1,374	20,106	7,452	7,786	4,868	39	3	15	22
Phrae Airport	1,106	17,467	5,762	4,783	6,922	38	16	1	21
Phetchaboon Airport	424	5,875	1,339	1,467	3,069	1	0	0	-
Sukhothai Airport	1,840	51,641	13,953	14,177	23,511	2	2	-	-
Phitsanulok Airport	6,675	207,707	103,903	103,394	410	246	156	90	-
Mae Hong Son Airport	3,675	132,501	62,255	70,246	-	283	239	44	-
Mae Sot Airport	1,313	15,995	7,595	8,335	65	10	5	5	-
Lampang Airport	1,944	57,800	29,202	28,501	97	33	10	23	-
Khon Kaen Airport	4,601	392,119	196,773	185,827	9,519	1,276	739	414	123
Nakhon Ratchasima Airport	763	11,200	4,934	3,047	3,219	41	24	11	6
Loei Airport	531	8,022	4,146	3,876	-	-	-	-	-
Nakhon Phanom Airport	982	28,994	15,021	13,973	-	0	0	0	-
Buri Ram Airport	789	22,341	10,733	11,509	99	4	3	2	-
Surin Airport	363	7,964	3,421	3,050	1,493	9	9	-	-
Sakon Nakhon Airport	1,182	31,871	16,265	15,506	100	32	6	24	1
Udon Thani Airport	2,724	355,219	183,896	168,273	3,050	1,344	873	471	-
Ubon Ratchathani Airport	2,134	252,647	126,991	125,656	-	983	853	130	-
Roi Et Airport	1,041	19,313	9,580	9,629	104	2	1	1	-
Nakhon Si Thammarat Airport	1,747	104,297	54,703	49,594	-	821	605	216	-
Narathiwat Airport	1,696	16,573	8,806	7,767	-	15	8	7	0
Pattani Airport	-	-	-	-	-	-	-	-	-

Table 8-20: 2003 Thai Airports Traffic (continued)

Airport	Aircraft Movements	Passengers				Freight (MT) inc. Mail			
		Total	Embarked	Disembarked	Transit	Total	Inbound	Outbound	Transit
Ranong Airport	981	48,458	24,018	24,440	-	134	13	121	-
Trang Airport	1,214	79,212	40,566	38,231	415	668	480	187	1
Ko Samui Airport	12,665	743,838	363,720	375,730	4,388	16	16	0	-
Surat Thani Airport	3,810	163,234	79,860	82,837	537	2,075	556	1,515	3
Chumphon Airport	1,089	5,853	2,871	2,982	-	1	0	0	-
Krabi Airport	4,408	338,002	167,042	170,428	532	1,003	340	656	8

Table 8-21: 2003 Trafic at Thailand's International Airports

Airport	Aircraft Movements	Passengers				Freight (MT) inc. Mail			
		Total	Embarked	Disembarked	Transit	Total	Inbound	Outbound	Transit
Bangkok International Airport	198,176	30,175,379	14,351,076	14,286,195	1,538,108	1,040,046	379,514	570,978	89,554
International traffic	137,157	22,790,455	10,602,600	10,649,747	1,538,108	992,822	353,928	549,340	89,554
Domestic traffic	61,019	7,384,924	3,748,476	3,636,448	-	47,224	25,586	21,638	-
Phuket International Airport	24,684	3,600,949	1,767,301	1,778,278	55,370	23,361	6,019	9,952	7,390
International traffic	12,015	1,496,401	748,514	693,591	54,296	12,342	616	4,344	7,382
Domestic traffic	12,669	2,104,548	1,018,787	1,084,687	1,074	11,019	5,403	5,608	8
Hat Yai International Airport	5,161	741,244	358,917	374,895	7,432	10,742	5,524	3,144	2,074
International traffic	1,223	105,297	45,703	52,592	7,002	2,243	96	73	2,074
Domestic traffic	3,938	635,947	313,214	322,303	430	8,499	5,428	3,071	-
Chiang Mai International Airport	15,879	2,055,591	982,519	1,025,559	47,513	25,624	9,604	15,628	392
International traffic	4,375	209,032	87,910	73,763	47,359	1,097	176	529	392
Domestic traffic	11,504	1,846,559	894,609	951,796	154	24,527	9,428	15,099	-
Chiang Rai International Airport	3,519	420,073	209,968	210,103	2	4,177	1,715	2,462	-
International traffic	13	1,772	975	797	-	-	-	-	-
Domestic traffic	3,506	418,301	208,993	209,306	2	4,177	1,715	2,462	-

Table 8-22: Forecast 2015 Traffic at Thailand's International Airports

Airport	Passengers				Freight (MT) inc. Mail			
	Total	Embarked	Disembarked	Transit	Total	Inbound	Outbound	Transit
Bangkok and Suvarnabhumi Airports	103,307,026	49,020,615	49,020,615	5,265,795	2,533,034	924,307	1,390,618	218,109
International traffic	78,024,343	36,379,274	36,379,274	5,265,795	2,418,020	861,992	1,337,919	218,109
Domestic traffic	25,282,683	12,641,341	12,641,341	-	115,014	62,315	52,699	-
Phuket International Airport	12,328,042	6,069,240	6,069,240	189,562	56,896	14,659	24,238	17,998
International traffic	5,123,009	2,468,562	2,468,562	185,885	30,059	1,500	10,580	17,979
Domestic traffic	7,205,033	3,600,678	3,600,678	3,677	26,837	13,159	13,658	19
Hat Yai International Airport	2,537,689	1,256,122	1,256,122	25,444	26,162	13,454	7,657	5,051
International traffic	360,490	168,259	168,259	23,972	5,463	234	178	5,051
Domestic traffic	2,177,199	1,087,863	1,087,863	1,472	20,699	13,220	7,479	-
Chiang Mai International Airport	7,037,426	3,437,381	3,437,381	162,663	62,407	23,391	38,062	955
International traffic	715,632	276,748	276,748	162,136	2,672	429	1,288	955
Domestic traffic	6,321,794	3,160,633	3,160,633	527	59,736	22,962	36,774	-
Chiang Rai International Airport	1,438,142	719,068	719,068	7	10,173	4,177	5,996	-
International traffic	6,067	3,033	3,033	-	-	-	-	-
Domestic traffic	1,432,076	716,035	716,035	7	10,173	4,177	5,996	-

Table 8-23: Forecast 2015 Thai Domestic Airports Traffic

Airport	Passengers				Freight (MT) inc. Mail			
	Total	Embarked	Disembarked	Transit	Total	Inbound	Outbound	Transit
U-Ta Pao Airport	257,685	127,378	127,378	2,928	14	0	14	-
Trat Airport	35,707	17,853	17,853	-	-	-	-	-
Hua Hin Airport	53,011	17,565	17,565	17,882	1	1	0	-
Tak Airport	-	-	-	-	-	-	-	-
Nan Airport	47,356	17,945	17,945	11,466	96	8	35	53
Phrae Airport	41,141	12,418	12,418	16,304	93	39	4	51
Phetchaboon Airport	13,838	3,305	3,305	7,229	1	1	0	-
Sukhothai Airport	121,631	33,128	33,128	55,376	4	4	-	-
Phitsanulok Airport	489,218	244,126	244,126	966	599	381	218	-
Mae Hong Son Airport	312,083	156,042	156,042	-	689	582	107	-

Table 8-23: Forecast 2015 Thai Domestic Airports Traffic (continued)

Airport	Passengers				Freight (MT) inc. Mail			
	Total	Embarked	Disembarked	Transit	Total	Inbound	Outbound	Transit
Mae Sot Airport	37,673	18,760	18,760	153	25	13	12	-
Lampang Airport	136,138	67,955	67,955	228	81	25	56	-
Khon Kaen Airport	923,569	450,574	450,574	22,420	3,109	1,800	1,009	300
Nakhon Ratchasima Airport	26,380	9,399	9,399	7,582	101	58	27	15
Loei Airport	18,894	9,447	9,447	-	-	-	-	-
Nakhon Phanom Airport	68,290	34,145	34,145	-	1	1	0	-
Buri Ram Airport	52,620	26,194	26,194	233	11	6	5	-
Surin Airport	18,758	7,621	7,621	3,517	22	22	-	-
Sakon Nakhon Airport	75,067	37,416	37,416	236	77	15	58	3
Udon Thani Airport	836,657	414,737	414,737	7,184	3,272	2,125	1,147	-
Ubon Ratchathani Airport	595,067	297,533	297,533	-	2,394	2,078	316	-
Roi Et Airport	45,488	22,622	22,622	245	6	3	3	-
Nakhon Si Thammarat Airport	245,654	122,827	122,827	-	1,999	1,474	525	-
Narathiwat Airport	39,035	19,517	19,517	-	37	19	17	1
Pattani Airport	-	-	-	-	-	-	-	-
Ranong Airport	114,134	57,067	57,067	-	327	32	295	-
Trang Airport	186,570	92,796	92,796	977	1,628	1,168	456	3
Ko Samui Airport	1,751,982	870,824	870,824	10,335	40	40	0	-
Surat Thani Airport	384,470	191,602	191,602	1,265	5,053	1,355	3,690	8
Chumphon Airport	13,786	6,893	6,893	-	2	1	1	-
Krabi Airport	796,106	397,426	397,426	1,253	2,443	827	1,597	19

6. Viet Nam

777. The Study of Following-Up on VITRANSS gave information on domestic and international air traffic levels and recent growth in Viet Nam. Table 8-24 shows trends in domestic passenger traffic from 1998 to 2004. Table 8-25 shows trends in international traffic over the same period.

778. Trends in domestic air freight are shown in Table 8-26, while Table 8-27 shows trends in international air freight.

779. As can be seen, in recent years overall growth has been quite strong for both passengers and freight on both domestic and international routes, despite a reduction in domestic air freight movements through the smaller airports.

780. In determining the projected growth rates to generate 2015 forecasts, it was noted that Viet Nam's air traffic is likely to grow more quickly than that of Lao PDR in both absolute and percentage terms. Equally however, it might be imprudent to extrapolate growth rates on an assumption of no slow-down from current levels. The following assumptions were therefore adopted:

- International air passengers: to grow at 1.10 times the Lao PDR rate, so will grow at 11.9% per annum;

- Domestic air passengers to grow at 1.25 times the Lao PDR rate, so will grow at 9.2% per annum; and

- Air freight to grow at 1.35 times the Lao PDR rate, so will grow at 10.4% per annum.

781. The resultant air traffic forecasts are shown in Table 8-28.

Table 8-24: Domestic Air Passenger Trends in Viet Nam

	1998	1999	2000	2001	2002	2003	2004	Average Annual Growth (%)
Hanoi	1,028,706	1,051,395	1,175,276	1,407,220	1,670,922	1,721,434	1,897,909	10.7%
Da Nang	407,324	415,864	437,462	599,156	713,581	663,100	772,787	11.3%
HCMC	1,308,791	1,343,205	1,449,289	1,769,521	2,142,435	2,164,174	2,395,720	10.6%
Others	577,111	578,517	598,242	729,176	919,492	985,467	1,050,898	10.5%
Total	3,321,932	3,388,981	3,660,269	4,505,073	5,446,430	5,534,175	6,117,314	10.7%

Table 8-25: International Air Passenger Trends in Viet Nam

	1998	1999	2000	2001	2002	2003	2004	Average Annual Growth (%)
Hanoi	549,428	562,578	649,008	799,832	1,043,400	1,118,555	1,231,026	14.4%
Da Nang		962	15,976	38,991	40,177	23,411	44,633	
HCMC	1,792,006	2,034,876	2,293,763	2,583,662	3,209,388	2,897,076	3,402,340	11.3%
Total	2,341,434	2,598,416	2,958,747	3,422,485	4,292,965	4,039,042	4,677,999	12.2%

Table 8-26: Domestic Air Freight Trends in Viet Nam (Tonnes)

	1998	1999	2000	2001	2002	2003	2004	Average Annual Growth (%)
Hanoi	19,736	15,337	17,969	28,580	36,746	42,689	45,803	15.1%
Da Nang	2,377	2,218	1,988	3,420	4,352	4,567	5,032	13.3%
HCMC	21,432	17,202	19,535	31,392	39,864	46,377	49,757	15.1%
Others	1,253	1,790	1,719	1,737	2,476	41	1,104	-2.1%
Total	44,798	36,547	41,211	65,129	83,438	93,674	101,696	14.6%

Table 8-27: International Air Freight Trends in Viet Nam (Tonnes)

	1998	1999	2000	2001	2002	2003	2004	Average Annual Growth (%)
Hanoi	9,853	9,230	11,247	12,088	18,863	20,884	22,184	14.5%
Da Nang			119	681	590	153	389	
HCMC	49,693	52,396	61,646	66,140	90,775	111,214	114,755	15.0%
Total	59,546	61,626	73,012	78,909	110,228	132,251	137,328	14.9%

Table 8-28: Forecast 2015 Air Traffic Levels for Viet Nam

Airport	Passengers p.a.		Freight (Tonnes p.a.)	
	Domestic	International	Domestic	International
Hanoi	4,997,173	4,240,316	136,005	65,872
Da Nang	2,034,740	153,740	14,942	1,155
HCMC	6,307,904	11,719,489	147,745	340,747
Others	2,767,003	0	3,278	0
Total	16,106,820	16,113,544	301,970	407,773

D. Air Transport Scheme Testing

782. The air traffic projections outlined above were intended to serve as baseline assumptions for the review of proposed air transport schemes. Where projected demand outstrips airport capacity then upgrading might be investigate. And where schemes are formulated, then likely time and/or cost savings can be estimated with reference to expected airport traffic.

783. It may also be the case that some schemes may lead to increased air traffic levels. Once again, such schemes were tested with reference to the baseline projections above.

E. Potential Issues with Air Transport Modeling

784. In recent years, especially in Thailand, budget airlines have grown. These could conceivably lead to additional air transport growth. However, to assess this would be to make a large assumption regarding the regulatory environments in GMS countries where such budget carriers have thus far had only limited access to, if any. Such policy changes might be best tested as schemes, rather than “Do Minimum” assumptions.

785. A further possible complication is that in very recent years oil prices (and so aviation fuel prices) have climbed markedly. As this was after many years of relatively weak oil/aviation fuel pricing, the long-term effects of such fuel price increases might not be fully felt yet, especially on Asia’s emergent budget airline sector.[1]

786. As outlined earlier, air transport often plays an important but qualitatively different role to surface modes. As such, it is being considered in a different way to surface modes. Therefore caution should be exercised when comparing air and surface transport schemes.

[1] The same argument could be applied to other transport forecasts regarding oil prices. However, the impact is likely to be greatest on the air subsector.

Annex One: Zonal Planning Data

Zonal planning data collated is presented below, by country. Absolute 2004 values were not important; rather it was the proportion of each indicator relative to the rest of the country that was used in distributing trip ends within the initial prior matrices.

Cambodia

Note: GDP data were not available by zone.

		Population (2002)	GDP (n/a)	Vehicle Ownership (2002)
67	Phnom Penh	1,234,000		15,876
68	Svay Rieng	541,000		65
69	Prey Veng	1,060,000		181
70	Kandal	1,231,000		2,111
71	Takeo	896,000		213
72	Kep	36,000		2
73	Kampot	600,000		155
74	Krong Preah Sihanouk	196,000		155
75	Koh Kong	173,000		61
76	Kampong Speu	699,000		306
77	Kampong Chhnang	489,000		198
78	Pursat	428,000		92
79	Battambang	971,000		736
80	Pailin	30,000		5
81	Banteay Meanchey	725,000		148
82	Oddar Meanchey	94,000		0
83	Siemreap	821,000		193
84	Preah Vihear	146,000		95
85	Stung Treng	98,000		102
86	Rattana Kiri	116,000		3
87	Mondul Kiri	40,000		3
88	Kratie	311,000		188
89	Kampong Thom	658,000		256
90	Kampong Cham	1,838,000		5,866

PRC

Note: Vehicle ownership data were not available in Guangxi.

		Population (2003)	GDP (RMB 00m 2003)	Vehicle Ownership (2003)
187	Kunming	5,008,000	814	525,597
188	Chuxiong	2,550,000	140	96,736
189	Liqiang	1,119,000	41	48,147
190	Diqing	336,000	14	26,465
191	Nujiang	472,000	14	13,951
192	Dali	3,358,000	175	159,341
193	Baoshan	2,393,000	87	127,372
194	Lincang	2,170,000	73	94,664
195	Simao	2,346,000	77	130,820
196	Xishuangbanna	869,000	58	125,616
197	Honghe	4,015,000	207	216,432
198	Yuxi	2,067,000	286	241,536
199	Wenshan	3,322,000	100	100,895
200	Qujing	5,612,000	282	38,409
201	Zhaotong	5,073,000	121	107,244
202	Dehong	1,048,000	42	150,429
203	Nanning	6,416,700	503	
204	Chongzuo	2,278,900	106	
205	Fangchenggang	788,500	72	
206	Qinzhou	3,367,400	155	
207	Beihai	1,467,700	140	
208	Bose	3,684,400	166	
209	Hechi	3,810,000	143	
210	Liuzhou	3,512,600	327	
211	Guilin	4,904,700	388	
212	Hezhou	2,092,200	115	
213	Wuzhou	2,936,900	162	
214	Laibin	2,441,400	119	
215	Guigang	4,703,500	134	
216	Yulin	5,895,500	245	

Lao PDR

Note: GDP data were not available by zone.

		Population (2002)	GDP (n/a)	Vehicle Ownership (2004)
1	Vientiane City	633,100		161,611
2	Phongsali	184,600		662
3	Louang Nam Tha	138,600		6,886
4	Udom Xai	253,900		2,441
5	Bokeo	137,200		3,897
6	Louang Prabang	440,700		9,690
7	Houa Phan	295,500		6,350
8	Xayaboury	352,400		6,856
9	Vientiane Province	346,100		27,419
10	Bolikhamxai	197,600		7,075
11	Khammouane	329,100		16,413
12	Savannakhet	811,400		47,603
13	Salavan	309,500		9,367
14	Sekong	77,500		1,684
15	Champasak	605,600		15,180
16	Attapeu	105,300		2,247
17	Xaysomboune, Xieng Khouang	307,600		15,071

Myanmar

Note: Raw data in Myanmar are by Division and State. GMS Transport Model zones subdivide these. However, as some prior matrices existed for Myanmar, planning data were not split-down to zonal level. Data by Division and State are thus presented here.

Note: GDP data were not available by Division/State.

		Population (2002)	**GDP (n/a)**	**Vehicle Ownership (2004)**
	DIVISIONS			
	Ayeyawady	7,052,000		12,645
	Magway	4,773,000		14,593
	Mandalay	7,089,000		121,821
	Bago	5,236,000		19,127
	Yangon	5,927,000		152,413
	Sagaing	5,555,000		25,581
	Tanintharyi	1,421,000		17,818
	STATES			
	Rakhine	2,863,000		2,952
	Chin	487,000		361
	Kachin	1,336,000		12,402
	Kayin	1,543,000		3,774
	Kayah	285,000		1,901
	Mon	2,609,000		16,745
	Shan	4,982,000		59,557

Thailand

		Population (2003)	GDP (m Baht; 2003)	Vehicle Ownership (2002)
91	Bangkok	5,844,607	1,653,510	5,399,153
92	Ang Thong, Sing Buri, Suphanburi	1,382,234	69,048	616,166
93	Ayutthaya, Nonthaburi, Pathum Thani	2,415,553	382,373	469,822
94	Chainat	349,216	20,184	132,570
95	Kanchanaburi	797,339	47,629	324,053
96	Lopburi	768,516	56,038	302,807
97	Nakhon Nayok, Saraburi	877,451	92,527	319,497
98	Nakhon Pathom, Ratchaburi	1,646,138	164,099	701,082
99	Phetchaburi, Samut Sakhon, Samut Songkhram	1,113,935	214,538	428,925
100	Samut Prakan	1,045,850	365,731	119,747
101	Prachuap Khiri Khan	492,480	36,217	257,102
102	Chachoengsao, Prachinburi	1,106,436	146,597	363,152
103	Chonburi	1,157,111	268,622	796,880
104	Rayong	556,733	277,896	359,968
105	Chanthaburi	511,587	22,481	253,495
106	Trat	225,021	13,628	86,180
107	Sa Kaeo	541,441	20,057	116,230
108	Chumphon	477,116	24,902	201,003
109	Ranong	163,436	10,758	52,538
110	Surat Thani	935,512	64,004	415,868
111	Phuket, Phang Nga	519,205	64,349	337,831
112	Krabi	384,416	24,123	164,076
113	Nakhon Si Thammarat	1,531,072	80,607	525,338
114	Trang	608,044	31,767	293,611
115	Phattalung	504,597	16,871	177,684
116	Satun, Songkhla	1,568,144	122,473	666,618
117	Narathiwat, Pattani, Yala	1,808,306	73,106	641,934
118	Nakhon Ratchasima	2,591,050	100,494	797,578
119	Buriram	1,554,009	37,093	319,266
120	Surin	1,406,612	28,719	267,003
121	Sisaket	1,465,538	29,178	271,006
122	Ubon Ratchathani	1,805,322	49,057	431,134
123	Chaiyaphum	1,138,944	28,493	227,165
124	Khon Kaen, Maha Sarakham	2,714,990	97,804	924,614
125	Roi Et, Yasothon	1,875,337	43,297	459,214
126	Amnat Charoen	370,627	7,623	68,047
127	Mukdahan	339,074	8,533	79,877
128	Kalasin	994,600	26,106	187,630
129	Loei, Nongbua Lamphu	1,124,089	27,509	242,125
130	Udon Thani	1,542,071	46,477	402,482
131	Nong Khai	913,275	21,780	182,510
132	Sakon Nakhon	1,113,720	23,699	218,971
133	Nakhon Phanom	710,440	15,951	130,923
134	Nakhon Sawan, Uthai Thani	1,466,222	60,466	548,022
135	Kamphaeng Phet	774,225	40,411	213,737
136	Tak	498,714	18,409	184,318
137	Phichit	597,882	19,524	237,893
138	Phetchabun	1,052,286	30,967	275,959
139	Phitsanulok, Sukhothai	1,489,049	54,279	535,223

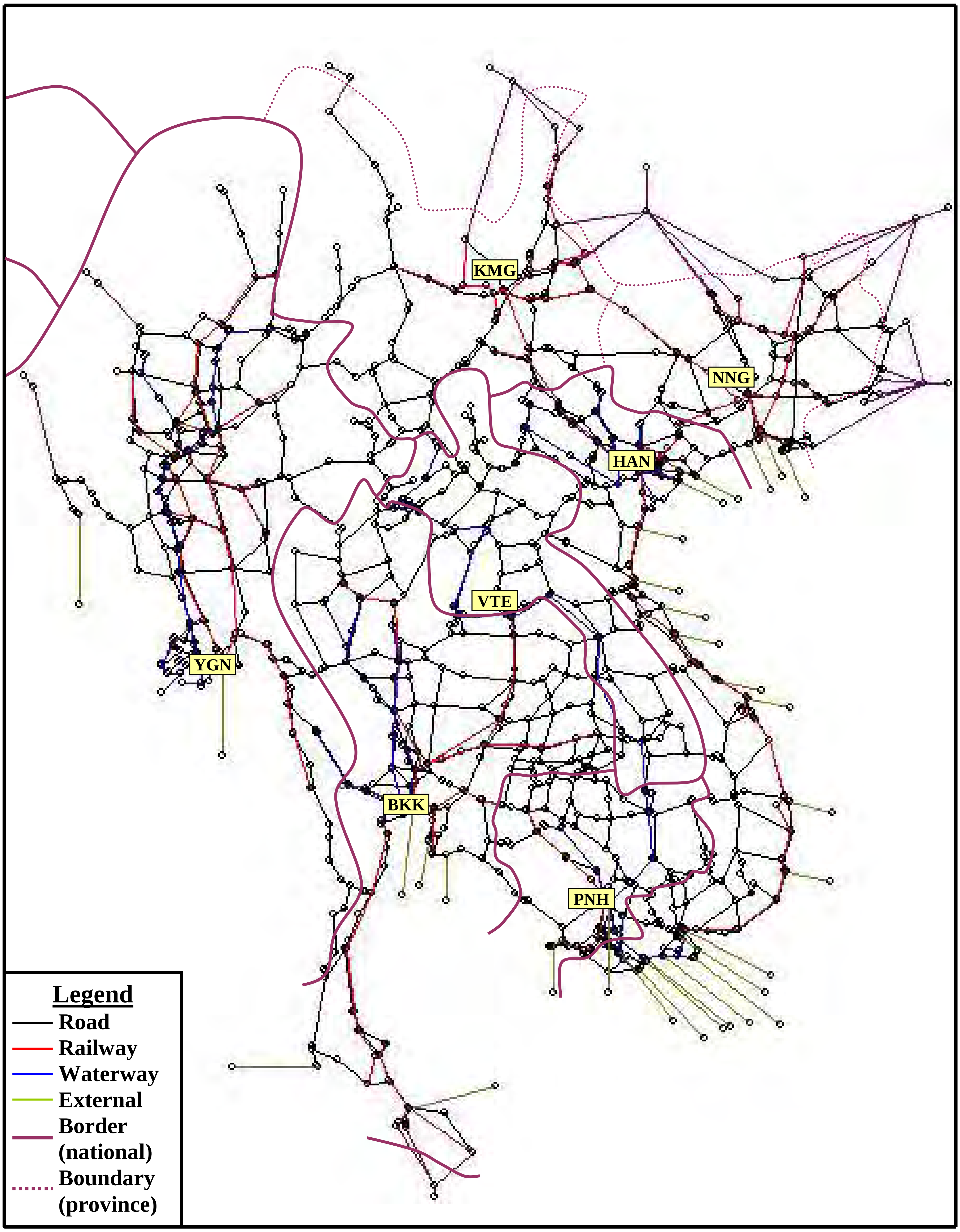
		Population (2003)	**GDP (m Baht; 2003)**	**Vehicle Ownership (2002)**
140	Phrae, Uttaradit	963,872	33,358	408,001
141	Nan	482,181	13,896	159,578
142	Phayao	501,509	15,046	206,314
143	Lampang, Lamphun	1,206,257	79,238	617,054
144	Chiang Mai	1,603,220	88,893	887,875
145	Mae Hong Son	238,241	6,225	27,573
146	Chiang Rai	1,214,913	35,190	482,828

Viet Nam

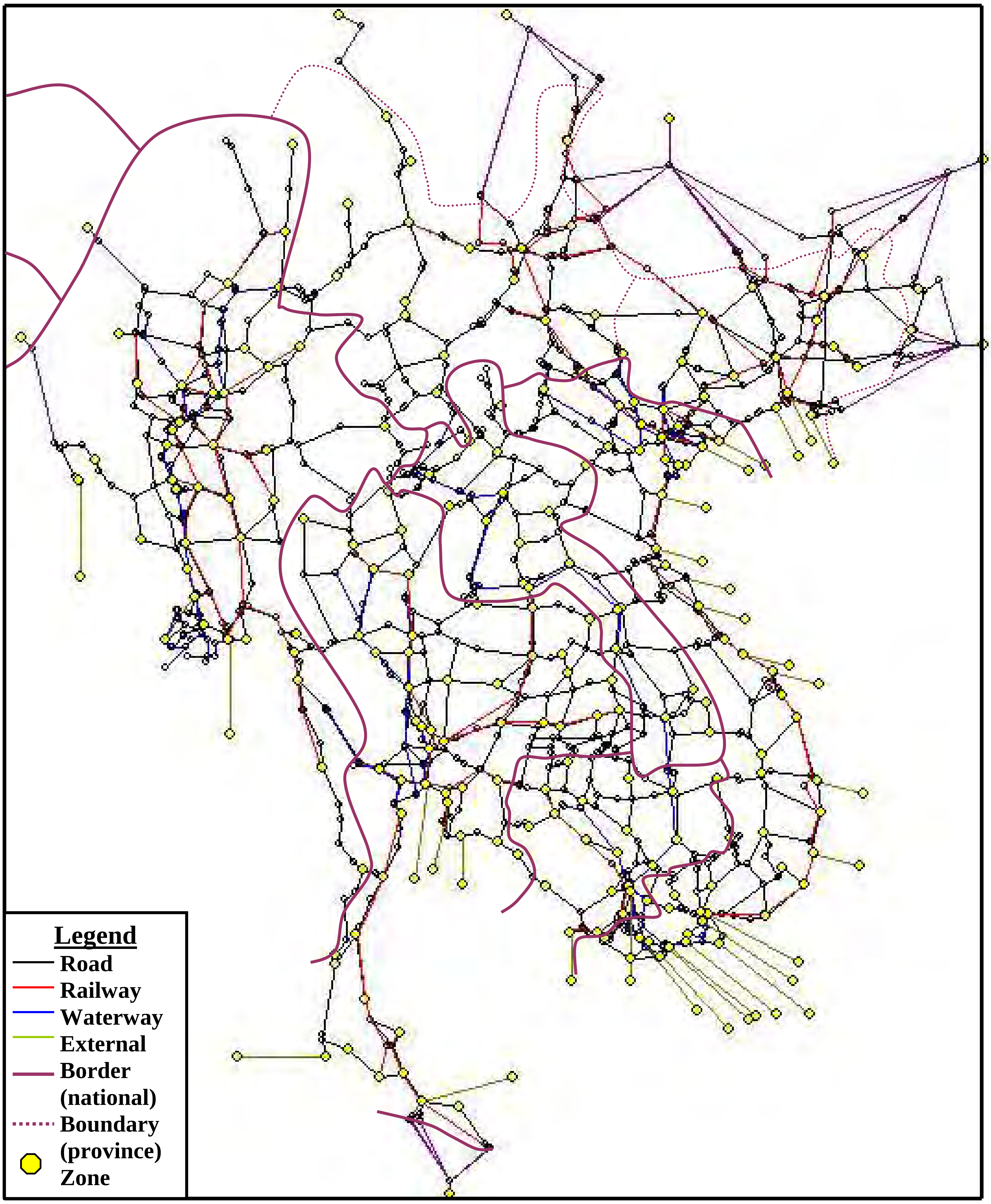
Note: GDP data were not available by zone.

		Population (2001)	GDP (n/a)	Vehicle Ownership (2004)
18	Hanoi	2,842,000		60,111
19	Thai Nguyen	1,062,000		5,150
20	Bac Kan, Cao Bang	785,000		2,818
21	Lang Son	715,000		4,223
22	Bac Giang, Bac Ninh	2,480,000		7,274
23	Quang Ninh	1,030,000		8,103
24	Hai Phong, Hai Duong	3,382,000		20,425
25	Thai Binh, Hung Yen	2,906,000		6,295
26	Nam Dinh, Ninh Binh	2,808,000		5,838
27	Ha Nam, Ha Tay	3,232,000		8,439
28	Phu Tho, Vinh Thuc	2,404,000		7,096
29	Tuyen Quang	693,000		2,296
30	Ha Giang	626,000		1,290
31	Yen Bai	700,000		2,138
32	Lao Cai	617,000		2,136
33	Lai Chau	616,000		1,741
34	Son La	922,000		2,481
35	Hoa Binh	774,000		2,981
36	Thanh Hoa	3,510,000		7,343
37	Nghe An	2,914,000		8,339
38	Ha Tinh	1,285,000		2,237
39	Quang Binh	813,000		2,391
40	Quang Tri	589,000		3,515
41	Tha Thienh Hue	1,079,000		4,686
42	Da Nang	715,000		9,551
43	Quang Nam	1,403,000		3,870
44	Quang Ngai	1,206,000		3,819
45	Kon Tum	331,000		1,281
46	Gia Lai	1,048,000		5,735
47	Binh Dinh	1,492,000		6,316
48	Phu Yen	811,000		2,855
49	Dak Lak	1,901,000		7,722
50	Khanh Hoa	1,066,000		7,278
51	Ninh Thuan	532,000		2,019
52	Lam Dong	1,050,000		6,044
53	Binh Thuan	1,080,000		3,418
54	Binh Phuoc	708,000		2,716
55	Dong Nai	2,067,000		18,391
56	Ba Ria Ving Tau	839,000		7,776
57	Binh Duong	768,000		10,024
58	Tay Ninh	990,000		4,154
59	TP HCM	5,378,000		117,232
60	Long An	1,348,000		3,409
61	Tien Giang, Ben Tre	2,944,000		9,660
62	Vinh Long, Tra Vinh	2,012,000		4,377
63	Dong Thap	1,593,000		2,372
64	An Giang	2,099,000		5,251
65	Can Tho, Soc Trang, Bac Lieu	3,822,000		8,959
66	Kien Giang, Ca Mau	2,701,000		5,310

Annex Two: 2004 Network Model with Country Boundaries



Annex Three: Zone Centroids on The 2004 Network



Annex Four: Comparison of Modeled and Observed 2004 Traffic Volumes

Note: These comparisons are in the form of PCUs (or equivalent PCUs for rail and water sites). Where two one-way counts were coded on a single link (for directional analysis), they have been re-combined hereunder by link.

Count	Country(ies)	Type	From/At	To	Passenger PCUs/Equivalents				Freight PCUs/Equivalents			
					Obs	Mod	M-O	%diff	Obs	Mod	M-O	%diff
1	LAO	HWAY	Nateuy Center Namtha	Center Namtha Center Namtha	58	53	-5	-9%	77	71	-5	-7%
2	LAO	HWAY	Center Namtha Bokeo/Center Nam	Houayxay Bokeo/Center Namtha	8	5	-3	-38%	70	71	2	2%
3	LAO	HWAY	Vientiane Vientiane/Bolikhamxa	Pakxan Vientiane/Bolikhamxai	472	468	-4	-1%	368	353	-15	-4%
4	LAO	HWAY	Pakxan Bolikhamxai	Ban Lao Bolikhamxai	458	437	-21	-5%	689	613	-76	-11%
5	LAO	HWAY	Thakhek Khammouan/Savannakhet	Seno Khammouan/Savannakhet	90	104	14	15%	131	183	52	40%
6	LAO	HWAY	Seno Savannakhet/Salavan	Muang Khongxedon Savannakhet/S	395	400	5	1%	499	543	44	9%
7	LAO	HWAY	Pakse Champasak	Veunkham (Border of Cambodia)	432	433	1	0%	242	240	-1	-1%
8	LAO	HWAY	Nateuy Centernamtha/Oudomxai	Oudomxai Centernamtha/Oudomxai	67	56	-11	-16%	144	145	1	1%
9	LAO	HWAY	Oudomxai Oudomxai/Centerphaban	Pakmong Oudomxai/Centerphabang	93	237	144	156%	150	341	191	127%
10	LAO	HWAY	Pakmong Centerphabang	Center Phrabang Centerphabang	142	198	56	40%	198	318	120	61%
11	LAO	HWAY	Center Phrabang Centerphabang	Phou Khoun Centerphabang	71	71	0	-1%	107	185	78	73%
12	LAO	HWAY	Phon Hong Vientiane	Vientiane Vientiane	175	162	-13	-8%	489	544	54	11%
13	LAO	HWAY	Muang Khoua Phongsali/ Oudomxa	Oudomxai Phongsali/ Oudomxai	28	29	1	2%	41	90	49	121%
14	LAO	HWAY	Muang Phin Savanakhet	Seno Savanakhet	545	571	26	5%	302	123	-179	-59%
15	LAO	HWAY	Pakmong Pakmong	Phoulao Pakmong	129	100	-29	-22%	133	132	-1	-1%
16	LAO	HWAY	Pakmong Pakmong	Louangprabang Pakmong	168	137	-31	-18%	231	209	-22	-10%
17	LAO	HWAY	Meung Kham Meung Kham	NamNeun Meung Kham	322	292	-30	-9%	69	93	24	35%
18	LAO	HWAY	Meung Kham Meung Kham	Phonsavanh Meung Kham	301	296	-4	-1%	154	112	-42	-27%
19	LAO	HWAY	Pakkhone Pakkhone	Thadeua Pakkhone	32	30	-2	-7%	124	132	8	7%
20	LAO	HWAY	Salaphoukoun Salaphoukoun	Xiengkhouang Salaphoukoun	125	135	10	8%	71	65	-6	-8%
21	LAO	HWAY	Salaphoukoun Salaphoukoun	Vientiane Salaphoukoun	184	174	-10	-5%	132	120	-11	-9%
22	LAO	HWAY	B. Sixomxeun Hinboun	Vientiane Hinboun	472	442	-30	-6%	535	593	59	11%
23	LAO	HWAY	Gnommalat Gnommalat	Thakhek Gnommalat	132	138	6	5%	259	131	-127	-49%
24	LAO	HWAY	M. Phin M. Phin	Salavan M. Phin	468	415	-52	-11%	92	37	-55	-59%
25	LAO	HWAY	Lak 35 Lak 35	Xeno Lak 35	258	279	20	8%	182	178	-3	-2%
26	VIE	HWAY	Dien Chau Nghe An	Vinh Nghe An	2,521	2,452	-69	-3%	2,331	2,280	-51	-2%
27	VIE	HWAY	Dong Hoi Quang Binh/Quang Tri	Dong Ha Quang Binh/Quang Tri	1,366	1,328	-38	-3%	1,244	1,215	-29	-2%
28	VIE	HWAY	Dong Ha Quang Tri/Thua Thien H	Hue Quang Tri/Thua Thien Hue	2,332	2,280	-53	-2%	2,514	2,470	-44	-2%
29	VIE	HWAY	Quang Ngai Quang Ngai/Binh Din	An Nhon Quang Ngai/Binh Dinh	2,533	2,568	35	1%	1,152	1,076	-76	-7%
30	VIE	HWAY	An Nhon Binh Dinh/Phu Yen	Tuy Hoa Binh Dinh/Phu Yen	3,863	3,774	-88	-2%	3,920	3,846	-74	-2%

Count	Country(ies)	Type	From/At	To	Passenger PCUs/Equivalents				Freight PCUs/Equivalents			
					Obs	Mod	M-O	%diff	Obs	Mod	M-O	%diff
31	VIE	HWAY	Ninh Hoa Khanh Hoa	Nha Trang Khanh Hoa	2,647	2,529	-118	-4%	2,469	2,410	-60	-2%
32	VIE	HWAY	Bien Hoa Dong Nai/Ho Cni Minh	Ho Cni Minh Dong Nai/Ho Cni Mi	27,958	27,538	-420	-2%	8,212	8,194	-18	0%
33	VIE	HWAY	Xuan Mai Hoa Binh	Hoa Binh Hoa Binh	1,017	1,100	83	8%	1,318	1,291	-27	-2%
34	VIE	HWAY	Son La Son La/Lai Chau	Tuan Giao Son La/Lai Chau	252	500	248	99%	264	245	-20	-7%
35	VIE	HWAY	Hanoi Hanoi/Vinh Phuc	Phuc Yen Hanoi/Vinh Phuc	5,149	5,208	60	1%	6,485	6,428	-57	-1%
36	VIE	HWAY	Viet Tri Phu Tho	Doan Hung Phu Tho	2,491	2,558	67	3%	4,934	4,878	-56	-1%
37	VIE	HWAY	Dong Ha Quang Tri	Lao Bao (Border of Lao PDR) Qu	295	259	-36	-12%	152	150	-2	-1%
38	VIE	HWAY	Giang Quang Nam	Dak To Quang Nam	223	278	55	25%	313	216	-97	-31%
39	VIE	HWAY	Khe Ve	West of Vung Ang Port	147	0	-147	-100%	619	0	-619	-100%
40	VIE	HWAY	Kon Tum	Quang Ngai	292	368	76	26%	118	131	13	11%
41	VIE	HWAY	North of Thuan Chau Son La	Son La	406	478	72	18%	222	244	22	10%
42	VIE	HWAY	South Bao Yen Lao Cai	Lao Cai	1,019	898	-120	-12%	805	789	-16	-2%
43	VIE	HWAY	North of Ham Yen (Tan Yen) Tuy	Tuyen Quang	765	742	-23	-3%	756	750	-6	-1%
44	VIE	HWAY	Dong Phu (South of Cho Moi) Th	Thai Nguyen	1,150	1,148	-2	0%	1,138	1,121	-17	-2%
45	VIE	HWAY	South of Pho Yen (Ba Hang) Tha	Thai Nguyen	4,917	4,775	-142	-3%	4,522	4,496	-25	-1%
46	VIE	HWAY	North of Kep Bac Giang	Bac Giang	4,170	3,503	-667	-16%	2,882	2,881	-1	0%
47	VIE	HWAY	East of Sao Do (Chi Linh) Hai	Hai Duong	5,808	1,337	-4,471	-77%	3,967	4,562	595	15%
48	VIE	HWAY	East of Dinh Lap Lang Son	Lang Son	277	38	-239	-86%	240	200	-40	-17%
49	VIE	HWAY	North East of Tong Dau Hoa Bin	Hoa Binh	929	1,044	115	12%	1,506	1,514	8	1%
50	VIE	HWAY	Thoung Bang la Yen Bai	Yen Bai	299	297	-2	-1%	177	216	40	22%
51	VIE	HWAY	South of Dong Van Ha Nam	Ha Nam	11,589	11,622	33	0%	12,529	12,447	-82	-1%
52	VIE	HWAY	South of Nghin Bridge Thai Bin	Thai Binh	2,109	2,018	-90	-4%	3,077	3,064	-13	0%
53	VIE	HWAY	East of Du Nghia Hai Phong	Hai Phong	8,550	8,811	261	3%	10,334	9,387	-947	-9%
54	VIE	HWAY	East of Kien Bridge Hai Phong	Hai Phong	5,071	7,257	2,186	43%	5,357	6,044	687	13%
55	VIE	HWAY	South of Nhu Nguyet Bridge Bac	Bac Ninh	5,648	8,679	3,031	54%	4,501	4,506	5	0%
56	VIE	HWAY	North of Bim Son Thanh Hoa	Thanh Hoa	5,921	5,867	-54	-1%	9,296	9,199	-97	-1%
57	VIE	HWAY	Lang Co Thua Thien Hue	Thua Thien Hue	2,799	2,690	-109	-4%	3,664	3,619	-46	-1%
58	VIE	HWAY	North of Tam Ky Quang Nam	Quang Nam	5,317	5,207	-110	-2%	5,121	4,961	-160	-3%
59	VIE	HWAY	East of An Khe pass (phu Pong)	Binh Dinh	3,285	3,151	-135	-4%	2,961	2,954	-7	0%
60	VIE	HWAY	East of Phuong Hoang pass Khan	Khanh Hoa	1,009	986	-23	-2%	1,854	1,854	-1	0%
61	VIE	HWAY	South of Ham Thuan Binh Thuan	Binh Thuan	6,653	9,426	2,773	42%	7,871	7,815	-56	-1%
62	VIE	HWAY	Bai Vot Ha Tinh	Ha Tinh	3,778	3,734	-44	-1%	4,833	4,702	-131	-3%
63	VIE	HWAY	North of Buon Ma Thuot Dac Lac	Dac Lac	3,498	3,642	144	4%	2,156	2,135	-21	-1%
64	VIE	HWAY	South of Nha Trang Khanh Hoa	Khanh Hoa	5,124	5,033	-91	-2%	5,873	5,814	-59	-1%
65	VIE	HWAY	North of Xuan Son Bridge Quang	Quang Binh	378	138	-240	-63%	236	5	-231	-98%
66	VIE	HWAY	Phu Dong 3-arm Junction Gia La	Gia Lai	3,203	3,135	-68	-2%	3,741	3,653	-88	-2%

Count	Country(ies)	Type	From/At	To	Passenger PCUs/Equivalents				Freight PCUs/Equivalents			
					Obs	Mod	M-O	%diff	Obs	Mod	M-O	%diff
67	VIE	HWAY	South of Tuy Hoa Phu Yen	Phu Yen	2,519	2,355	-164	-7%	3,248	3,191	-57	-2%
68	VIE	HWAY	North of Dong Xoai Binh Phuoc	Binh Phuoc	3,065	5,907	2,841	93%	3,239	3,248	8	0%
69	VIE	HWAY	South of Ma Da Gui Dong Nai	Dong Nai	7,247	2,318	-4,929	-68%	6,154	6,151	-3	0%
70	VIE	HWAY	North of Phu My (Tan Thanh) Ba	Ba Ria Vung Tau	14,136	13,984	-152	-1%	7,247	7,234	-13	0%
71	VIE	HWAY	South of Ho Nai Dong Nai	Dong Nai	13,900	11,745	-2,156	-16%	14,025	13,966	-59	0%
72	VIE	HWAY	South of Thu Dau Mot Binh Duon	Binh Duong	13,145	13,538	394	3%	10,438	10,417	-21	0%
73	VIE	HWAY	North of Tan An Long An	Long An	22,593	22,278	-315	-1%	20,158	20,109	-49	0%
74	VIE	HWAY	East of Trang Bang Tay Ninh	Tay Ninh	7,815	7,798	-17	0%	6,144	6,111	-33	-1%
75	VIE	HWAY	South of Can Tho Ferry (say on	Vinh Long	12,857	12,836	-21	0%	4,239	4,231	-8	0%
76	VIE	HWAY	South of Thach Hung (Lap Vo) D	Dong Thap	4,434	4,345	-88	-2%	2,203	2,190	-13	-1%
77	VIE	HWAY	Rach Goi Hau Giang	Hau Giang	3,991	3,947	-44	-1%	1,614	1,613	0	0%
78	VIE	HWAY	South of Trung Luong Junction	Tien Giang	21,615	21,373	-242	-1%	12,990	12,956	-34	0%
79	VIE	HWAY	Thot Not Can Tho	Can Tho	7,947	8,002	54	1%	2,258	2,257	0	0%
80	VIE	HWAY	Long Xuyen An Giang	An Giang	3,550	3,545	-5	0%	1,754	1,747	-7	0%
81	CAM	HWAY	Svay Rieng Svay Rieng/Prey Ven	Neak Loeung Svay Rieng/Prey Ve	1,375	1,363	-12	-1%	755	738	-17	-2%
82	CAM	HWAY	Neak Loeung Prey Veng/Kandal	Phnom Penh Prey Veng/Kandal	9,800	9,786	-14	0%	3,047	3,028	-19	-1%
83	CAM	HWAY	Odong Kandal/Kampong Chhnang	Kampong Chhnang Kandal/Kampong	1,719	1,702	-17	-1%	686	679	-7	-1%
84	CAM	HWAY	Kampong Chhnang Kampong Chhnan	Pursat Kampong Chhnang/Pursat	791	777	-13	-2%	287	283	-4	-1%
85	CAM	HWAY	Pursat Pursat/Battambang	Battambang Pursat/Battambang	1,879	1,867	-11	-1%	512	508	-4	-1%
86	CAM	HWAY	Battambang Battambang/Banteaym	Sisophon Battambang/Banteaymea	1,560	1,553	-7	0%	536	534	-2	0%
87	CAM	HWAY	Stung Treng Stung Treng/Kratie	Kratie Stung Treng/Kratie	212	205	-7	-3%	50	57	7	15%
88	CAM	HWAY	Kratie Kratie/Kampong Cham	Snuol Kratie/Kampong Cham	286	277	-9	-3%	77	174	97	125%
89	CAM	HWAY	Snuol Kampong Cham	Phum Krek Kampong Cham	286	283	-3	-1%	77	138	61	79%
90	CAM	HWAY	Phum Krek Kampong Cham	Kampong Cham Kampong Cham	486	479	-7	-1%	285	613	327	115%
91	CAM	HWAY	Kampong Cham Kampong Cham	Skun Kampong Cham	902	887	-16	-2%	453	609	155	34%
92	CAM	HWAY	Skun Kampong Cham/Kandal	Thnal Keng Kampong Cham/Kandal	1,195	1,173	-21	-2%	387	407	20	5%
93	CAM	HWAY	Phnom Penh Kandal/Kampong Speu	Kampong Speu Kandal/Kampong Sp	1,954	1,936	-19	-1%	2,022	2,043	21	1%
94	CAM	HWAY	Kampong Speu Kampong Speu/Siha	Veal Rinh Kampong Speu/Sihanou	1,954	1,947	-7	0%	2,022	2,020	-2	0%
95	CAM	HWAY	Cham Yeam	Sre Ambel (Chamkar Luong)	267	266	-1	-1%	13	13	0	-3%
96	CAM	HWAY	Sisophon	Kralanh	170	168	-2	-1%	198	292	94	47%
97	CAM	HWAY	Kralanh	Siemreap	783	776	-7	-1%	451	585	134	30%
98	CAM	HWAY	Siemreap	Kampong Thom	426	417	-9	-2%	263	396	133	51%
99	THA	HWAY	Sa Kaeo Sa Kaeo/Prachinburi	Kabinburi Sa Kaeo/Prachinburi	9,784	13,689	3,905	40%	2,669	5,553	2,883	108%
100	THA	HWAY	Prachinburi (Jct.R33/R320) Pra	Nakhonnayok Prachinburi	7,470	6,828	-641	-9%	8,517	7,049	-1,469	-17%
101	THA	HWAY	Jct. Hin Kong Saraburi/Ayuttha	Bangkok North (Bang Pa-in Inte	15,242	9,372	-5,870	-39%	39,212	25,257	-13,956	-36%

Count	Country(ies)	Type	From/At	To	Passenger PCUs/Equivalents				Freight PCUs/Equivalents			
					Obs	Mod	M-O	%diff	Obs	Mod	M-O	%diff
102	THA	HWAY	Bangkok North (Bang Pa-in Inte	Angthong Ayutthaya/Angthong	43,103	38,934	-4,168	-10%	28,041	28,046	5	0%
103	THA	HWAY	Sing Buri Sing Buri/Chai Nat	Chai Nat Sing Buri/Chai Nat	10,593	12,137	1,544	15%	22,519	22,514	-6	0%
104	THA	HWAY	Chai Nat Chai Nat/Nakhon Sawan	Nakhon Sawan Chai Nat/Nakhon S	12,081	14,433	2,353	19%	21,487	21,486	-1	0%
105	THA	HWAY	Nakhon Sawan Nakhon Sawan/Kamp	Jct. Khanu Woralaksaburi Nakho	8,951	8,937	-13	0%	18,621	18,601	-20	0%
106	THA	HWAY	Kampheng Phet Kampheng Phet/Ta	Tak (Jct. R1/R105) Kampheng Ph	13,431	13,417	-14	0%	21,191	21,178	-13	0%
107	THA	HWAY	Hat Yai (Jct. B.Kho Hong) Song	Phatthalung Songkhla, Phatthal	13,436	13,379	-57	0%	16,326	16,272	-54	0%
108	THA	HWAY	Phatthalung Phatthalung/ Nakho	Thungsong Phatthalung/ Nakhons	12,183	12,240	58	0%	8,930	13,416	4,486	50%
109	THA	HWAY	Thungsong Nakhonsithammarat/ S	Waing Sa Nakhonsithammarat/ Su	9,123	8,323	-800	-9%	13,473	13,416	-57	0%
110	THA	HWAY	Waing Sa Nakhonsithammarat/ Su	Jct. R41/R401 Nakhonsithammara	10,307	10,113	-195	-2%	18,662	18,582	-79	0%
111	THA	HWAY	Jct. R41/R401 Suratthani	Chumphon Suratthani	10,441	10,229	-213	-2%	26,359	26,249	-110	0%
112	THA	HWAY	Tha Sae Chumphon	Bang Saphan Noi Chumphon	8,295	8,055	-240	-3%	15,961	15,852	-109	-1%
113	THA	HWAY	Pranburi Phetchaburi	Chah-Am Phetchaburi	24,164	23,433	-731	-3%	780	673	-108	-14%
114	THA	HWAY	Pak Tho (Jct. R4/R35) Ratcha B	Nakhon Pathom Ratcha Buri/Nakh	36,062	36,052	-10	0%	11,243	11,240	-2	0%
115	THA	HWAY	Tak (Jct. R1/R105) Tak	Thoen Tak	14,137	14,127	-10	0%	11,870	11,829	-41	0%
116	THA	HWAY	Ngao Lampang	Phayao Lampang	10,137	10,119	-18	0%	5,000	4,999	-1	0%
117	THA	HWAY	Phayao Phayao/Chiangrai	Chiang Rai Phayao/Chiangrai	12,617	13,319	702	6%	4,177	4,183	6	0%
118	THA	HWAY	Jct. Ban Phue Udonthani/Khonka	Udonthani Udonthani/Khonkaen	6,043	5,801	-241	-4%	6,215	5,822	-392	-6%
119	THA	HWAY	Udonthani Udonthani/Khonkaen	Nam Phong Udonthani/Khonkaen	24,782	23,221	-1,561	-6%	5,482	5,035	-447	-8%
120	THA	HWAY	Banphai Khonkaen	Phon Khonkaen	16,354	12,788	-3,566	-22%	11,343	10,170	-1,173	-10%
121	THA	HWAY	Sikhui Nakhonrachasima	Muaklek Nakhonrachasima	13,843	7,573	-6,270	-45%	17,130	13,986	-3,143	-18%
122	THA	HWAY	Saraburi Saraburi	Jct. Hinkong Saraburi	8,160	13,004	4,843	59%	26,002	25,999	-4	0%
123	THA	HWAY	Nakhon Phanom Nakhon Phanom/Sa	Jct. R22/R223 (B.That Na Weng)	9,455	9,451	-4	0%	4,436	4,433	-3	0%
124	THA	HWAY	Sawang Dan Din Udonthani/Sakho	Udonthani Udonthani/Sakhonakro	2,086	2,018	-67	-3%	2,853	2,851	-2	0%
125	THA	HWAY	Mukudahan Mukudahan	Nong Sung Mukudahan	6,568	11,744	5,176	79%	4,283	4,059	-224	-5%
126	THA	HWAY	Som Det Kalasin	Kalasin Kalasin	8,738	7,965	-772	-9%	2,063	2,056	-7	0%
127	THA	HWAY	Yang Ta Lat Kalasin/Mahasaraka	Khonkaen Kalasin/Mahasarakam/K	17,717	18,141	424	2%	8,462	8,448	-14	0%
128	THA	HWAY	Jct. Nam Nao Phetchabun	Jct.R12/R21 (Lom Sak) Phetchab	2,792	3,779	987	35%	2,375	2,381	6	0%
129	THA	HWAY	Wang Thong Phitsunulok	Phitsanulok Phitsunulok	10,313	8,156	-2,157	-21%	4,544	4,503	-41	-1%
130	THA	HWAY	Sukhothai Sukhothai/Tak	Tak (Jct. R1/R105) Sukhothai/T	10,887	10,722	-165	-2%	1,905	1,865	-40	-2%
131	THA	HWAY	Bypass Pattani Pattani, Songkh	Hat Yai (Jct. R43/R4-B. Pru) P	6,388	6,376	-12	0%	1,789	1,787	-1	0%
132	THA	HWAY	Pak Thong Chai Nakhonrachasima	Kabin Buri Nakhonrachasima/Pra	7,869	4,714	-3,155	-40%	9,398	10,038	640	7%
133	THA	HWAY	Plaeng Yao Chonburi	Jct. R331/R344 Chonburi	12,233	8,577	-3,657	-30%	12,537	12,338	-199	-2%
134	THA	HWAY	Chonburi Chonburi/Bangkok	Bangkok East (Outer Ring Road	36,926	37,829	903	2%	16,304	16,328	24	0%
135	THA	HWAY	Mukdahan Thailand	Amnat Charoen Thailand	3,422	3,392	-29	-1%	3,195	3,191	-4	0%
136	THA	HWAY	Yasothon Thailand	Suwannaphum Thailand	5,604	6,432	828	15%	8,407	8,383	-24	0%
137	THA	HWAY	Phayakkhaphum Phisai Thailand	Buriram Thailand	2,180	2,435	255	12%	3,143	3,135	-8	0%

Count	Country(ies)	Type	From/At	To	Passenger PCUs/Equivalents				Freight PCUs/Equivalents			
					Obs	Mod	M-O	%diff	Obs	Mod	M-O	%diff
138	THA	HWAY	Buriram Thailand	Nang Rong Thailand	5,654	2,168	-3,485	-62%	2,997	2,980	-16	-1%
139	THA	HWAY	Kanchanburi Thailand	Nakhon Pathom Thailand	31,694	31,681	-13	0%	3,599	3,203	-397	-11%
140	THA	HWAY	Chonburi Thailand	Laem Chanbang Thailand	16,994	26,084	9,090	53%	81,219	77,400	-3,819	-5%
141	THA	HWAY	Klaeng Thailand	Chanthanburi Thailand	26,853	24,529	-2,324	-9%	7,237	7,235	-2	0%
142	THA	HWAY	Chanthanburi Thailand	Trat Thailand	4,349	4,427	78	2%	3,270	3,273	3	0%
143	THA	HWAY	Jct Tha Miram Phattalung	Trang District Phattalung	10,020	10,022	2	0%	3,604	3,601	-4	0%
144	THA	HWAY	Rama V Monument Ranong	Kra Buri Ranong	3,827	3,820	-7	0%	1,307	1,306	-1	0%
145	THA	HWAY	Jct To Pha To Ranong	Ka Poh Ranong	4,289	3,965	-324	-8%	1,434	1,432	-2	0%
146	THA	HWAY	Bang Prachuan Bridge Samut Son	Pak Tho (R4) Samut Songkhram	18,141	18,320	179	1%	20,646	20,594	-52	0%
147	THA	HWAY	Bangkok Bangkok	Pathum Thani Bangkok	21,880	12,572	-9,308	-43%	1,258	1,253	-5	0%
148	THA	HWAY	Chanthaburi	Chanthaburi	1,919	5,035	3,116	162%	600	590	-10	-2%
149	THA	HWAY	Bypass Chachoengsao Chachoengs	Bypass Chachoengsao Chachoengs	12,397	16,425	4,028	32%	19,752	19,356	-395	-2%
150	THA	HWAY	Jct to PNSA Phra Nakhon Si Ayu	Jct to Ang Thong Phra Nakhon S	44,088	44,080	-9	0%	21,911	21,864	-47	0%
151	THA	HWAY	Ban Mi Lop Buri	Lop Buri Lop Buri	10,328	5,994	-4,334	-42%	4,855	4,860	4	0%
152	THA	HWAY	Phu Khan Sara Buri	Lamhuai Phu Khan Sara Buri	6,722	8,578	1,856	28%	22,289	22,220	-70	0%
153	THA	HWAY	ta Pa Chainat	Chai Nat Chainat	12,864	14,433	1,569	12%	21,487	21,486	-1	0%
154	THA	HWAY	Nakhon Sawan Nakhon Sawan	Khlong Ban Phalang Bridge Nakh	12,591	13,752	1,161	9%	10,436	10,448	12	0%
155	THA	HWAY	Nakhon Sawan Nakhon Sawan	Chum Sahng Nakhon Sawan	6,184	6,120	-65	-1%	3,383	3,368	-15	0%
156	THA	HWAY	Kamphaeng Phet Kamphaeng Phet	Phichit Kamphaeng Phet	8,828	8,822	-6	0%	2,485	2,488	3	0%
157	THA	HWAY	Phichit Phitsanulok	Phitsanulok Phitsanulok	3,327	2,953	-374	-11%	2,320	2,353	33	1%
158	THA	HWAY	Phitsanulok Uttaradit	Uttaradit Uttaradit	5,878	5,878	-1	0%	3,970	4,003	32	1%
159	THA	HWAY	Rong Kwan Phrae	Nan Phrae	3,949	3,939	-11	0%	1,299	1,294	-5	0%
160	THA	HWAY	Rong Kwan Phrae	Huai Bo Thong Phrae	3,616	3,566	-50	-1%	2,873	2,907	34	1%
161	THA	HWAY	Lampang Lampang	Lamphun Lampang	6,920	6,925	4	0%	6,760	6,755	-4	0%
162	THA	HWAY	Ban Sop Ngao Mae Hong Son	Amphoh Mah Sariang Mae Hong So	1,198	1,179	-19	-2%	115	112	-3	-2%
163	THA	HWAY	Chiang Mai Mae Hong Son	Amphoh Mah Sariang Mae Hong So	597	326	-271	-45%	457	0	-457	-100%
164	THA	HWAY	Chiang Mai Mae Hong Son	Ban Mah Na Mae Hong Son	1,389	3,128	1,739	125%	681	1,074	393	58%
165	THA	HWAY	km77 Chiang Mai	Ban Ping Khong Chiang Mai	1,716	1,800	83	5%	1,488	1,089	-399	-27%
166	THA	HWAY	km20 Chiang Mai	Pang Namthu Chiang Mai	4,617	6,566	1,949	42%	1,488	1,488	0	0%
167	THA	HWAY	Tha Ton Chiang Mai	Chiang Rai Chiang Mai	4,141	1,748	-2,393	-58%	1,091	1,084	-6	-1%
168	THA	HWAY	Prakhon Chai Buri Rum	Prasat Buri Rum	5,187	2,019	-3,167	-61%	6,368	450	-5,917	-93%
169	THA	HWAY	Kra Sang Buri Rum	Surin District Buri Rum	1,081	1,094	13	1%	1,189	1,183	-7	-1%
170	THA	HWAY	Tha Tum (Yasothon) Surin	Chom Phra Surin	5,186	5,730	543	10%	4,154	4,148	-5	0%
171	THA	HWAY	Sikhoruphum Surin	Samrong Thap Surin	3,210	3,562	353	11%	3,452	3,444	-8	0%
172	THA	HWAY	Chaiyaphum Chaiyaphum	Nong Wahng Chaiyaphum	1,539	1,637	97	6%	1,478	1,468	-10	-1%
173	THA	HWAY	Wang Katha Chaiyaphum	km159+700 Chaiyaphum	961	950	-11	-1%	1,008	972	-36	-4%

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					Obs	Mod	M-O	%diff	Obs	Mod	M-O	%diff
174	THA	HWAY	Ban Thum Khon Kaen	Mancha Khiri Khon Kaen	3,134	2,929	-206	-7%	2,646	2,615	-31	-1%
175	THA	HWAY	Huai Pha Nang Bridge Nong Bua	Loei Nong Bua Lam Phu	2,014	1,762	-252	-13%	2,522	2,499	-23	-1%
176	THA	HWAY	Nong Bong Loei	km30 Loei	891	836	-55	-6%	905	926	21	2%
177	THA	HWAY	Kalasin Kalasin	Lam Chi Kalasin	5,348	5,521	173	3%	3,018	3,009	-10	0%
178	THA	HWAY	Ban Kok Tum Kalasin	km82+620 Kalasin	1,452	2,329	878	60%	189	180	-9	-5%
179	THA	HWAY	Roi Et Roi Et	Suwannaphum Roi Et	6,386	6,350	-36	-1%	720	717	-3	0%
180	THA	HWAY	Roi Et Roi Et	Amphon Phon Thong Roi Et	6,846	6,108	-738	-11%	2,191	2,182	-9	0%
181	THA	HWAY	Roi Et Roi Et	Maha Sarakham Roi Et	8,133	8,958	825	10%	692	678	-14	-2%
182	THA	HWAY	Muang Samsip Ubon Ratchathani	Ubon Ratchathani Ubon Ratchath	7,970	7,887	-84	-1%	3,126	3,120	-7	0%
183	THA	HWAY	Renu Nakhon Nakhon Phanom	Ban Tong Nakhon Phanom	2,372	2,393	21	1%	1,060	1,056	-3	0%
184	MYA	HWAY	Kawkareik Kayin	Paan Kayin	114	108	-6	-5%	65	138	73	113%
185	MYA	HWAY	Paan Kayin/Mon	Thaton Kayin/Mon	196	233	37	19%	150	252	101	67%
186	MYA	HWAY	Thaton Mon/Bago	Kyaikhto Mon/Bago	473	1,375	902	191%	492	1,112	620	126%
187	MYA	HWAY	Bago Bago/Yangon	Yangon Bago/Yangon	2,895	2,614	-281	-10%	3,211	2,781	-430	-13%
188	MYA	HWAY	Nyaunglebin Bago	Toungoo Bago	995	2,354	1,359	137%	1,392	2,224	832	60%
189	MYA	HWAY	Toungoo Bago/Mandalay	Pyinmana Bago/Mandalay	837	1,857	1,020	122%	1,069	1,380	311	29%
190	MYA	HWAY	Pyinmana Mandalay	Pyawbwe Mandalay	2,268	3,288	1,019	45%	2,776	3,079	303	11%
191	MYA	HWAY	Meiktila Mandalay	Myittha (Yewun) Mandalay	1,352	1,642	290	21%	1,144	1,234	90	8%
192	MYA	HWAY	Myittha (Yewun) Mandalay	Mandalay Mandalay	1,352	1,647	295	22%	1,144	1,235	91	8%
193	MYA	HWAY	Mandalay Mandalay/Sagaing	Sagaing Mandalay/Sagaing	3,443	3,713	271	8%	463	517	54	12%
194	MYA	HWAY	Gangaw Magway/Sagaing	Kalemyo Magway/Sagaing	80	41	-38	-48%	91	0	-91	-100%
195	MYA	HWAY	Kalemyo Sagaing	Tamu (Border of India) Sagaing	109	107	-1	-1%	154	154	0	0%
196	MYA	HWAY	Loilem Shan	Taunggyi Shan	94	20	-74	-79%	148	160	11	8%
197	MYA	HWAY	Kalaw Shan/Mandalay	Meiktila Shan/Mandalay	672	655	-17	-3%	906	901	-5	-1%
198	MYA	HWAY	Muse (Border of PRC) Shan	Hsenwi Shan	141	187	46	33%	273	201	-72	-26%
199	MYA	HWAY	Hsenwi Shan	Lashio Shan	113	821	708	627%	241	341	100	41%
201	MYA	HWAY	Kyaykme Shan/Mandalay	Pyin U Lwin Shan/Mandalay	648	842	194	30%	508	515	6	1%
202	MYA	HWAY	Thaton	Mawlamyine	704	1,241	537	76%	551	860	309	56%
203	MYA	HWAY	Ye	Kaleinaung	67	100	33	50%	72	85	14	19%
204	MYA	HWAY	Yangon	Taukkyan	4,930	3,682	-1,248	-25%	2,366	2,096	-270	-11%
205	MYA	HWAY	Shwebo	Kawlin	57	52	-5	-8%	498	510	12	2%
206	MYA	HWAY	Mandalay	Mogok	588	328	-260	-44%	404	401	-3	-1%
207	MYA	HWAY	Myingyan	Meiktila	424	567	143	34%	427	0	-427	-100%
208	MYA	HWAY	Meiktila	Kyaukpadaung	550	999	449	82%	656	854	197	30%
209	MYA	HWAY	Pyay	Myayde	1,153	143	-1,010	-88%	1,146	953	-193	-17%

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					Obs	Mod	M-O	%diff	Obs	Mod	M-O	%diff
210	MYA	HWAY	Pyay	Thandwe	309	274	-35	-11%	961	953	-8	-1%
211	MYA	HWAY	Taungoo	Loikaw	578	578	0	0%	803	923	121	15%
212	MYA	HWAY	Bago	Thanylin	1,067	944	-123	-12%	557	555	-2	0%
213	MYA	HWAY	Yangon	Pyay	2,073	2,039	-34	-2%	2,091	1,625	-466	-22%
214	MYA	HWAY	Pathein	Hinthada	214	125	-89	-42%	136	135	-1	-1%
215	MYA	HWAY	Yangon	Pathein	171	261	90	53%	67	85	18	27%
216	MYA	HWAY	Monywa	Nyaungbingyi	173	262	89	52%	93	92	-2	-2%
217	MYA	HWAY	Nyaung-U	Kyunchaung	13	108	95	736%	28	28	0	-2%
218	MYA	HWAY	Chauk	Seikpu	1	0	-1	-83%	55	285	230	418%
219	MYA	HWAY	Magwe	Minbu	49	92	43	87%				
220	MYA	HWAY	Thayet	Myayde	0	0	0	-100%	20	20	0	0%
221	MYA	HWAY	Pyay	Sinde	309	365	56	18%	345	343	-2	-1%
222	CHI	HWAY	Pangxieqing Yunnan	Wuding Yunnan	2,934	2,930	-4	0%	2,513	2,511	-2	0%
223	CHI	HWAY	Maliuwan Yunnan	Zhaotong Yunnan	2,153	2,152	-2	0%	1,844	1,841	-3	0%
224	CHI	HWAY	Zhaotong Yunnan	Daibu Yunnan	4,130	4,127	-3	0%	3,537	3,536	-2	0%
225	CHI	HWAY	Songming Yunnan	Mohei Yunnan	11,517	11,507	-11	0%	9,864	9,851	-13	0%
226	CHI	HWAY	Mohei Yunnan	Xiaomengyang Yunnan	4,537	4,520	-17	0%	3,886	3,865	-21	-1%
227	CHI	HWAY	Gejiehe Yunnan	Zhongdian Yunnan	796	786	-10	-1%	682	672	-9	-1%
228	CHI	HWAY	Zhongdian Yunnan	Lijiang Yunnan	1,746	1,727	-19	-1%	1,496	1,476	-20	-1%
229	CHI	HWAY	Lijiang Yunnan	Dali Yunnan	7,613	7,584	-29	0%	6,520	6,456	-64	-1%
230	CHI	HWAY	Dali Yunnan	Lincang Yunnan	6,744	6,700	-44	-1%	5,776	5,768	-8	0%
231	CHI	HWAY	Lincang Yunnan	Simao Yunnan	1,890	883	-1,007	-53%	1,619	363	-1,256	-78%
232	CHI	HWAY	Simao Yunnan	Xiaomengyang Yunnan	3,559	639	-2,920	-82%	3,048	341	-2,708	-89%
233	CHI	HWAY	Shengjingguan Yunnan	Qujing Yunnan	5,658	5,734	76	1%	4,845	4,818	-27	-1%
234	CHI	HWAY	Qujing Yunnan	Kunming Yunnan	14,650	14,612	-38	0%	12,547	12,520	-27	0%
235	CHI	HWAY	Kunming Yunnan	Baoshan Yunnan	3,482	3,439	-44	-1%	2,982	2,948	-34	-1%
236	CHI	HWAY	Baoshan Yunnan	Ruili Yunnan	4,183	4,075	-108	-3%	3,582	3,499	-83	-2%
237	CHI	HWAY	Luocunkou Yunnan	Yanshan Yunnan	2,871	2,926	55	2%	2,459	2,452	-7	0%
238	CHI	HWAY	Yanshan Yunnan	Kaiyuan Yunnan	5,555	5,339	-216	-4%	4,758	4,751	-7	0%
239	CHI	HWAY	Kaiyuan Yunnan	Anding Yunnan	2,657	2,813	156	6%	2,275	2,267	-8	0%
240	CHI	HWAY	Anding Yunnan	Pu'er Yunnan	2,013	2,005	-8	0%	1,724	1,713	-11	-1%
241	CHI	HWAY	Pu'er Yunnan	Lincang Yunnan	2,647	2,632	-15	-1%	2,267	2,252	-14	-1%
242	CHI	HWAY	Zhaokua Yunnan	Xiaoshiba Yunnan	6,737	4,221	-2,516	-37%	5,770	3,627	-2,142	-37%
243	CHI	HWAY	Shanmuqing Yunnan	Qujing Yunnan	4,747	4,738	-9	0%	4,065	4,040	-25	-1%
244	CHI	HWAY	Qujing Yunnan	Shilin Yunnan	4,237	4,221	-16	0%	3,629	3,627	-1	0%
245	CHI	HWAY	Shilin Yunnan	Mile Yunnan	5,029	4,861	-169	-3%	4,307	4,299	-8	0%

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246	CHI	HWAY	Mile Yunnan	Kaiyuan Yunnan	6,014	6,039	25	0%	5,150	5,146	-4	0%
247	CHI	HWAY	Nanning Guangxi	Bose Guangxi	4,835	4,833	-2	0%	4,356	4,359	3	0%
248	CHI	HWAY	Banli Guangxi	Guangxi	1,830	1,597	-233	-13%	1,567	1,563	-5	0%
249	VIE	RAIL	Lao Cai	Lang Giang	114	94	-20	-18%	851	828	-23	-3%
251	VIE	RAIL	Lang Giang	Yen Bai	207	209	2	1%	1,518	1,493	-24	-2%
252	VIE	RAIL	Yen Bai	Lang Giang	250	209	-41	-16%	1,719	1,493	-225	-13%
253	VIE	RAIL	Yen Bai	Viet Tri	293	293	0	0%	1,797	1,772	-25	-1%
254	VIE	RAIL	Viet Tri	Yen Bai	303	293	-10	-3%	1,507	1,772	265	18%
255	VIE	RAIL	Viet Tri	Dong Anh	313	428	115	37%	1,766	1,675	-90	-5%
256	VIE	RAIL	Dong Anh	Viet Tri	310	428	117	38%	1,691	1,675	-16	-1%
257	VIE	RAIL	Dong Anh	Yen Vien	308	390	82	27%	2,103	2,044	-59	-3%
258	VIE	RAIL	Yen Vien	Dong Anh	336	390	54	16%	2,120	2,044	-76	-4%
259	VIE	RAIL	Yen Vien	Gia Lam	365	476	111	30%	2,114	2,065	-50	-2%
260	VIE	RAIL	Gia Lam	Yen Vien	404	476	72	18%	1,704	2,065	361	21%
261	VIE	RAIL	Gia Lam	Ha Noi	443	378	-65	-15%	1,303	1,280	-23	-2%
262	VIE	RAIL	Ha Noi	Gia Lam	236	378	141	60%	809	1,280	471	58%
263	VIE	RAIL	Quan Trieu	Dong Anh	30	38	8	28%	480	482	2	0%
264	VIE	RAIL	Dong Anh	Quan Trieu	26	38	12	47%	518	482	-36	-7%
265	VIE	RAIL	Bang Tuong	Dong Mo	22	0	-22	-100%	306	223	-83	-27%
266	VIE	RAIL	Dong Mo	Bang Tuong	21	0	-21	-100%	374	223	-150	-40%
267	VIE	RAIL	Dong Mo	Kep	19	9	-10	-53%	289	355	66	23%
268	VIE	RAIL	Kep	Dong Mo	56	9	-47	-84%	381	355	-27	-7%
269	VIE	RAIL	Bac Giang	Yen Vien	92	86	-6	-7%	521	539	18	3%
270	VIE	RAIL	Yen Vien	Bac Giang	46	86	40	87%	163	539	376	231%
271	VIE	RAIL	Co Thanh	Chi Linh					760	0	-760	-100%
272	VIE	RAIL	Chi Linh	Co Thanh	94	0	-94	-100%	1,244	423	-821	-66%
273	VIE	RAIL	Hai Phong	Gia Lam	188	137	-51	-27%	995	993	-1	0%
274	VIE	RAIL	Gia Lam	Hai Phong	287	137	-149	-52%	1,447	993	-454	-31%
275	VIE	RAIL	Nam Dinh	Ha Noi	385	384	-1	0%	1,459	1,444	-15	-1%
276	VIE	RAIL	Ha Noi	Nam Dinh	403	384	-19	-5%	1,284	1,444	159	12%
277	VIE	RAIL	Thanh Hoa	Nam Dinh	420	400	-20	-5%	1,372	1,240	-132	-10%
278	VIE	RAIL	Nam Dinh	Thanh Hoa	415	400	-15	-4%	1,163	1,240	77	7%
279	VIE	RAIL	Vinh	Thanh Hoa	411	384	-27	-6%	1,311	1,159	-152	-12%
280	VIE	RAIL	Thanh Hoa	Vinh	393	384	-8	-2%	1,323	1,159	-164	-12%
281	VIE	RAIL	Dong Hoi	Vinh	374	371	-3	-1%	1,210	1,190	-20	-2%
282	VIE	RAIL	Vinh	Dong Hoi	382	371	-11	-3%	1,174	1,190	16	1%

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					Obs	Mod	M-O	%diff	Obs	Mod	M-O	%diff
284	VIE	RAIL	Dong Hoi	Hue	400	387	-13	-3%	1,025	1,037	11	1%
286	VIE	RAIL	Hue	Da Nang	394	406	12	3%	998	946	-52	-5%
288	VIE	RAIL	Da Nang	Quang Ngai	386	375	-11	-3%	780	799	19	2%
290	VIE	RAIL	Quang Ngai	Dieu Tri	398	418	20	5%	690	708	18	3%
292	VIE	RAIL	Dieu Tri	Nha Trang	412	418	6	1%	627	622	-4	-1%
294	VIE	RAIL	Nha Trang	Thap Cham	422	418	-3	-1%	588	580	-8	-1%
296	VIE	RAIL	Thap Cham	Muong Man	530	969	439	83%	518	539	20	4%
298	VIE	RAIL	Muong Man	Sai Gon	775	639	-136	-18%	354	478	124	35%
300	THA	RAIL	Phattalung	Ron Phibun	429	409	-20	-5%	208	200	-8	-4%
301	THA	RAIL	Nakhon Si Thammarat	Ron Phibun	298	291	-6	-2%	64	60	-4	-7%
302	THA	RAIL	Trang	Thung Song	82	73	-9	-11%	12	11	-1	-11%
303	THA	RAIL	Thung Song	Wiang Sa	632	600	-32	-5%	253	241	-13	-5%
304	THA	RAIL	Surat Thani	Chumphon	786	751	-35	-5%	273	259	-14	-5%
305	THA	RAIL	Chumphon	Prachuap Khiri Khan	881	837	-44	-5%	287	272	-15	-5%
306	THA	RAIL	Prachuap Khiri Khan	Phetchaburi	968	920	-47	-5%	300	285	-15	-5%
307	THA	RAIL	Pak Tho	Nakhon Pathom	1,284	1,233	-51	-4%	321	306	-15	-5%
308	THA	RAIL	Kanchanaburi	Nakhon Pathom	52	45	-7	-13%	86	85	-1	-2%
309	THA	RAIL	Nakhon Pathom	Bangkok	1,336	1,280	-55	-4%	381	365	-15	-4%
310	THA	RAIL	Sattahip	Chon Buri	9	13	4	52%	3,128	3,115	-13	0%
311	THA	RAIL	Chon Buri	Chachoengsao	13	13	0	-3%	5,520	5,471	-50	-1%
312	THA	RAIL	Sa Kaeo	Kabin Buri	83	890	807	966%	736	733	-3	0%
313	THA	RAIL	Chachoengsao	Bangkok	554	890	336	61%	7,360	7,296	-64	-1%
314	THA	RAIL	Bangkok	(jn)	2,182	2,080	-103	-5%	3,613	3,575	-38	-1%
315	THA	RAIL	Udon Rathchatani	Si Saket	356	355	-1	0%	117	108	-9	-8%
316	THA	RAIL	Si Saket	Surin	600	599	-1	0%	315	301	-14	-5%
317	THA	RAIL	Surin	Buriram	789	890	101	13%	449	430	-19	-4%
318	THA	RAIL	Buriram	Nakhon Ratchasima	926	922	-4	0%	613	589	-24	-4%
319	THA	RAIL	Nong Khai	Udon Thani	81	66	-14	-18%	26	23	-3	-13%
320	THA	RAIL	Udon Thani	Khon Kaen	286	263	-23	-8%	96	88	-8	-8%
321	THA	RAIL	Khon Kaen	Bua Yar	365	336	-29	-8%	154	141	-13	-8%
322	THA	RAIL	Saraburi	rail jn	1,360	1,338	-22	-2%	1,349	1,309	-41	-3%
323	THA	RAIL	Lamphun	Lampang	192	240	47	25%	225	219	-5	-2%
324	THA	RAIL	Lampang	Den Chai	249	277	28	11%	338	334	-4	-1%
325	THA	RAIL	Den Chai	Phitsanulok	479	492	13	3%	780	768	-12	-2%
326	THA	RAIL	Nakhon Sawan	Lop Buri	812	726	-86	-11%	1,938	1,919	-19	-1%
327	THA	RAIL	Lop Buri	rail jn	898	848	-50	-6%	2,222	2,200	-22	-1%

Count	Country(ies)	Type	From/At	To	Passenger PCUs/Equivalents				Freight PCUs/Equivalents			
					Obs	Mod	M-O	%diff	Obs	Mod	M-O	%diff
328	THA	RAIL	Phra Nakhon Si Ayuttahya	rail jn	2,086	2,025	-61	-3%	3,282	3,227	-55	-2%
329	MYA	RAIL	Yangon - Mandalay		1,587	1,573	-14	-1%	533	528	-6	-1%
330	MYA	RAIL	Amarapura - Myitkina		787	780	-7	-1%	117	112	-5	-4%
331	MYA	RAIL	Naungpattaya - Mawlamyaine		281	268	-13	-5%	35	33	-2	-7%
332	MYA	RAIL	Kyimyindaine - Pyay		730	722	-7	-1%	12	11	-1	-10%
333	MYA	RAIL	Langwa - Katha		35	33	-2	-6%				
334	MYA	RAIL	Ngalontin - Tawgyangyi		14	12	-2	-12%				
335	MYA	RAIL	Kaunghmudaw - Budalin		149	148	-1	-1%	6	5	-1	-13%
336	MYA	RAIL	Sagaing-Monywa		163	159	-4	-3%	6	4	-2	-31%
337	MYA	RAIL	Tonbo - Lashio		67	63	-4	-6%	48	44	-4	-7%
338	MYA	RAIL	Tada-U - Sanpya		69	48	-21	-30%				
339	MYA	RAIL	Tawma - Myingyan		135	132	-3	-2%	1	4	3	428%
340	MYA	RAIL	Hlaingdet - Shwenyaung - Yaksa		65	51	-13	-21%	104	103	-1	-1%
341	MYA	RAIL	Inwon - Loikaw		26	25	-1	-3%				
342	MYA	RAIL	Taunggyi - Banyin		29	26	-3	-9%				
343	MYA	RAIL	Pyudwin - Dlangyun		74	72	-2	-3%	17	15	-1	-7%
344	MYA	RAIL	Nyaungwaing - Tharrawaw		135	128	-7	-5%				
345	MYA	RAIL	Mawlamyaine South - Ye		165	13	-151	-92%	4	3	-1	-31%
346	MYA	RAIL	Tavoy - Yephyu		14	13	0	-1%				
347	MYA	RAIL	Henzada - Pathein		167	162	-5	-3%	4	4	0	-11%
348	MYA	RAIL	Tagwa - Kyangin		122	121	-1	-1%	19	18	-1	-4%
349	MYA	RAIL	Kalay - Gangaw		166	162	-4	-2%				
350	MYA	RAIL	Saka - Pagan		55	48	-7	-13%	507	498	-9	-2%
351	MYA	RAIL	Obauk - Kyeni		216	206	-9	-4%	9	7	-2	-18%
352	CAM	RAIL	Battambang	Sisophon					181	179	-2	-1%
353	CAM	RAIL	Tuek Phos	Pursat					362	357	-5	-1%
354	CAM	RAIL	spur to	Phnom Penh					603	595	-8	-1%
355	CAM	RAIL	Angkor Chey	Doun Kaev					241	236	-5	-2%
356	CAM	RAIL	Sihanoukville	Prey Nob					241	238	-3	-1%
357	CHI	RAIL			329	320	-9	-3%	9,421	9,308	-114	-1%
358	CHI	RAIL			390	379	-11	-3%	12,496	12,360	-136	-1%
359	CHI	RAIL			223	217	-5	-2%	2,599	2,583	-16	-1%
360	CHI	RAIL			602	591	-11	-2%	14,851	14,703	-148	-1%
361	CHI	RAIL			121	226	105	87%	8,781	8,737	-44	-1%
362	CHI	RAIL			681	529	-152	-22%	22,114	21,926	-188	-1%
363	CHI	RAIL							5,735	5,535	-200	-3%

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					Obs	Mod	M-O	%diff	Obs	Mod	M-O	%diff
364	CHI	RAIL			75	198	124	166%	3,331	3,306	-25	-1%
365	CHI	RAIL			167	169	1	1%	2,983	3,013	30	1%
366	CHI	RAIL			170	169	-1	-1%	3,013	3,013	0	0%
367	CHI	RAIL			3	1	-2	-56%	44	42	-2	-4%
368	CHI	RAIL			1,100	1,228	128	12%	41,134	41,132	-3	0%
369	CHI	RAIL			1,894	1,889	-6	0%	47,418	47,413	-5	0%
370	CHI	RAIL			712	708	-4	-1%	8,612	8,532	-80	-1%
371	CHI	RAIL			2,391	2,383	-8	0%	52,587	52,501	-85	0%
372	CHI	RAIL			598	595	-3	-1%	16,344	16,314	-30	0%
373	CHI	RAIL			241	237	-4	-2%	11,394	11,386	-8	0%
374	CHI	RAIL			449	446	-3	-1%	12,430	12,402	-28	0%
375	CHI	RAIL			932	927	-5	-1%	15,560	15,550	-11	0%
376	CHI	RAIL			2,654	2,649	-5	0%	47,599	47,557	-42	0%
377	CHI	RAIL			3,586	3,576	-10	0%	63,159	63,107	-52	0%
378	CHI	RAIL			3,104	3,098	-6	0%	32,172	32,152	-20	0%
379	CHI	RAIL			2,309	2,305	-4	0%	24,933	24,920	-13	0%
380	CHI	RAIL			3,666	3,653	-13	0%	60,723	60,685	-39	0%
381	CHI	RAIL			3,437	3,424	-12	0%	57,636	57,600	-35	0%
382	CHI	RAIL			1,444	1,440	-4	0%	28,115	28,100	-15	0%
383	CHI	RAIL			45	44	-1	-1%	574	574	-1	0%
384	CHI	RAIL			1,478	1,467	-11	-1%	14,953	15,135	182	1%
385	CHI	RAIL			406	402	-3	-1%	4,684	4,680	-4	0%
386	CHI	RAIL			1,131	1,122	-8	-1%	10,622	10,608	-15	0%
387	CHI	RAIL			176	169	-7	-4%	1,835	1,821	-14	-1%
388	CHI	RAIL			15	0	-15	-100%	88	0	-88	-100%
389	VIE	WATER	Yen Hung		203	194	-9	-4%	8,841	8,621	-220	-2%
390	VIE	WATER	Duong Ha		208	0	-208	-100%	9,050	9,424	374	4%
391	VIE	WATER	Son Tay		270	73	-197	-73%	11,755	11,384	-371	-3%
392	VIE	WATER	Viet Tri		326	215	-111	-34%	14,212	14,127	-85	-1%
393	VIE	WATER	Phu Nha		84	26	-59	-70%	3,679	1,043	-2,637	-72%
394	VIE	WATER	Phuoc Dong		257	256	-1	0%	11,185	11,178	-7	0%
395	VIE	WATER	Binh Duc		273	179	-94	-34%	11,880	11,873	-7	0%
396	VIE	WATER	Lap Vo		179	122	-57	-32%	7,803	6,537	-1,266	-16%
397	VIE	WATER	Cao Lanh		150	157	7	5%	6,542	6,537	-5	0%
398	VIE	WATER	Hanoi		23	48	25	107%	1,004	1,003	0	0%
399	VIE	WATER	Viet Tri		8	7	0	-6%	343	327	-16	-5%

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					Obs	Mod	M-O	%diff	Obs	Mod	M-O	%diff
400	VIE	WATER	Dap Cau		3	3	0	2%	119	118	-1	-1%
401	VIE	WATER	Hoa Binh		3	3	0	-5%	119	113	-6	-5%
402	VIE	WATER	Ninh Binh		24	23	0	-1%	1,034	920	-114	-11%
403	VIE	WATER	Nam Dinh		3	2	-1	-23%	125	123	-2	-2%
404	VIE	WATER	My Tho		3	4	1	31%	119	118	-1	-1%
405	VIE	WATER	Vinh Long		6	5	-1	-10%	241	240	-1	0%
406	VIE	WATER	Long Xuyen		11	10	-1	-10%	482	480	-1	0%
407	VIE	WATER	Binh Tri		51	51	0	0%	2,239	2,237	-2	0%
408	MYA	WATER	Bhamo	Loadings					25	24	-2	-7%
409	MYA	WATER	Katha	Loadings					27	25	-2	-7%
410	MYA	WATER	Thabeikkyin	Loadings					3	0	-3	-100%
411	MYA	WATER	Kyaukmyaung	Loadings					6	0	-6	-100%
412	MYA	WATER	Mandalay	Loadings					196	194	-3	-1%
413	MYA	WATER	Sagaing	Loadings					6	5	-1	-17%
414	MYA	WATER	Mawlaik	Loadings					2	0	-2	-100%
415	MYA	WATER	Kalewa	Loadings					14	7	-7	-52%
416	MYA	WATER	Monywa	Loadings					54	52	-2	-4%
417	MYA	WATER	Myingyan	Loadings					6	4	-1	-25%
418	MYA	WATER	Pakokku	Loadings					105	101	-4	-4%
419	MYA	WATER	Nyaung-U	Loadings					6	5	-1	-23%
420	MYA	WATER	Kyunchaung	Loadings					14	0	-14	-100%
421	MYA	WATER	Chauk	Loadings					84	82	-2	-2%
422	MYA	WATER	Sinbyugyun	Loadings					23	0	-23	-100%
423	MYA	WATER	Yenangyaung	Loadings					4	0	-4	-100%
424	MYA	WATER	Minbu	Loadings					7	0	-7	-100%
425	MYA	WATER	Magwe	Loadings					11	9	-2	-18%
426	MYA	WATER	Minhla	Loadings					6	5	-1	-17%
427	MYA	WATER	Myayde	Loadings					19	0	-19	-100%
428	MYA	WATER	Thayet	Loadings					144	0	-144	-100%
429	MYA	WATER	Pyay	Loadings					34	32	-3	-7%
430	MYA	WATER	Myanaung	Loadings					141	139	-2	-1%
431	MYA	WATER	Hinthada	Loadings					27	26	-1	-5%
432	MYA	WATER	Danubyu	Loadings					11	0	-11	-100%
433	MYA	WATER	Nyaungdone	Loadings					29	27	-1	-5%
434	MYA	WATER	Einme	Loadings					49	0	-49	-100%
435	MYA	WATER	Myaungmya	Loadings					120	0	-120	-100%

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					Obs	Mod	M-O	%diff	Obs	Mod	M-O	%diff
436	MYA	WATER	Pathein	Loadings					75	73	-2	-3%
437	MYA	WATER	Ngathainggaung	Loadings					6	0	-6	-100%
438	MYA	WATER	Yangon - ALL	Loadings					544	539	-5	-1%
470	CAM	WATER	Kampong Chhnang	Siem Reap	21	20	-1	-5%	182	179	-2	-1%
471	CAM	WATER	Phnom Penh	Kampong Chhnang	52	49	-3	-6%	454	451	-3	-1%
472	CAM	WATER	Phnom Penh	Kratie	14	12	-2	-14%	121	118	-3	-2%
473	CAM	WATER	Kratie	Stung Treng	3	2	-1	-31%	30	28	-2	-8%
474	CAM	WATER	Phnom Penh	Chau Doc (Mekong)	3	36	33	1,272%	23	0	-23	-100%
475	CAM	WATER	Phnom Penh	Chau Doc (Bassac)	1	38	37	2,844%	11	1	-10	-89%
476	MYA/THA	Border	Kawthaung	Ranong	2	0	-2	-100%	53	57	4	8%
477	MYA/THA	Border	3 Pagodas	3 Pagodas	81	44	-36	-45%	53	57	5	9%
478	MYA/THA	Border	Myawaddy	Mae Sot	146	148	2	1%	206	203	-3	-1%
479	MYA/THA	Border	Ponpartyin	Pungpakyem	2	54	52	2,320%	53	5	-48	-91%
480	MYA/THA	Border	Tachilek	Mae Sai	529	528	0	0%	105	104	-1	-1%
481	MYA/CHI	Border	Wan Kong	Daluo	369	0	-369	-100%	227	38	-189	-83%
482	MYA/CHI	Border	Mang'a	Mengma	93	59	-35	-37%	23	22	-1	-2%
483	MYA/CHI	Border	Hopang	Mengding	232	314	82	36%	68	341	273	400%
484	MYA/CHI	Border	Kyugok	Wanding	219	287	68	31%	203	201	-2	-1%
485	MYA/CHI	Border	Muse	Ruili	1,177	966	-211	-18%	398	0	-398	-100%
486	MYA/CHI	Border	Lwejel	Zhangfeng	195	302	108	55%	743	0	-743	-100%
487	MYA/BAN	Border	Maungtaw		0	0	0	-100%	21	0	-21	-100%
488	MYA/IND	Border	Tamu		1	0	0	-52%	46	0	-46	-100%
489	MYA/SEA	Border	Yangon						9,879	9,871	-9	0%
490	MYA/SEA	Border	Sittwe						214	0	-214	-100%
491	CHI/LAO	Border	Mohan	Boten	34	16	-18	-53%	78	74	-5	-6%
492	CHI/VIE	Border	Jinping	Nam Cum	23	21	-2	-9%	22	20	-3	-11%
493	CHI/VIE	Border	Hekou	Lao Cai	461	455	-6	-1%	850	837	-13	-2%
494	CHI/VIE	Border		Railway					604	667	63	10%
495	CHI/VIE	Border	Lao Shan	Thanh Thu	48	46	-3	-6%	50	48	-2	-4%
496	CHI/VIE	Border	Pingxiang	Friendship Pass	62	13	-49	-79%	430	426	-3	-1%
497	CHI/VIE	Border	Pingxiang	Railway	2	0	-2	-100%	305	223	-82	-27%
498	CHI/VIE	Border	Dongxing	Mong Cai, Quang Ninh	605	643	38	6%	517	400	-117	-23%
499	CHI/VIE	Border	Shiukou	Ta Lung, Cao Bang	35	32	-3	-9%	735	699	-36	-5%
500	CHI/VIE	Border	Longbang	Tra Linh, Cao Bang	17	17	0	0%	246	231	-15	-6%
501	CHI/SEA	Border	Beihai						4,661	4,658	-3	0%
502	CHI/SEA	Border	Qinzhou						2,831	2,828	-3	0%

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					Obs	Mod	M-O	%diff	Obs	Mod	M-O	%diff
503	CHI/SEA	Border	Fangchenggang						14,209	14,173	-35	0%
504	THA/LAO	Border	Chiang Khong	Houayxay	8	4	-4	-46%	24	31	6	27%
505	THA/LAO	Border	Huai Kon	Muang Ngeun	8	7	0	-6%	24	24	0	0%
506	THA/LAO	Border	Mao Nam Hueang	Kenthao	25	24	0	-1%	24	40	15	64%
507	THA/LAO	Border	Nong Khai	Friendship Bridge	716	698	-18	-2%	339	308	-32	-9%
508	THA/LAO	Border	Nakhon Phanom	Thakhek	22	16	-6	-27%	335	332	-4	-1%
509	THA/LAO	Border	Mukdahan	Savannakhet	30	31	2	6%	917	906	-12	-1%
510	THA/LAO	Border	Chong Mek	Wang Tao	49	46	-3	-6%	40	37	-4	-9%
511	THA/CAM	Border	Prasat Khao Phra	north of Chaom Khsan	3	3	-1	-16%	50	49	-2	-3%
512	THA/CAM	Border	Chong Phra Phlai	north of Phumi Roessi	3	3	0	3%	50	49	-1	-2%
513	THA/CAM	Border	Chong Chom	north of Samraong	3	229	225	7,256%	50	50	0	0%
514	THA/CAM	Border	Chong Sangam	north of Phumi Ampi	3	3	0	-10%	50	400	350	694%
515	THA/CAM	Border	Aranyaprathet	Poipet	985	984	-1	0%	1,009	1,607	599	59%
516	THA/CAM	Border		Pailin	9	9	0	-3%	151	148	-3	-2%
517	THA/CAM	Border	Ban Hat Lek	Krong Kaoh Kong	13	8	-6	-42%	58	57	-1	-2%
518	THA/MAL	Border	All Crossings		943	935	-8	-1%	11,799	11,790	-9	0%
519	THA/SEA	Border	Rayong	Map Ta Put					133,469	133,459	-10	0%
520	THA/SEA	Border	Laem Chabang	Laem Chabang					118,997	118,990	-8	0%
521	THA/SEA	Border	Bangkok	Bangkok					22,946	22,935	-11	0%
522	THA/SEA	Border	Songkhla	Songkhla					14,887	14,882	-6	0%
523	THA/SEA	Border	Phuket	Phuket					7,444	7,446	3	0%
524	THA/RIV	Border	Chiang Saen						119	117	-2	-1%
525	THA/RIV	Border	Chiang Khong						295	292	-4	-1%
526	THA/RIV	Border	Mainline						414	352	-62	-15%
527	VIE/LAO	Border	Lao Bao	Dan Savan	7	21	15	214%	162	160	-2	-1%
528	VIE/LAO	Border	Mu Dia	Lang Khan	3	8	5	201%	5	5	0	-3%
529	VIE/LAO	Border	Cau Treo	Nam Phao	27	24	-3	-10%	137	146	9	7%
530	VIE/LAO	Border	Nam Kanh	Nam Kanh	9	6	-4	-39%	16	19	3	22%
531	VIE/LAO	Border	Na Meo	Na Meo	1	1	0	-2%	14	12	-2	-13%
532	VIE/LAO	Border	SW of Moc Chau	Panang	4	2	-3	-63%	7	7	-1	-12%
533	VIE/LAO	Border	Dien Bien Phu	Taichang	1	0	-1	-100%	1	1	0	-13%
534	VIE/LAO	Border	Bo Y	Ban Het	36	25	-10	-29%	14	0	-14	-100%
535	VIE/CAM	Border	Thang Duc	Ovadouy	17	15	-3	-15%	22	18	-4	-17%
536	VIE/CAM	Border	Dak But So	SE of Phumi Dak Dam	0	0	0	-50%	1	0	0	-45%
537	VIE/CAM	Border	Thanh Hoa	S of Kaev Sima	45	0	-45	-100%	91	0	-91	-100%
538	VIE/CAM	Border	Loc Ninh	SE of Snuol	45	39	-6	-14%	91	61	-29	-32%

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					Obs	Mod	M-O	%diff	Obs	Mod	M-O	%diff
539	VIE/CAM	Border	Xa Mat	Ponhaea Kraek	564	555	-9	-2%	824	725	-98	-12%
540	VIE/CAM	Border	Moc Bai	Moc Bai	149	137	-12	-8%	310	294	-16	-5%
541	VIE/CAM	Border	An Phu (N of Chau Doc)	Kandal Province	45	0	-45	-100%	91	0	-91	-100%
542	VIE/CAM	Border	Nha Bang (SW of Chau Doc)	Takeo Province	36	34	-2	-5%	72	105	33	45%
543	VIE/CAM	Border	Ha Tien	S of Kompong Trach	64	59	-4	-7%	132	134	1	1%
544	VIE/CAM	Border	Mekong River		37	36	-1	-2%	78	0	-78	-100%
545	VIE/CAM	Border	Bassac River		41	38	-3	-7%	91	1	-89	-99%
546	VIE/SEA	Border	Quang Ninh						9,526	9,519	-7	0%
547	VIE/SEA	Border	Haiphong						6,109	6,101	-8	0%
548	VIE/SEA	Border	Thanh Hoa						135	290	154	114%
549	VIE/SEA	Border	Vinh/Nghe Tinh						204	197	-7	-3%
550	VIE/SEA	Border	Vung Ang						257	91	-165	-64%
551	VIE/SEA	Border	Quang Binh						41	39	-2	-4%
552	VIE/SEA	Border	Thuan An						178	173	-6	-3%
553	VIE/SEA	Border	Da Nang						1,197	1,186	-11	-1%
554	VIE/SEA	Border	Qui Nhon						1,408	1,400	-8	-1%
555	VIE/SEA	Border	Nha Trang						688	685	-3	0%
556	VIE/SEA	Border	Vung Tau						95	92	-3	-3%
557	VIE/SEA	Border	Bien Hoa/ Dong Nai						605	599	-6	-1%
558	VIE/SEA	Border	HCMC						18,925	18,914	-11	0%
559	VIE/SEA	Border	My Tho						17	16	-1	-6%
560	VIE/SEA	Border	Dong Thap						23	22	-1	-3%
561	VIE/SEA	Border	Vinh Long						28	27	-1	-3%
562	VIE/SEA	Border	Can Tho						231	229	-3	-1%
563	VIE/SEA	Border	Long Xuyen/ My Thoi						365	363	-2	-1%
564	LAO/CAM	Border	Voeun Kham	Dong Crorior	3	2	-1	-23%	3	0	-3	-100%
565	LAO/CAM	Border	Mekong						1	1	0	51%
566	CAM/SEA	Border	Phnom Penh						142	138	-4	-3%
567	CAM/SEA	Border	Sihanoukville						888	885	-3	0%

APPENDIX 3

SELECTED INVESTMENT PROJECT CONCEPT PROFILES

PROJECT/TA CONCEPT PROFILE[1]

1.	**Project Name (Number):** **C1-1** Improvement/Adaptation of Savannakhet Airport for Joint Thai-Lao Use
2.	**Loan or TA:** Loan and Project Preparation Technical Assistance
3.	**Project Location:** Savannakhet, Lao PDR
4.	**Countries Involved:** Lao PDR and Thailand
5.	**Sector/Subsector:** Transport/Civil Aviation
6.	**Background and Rationale:** The Mukdahan-Savannakhet cross-border region currently has only one airport,[2] in Savannakhet, but the airport, which was opened in 1970 has not been served by scheduled flights recently due to limited demand. However, significant developments in the region include: (i) project **A1-4** the Japan Bank for International Cooperation (JBIC)-assisted construction of a bridge across the Mekong River linking Mukdahan and Savannakhet, with completion expected in late 2006/early 2007; and (ii) a plan to establish a Special Economic Zone near the new bridge in the vicinity of the junction of Routes 9/13S in Lao PDR. These developments are expected to completely alter the demand prospects for Savannakhet airport, located 1 km south of central Savannakhet Municipality. Under these circumstances, a 2001 JICA study found that it would be most economical to improve Savannakhet airport and use it for passengers from and to both Mukdahan and Savannakhet to serve expected future demand from both sides of the river.[3]

[1] Particularly useful sources for this Project Profile was Japan International Cooperation Agency, *The Study on the Integrated Regional Development Plan for the Savannakhet and Khammouan Region in the Lao People's Democratic Republic*, Final Report and Sector Report, prepared for the Committee for Planning and Cooperation, Lao People's Democratic Republic, and the Office of the National Economic and Social Development Board, Kingdom of Thailand, September 2001, 7-17 to 7-31 [Final Report] and VI-38 to VI-41 [Sector Report]. Also helpful was Asian Development Bank and Ministry of Communication, Transport, Posts and Construction, Civil Aviation Master Plan, 2004-2013, Lao People's Democratic Republic, Rev 2 – 22 December 2003, October 2003, pp. 9-33 to 9-35. It is also understood that a JICA feasibility study of this project was to be completed in March 2006.

[2] Mukdahan (with a population of about 350,000) currently does not have an airport.

[3] While the JICA-assisted Study on Airport Development Masterplan in the Kingdom of Thailand (2000) proposed a new Mukdahan Airport at a site 16 km north of the city at a cost of US$15 million, the 2001 JICA study cited in the first footnote rejected this alternative as

7.	**Objective(s):** To improve air service in the Mukdahan (Thailand)-Savannakhet (Lao PDR) area in a cost-effective manner, and by so doing facilitate exchange and development between and among the GMS countries, and between the GMS and the rest of the world; upgrade the subregional air transport infrastructure to meet current and anticipated future traffic; and support planned initiatives in tourism.
8.	**Scope**: The project entails the following components: (i) extension of the existing runway from 1,633 m to 2,220 m; (ii) minor diversion of the existing city road A1; and (iii) measures for cross-border access/egress to/from the airport for people in the Mukdahan area.
9.	**Estimated Cost**: To be determined in subsequent project preparation studies, but estimated by the 2001 JICA study as US$3.2 million, or about US$3.5 million at 2005 prices,[1] for both the runway extension and the associated development of a Mukdahan City Air Terminal (MCAT), a fully functional passenger terminal building with necessary parking lots and bus yard.
10.	**Financing Plan and Financing Arrangement (Public/Private):** Elements of both public and private financing are envisaged. Airport development projects generate revenues and therefore offer some scope for cost recovery. However, it is likely that bilateral or multilateral loans will be required. Present development partners in the GMS civil aviation subsector include the Bank, the International Finance Corporation (IFC) of the World Bank Group, and the JBIC. These and others may be interested in supporting the Project. JBIC may have a particular interest as a complement to the international bridge that it has funded to link Mukdahan and Savannakhet.
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule**: 2007-2008
13.	**Executing/Implementation Agencies and Contact Persons:** Executing Agencies: Department of Civil Aviation of Lao PDR and the Department of Aviation of Thailand (and/or a Savannakhet-Mukdahan Airport

less economical. Also, the study deemed a second alternative – to utilize an existing air force base in Roi Et province – to be too far from Mukdahan city.

[1] As noted, the estimated cost of a new airport at Mukdahan is about US$15.0 million in 2000 prices, or about US$16.7 million in 2005 prices.

Authority, or SMAA) as recommended by the 2001 JICA study for integrated operation in the countries).[1]

ADB Contact Division/Person:

Mekong Department, Infrastructure Division
Email: gms@adb.org

14. Estimated Benefits and Beneficiaries:

The project would result in improvements in Savannakhet Airport and strengthen the its link with Thailand, thereby improving the overall subregional air transport infrastructure and increasing connectivity.

Economic benefits from the project would include the development of international trade and tourism, and increased economic activity in export-oriented high-value and/or perishable commodities. Financial benefits of the project would include revenue to the airport operating authorities. These benefits would be generated by the following traffic demand, as forecast by the 2001 JICA study:

(i) Vientiane-Savannakhet-Vientiane (domestic): 15,336 in 2007,[2] 24,364 in 2012, and 38,707 in 2017;
(ii) Bangkok-Savannakhet-Bangkok (international): 112,800 in 2007, 202,535 in 2012, and 318,600 in 2017; and
(iii) Bangkok-Mukdahan-Bangkok (domestic): 112,800 in 2007, 202,535 in 2012, and 318,600 in 2017.[3]

Based on this traffic, the 2001 JICA study estimated the financial internal rate of return for the project to be 14.9%; it did not calculate an economic internal rate of return. More generally, the project will strengthen linkages between and among GMS countries by providing the infrastructure necessary for improved air linkages. Also, it would increase the value provided by development partner financing for current projects by upgrading the infrastructure in the overall subregional air transport system.

15. Social and Environmental Issues:

The 2001 JICA study found that the environmental impact of the proposed project would be "modest".[4] About 16 ha of land would have to be acquired for the runway extension and 3-4 hectares for the airport lights; a few houses would have to be moved. In addition, part of the extension site has a seasonal stream

[1] SMAA would be responsible for contracting for MCAT and the runway extension, either through its own budget or external resources, or a combination of both.
[2] Actual traffic on this route in 1998 was 7,313.
[3] These forecasts assume: (i) domestic as opposed to International Air Transport Association (IATA)-based airfares; and (ii) passengers from Thailand can use Savannakhet Airport without immigration controls.
[4] Japan International Cooperation Agency, *The Study on the Integrated Regional Development Plan for the Savannakhet and Khammouan Region in the Lao People's Democratic Republic*, Final Report, prepared for the Committee for Planning and Cooperation, Lao People's Democratic Republic, and the Office of the National Economic and Social Development Board, Kingdom of Thailand, September 2001, 7-27 to 7-29.

	running through it, which would have to be diverted and appropriate drainage works undertaken. Also, the few trees on the site would have to be removed. Finally, traffic lights may have to be installed on the northwest-southeast road and a new dual carriageway; these would be activated during landing and takeoff, perhaps 2-3 times per day.[1] The project would help alleviate poverty indirectly to the extent that employment is created in the tourism industry and secondarily in the airline industry. All stakeholders must be consulted by governments, e.g., persons living near the airports, airlines Ideally, the Mukdahan City Air Terminal developed under the project should meet the needs of the disabled, providing, e.g., convenient drop-off points near main entrances, adequate auxiliary services (e.g., accessible toilets), airline flight dissemination for the hearing and vision impaired.[2]
16.	**Priority of Project/TA:** Priority ***, Feasibility Study (FS) project (see Chapter X).
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation**: Project preparation technical assistance (or Special Assistance for Project Formation, SAPS, in JBIC parlance) may be required to bring the 2001 JICA-assisted prefeasibility assessment to the feasibility level.
19.	**Pre-feasibility Study (Completed/Required):** Required
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary feasibility studies and implement the Project.
21.	**Issues/Constraints**: A major issue with this project will be the formulation and implementation of measures for cross-border access/egress to/from the airport for people in the Mukdahan area of Thailand, item (iii) in the project scope, Section 8 above. For a flight to Bangkok,[3] for example, it is envisaged that passengers would check in at a Mukdahan City Air Terminal (MCAT) and then cross the Second Mekong International Bridge on a designated bus to Savannakhet Airport without

[1] It was found that Mukdahan Tower on the Thailand side of the Mekong River is relatively low lying and would pose an obstacle to approaching or departing aircraft.
[2] See, e.g., Economic and Social Commission for Asia and the Pacific, *Barrier-Free Tourism for People with Disabilities in the Asian and Pacific Region*, 2003, p. 54.
[3] The Lao PDR Department of Civil Aviation would need to reclassify Savannakhet Airport from domestic to international.

immigration control; passengers from Mukdahan would be marked with small seal badges to waive immigration control. Lao PDR residents would be subject to customs, immigration, and quarantine (CIQ) controls for the same flight. After arrival at Bangkok Airport, domestic and international passengers would be sorted out by the small seal badges and sent appropriately to the domestic and international terminals by bus. Separated domestic/international flights would also be possible, as would be flights to destinations outside of the two countries (e.g., Hanoi, Singapore, Hong Kong); in the latter case, passengers from Mukdahan would have to undergo CIQ formalities at MCAT.[1]

More generally, as with all airport projects, main constraints or risks of this project include the difficulty of procuring adequate funding, the need for a sustainable and adequate repair and maintenance budget, the requirement for user charges to be sufficiently high to cover costs, and institutional development issues.

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Sector	*Transportation and Communication*
Subsector	*Civil Aviation*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

[1] Japan International Cooperation Agency, *The Study on the Integrated Regional Development Plan for the Savannakhet and Khammouan Region in the Lao People's Democratic Republic*, Final Report, prepared for the Committee for Planning and Cooperation, Lao People's Democratic Republic, and the Office of the National Economic and Social Development Board, Kingdom of Thailand, September 2001, 7-20 to 7-21.

PROJECT/TA CONCEPT PROFILE

1. Project Name (Number):

C2.1-3*** New Kunming International Airport Development Improvement Project

2. Loan or TA:

Loan and Project Preparation Technical Assistance

3. Project Location:

Kunming

4. Country Involved:

PRC (Yunnan Province)

5. Sector/Subsector:

Transport/Civil Aviation

6. Background and Rationale:

As noted in the 1993-94 *GMS Subregional Transport Sector Study*, air transport can play an important role in the economic development of the GMS. Air services linking the six countries with each other and with the rest of the world are necessary for two reasons (i) to allow business and professional persons to link with trading partners and with sources of capital and technology; and (ii) to facilitate (high-value) tourism, an important source of foreign exchange.[1]

As of June 2005, there were 33 round-trip international flights between Kunming and other GMS cities, and there is demand for additional flights but a shortage of available slots. Passenger traffic demand data for Kunming indicates growth from 6.391 million passengers in 2001 to 9.792 million passengers in 2004,[2] an average annual rate of 15.3%, and from 107,526 tons of air cargo in 2001 to 170,939 tons of air cargo in 2004[3], an annual average rate of 16.7%. In terms of aircraft movements, the existing Kunming [Wujiaba] International Airport ranked 8th in the PRC in 2004, ahead of Guilin Liangjiang International Airport, which ranked 24th, and ahead of Nanning [Wuxu], which ranked 33rd. Growth rates are expected to accelerate in the coming years, with forecasts provided by the General Administration of Civil Aviation of China (CAAC) indicating annual average air passenger traffic growth rates in southwestern PRC of 15% from 2006to 2010, 10% from 2011 to 2020, or 11.4% between 2006 and 2020. CAAC expects that by 2015 Kunming airport will handle 24 million passengers and

[1] PADECO Co., Ltd., Regional Technical Assistance on Promoting Subregional Cooperation among Cambodia, the People's Republic of China, Lao PDR, Myanmar, Thailand, and Viet Nam – Subregional Transport Sector Study, prepared for the Asian Development Bank, October 2004, p. 62.

[2] Data for 2005 indicated 11.82 million passengers in that year, 20.7% increase over 2004.

[3] Although a total of 54,872 tons were recorded in 2002, the year before the outbreak of SARS (Severe Acute Respiratory Syndrome).

	600,000 tons of cargo (and 36 million air passengers tons of 1.3 million tons of cargo by 2020. Already faced with saturation at its existing site 6.6 km from the downtown Kunming,[1] CAAC and the Planning Commission of Yunnan Province have proposed the construction of a new international airport and have included the project in the 11th five-year airport construction plan (2006-2015) and, particularly, as a key airport project for 2006.
7.	**Objective(s):** To facilitate exchange and development between and among the GMS countries, and between the GMS and the rest of the world; to upgrade the subregional air transport infrastructure to meet current and anticipated future traffic; and to support planned initiatives in tourism. The new airport will be targeted to meet the rapid growth of traffic demand in Kunming and designed in the national plan as a large hub gateway airport connecting southwestern PRC with the other countries of the GMS, as well as the non-GMS countries of ASEAN and South Asia, thereby playing a vital role in facilitating intraregional trade.
8.	**Scope**: The project will develop a new Kunming International Airport at Xiao Xiao Gang Xiang, 24.5 km west of the city.
9.	**Estimated Cost**: To be determined in subsequent project preparation technical assistance studies, but estimated at US$2.9 billion.
10.	**Financing Plan and Financing Arrangement (Public/Private):** Elements of both public and private financing are envisaged. Airport development projects generate revenues and therefore offer some scope for cost recovery. However, given the magnitude of funds required for the project components, even with substantial user charge increases it is likely that large bilateral or multilateral loans will be required. Present development partners in the GMS civil aviation subsector include the Bank, the International Finance Corporation (IFC) of the World Bank Group, and the Japan Bank for International Cooperation. These and others may be interested in supporting the project, or certain project components.
11.	**Financing Status:** Proposed for financing

[1] Further expansion of airport capacity at the urban site of the existing airport would result in substantial relocation impacts.

12.	**Proposed Implementation Period/Schedule**: 2007[1]-2010
13.	**Executing/Implementation Agency and Contact Persons:** Executing Agency: Civil Aviation Administration of China and Yunnan Province (PRC)[2] **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries**: The project will result in an new, larger Kunming International Airport, thereby improving the overall subregional air transport infrastructure and increasing connectivity. Economic benefits from the project would likely include the development of international trade and tourism, time benefits for flight passengers, increased safety, and increased economic activity in export-oriented high-value perishable manufactured and agricultural goods. Financial benefits of the Project would likely include increased revenue to the airport operating authorities. The project will strengthen linkages between and among GMS countries by providing the infrastructure necessary for improved air linkages. Also, it would increase the value provided by development partner financing for current projects by upgrading the infrastructure in the overall subregional air transport system.
15.	**Social and Environmental Issues**: The project may have impacts on the natural, cultural, and social environment during construction and/or during operation. Possible impacts relate to subsurface contamination, fuel/hazardous materials storage/handling, air emissions, storm water drainage and effluent discharges, solid and liquid waste management, aircraft noise, employee health and safety, and cultural and archeological heritage. Appropriate mitigation measures (e.g., noise reduction) should be implemented. The project will help alleviate poverty indirectly to the extent that employment is created in the tourism industry and secondarily in the airline industry. All stakeholders must be consulted by governments, e.g., persons living near the airports, airlines, airline employees. Airport terminals developed under the project should meet the needs of the disabled, providing, e.g., convenient drop-off points near main entrances, adequate auxiliary services within airports (e.g.,

[1] Or late 2006.
[2] In June 2004 CAAC completed the transfer of ownership and management of 90 airports across the country to local governments.

	accessible toilets), airline flight dissemination for the hearing and vision impaired.[1]
16.	**Priority of Project:** [Priority *** Capacity-Enhancement Project (CP) (see Chapter X)]
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation**: The project requires a detailed preparation study.
19.	**Pre-feasibility Study (Completed/Required):** Required
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary feasibility studies and implement the Project.
21.	**Issues/Constraints**: As noted in the Project Profile on the Phased Implementation of Open Skies, the PRC has called for implementation of PRC-ASEAN cooperation to establish regional air services agreements by 2010, corresponding with the timetable for establishing a China-ASEAN free trade region; while the time for participation may be decided by each ASEAN country, the PRC noted that participation in the arrangements and commitments to concrete measures may not be later than 2015, taking into account the progress of general goals agreed by PRC and ASEAN national leaders.[2] Main constraints or risks for implementation of this project include delayed implementation of PRC-ASEAN cooperation on regional air services, the difficulty of procuring adequate funding, the need for a sustainable and adequate repair and maintenance budget, the requirement for user charges to be sufficiently high to cover costs, and institutional development issues.

[1] See, e.g., Economic and Social Commission for Asia and the Pacific, Barrier-Free Tourism for People with Disabilities in the Asian and Pacific Region, 2003, p. 54.

[2] Concept Paper on China-ASEAN Regional Air Services Arrangements, Agenda Item 5, Fourth ASEAN and China Senior Transport Officials Meeting (4th STOM + China), Vientiane, 15 November 2005, pp. 3-4.

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Sector	*Transportation and Communication*
Subsector	*Civil Aviation*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

PROJECT/TA CONCEPT PROFILE

1. Project Name (Number):

C3.2-4 *** Laem Chabang, Phase 2, Construction of C and D Container Terminals

2. Loan or TA:

Private sector participation

3. Project Location:

Laem Chabang, Chonburi Province, Thailand (130 km southeast of Bangkok)

4. Countries Involved:

Thailand

5. Sector/Subsector:

Transport/Port

6. Background and Rationale:

Opened in 1992 on the Eastern Seaboard of the Gulf of Thailand, Laem Chabang is one of the fastest growing ports in the world. Throughput tonnage and container volume in TEUs at Bangkok Port and at Laem Chabang 1999-2004 is given below:

Tonnage

Year	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Tons Million						
Bangkok	12.8	13.3	13.4	14.0	14.6	na
Laem Chabang	16.6	19.1	21.4	25.6	29.0	na
TEUs Million						
Bangkok	0.9	0.9	0.9	1.0	1.1	na
Laem Chabang	1.8	2.1	2.3	2.7	3.1	3.5

Source: Port Authority of Thailand (PAT), PAT Annual Report 2003 and Article for ASEAN Port Association Newsletter

Annual average growth rates in tonnage/TEUs through Laem Chabang were 15.0%/14.9% for 1999-2003 (tonnes) and 1999-2004 (TEUs).

As existing terminals at Laem Chabang have reached or surpassed the capacity required to meet present and forecast demand, the Port Master Plan calls for development of new terminals, and even so, has required revision to accelerate development to meet demand. The current facilities at Laem Chabang, with expansion to include five terminals in Basin 2 (C1, C2, D1-3), could

	accommodate up to 11 million TEUs, bringing Laem Chabang up to 12th in world TEU throughput ratings.[1] While Laem Chabang and Bangkok are hub ports for Thailand and the GMS, the main regional hubs are Singapore, which had a throughput of 30 million TEUs in 2004 and Hong Kong, which handled a total of 22 million TEUs.[2] A recent ASEAN Study reported that ASEAN shippers express "concerns about trends in international shipping and ASEAN's helplessness in strengthening its role when many shipping decisions are made by external shippers, customers and their logistics agents located outside the region; and, there are related concerns about the domination of international liner services through regional hubs and the tendency for ASEAN shipping services to be pushed down the distribution chain."[3] This study forecasts that GMS and Laem Chabang tonnage throughputs will grow at rates of at least 9% per annum, with the capacity of existing facilities soon to be exceeded. This project is closely linked to technical assistance projects noted in Chapter IX and Appendix 4, including **TAP 35,** Marketing and Container Train Concessions between Laem Chabang, Thailand and Thanaleng, Lao PDR, and **TAP 36**, Promotion of Marketing Functions for GMS Ports.
7.	**Objective(s):** To expand the existing port so that it may better cope with increased container traffic, while also better serving transit traffic to/from Lao PDR. The project is related to the Government of Thailand's plan to turn the country in general and Bangkok and environs in particular into a regional logistics hub, with the focus on serving other GMS countries.
8.	**Scope:** To add capacity at the port of Laem Chabang through the construction of remaining C and D container terminals according to a Phase 3 development plan. PAT mentions the following initiatives to be undertaken along with the proposed expansion: (i) purchase of diesel locomotives for rent to the State Railway of Thailand, and (ii) further expansion of surface transport services through cooperation with the Express Transport Organization of Thailand (ETO), and the Thai Maritime Navigation Company.[4]

[1] According to the PAT Newsletter for the ASEAN Port Association, further development of Basin 3 planned for the longer term could put Laem Chabang in the top ten ports globally in terms of TEU capacity at 18.4 million TEU.

[2] PSA International and Hong Kong Marine Department websites.

[3] ASEAN/AUSAID supported Study *Promoting Efficient and Competitive Intra-ASEAN Shipping Services* (REPSF Project No. 04/001) issued in March, 2005 and carried out by PDP Australia PTY. Ltd. and Meyrick and Associates.

[4] The role of the Express Transportation Organization (ETO) will likely be taken by private sector operator's as the ETO will probably cease trading according to the *Bangkok Post*, 16 November 2005. This should not be an issue as the PAT has long had successful relationships with the private sector.

9.	**Estimated Cost:** To be determined in detailed studies.
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2006-2010
13.	**Executing/Implementation Agency and Contact Persons:** Port Authority of Thailand (PAT), Ministry of Transport (Thailand) **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** Tangible economic benefits from the project would likely include: (i) ship time savings, including reduction in sailing times as well as time awaiting berth and at berth due to improved cargo handling productivity, thus leading to avoidance of surcharges typically levied by shipping companies at congested ports;(ii) cargo time savings (i.e., interest savings on cargo value); and (iii) a reduction in risks as reflected in insurance premiums. More general although difficult-to-quantify benefits would relate to the economic development of the port hinterland. Financial benefits would include increased revenues to the port operator.
15.	**Social and Environmental Issues:** Port development usually affects the local environment. The degree of impact varies with location depending on features such as geography, hydrology, geology, ecology, industrialization, urbanization, and type of shipping. Adverse impacts and their magnitude also vary by type of construction. The major actions in port projects affecting the environment typically include dredging operations, material disposal, shoreline development, increased maritime traffic, and vehicular traffic in the port. The impacts of these actions include: (i) air pollutant emissions and noise from motorized vessels; (ii) loss of habitat for terrestrial wildlife due to shoreline development; (iii) impairment of fisheries/aquatic ecology caused by navigability improvement and facility construction works (e.g., dredging and dredge spoil disposal); (iv) loss of cultural/historical/recreational properties from the potential destruction of historical places, parks, and water-based recreational/tourism resources; (v) erosion and sedimentation due to hydrological changes caused by navigability improvement and shoreline development works; (vi) environmental aesthetics; (vii) navigation hazards, resulting in an increased risk of oil spills and the release of contaminants from

increased maritime traffic; and (viii) resettlement from the establishment of harbor facilities.

It is important to note that PAT has over the last decade engaged in environmental mitigation measures in the following respects:

(i) engaging consultants to monitor qualities of waste water and, air and noise pollution at Bangkok and Laem Chabang ports;
(ii) cooperating with the Land Transport Department in reducing levels of pollution arising from the operation of vehicles to/from Bangkok port as well as the close monitoring of outputs from PAT's vehicle fleet;
(iii) participation in the Port Safety and Environmental Management System under the Partnership in Environmental Management for the Seas of Asia Project; and
(iv) acted in accordance with an action plan on prevention and removal of oily wastes from waterways under the aegis of the Marine Department.[1]

16. Priority of Project/TA:

Priority *** Capacity-Enhancement Project (CP) (see Chapter X)

17. Project Status (Proposed/Ongoing/Completed):

Proposed

18. Status of Project/TA Preparation:

A detailed design study has been programmed.

19. Pre-feasibility Study (Completed/Required):

Further design and environmental studies may be required.

20. Follow-up Actions Required:

Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.

21. Issues/Constraints:

Critical success factors for the project include: (i) sufficient traffic to justify the investment; (ii) the need for a sustainable and adequate repair and maintenance budget; and (iii) the setting of user charges sufficiently high to recover costs.

An associated issue is the future role of the river port of Bangkok. As noted in the Project Concept Profile of **TAP 37**, Promotion of Short Sea Shipping Services, it is not the case that the development of hubs need hinder the development of short sea shipping services. Many modern container berths in, for instance, Viet Nam, have been developed at green field sites leaving the older ports with some capacity available for short sea shipping services. Bangkok could retain a limited role in providing for such services.

[1] Port Authority of Thailand Annual Report, 2003.

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Sector	*Transport and Communication*
Subsector	*Port*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

PROJECT/TA CONCEPT PROFILE

1. Project Name (Number):

D21 *** Upper (Lancang-)Mekong River Navigation Channel Improvement and Maintenance including
C3.2.1 *** Channel, Navigation, and Port Improvements on the Lancang and Mekong and Development of an Intermodal Terminal at Khone Falls
TAP 19A[1] Upper (Lancang-)Mekong River Navigation Improvement and Maintenance Project

2. Loan or TA:

TA with subsequent loan

3. Project Location:

Upper Lancang and Mekong Rivers

4. Countries Involved:

PRC, Lao PDR, Myanmar, and Thailand

5. Sector/Subsector:

Transportation/Inland Waterway

6. Background and Rationale:

The Lancang-Mekong River is the potentially significant artery for cross-border inland water transport in the GMS.[2] Navigation on the river may be divided into major segments: (i) an upper segment, suitable for only inland navigation, from the PRC port of Simao to Kompong Cham in Cambodia (although there is no through traffic between Cambodia and Lao PDR because of the impassable Khone Falls in southern Lao PDR),[3] and from Kompong Chnnang to the Great [Tonlé Sap] Lake in Cambodia; and (ii) a lower segment, suitable both for inland and maritime navigation, from Kompong Cham to the sea and from Kampong Chnnang to the sea via the Mekong, Bassac, and Tonlé Sap rivers. **This Project Profile concerns the upper segment of the river.**

While cross-border passenger transport along the Lancang-Mekong River is rather limited at present, there is domestic passenger travel along the river is of some importance in Lao PDR. Available passenger statistics in the upper

[1] At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, Viet Nam suggested separating the upstream and downstream components of the Lancang-Mekong River Improvement Project. Summary of Proceedings, Appendix 11, paragraph 37.

[2] Cross-border passenger traffic on other international rivers in the GMS (e.g., the Red River) is not expected to be significant in the period to 2015.

[3] Prior to 1925, goods were transshipped over Khone Island by means of a 5 km railway to a point downstream of the falls. The ruins of this transshipment facility, including a slipway with a hauling winch at one end and a gantry crane at the other end, can still be seen at the site.

portions of the (Lancang-)Mekong River are shown in the following table. The Mekong River Commission (MRC) has concluded that passenger traffic data on the Lancang-Mekong River is insufficient and accordingly have called for systematic collection of this data.

While existing cross-border passenger flows along the Upper (Lancang-)Mekong River have been small, there is potential for relatively large passenger flows. One MRC document cited possible traffic along the Upper Lancang-Mekong River corridor as 400,000-500,000 by 2010, while officials of the Yunnan Provincial Navigation Affairs Bureau has expectations of passenger traffic of 1 million passengers per year in the next 5-10 years. [1]

Passenger Transport Flows along the Upper (Lancang-)Mekong River

Section	Annual Passengers (m)	Annual Passenger-Km
PRC-southern points-PRC	0.02 (2004)	NA
Lao PDR, domestic	1.8 (2000)	72.8 (2000)
Thailand-Lao PDR-Thailand	0.2 (2001)	0.4 (2001)

Source: Interviews conducted for this study and [Captain] Lieven Geerinck [Navigation Programme Manager, Mekong River Commission], Incorporation of Navigation into the Integrated Water Resources Development and Management Strategy, January 2005, p. 13.

Freight traffic is not yet well developed along the Upper (Lancang-)Mekong River, although rapid growth in freight traffic has been observed between Thailand and the PRC, up to 40% per year. Available data on freight traffic along Upper (Lancang-)Mekong River appears below.

Freight Transport Flows along the Upper (Lancang-)Mekong River

Section	Annual Metric Tons (m)	Annual Metric Ton-Km
Thailand-PRC-Thailand	0.4 (2001)	200.0
Lao PDR, domestic	0.7 (2000)	58.9 (2000)
Thailand-Lao PDR-Thailand	1.5 (2001)	2.9 (2001)

Source: Interviews conducted for this study and [Captain] Lieven Geerinck [Navigation Programme Manager, Mekong River Commission], Incorporation of Navigation into the Integrated Water Resources Development and Management Strategy, January 2005, p. 13.

7. Objective(s):

To facilitate exchange and development between and among the Upper (Lancang-) Mekong River countries.

[1] Globally, river cruises are quite popular, e.g., on the Rhine, Donau, Po, Seine, Volga, Nile, Mississippi, Murray, and Yangtze (Changjiang) rivers.

8. Scope:

Consistent with Component 3 of the MRC Work Programme (Traffic Safety and Environmental Sustainability), an Upper (Lancang-)Mekong River Improvement Project should be implemented mainly to address safety/efficiency constraints and provide necessary infrastructure to support the GMS Tourism Sector Strategy.

Specific components[1] to be included in the project include the following:

(i) development of river-based infrastructure, including channel, navigation, and port improvements, among other things to address the requirements of the Mekong World Tourism Corridor – An Endless Stream of Tourism Cooperation Project, Strategic Project 2.2 of the GMS Tourism Sector Strategy TA[2];
(ii) installation of navigation aids that meet adequate safety, and implementation of efficiency standards, and perhaps to allow for night navigation;
(iii) development of an intermodal terminal at the Khone Falls in southern Lao PDR; and
(iv) improvement of maintenance, through the development of a maintenance fund.[3]

9. Estimated Cost:

US$30-35 million[4]

10. Financing Plan and Financing Arrangement (Public/Private):

Public

11. Financing Status:

Proposed for financing

12. Proposed Implementation Period/Schedule:

2006-2010, i.e., consistent with the timetable proposed for Component 3 of the MRC Work Programme (Traffic Safety and Environmental Sustainability; 2004-2009) and the timetable proposed for Strategic Project 2.2 of the GMS Tourism Sector Strategy TA (2006-2010).

[1] More specific components will be defined during the recommended technical assistance project.
[2] Asia Pacific Projects, *Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Draft Report, Annex Volume*, 7 March 2005, pp. 46-48.
[3] At the Final Meeting on the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006, Mr. Silpachai Jarukasemratana, Thailand, suggested that ADB consider financial support for the establishment of the maintenance fund. Summary of Proceedings, paragraphs 21 and 27.
[4] As reported by the PRC at the Final Meeting on the GMS Transport Sector Strategy, held in Vientiane on 21 March 2006, this cost estimate has been based on the latest figures, since the project will involve improvement of another four shoals and other substantial works that will require significant financing. Summary of Proceedings, paragraph 17.

13. Executing/Implementation Agency and Contact Persons:

Ministry of Communications, Yunnan Province Bureau of Communications (PRC); Ministry of Communication, Transport, Post and Construction (Lao PDR); and Directorate of Water Resources and Improvement of River System (DWIR) under Ministry of Transport (Myanmar) – all of which have established the Joint Committee on Coordination of Commercial Navigation (JCCCN)

ADB Contact Division/Person:

Mekong Department, Infrastructure Division
Email: gms@adb.org

Mekong River Commission[1] Contact Division/Person

Captain Lieven Geerinck, Operations Division, Navigation Programme Manager
Email: geerinck@mrcmekong.org

14. Estimated Benefits and Beneficiaries:

The Project would result in reduced transport costs relative to road transport, benefiting direct and indirect waterway users.

15. Social and Environmental Issues:

The Project may have complex environmental impacts (e.g., with respect to river ecology, air pollution from motorized river vessels, waste emissions from port facilities, impacts on local forests) and these impacts need to be reviewed carefully,[2] and all stakeholders thoroughly consulted.[3]

16. Priority of Project/TA:

** (see Chapter IX)

[1] The MRC is the leading repository of data and expertise relating to the Mekong River, and as such, through its Navigation Programme, is uniquely positioned to lead implementation of projects relating to the inland waterway transport along the River.
[2] At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, Thailand Viet Nam stressed environmental concerns about upstream improvements. Summary of Proceedings, appendix 11, paragraphs 31 and 37.
[3] For a project recently implemented on the upper reaches, an environmental impact assessment formally known as The Report on Environmental Impact, the Navigation Channel Improvement of the Lancang-Mekong River from China-Myanmar Boundary Marker 243 to Ban Houei Sai of Lao PDR, was completed in September 2001, but it was criticized by NGOs and others (see, e.g., Milton Osborne, *River at Risk: The Mekong and the Water Politics of China and Southeast Asia*, Lowry Institute Paper 02, 2004). On 12 May 2004, a four-country expert group signed a joint final working report for the Project, which concluded that implementation was conducted according to the requirements specified in the EIA Report approved by the governments of the four countries, and there were no negative environmental impacts as the required environment protection measures had been taken.

17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** Technical assistance required for proper project preparation
19.	**Pre-feasibility Study (Completed/Required):** Further feasibility and environmental studies required; see earlier footnote referring to technical assistance for Design of the Waterborne Transport on the Mekong River System.
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the Project.
21.	**Issues/Constraints:** Satisfactory resolution of environmental issues is required before implementation.[1] With respect to environmental studies, however, as noted by the MRC, river transport improvement projects should be held to the same standards (neither higher nor lower) as those applied to transport projects in other subsectors (e.g., road, rail). Nonphysical barriers to cross-border inland water transport (e.g., lack of common navigation rules, inefficient customs and immigration procedures) are significant and need to be addressed; see TAP-5, Project To Establish a Legal Framework for Cross-Border Navigation on the Mekong River ["Navigation Without Frontiers", a motto adopted by the Mekong River Commission].

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Sector	*Transportation and Communication*
Subsector	*Inland Waterway*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

[1] Thailand and Viet Nam stressed the importance of environmental improvement issues regarding navigation projects during the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005. Summary of Proceedings, Appendix 11, paragraphs 31 and 37.

PROJECT/TA CONCEPT PROFILE

1. Project Name (Number):

D21*** Lower Mekong River Navigation Channel Improvement and Maintenance
C3.2-3 *** Channel, Navigation, and Port Improvements on Mekong and for Access to Port at Siem Reap; and Development of a Floating Port on the Hamluong River
TAP 19B[1] Lower Mekong River Navigation Improvement and Maintenance Project

2. Loan or TA:

TA with subsequent loan

3. Project Location:

Lower Mekong River

4. Countries Involved:

Cambodia and Viet Nam

5. Sector/Subsector:

Transportation/Inland Waterway

6. Background and Rationale:

The Lancang-Mekong River[2] is the potentially significant artery for cross-border inland water transport in the GMS.[3] Navigation on the river may be divided into major segments: (i) an upper segment, suitable for only inland navigation, from the PRC port of Simao to Kompong Cham in Cambodia (although there is no through traffic between Cambodia and Lao PDR because of the impassable Khone Falls in southern Lao PDR),[4] and from Kompong Chnnang to the Great [Tonlé Sap] Lake in Cambodia; and (ii) a lower segment, suitable both for inland and maritime navigation, from Kompong Cham to the sea and from Kampong Chnnang to the sea via the Mekong, Bassac, and Tonlé Sap rivers. **This Project Profile concerns the lower segment of the river.**

[1] At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, Viet Nam suggested separating the upstream and downstream components of the Lancang-Mekong River Improvement Project. Summary of Proceedings, Appendix 11, paragraph 37.
[2] The name “Lancang-Mekong” has been used to refer to the river in its entirety or in the upper reaches, while the term “Mekong” alone has been used to refer to the lower portions of the river.
[3] Cross-border passenger traffic on other international rivers in the GMS (e.g., the Red River) is not expected to be significant in the period to 2015.
[4] Prior to 1925, goods were transshipped over Khone Island by means of a 5 km railway to a point downstream of the falls. The ruins of this transshipment facility, including a slipway with a hauling winch at one end and a gantry crane at the other end, can still be seen at the site.

While cross-border passenger transport along the Mekong River is rather limited at present, there is a well-developed domestic passenger transport system in the Mekong delta. Available passenger statistics indicate annual (2001) flows of 0.2 million passengers and 54.3 million passenger-km in Cambodia and 86.0 million passengers and 1,292.1 million passenger-km in Viet Nam. There are some notable services that have been initiated by private operators such as a tourist passenger boat service between Siem Reap and Ho Chi Minh City. The Mekong River Commission (MRC) has concluded that passenger traffic data on the Mekong River is insufficient and accordingly have called for systematic collection of this data.

Freight traffic along the Mekong is concentrated in southern Viet Nam and Cambodia, where the transport system is based on a dense and efficient network of navigable waterways. Traffic in the Mekong Delta has been growing at a sustained rate of 10% per year. With Cambodia's accession to the World Trade Organization in October 2004, the link between Phnom Penh and the sea via the Mekong Delta has become more important.[1] Available data on freight traffic along Mekong indicate annual (2001) flows of 0.5 million tons and 53.2 million ton-km in Cambodia and 21.8 million tons and 2,316.5 million ton-km in Viet Nam.[2]

7. Objective(s):

To facilitate exchange and development between and among the Lower Mekong countries.

8. Scope:

Consistent with Component 3 of the MRC Work Programme (Traffic Safety and Environmental Sustainability), a Lower Mekong River Improvement Project should be implemented mainly to address safety/efficiency constraints and provide necessary infrastructure to support the GMS Tourism Sector Strategy.

Specific components[3] to be included in the project include the following:

(i) development of river-based infrastructure, including channel, navigation, and port improvements, among other things to address the requirements of the Mekong World Tourism Corridor – An Endless Stream of Tourism Cooperation Project, Strategic Project 2.2 of the GMS Tourism Sector Strategy TA[4];

(ii) installation of navigation aids that meet adequate safety, and implementation of efficiency standards, and perhaps to allow for night navigation;

[1] Design of the Waterborne Transport on the Mekong River System, an ongoing technical assistance project under the auspices of the MRC, is seeking ways to improve the rural, domestic, and international transport networks using the Mekong River System in Cambodia.

[2] Data on passenger and freight traffic from [Captain] Lieven Geerinck [Navigation Programme Manager, Mekong River Commission], *Incorporation of Navigation into the Integrated Water Resources Development and Management Strategy*, January 2005, p. 13.

[3] More specific components will be defined during the recommended technical assistance project.

[4] Asia Pacific Projects, *Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Draft Report, Annex Volume*, 7 March 2005, pp. 46-48.

	(iii) improvement of maintenance, through the development of a maintenance fund; (iv) provision of access to a port at Siem Reap in northeastern Cambodia; and (v) development of a floating port on the Hamluong River in southern Viet Nam.
9.	**Estimated Cost:** US$10 million
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2006-2010, i.e., consistent with the timetable proposed for Component 3 of the MRC Work Programme (Traffic Safety and Environmental Sustainability; 2004-2009) and the timetable proposed for Strategic Project 2.2 of the GMS Tourism Sector Strategy TA (2006-2010).
13.	**Executing/Implementation Agency and Contact Persons:** Ministry of Public Works and Transport (Cambodia) and Ministry of Transport (Viet Nam) **Mekong River Commission**[1] **Contact Division/Person** Captain Lieven Geerinck, Operations Division, Navigation Programme Manager Email: geerinck@mrcmekong.org **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** The Project would result in reduced transport costs relative to road transport, benefiting direct and indirect waterway users.

[1] The MRC is the leading repository of data and expertise relating to the Mekong River, and as such, through its Navigation Programme, is uniquely positioned to lead implementation of projects relating to the inland waterway transport along the River.

15.	**Social and Environmental Issues:** The Project may have complex environmental impacts (e.g., with respect to river ecology, air pollution from motorized river vessels, waste emissions from port facilities, impacts on local forests) and these impacts need to be reviewed carefully, and all stakeholders thoroughly consulted.
16.	**Priority of Project/TA:** *** as relates to transport between Cambodia and Viet Nam; otherwise, ** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** Technical assistance required for proper project preparation
19.	**Pre-feasibility Study (Completed/Required):** Further feasibility and environmental studies required; see earlier footnote referring to technical assistance for Design of the Waterborne Transport on the Mekong River System.
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the Project.
21.	**Issues/Constraints:** Nonphysical barriers to cross-border inland water transport (e.g., lack of common navigation rules, inefficient customs and immigration procedures) are significant and need to be addressed; see TAP-5, Project To Establish a Legal Framework for Cross-Border Navigation on the Mekong River [“Navigation Without Frontiers”, a motto adopted by the Mekong River Commission].

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*Inland Waterway*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** **D14 ***** Guilin Liangjiang International Airport Improvement Project
2.	**Loan or TA:** Loan and Project Preparation Technical Assistance
3.	**Project Location:** Guilin
4.	**Country Involved:** PRC (Guangxi Zhuang Autonomous Region)
5.	**Sector/Subsector:** Transport/Civil Aviation
6.	**Background and Rationale:** As noted in the 1993-94 *GMS Subregional Transport Sector Study*, air transport can play an important role in the economic development of the GMS. Air services linking the six countries with each other and with the rest of the world are necessary for two reasons (i) to allow business and professional persons to link with trading partners and with sources of capital and technology; and (ii) to facilitate (high-value) tourism, an important source of foreign exchange.[1] Guilin Liangjiang International Airport, located 28 km southwest of the city of Guilin, opened in October 1996. The airport is the largest in the province, which had a population of 48.0 million in 2004 and an estimated GDP of US$35 billion in 2005.[2] Guilin Liangjiang International Airport was cited as a "key alternative gateway" for international tourism flows by the GMS Transport Sector Strategy Study TA.[3] There are seven flights per week to/from Bangkok (as of this writing), and demand is expected to increase for routes to/from other international destinations, both within and outside the GMS. Local authorities in Guangxi view civil aviation as a "sunrise" industry, as it is rapidly developing. Passenger traffic demand data for Guilin Liangjiang

[1]PADECO Co., Ltd., *Regional Technical Assistance on Promoting Subregional Cooperation among Cambodia, the People's Republic of China, Lao PDR, Myanmar, Thailand, and Viet Nam – Subregional Transport Sector Study*, prepared for the Asian Development Bank, October 2004, p. 62.
[2] With a year-on-year GDP growth rate of 10.2% in 2005.
[3] Asia Pacific Projects, Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Report, Annex Volume, 2005, p. 85. An internal ADB study identified a key tourism project to develop tourism circuit tours involving Guangxi, including Guilin/Nanning-Hanoi-Vientiane-Bangkok and Guilin/Nanning-Hanoi-Vientiane-Bangkok. Asian Development Bank, Study for the Closer Integration of Guangxi Zhuang Autonomous Region in the Greater Mekong Subregion, Draft Report, October 2005, Appendix 4, p. 5.

	International Airport indicates growth from 1.450 million passengers in 1991 to 2.900 million passengers in 2004, an average annual rate of 5.7%, and from 16,431 tons of air cargo in 1991 to 38,784 tons of air cargo in 2004[1], an annual average rate of 6.8%. In terms of aircraft movements, Guilin Liangjiang International Airport ranked 24th in the PRC in 2004, ahead of Nanning [Wuxu], which ranked 33rd, but behind Kunming [Wujiaba], which ranked 8th. Growth rates are expected to accelerate in the coming years, with forecasts provided by the General Administration of Civil Aviation of China (CAAC) indicating annual average air passenger traffic growth rates in southwestern PRC of 15% from 2006to 2010, 10% from 2011 to 2020, or 11.4% between 2006 and 2020.
7.	**Objective(s):** To facilitate exchange and development between and among the GMS countries, and between the GMS and the rest of the world; to upgrade the subregional air transport infrastructure to meet current and anticipated future traffic; and to support planned initiatives in tourism.
8.	**Scope**: The project will improve Guilin Liangjiang International Airport by extending the current runway from 2,800 m to 3,200 m and expanding the existing 50,300 m^2 terminal by 30,000 m^2, which would increase the airport's current annual capacity of 5 million passengers to 8.5 million.
9.	**Estimated Cost**: To be determined in subsequent project preparation technical assistance studies, but estimated by local authorities to be US$12 million.
10.	**Financing Plan and Financing Arrangement (Public/Private):** Elements of both public and private financing are envisaged. Airport development projects generate revenues and therefore offer some scope for cost recovery. However, given the magnitude of funds required for the project components, even with substantial user charge increases it is likely that large bilateral or multilateral loans will be required. Present development partners in the GMS civil aviation subsector include the Bank, the International Finance Corporation (IFC) of the World Bank Group, and the Japan Bank for International Cooperation. These and others may be interested in supporting the project, or certain project components.
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule**: 2008-2009

[1] Although a total of 54,872 tons were recorded in 2002, the year before the outbreak of SARS (Severe Acute Respiratory Syndrome).

13.	**Executing/Implementation Agency and Contact Persons:** Executing Agency: Civil Aviation Administration of China and the Guangxi Airport Management Group Company, Guangxi Zhuang Autonomous Region (PRC)[1] **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries**: The project will result in improvements in Guangxi Liangjiang International Airport, thereby improving the overall subregional air transport infrastructure and increasing connectivity. Economic benefits from the project would likely include the development of international trade and tourism, time benefits for flight passengers, increased safety, and increased economic activity in export-oriented high-value perishable manufactured and agricultural goods. Financial benefits of the Project would likely include increased revenue to the airport operating authorities. The project will strengthen linkages between and among GMS countries by providing the infrastructure necessary for improved air linkages. Also, it would increase the value provided by development partner financing for current projects by upgrading the infrastructure in the overall subregional air transport system.
15.	**Social and Environmental Issues**: The project may have impacts on the natural, cultural, and social environment during construction and/or during operation. Possible impacts relate to subsurface contamination, fuel/hazardous materials storage/handling, air emissions, storm water drainage and effluent discharges, solid and liquid waste management, aircraft noise, employee health and safety, and cultural and archeological heritage. Appropriate mitigation measures (e.g., noise reduction) should be implemented. The project will help alleviate poverty indirectly to the extent that employment is created in the tourism industry and secondarily in the airline industry. All stakeholders must be consulted by governments, e.g., persons living near the airports, airlines, airline employees. Airport terminals developed under the project should meet the needs of the disabled, providing, e.g., convenient drop-off points near main entrances, adequate auxiliary services within airports (e.g., accessible toilets), airline flight dissemination for the hearing and vision impaired.[2]

[1] In June 2004 CAAC completed the transfer of ownership and management of 90 airports across the country to local governments.

[2] See, e.g., Economic and Social Commission for Asia and the Pacific, *Barrier-Free Tourism for People with Disabilities in the Asian and Pacific Region*, 2003, p. 54.

16.	**Priority of Project:** Priority *** Capacity-Enhancement Project (CP) (see Chapter X)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation**: The project is understood to be ready for implementation with limited additional studies.
19.	**Pre-feasibility Study (Completed/Required):** Required
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary feasibility studies and implement the Project.
21.	**Issues/Constraints**: As noted in the Project Profile on the Phased Implementation of Open Skies, the PRC has called for implementation of PRC-ASEAN cooperation to establish regional air services agreements by 2010, corresponding with the timetable for establishing a China-ASEAN free trade region; while the time for participation may be decided by each ASEAN country, the PRC noted that participation in the arrangements and commitments to concrete measures may not be later than 2015, taking into account the progress of general goals agreed by PRC and ASEAN national leaders.[1] Main constraints or risks for implementation of this project include delayed implementation of PRC-ASEAN cooperation on regional air services, the difficulty of procuring adequate funding, the need for a sustainable and adequate repair and maintenance budget, the requirement for user charges to be sufficiently high to cover costs, and institutional development issues.

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Sector	*Transportation and Communication*
Subsector	*Civil Aviation*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

[1] Concept Paper on China-ASEAN Regional Air Services Arrangements, Agenda Item 5, Fourth ASEAN and China Senior Transport Officials Meeting (4th STOM + China), Vientiane, 15 November 2005, pp. 3-4.

APPENDIX 4

TECHNICAL ASSISTANCE
PROJECT CONCEPT PROFILES

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** Implementing the GMS Agreement to Facilitate the Cross-Border Movement of Goods and People, Phase 2[1] (TAP 1)
2.	**Loan or TA:** Regional TA (RETA)
3.	**Project Location:** GMS-wide
4.	**Countries Involved:** All GMS countries
5.	**Sector/Subsector:** Transportation/Road Transport
6.	**Background and Rationale:** Since 1996, ADB has been helping to mitigate nonphysical barriers to the efficient flow of goods and people across borders in the GMS. As a result, the six GMS countries have now signed the GMS Cross-Border Transport Agreement (CBTA) and it entered into force on 31 December 2003. Prepared under the auspices of ADB technical assistance, the CBTA provides a basic framework for facilitating the cross-border movement of goods and people. Further, pursuant to the mandate of the Ninth GMS Ministerial Conference in Manila in January 2000, all implementing annexes and protocols to the framework agreement were finalized as of November 2005. Drafts of these 20 annexes and protocols were prepared with ADB technical assistance, and further assistance was provided by ADB for their negotiation, a complex process as it involved over 10 ministries/agencies in each of the participating governments. A total of 16 of the 20 annexes and protocols have already been signed, while the remaining four are to be signed in the first half of 2006 in the PRC at the Second Meeting of the GMS Joint Committee The implementation of the cross-border facilitation measures included in the CBTA and its annexes and protocols will be particularly important to maximize the economic benefits of the high-priority GMS transport corridors. Memoranda of understanding (MOUs) for CBTA implementation have been finalized for 7 of the 15 key border crossings in the GMS agreed upon to be covered by the CBTA: Dansavanh (Lao PDR)-Lao Bao (Viet Nam), Mukdahan (Thailand)-Savannakhet (Lao PDR), and Mae Sot (Thailand)-Myawaddy (Myanmar) border crossings along the East-West Economic Corridor; the

[1] A Phase 1 initiative was undertaken in 2003-2005. After 2008, additional phases may be required. This Project Profile draws extensively from internal ADB documents (especially the TA paper, expected to be approved by the ADB President in January 2006) as the TA embodied in the Project is now under preparation.

	Bavet (Cambodia)-Moc Bai (Viet Nam) and Aranyaprathet (Thailand)-Poipet (Cambodia) border crossings along the Southern Economic Corridor; and the Mae Sai (Thailand)-Tachilek (Myanmar) and Hekou (PRC)-Lao Cai (Viet Nam) border crossings along the North-South Economic Corridor. The MOUs include a time-bound action plan for self-executing articles[1] of the CBTA, commitments to expedite the implementation of annexes and protocols following their ratification, and interim measures for key procedures, such as the bilateral exchange of traffic rights, until such time that the relevant annexes and/or protocols are ratified by GMS governments. Implementation of the CBTA began on 30 June 2005 at the Dansavanh-Lao Bao border crossing, will begin by 31 December 2005 at the Mukdahan-Savannakhet and Aranyaprathet-Poipet border crossings, and by 30 June 2006 at the other four key border crossings. According to ADB's (draft) TA paper, key challenges for effective implementation of the CBTA include: (i) establishment of efficient management systems and associated capacity building; (ii) streamlining and harmonization of border control documents; (iii) preparation of revised manuals of operation at the border checkpoints and associated training; (iv) establishment of required infrastructure, and in some cases, relocation and/or modification of layouts of border checkpoints as well as provision of common control areas to allow single-stop inspection and single-window inspection; and (v) mitigation of negative externalities associated with increased cross-border movement. GMS officials have also stressed that successful implementation of the CBTA at the key border crossings will encourage GMS governments to ratify the annexes and protocols and thus accelerate full implementation of the CBTA subregionwide.
7.	**Objective(s):** The goal of the TA is to promote economic cooperation and integration in the Greater Mekong Subregion, consistent with the GMS Program vision of a more integrated, prosperous, and equitable subregion. The specific objective of the RETA is to facilitate the cross-border transport of goods and people in the GMS by road transport, which in turn increase trade and investment, leading to rapid and sustainable economic growth.
8.	**Scope:**[2] The expected outputs of the TA include: (i) shortened border crossing clearance times at key border crossings; (ii) finalized arrangements for CBTA implementation at a second set of border crossings; (iii) recommendations to maximize benefits and address limitations of long-term and sustainable implementation of the CBTA; and (iv) strengthened National Transport Facilitation Committees (NTFCs).[3]

[1] Implementation of a self-executing article of the CBTA does not require the entry into force of an annex or protocol.
[2] Again, it is noted that this Project Profile (particularly the scope) draws upon internal ADB documents (especially the TA paper, expected to be approved by the ADB President in January 2005) as the TA embodied in the Project is now under preparation.
[3] Article 28 of the CBTA calls for each Contracting Party to "establish a permanent National Transport Facilitation Committee chaired by a Minister or Vice Minister or its equivalent"; it is to "bring together representatives of all parties concerned with implementation of the

The details of the key components follow:

Implementation of the CBTA at Key Border Crossings. The action plan in the time-bound MOUs for implementation of the CBTA at the seven key border crossings states that technical assistance will be needed to support the following measures: (i) harmonizing, simplifying, and rationalizing forms and procedures, and preparing manuals for efficient border management consistent with related international (e.g., World Customs Organization [WCO]) and regional (e.g., Association of Southeast Asian Nations [ASEAN]) agreements, including translation of forms, procedures, and manuals into the respective local languages; (ii) identifying the information and communication technology/ management information system (ICT/MIS) requirements including the facilitation of pre-arrival clearance procedures, taking into account ICT/MIS provided by other external aid/funding agencies; (iii) facilitating the implementation of the single-window system prescribed under the ASEAN Customs Cooperation initiatives; (iv) providing limited ICT equipment and software at selected border checkpoints where such are urgently needed to facilitate the establishment of an electronically transmitted declaration system; (v) conducting a study on modern border management systems and recommending its implementation; (vi) conducting location-specific training/capacity-building activities, including preparation of manuals, guidelines and procedures, and instructional media; (vii) conducting "before and after" border crossing clearance time studies and compiling relevant cross-border statistics to assess the effectiveness of facilitation measures; and (viii) monitoring the implementation of, and facilitating compliance with, the time-bound arrangements for CBTA implementation and advising the NTFCs and/or line agencies of the status of compliance.

Arrangements for CBTA Implementation at a Second Set of Border Crossings. The TA will support the preparation and finalization of arrangements to implement the CBTA at a second set of border crossings. The TA will provide assistance in (i) drafting bilateral time-bound MOUs for implementation of the CBTA at each of the second set of border crossings to be considered and endorsed by the Ministerial Joint Committee (MJC);[1] (ii)

Agreement". Article 29 of the CBTA states that "[r]epresentatives of the respective National Transport Facilitation Committees will form together the Joint Committee", which "will monitor and assess the functioning of the agreement, as well as serve as a platform for amicable settlement of disputes, and it may address advice to the Contracting Parties and formulate proposals for amendment of the Agreement" .

[1] The consultants recommend that all of the 15 pairs of border crossing points (and associated routes) currently listed in Protocol 1 of the CBTA [Designation of Corridors, Routes, and Points of Entry (Border Crossings)] be implemented by 2010, and that Protocol 1 be implemented GMS wide by 2015, i.e., at the end of the study planning period. In this context, it is noted that at the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study (held in Ho Chi Minh City, Viet Nam on 8-9 December 2005, Thailand urged that Protocol 1 of the CBTA be amended to reflect new corridors, e.g., Kanchanaburi-Dawei (Phunamron, Thailand, and Maethame, Myanmar), the Northwestern Corridor from Bangkok to Thanbyuzayat to Mawlamyine onward (Three Pagoda Pass on the Thai side). Summary of Proceedings, Appendix 11, paragraph 26. Also, at the Final Meeting on the GMS Transport Sector Strategy, held in Vientiane on 21 March 2006, the PRC and Viet Nam that the proposed Northeastern Corridor (NEC) linking Nanning with Hanoi (en route to Bangkok and Laem Chabang) be included in the Protocol 1 list. Summary of Proceedings, paragraphs 17 and 20.

	facilitating meetings to negotiate and finalize the MOUs; (iii) identifying and facilitating the provision of requirements for establishing an effective border management system and implementing single-window inspection and single-stop inspection for each border crossing; and (iv) monitoring the implementation of the MOUs, and advising NTFCs and/or line agencies of the status of compliance.[1] **Effective and Sustainable Implementation of the CBTA.** The TA will assist in (i) strengthening the existing institutional mechanisms within each country (i.e., NTFCs) and among countries (i.e., the MJC and its subcommittees[2]); (ii) reviewing the structure of NTFCs, the MJC, and its subcommittees, and offering recommendations for their operationalization; (iii) examining key outstanding issues in the CBTA and its annexes and protocols; (iv) measuring the benefits of increased cross-border transport facilitation, through "before and after" studies; (v) disseminating information about implementation of the CBTA to the public and private sectors, including in the border areas; and (vi) providing coordination/secretariat support to the MJC, its subcommittees, and NTFCs.
9.	**Estimated Cost:** US$860,000
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public; US$800,000 jointly from the Poverty Reduction and Cooperation Fund and the ADB TA funding program Fund, and US$60,000 in in-kind financing from the respective GMS governments
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2006-2008; additional phases may be required after 2008
13.	**Executing/Implementation Agency and Contact Persons:** Executing Agencies: National Transport Facilitation Committees (NTFCs) of the six GMS countries and the Joint Committee comprised of representatives of the respective NTFCs. **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** The Project will result in an increase in cross-border trade and/or reduction in the border crossing clearance time targets that are specified in the MOUs for IICBTA at the pilot border sites.

15. Social and Environmental Issues:

The project is not expected have significant environmental impacts. Nevertheless, appropriate mitigation measures (e.g., noise reduction) should be implemented.
The project will help alleviate poverty indirectly to the extent that employment is created in the road transport industry. Also, the TAP will result in increased cross-border accessibility for passengers who cannot afford air travel, even by low-cost carriers.

16. Priority of Project/TA:

**** (see Chapter IX)

17. Project Status (Proposed/Ongoing/Completed):

Proposed

18. Status of Project/TA Preparation:

TA in the advanced preparation stage, as indicated by the detail of the project scope stated above.

19. Follow-up Actions Required:

Approval of the respective national ministries concerned.

Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.

20. Issues/Constraints:

At the Second GMS Summit held in Kunming, the People's Republic of China (PRC) in July 2005, the GMS leaders were "encouraged by the considerable progress in negotiating the annexes and protocols of the Cross-Border Transport Agreement (CBTA) and the commencement of its implementation." They further reaffirmed their commitment "to move with speed and purpose to implement the Agreement at an increasing number of border crossings." GMS leaders also committed that GMS countries will "take all necessary domestic measures to ensure that the Agreement can be implemented starting in 2006.€[1] 35The GMS countries requested the proposed to support their efforts to facilitate cross-border transport and trade in the subregion through the accelerated implementation of the CBTA at key border crossings. The TA will complement the GMS Strategic Framework for Action on Trade Facilitation and Investment, which will enhance the benefits of the CBTA through a comprehensive set of measures to facilitate trade.

For the expected outputs and deliverables to be achieved, it is reasonably assumed that the GMS countries will remain committed to facilitating the cross-border movement of goods and people between and among them. It is also reasonably assumed that the GMS countries will perceive the benefits of

[1]Kunming Declaration adopted by the GMS leaders during the Second GMS Summit held on 4-5 July 2005.

	improved cross-border movement, and act positively to agree on the remaining annexes and protocols, and proceed with implementation on a sustainable basis. Specifically, it is assumed that goodwill and camaraderie among GMS officials will facilitate the finalization of the remaining annexes and protocols, and that GMS officials will continue to exert efforts and participate actively in training activities. ADB's Operations Coordination Division (MKOC), Mekong Department (MKRD), will continue to develop its system for monitoring, updating, and disseminating information and developments on cross-border transport facilitation activities. This system includes a library of cross-border agreements and related materials and inclusion of a section on GMS cross-border transport facilitation on ADB's official GMS website (www.adb.org/gms). Official summaries of proceedings of meetings held under the TA will be posted on ADB's GMS website. ADB's MKRD/MKOC will report the outcome of TA activities during GMS subregional transport forum meetings, GMS senior officials' meetings, and GMS ministerial conferences. As called for in Article 29 of the GMS Cross-Border Agreement, the Joint Committee, which the TA will support, will monitor and assess the functioning of the CBTA.

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*Road Transport and Multimodal Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** "Fine Tuning" of the GMS Cross-Border Transport Agreement (TAP 2)	
2.	**Loan or TA:** Regional TA (RETA)	
3.	**Project Location:** GMS-wide	
4.	**Country(ies) Involved:** All GMS countries	
5.	**Sector/Subsector:** Transportation/Road Transport	
6.	**Background and Rationale:** Since 1996, ADB has been helping to mitigate nonphysical barriers to the efficient flow of goods and people across borders in the GMS. As a result, the six GMS countries have now signed the Cross-Border Transport Agreement (CBTA) and it entered into force on 31 December 2003. Prepared under the auspices of ADB technical assistance, the CBTA provides a basic framework for facilitating the cross-border movement of goods and people. Further, pursuant to the mandate of the Ninth GMS Ministerial Conference in Manila in January 2000, the implementing annexes and protocols to the framework agreement are to be finalized by 2005. The GMS countries have signed 16 of these 20 Annexes and Protocols to the Agreement. Final drafts of the remaining four annexes and protocols were agreed at Vientiane on 3 November 2005. It is expected that these remaining annexes and protocols will be signed at the second meeting of the GMS Joint Committee, to be held in the PRC during the first half of 2006. While a pioneering set of legal instruments, it is apparent already that certain aspects of the GMS CBTA could benefit from "fine tuning". Further, during implementation, the need for such "fine tuning" and "mid-course corrections" is likely to become more apparent.	
7.	**Objective(s):** The goal of the TA is to promote economic cooperation and integration in the Greater Mekong Subregion, consistent with the GMS Program vision of a more integrated, prosperous, and equitable subregion. The specific objective of the RETA is to facilitate the cross-border transport of goods and people in the GMS.	

8.	**Scope:**
	Over a longer-term time horizon (2006-2015), "fine tuning" of the GMS CBTA and its annexes and protocols is recommended and called for by this Project. Some remedial measures may be apparent based on implementation monitoring and evaluation studies. However, a number of measures can be identified as this stage:[1] (i) establishment of a GMS visa-free regime for travelers[2] – if a full visa-free regime cannot be achieved, at least a GMS visa, as recommended by the GMS Tourism Sector Strategy TA,[3] is recommended;[4] (ii) establishment of a third-party motor vehicle liability insurance regime – a first priority may be the establishment of a system analogous to the "green card" system in Europe as the existing redundancy in motor insurance cover due to the lack of mutual recognition is time consuming and costly; (iii) increase in the liability limits in Annex 5 on the Cross-Border Movement of People to international standards – this would open the countries further to international trade, transport, and tourism exchanges, while it would not necessarily increase insurance premiums because only actual damage would be compensated; (iv) inclusion of a substantive health and SPS (sanitary and phytosanitary) regime - the CBTA does not address this critical issue in a substantive way, but rather basically refers to national law, although it requires conformity to international conventions; (v) consideration of harmonization of criteria for the licensing of carriers[5];

[1] In these cases, generally the ADB team including consultants had drafted text that effectively addressed the subject issue, but due to changes during the country negotiations, the final version included provisions that do not maximize facilitation and efficiency.

[2] ASEAN was planning a visa exemption arrangement for ASEAN nationals traveling within the ASEAN region by 2005 (based on a draft ASEAN Framework Agreement on Visa Exemption Framework); ASEAN has also worked toward harmonization of the procedures for issuing visas to international travelers in ASEAN. See Action Plan for the Implementation of the ASEAN Tourism Agreement, 23 January 2005.

[3] ADB sponsored an initiating paper on the GMS visa concept in 2003 and completed it in February 2004. Thailand, an early proponent of the concept, organized a working group under the five-country (i.e., including all GMS countries except the PRC) ACMECS (Ayeyawady-Chao Phraya-Mekong Economic Cooperation) forum. Studies are ongoing within the countries (e.g., regarding distribution of revenues, which borders would be opened first on an experimental basis, security issues); preliminary indications are that Cambodia and Myanmar are very interested, but Lao PDR is uncertain considering the importance of visa fees for its governmental finances. 16th Meeting of the Working Group on the Greater Mekong Subregion Tourism Sector, Summary of Proceedings, 25-27 Match 2005, paragraph 56.

[4] Also, in the context of freight transport, implementation of a system whereby at least the vehicle crew members (drivers and others) are entitled to enter a host country on the basis of their mere capacity (comparable to the seamen's book in the maritime transport mode) is recommended.

[5] This was a suggestion of the PRC at the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City, Viet Nam on 8-9 December 2005. Also, Also, the PRC noted that the CBTA states that vehicle dimensions and axle loads should follow host country standards, which may create problems with the forthcoming free market approach as it may lead to discrimination against some operators in GMS countries. The PRC suggested that this issue may be productively revisited as part of the fine tuning process, as a matter of priority. Another issue to be considered in the fine tuning process is

(vi) exchange of information on licensed carriers – it is recommended to insert a provision in Annex 9 on Criteria for Licensing of Transport Operators for Cross-Border Transport Operations for the exchange of information among the signatory countries on the road transport operators licensed in their respective countries;
(vii) arrangements for the depository of the CBTA and its annexes and protocols – the procedure of adoption and amendment of the instruments would be simplified through the creation of a depository;
(viii) change of the relationship with other agreements among the signatory countries – the best approach is for the CBTA to supersede any more restrictive existing agreements between the signatory countries;
(ix) upgrading of the GMS to an intergovernmental (supranational) organization having real legal personality – such institutional strengthening, which would not be limited to transport, would greatly enhance the sustainability of the GMS initiative and make it independent from ADB;
(x) upgrading of the English-language principle to an Agreement provision – instead of having to repeat in individual annexes and protocols that whatever documents are necessary should also be expressed in the English language in addition to national languages, it is recommended to insert this principle in the CBTA itself;
(xi) removal of transition provisions – taking into account the time that will have lapsed since drafting of the CBTA and its annexes and protocols, the transition provisions will have become obsolete;
(xii) adoption of the seven international conventions called for by UNESCAP (United Nations Economic Commission for Asia and the Pacific) Resolution 48/11[1] - considering that in many ways, the GMS regime has been crafted as a transitional regime leading toward accession of these conventions, which would allow the GMS countries to seamlessly participate in world trade and transport;
(xiii) extension of the facilitation regime to rail transport and inland water transport;
(xiv) inclusion of an express provision as a concrete basis for E-trade/E-government techniques, since currently Article 35 of the CBTA provides only a vague basis for such transactions, although the need for such an express provision will depend on progress at the global level;
(xv) extension of Annex 2 on Registration of Vehicles in International Traffic to trailers since logic commands such inclusion; and
(xvi) adoption of the international regime on the transportation of dangerous goods – it is recommended that the countries adopt of the UN regime on the transportation of dangerous goods.

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the working time of drivers, which also will be important with the forthcoming free market approach. Summary of Proceedings, Appendix 11, paragraph 7.

[1] Convention on Road Traffic (Vienna, 8 November 1968), Convention on Road Signs and Signals (Vienna, 8 November 1968), Customs Convention on the International Transport of Goods Under the Cover of TIR Carnets (Geneva, 14 November 1975), Customs Convention on the Temporary Import of Commercial Road Vehicles (Geneva, 18 May 1956), Customs Convention on Containers (Geneva, 2 December 1972), International Convention on the Harmonization of Frontier Control of Goods (Geneva, 21 October 1982), and the Convention on the Contract for the International Carriage of Goods by Road (CMR)(Geneva, 19 May 1956) + Protocol to the Convention on the Contract for the International Carriage of Goods by Road (5 July 1978 [some apply mainly or entirely to cargo transport].

9.	**Estimated Cost:** US$2 million
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2006-2015, but likely concentrated in the latter part of the study time horizon (i.e., 2011-2015)
13.	**Executing/Implementation Agency and Contact Persons:** Executing Agencies: National Transport Facilitation Committees (NTFCs) of the six GMS countries and the Joint Committee comprised of representatives of the respective NTFCs **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** The TAP will provide recommendations to maximize benefits and address constraints on long-term, sustainable implementation of the CBTA. Specific expected outcomes will include reduced nonphysical barriers to the cross-border movement of goods, vehicles, and people, which will result in increased cross-border trade at border crossings covered by the CBTA.
15.	**Social and Environmental Issues:** The project is not expected have significant environmental impacts. Nevertheless, appropriate mitigation measures (e.g., noise reduction) should be implemented.
16.	**Priority of Project/TA:** *** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** Not yet prepared

19.	**Pre-feasibility Study (Completed/Required):** Not applicable
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.
21.	**Issues/Constraints:** As has been noted, the "fine tuning" envisaged here would relate also to cargo transport.

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*Road Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

PROJECT/TA CONCEPT PROFILE[1]

1.	**Project Name (Number):** Processing and Facility Improvements at Border Crossing Points (TAP 3)
2.	**Loan or TA:** Regional TA (RETA)
3.	**Project Location:** At selected border crossing points in the GMS, most likely considering those selected for initial implementation of the GMS CBTA (i.e., the first set, including Dansavanh-Lao Bao, Mukdahan-Savannakhet, Bavet-Moc Bai, Aranyaprathet-Poipet, Mae Sot-Myawaddy, Mae Sai-Tachilek, and Hekou-Lao Cai, and a second set, i.e., Chiang Khong-Houayxay, Mohan-Boten, Hat Lek-Cham Yeam, Nong Khai-Thanaleng, Veunekham-Dong Kralor, and Ruili-Muse); the GMS Tourism Sector Strategy TA has recommended that this project be implemented at a somewhat different set of border crossing points, i.e., all those included in the foregoing list except Hat Lek-Cham Yeam, Nong Khai-Thanaleng (which presumably is considered to already offer modern facilities), and Ruili-Muse
4.	**Countries Involved:** All GMS countries
5.	**Sector/Subsector:** Transportation/Road Transport
6.	**Background and Rationale:** An Asian Development Bank (ADB) staff consultancy in November-December 2004 confirmed the prevalence of multi-step, sequential, redundant, and generally uncoordinated processing of goods, vehicles, and people by regulatory agencies at border crossings in the GMS.[2] In Lao PDR, for example, it was found that while up to ten agencies intervene in the clearance of goods, vehicles, and people, involvement of half of these agencies was unnecessary as many of their functions could be delegated to primary agencies (e.g., customs, immigration) without loss of regulatory control or revenue. Among other things, the staff consultancy also found that:

[1] Useful sources for this Project Profile included: (i) Reports of ADB staff consultancy undertaken by William E. LeDrew, November 2004-January 2005; (ii) Asia Pacific Projects, *Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Draft Report, Annex Volume*, 7 March 2005, especially pp. 131-33; (iii) Global Facilitation Partnership for Transportation and Trade, The United Nations Trade Facilitation Network, The World Bank Group, GFP Explanatory Notes, Integrated Border Management, GFP Explanatory Notes, at http://www.gfptt.org/uploadedFiles/7488d415-51ca-46b0-846f-daa145f71134.pdf; and (iv) Integrated Border Management at http://www.ear.eu.int/agency/main/Agency-ala2d3a4.htm.

[2] Mukdahan (Thailand)-Savannakhet (Lao PDR), Dansavanh (Lao PDR)-Lao Bao (Viet Nam), Bavet (Cambodia)-Moc Bai (Viet Nam), Aranyaprathet (Thailand)-Poipet (Cambodia), and Hekou (People's Republic of China)-Lao Cai (Viet Nam).

	(i) limited, if any, risk management techniques were employed at the border sites visited, except in Thailand; (ii) facility constraints are common, and in some cases facility improvements underway may not be designed to allow for processing improvements; and (iii) in most locations the use of information and communications technology (ICT) is very limited, with the borders generally operating stand-alone systems unconnected to the national system, with Thailand the exception again.[1] In addition, ADB TA 6179-GMS, the GMS Tourism Sector Strategy, found that the current land border crossing point facilities and related processing[2] and management of tourists in the GMS are of low standard, generally unsuited to the needs of high-yielding tourists and the management of fast-growing tourism markets, and do not support the GMS priority tourism areas and routes. The TA further found that the marketing of the GMS as a single destination needs to be supported by first-class border facilities and services.[3] While implementation of the GMS CBTA will address these inefficiencies, an additional TAP to promote integrated border management and improve border facilities will further promote the efficiency of processing at major border crossing points in the subregion.
7.	**Objective(s):** The goal of the TAP is to facilitate the movement of goods, vehicles, and people while maintaining secure borders and meeting national legal requirements, through integrated border management.
8.	**Scope:** The TAP will promote both (i) domestic integration between government agencies within one country and (ii) international integration between neighboring countries. Domestic integration will be promoted through:

[1] Reports of ADB staff consultancy undertaken by William E. LeDrew, November 2004-January 2005. Also, at the Final Meeting on the GMS Transport Sector Study, held in Vientiane on 21 March 2006, Mr. Lattanamany Khounnyvong, Lao PDR, suggested consideration of the application of information and communications technology (ICT) to transport operations, as this is an important trend currently. The consultants stated that a logical starting point is the use of ICT at the border crossing points. Summary of Proceedings, paragraph 29.

[2] It is useful to recall Article 11 of Annex 4 to the GMS CBTA states that "[t]he Contracting Parties will see to it that the required facilities and personnel for the smooth performance of border crossing formalities (as set out in Annex 12) are available in the crossing points mentioned in Protocol 1." Article 4 of Annex 12 states that "[t]he Contracting Parties will make the minimum services, facilities, and personnel available for crew and passengers: a facility for the purpose of searching travelers, rest areas, sanitary equipment (toilets), and medical first aid.€ 35

[3] Asia Pacific Projects, *Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Draft Report, Annex Volume*, 7 March 2005, p. 131.

(i) coordinated processing at border crossings, with focused risk management[1] procedures, and with the establishment of clear demarcations of who checks what and in what sequence;
(ii) integrated information technology systems to permit multi-agency access and sharing of information; and
(iii) awareness building leading to actual shared responsibilities between agencies in the medium term.

Specific elements of the TAP to achieve such domestic integration will include:

(i) institutional building for involved agencies, particularly at the border;
(ii) development of coordinated and harmonized procedures between agencies involved;
(iii) information technology systems providing for inter-service data exchange, including automated single-window processing[2]; and
(iv) equipment supply and infrastructure works for border control and trade facilitation (e.g., customs processing equipment).

International integration will be promoted through assisting neighboring countries to align and integrate common border formalities.

Consistent with Strategic Project 7.2 of the GMS Tourism Sector Strategy TA, Tourism Facility and Processing Improvements at Key Border Checkpoints in the GMS, the TAP will also: (i) train border, immigration, customs, and security staff in the handling of tourists; (ii) standardize immigration and customs fees, forms, and processing procedures; (iii) improve border tourism facilities; (iv) upgrade and landscape road access to border crossing points; (v) upgrade and develop tourist information, signage, food and beverage, transit accommodation, shopping, money exchange, toilet, and other facilities; and (vi) develop a fully functioning border facility between Cambodia and Lao PDR at Dom Kralor/Voen.[3]

After implementation, a monitoring program to measure performance and efficiency, measured by reduced costs and minimized time at points of entry, should be implemented.[4] A dialogue with the various stakeholders may productively complement such monitoring since customer satisfaction may be used to gauge the success of a program.

9. Estimated Cost:

US$1 million for technical assistance and US$20 million for construction at about eight selected border crossing points[5]

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[1] Risk management enables a better understanding of threats and allows for more targeted enforcement programs.
[2] See, e.g., http://www.aseansec.org/14308.htm,
http://www.unece.org/trade/workshop/moscow_1104/presentations/butterly_singlewindow.ppt.
[3] Asia Pacific Projects, *Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Draft Report, Annex Volume*, 7 March 2005, p. 132.
[4] See, e.g. http://www.seerecon.org/ttfse/TTFSE_Manual.pdf.
[5] For comparison, Strategic Project 7.2 of the GMS Tourism Sector Strategy TA estimated TA costs of US$750,000 and construction costs of US$15.5 million.

10.	**Financing Plan and Financing Arrangement (Public/Private):** Public (from funds of ADB or other development partners[1])[2]
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2006-2010 (corresponding with the timeline proposed for Strategic Project 7.2 of the GMS Tourism Sector Strategy TA, which called for preparation in 2006, capacity building in 2006-2007, construction in 2007-2008, and evaluation in 2007-2010); a second phase may be implemented for additional border crossings in the 2011-15 period.
13.	**Executing/Implementation Agency and Contact Persons:** Executing Agencies: National Transport Facilitation Committees (NTFCs) of the six GMS countries and the Joint Committee comprised of representatives of the respective NTFCs; the Border Control Authorities (e.g., Customs, Immigration, Quarantine Departments) of the six GMS countries; and the Tourism Authorities of the six GMS countries. **ADB Contact Division/Person:** Mekong Department, Operations Coordination (GMS) Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** The TAP will benefit transport systems users (people as well as transport operators) crossing borders in the GMS. Benefits will include time and cost savings for transport system users at border crossing points, as well as processing efficiencies of governmental border control authorities. Example measures of benefits may include mean and median border entry and exit times, total customs administration cost per revenue collected, number of declarations per customs administration staff member, and surveyed/reported occurrences of corruption.
15.	**Social and Environmental Issues:** The TAP will help alleviate poverty, e.g., by creating employment in the road transport industry, by facilitating the movement of tourists interested in

[1] One source expressly calls for twinning projects in which agencies of a developing/transitioning country work directly with corresponding agencies of a developed country. Global Facilitation Partnership for Transportation and Trade, The United Nations Trade Facilitation Network, The World Bank Group, GFP Explanatory Notes, Integrated Border Management, GFP Explanatory Notes, at http://www.gfptt.org/uploadedFiles/7488d415-51ca-46b0-846f-daa145f71134.pdf, p. 4.

[2] Some commercial facilities, e.g., restaurants and hotels, would be developed and operated by the private sector, to assure sustainability from an economic point of view; also, the private sector may be interested in developing border facilities on a build-operate-transfer basis in return for access to the captive market found at the border.

experiencing tourism resources in areas where rates of poverty incidence are high.

The TAP is not expected to have significant environmental impacts. Nevertheless, appropriate mitigation measures (e.g., noise reduction) should be implemented. The TAP may also have an indirect impact on the natural, cultural, and social environment through increased tourism volumes and connectivity. Site mitigation measures should be implemented, and information material on responsible behavior should be disseminated to travelers. Possible negative social impacts of the increased flows of persons, especially on women and children, require careful management.

16. Priority of Project/TA:

*** (see Chapter IX)

17. Project Status (Proposed/Ongoing/Completed):

Proposed

18. Status of Project/TA Preparation:

The TAP builds upon the GMS CBTA, the final annexes and protocols of which are being finalized in 2005. The TAP also builds upon Strategic Project 7.2 (Tourism Facility and Processing Improvements at Key Border Checkpoints in the GMS); the GMS Task Force under the leadership of Lao PDR was proposed as the implementing agency for Strategic Project 7.2, and the PRC/Yunnan National Tourism Administration suggested that the PRC could lead Strategic Project 7.2.

19. Pre-feasibility Study (Completed/Required):

Not applicable

20. Follow-up Actions Required:

Approval of the respective national ministries concerned.

Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.

21. Issues/Constraints:

The project is fully supportive of the implementation of the GMS CBTA, particularly of Annexes 4 and 12 to the CBTA. As with implementation of the rest of the CBTA, to the extent that special interest groups may perceive themselves as not benefiting, there may be hindrances toward implementation, but successful experience elsewhere in the world suggests that this constraint to implementation can be addressed.

To implement the specific organizational changes necessary to develop the integrated border management requires political support at the highest levels, i.e., a mandate from the Prime Minister or similar official with authority over the agencies concerned. Based on this mandate, an interagency taskforce can undertake the work. However, a legal review of domestic laws and regulations

may be required, and a lead agency nominated to direct the process, typically the Customs authority.[1]

At the Final Meeting on the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006, Mr. Lattanamany Khounnyvong of Lao PDR called for the provision of facilities to complement the development of road infrastructure. Among other facilities, these would include border infrastructure and hence this TAP was specially mentioned in this regard. Mr. Nguyen Van Thach, Viet Nam, supported the comment by Lao PDR and cited in particular that the border crossing points between Lao PDR and Viet Nam at Dansavanh-Lao Bao has been operating since June 2005, although common control areas have not been established yet at these points. Also, at the border crossing on the Phnom Penh-Ho Chi Minh City route, there are no similar facilities yet.

FOR ADB USE ONLY

Sector	*Transportation and Communication (as well as Tourism)*
Subsector	*Road Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Competitiveness*

[1] Global Facilitation Partnership for Transportation and Trade, The United Nations Trade Facilitation Network, The World Bank Group, GFP Explanatory Notes, Integrated Border Management, GFP Explanatory Notes, at http://www.gfptt.org/uploadedFiles/7488d415-51ca-46b0-846f-daa145f71134.pdf, p. 1.

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** Updating or Improving Existing Bilateral Railway Agreements and/or Amending the GMS Cross-Border Transport Agreement (CBTA) To Cover Cross-Border Railway Transport [1] (TAP 4)
2.	**Loan or TA:** Advisory Regional Technical Assistance
3.	**Project Location:** GMS Wide
4.	**Countries Involved:** All GMS countries
5.	**Sector/Subsector:** Transportation/Railway
6.	**Background and Rationale:** In terms of “software,” at present there are two bilateral railway agreements in the GMS (a Match 1992 agreement between the PRC and Viet Nam,[2] and an April 1997 agreement between Lao PDR and Thailand), [3] which like interchange agreements between railways in Europe, North America, and elsewhere, provide for through movement of coaches and wagons, with locomotives changed at border stations. The arrangement between the PRC and Viet Nam continues an arrangement that has been in place for about 50 years. Since technical details are covered in separate protocols, the agreement is quite brief. Because both countries are long-time members of OSZhD (the Committee for the Organization for Cooperation between Railways, based in Warsaw), arrangements for common ticketing and other commercial aspects are covered by reference to the terms of the OSZhD[4] Agreement.[5] The Lao PDR-Thailand agreement, on the other hand, in the

[1] At the Myanmar Country Workshop held on 3 August 2005 in Yangon, it was suggested that the title of this TAP be renamed to include the possibility of adopting new bilateral cross-border railway agreements. However, it was noted that a GMS-wide approach may be a better way to address such issues.

[2] Agreement on Border Railway Transport between the Ministry of Transport Telecommunication and Post, Socialist Republic of Viet Nam, and Ministry of Railways, People’s Republic of China, Beijing, 8 March 1992. It may have been updated in recent years.

[3] The Agreement on Joint Traffic Working over the Government of Lao People’s Democratic Republic and Kingdom of Thailand, 4 April 1997.

[4] Sometimes also referred to in English as the OSJD or OSShD Agreement.

[5] Under the PRC-Viet Nam bilateral railway agreement, Lao Cai station in Viet Nam acts as the border station for the trains of both railway systems, while on the Nanning-Hanoi line, the common border station is at Dong Dang. PRC rolling stock is permitted to move into Viet Nam, but a change of locomotives and rivers is required beforehand. See KTM, K.L. Consult, and Jurutera Perunding Zaaba Sdn BHd, *Feasibility Study for the Singapore-Kunming Rail Link,*

	absence of a railway operating entity in Lao PDR or of other precedents,[1] covers exchange of wagons, issuance of through tickets, and so on. Protocol 6 of the ASEAN Framework Agreement on the Facilitation of Goods in Transit covers Railway Border and Interchange Stations but it has not yet been signed.[2] Topics covered in the draft include obligations, designated railway border and interchange stations, type and quantity of rolling stock and inspection of rolling stock, basic operational arrangements, and institutional provisions. The GMS CBTA does not currently cover cross-border railway transport, although the consultants' original draft included a Part VII covering Particulars on Rail Transport,[3] including an article on cooperation between railways (with an associated protocol) and an article part addressing rail liability regime (with an associated annex).[4]
7.	**Objective(s):** The goal of the TA is to promote economic cooperation and integration in the Greater Mekong Subregion, consistent with the GMS Program vision of a more integrated, prosperous, and equitable subregion. The specific objective of the RETA is to facilitate the cross-border transport of goods and people in the GMS by railway transport.
8.	**Scope:** To the extent that railways are to be developed in the GMS - and construction on one new railway line, that between Nong Khai, Thailand and Vientiane, Lao PDR is expected to commence soon and be completed by mid-2007 - existing bilateral agreements may be updated and improved, or the GMS CBTA amended to cover cross-border railway transport. A new Part to the GMS CBTA – Particulars on Rail Transport – could be

Final Report, Volume 1 – Report on Feasibility, prepared for the Government of Malaysia, Ministry of Transport, November 2000, p. 4-24.

[1] Except for an interchange agreement between Thailand and Malaysia, which has been in operation for more than 75 years.

[2] No such Protocol is attached to the (draft) ASEAN Framework Agreement on the Facilitation of Inter-State Transport.

[3] The current GMS CBTA was originally formulated in 1998 as a Draft Framework to Facilitate the Cross-Border Movement of Goods and People in the GMS, which included a part on railways. However, in late 1998 this draft framework was streamlined to form the basis of a trilateral agreement between and among Lao PDR, Thailand, and Viet Nam; since cross-border railways were not at the time applicable to these three countries, the part of the draft framework on railways was deleted in the streamlined agreement. Later this trilateral agreement became a GMS-wide agreement (the GMS CBTA) with accession by Cambodia (November 2001), the PRC (November 2002), and Myanmar (September 2003).

[4] As set out in Article 3 of the GMS CBTA, an annex is "an attachment to the Agreement that will contain technical details", while a protocol is "an attachment the Agreement that will contain time- or site-specific variable elements". Both "[form] integral parts of the Agreement and will be equally binding" .

drafted, involving two articles, one on Cooperation between Railways and the other on Rail Liability Regime.[1] Two model agreements governing cooperation between connecting railways are available, that of the Paris-based International Union of Railways (Union Internationale des Chemins de Fer, UIC) or the Warsaw-based Committee for the Organization for Cooperation between Railways (i.e., the OSZhD). Accordingly, these two options may be provided in the draft text on railway cooperation, although many details (e.g., regarding border stations, interchange stations, type and quantity of rolling stock) are site specific and would have to be spelled out in separate, perhaps bilateral, protocols. Regarding the article on rail liability regime, it should be noted that interim arrangements not involving one of the two approaches offered would not likely attract the interest of the international insurance industry and would therefore not serve any useful purpose.

Draft text for the two articles providing Particulars on Rail Transport follow:

"**Article € 46Cooperation Between Railways**

(a) The Contracting Parties will organize the cooperation between their respective railways according to the:

[Option 1]

framework of the Paris-based International Union of Railways (Union Internationale des Chemins de Fer, UIC).

[Option 2]

framework of the Warsaw-based Committee for the Organization for Cooperation between Railways (i.e., the OSZhD Agreement).

(b) The designation of interchange and border stations, the type and quantity of rolling stock, as well as the basic operational arrangements relating to technical inspection of the rolling stock and other issues, shall be agreed in Protocol ….

Article € 46Rail Liability Regime

The Contracting Parties undertake to follow the:

[Option 1]

the Uniform Rules Concerning the Contract for International Carriage of Passengers and Luggage by Rail (CIV) (drawn from Appendix A of the Convention Concerning the International Transport of Goods by Rail, COTIF, Bern, 9 May 1980), and the Uniform Rules Concerning the Contract for International Carriage of Goods by Rail (CIM) (drawn from Appendix B of the Convention Concerning the International Transport of Goods by Rail, COTIF), set out in Annex ….

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[1] See PADECO Co., Ltd., *T.A. No. 5749-REG, Cross-Border Movement of Goods and People in the Greater Mekong Subregion, Main Report*, prepared for the Asian Development Bank, September 1998, pp. 31-33.

	or [Option 2] the Agreement on International Carriage of Passengers of Passengers (SMPS) and the Agreement on the International Carriage of Goods (SMGS) concluded in the framework of OSZhD, set out in Annex.
9.	**Estimated Cost:** US$100,000
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2006-2007, considering that construction of a new railway line between Nong Khai, Thailand and Vientiane, Lao PDR is expected to be completed by mid-2007
13.	**Executing/Implementation Agency and Contact Persons:** Royal Railway of Cambodia (Cambodia), Ministry of Railways, Yunnan Province, and Guangxi Zhuang Autonomous Region (PRC); Railway Authority, Ministry of Communication, Transport, Post and Construction (Lao PDR); Myanma Railways, Ministry of Rail Transportation (Myanmar); State Railway of Thailand, Ministry of Transport (Thailand); and Vietnam Railways, Ministry of Transport (Viet Nam) **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email**:** gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** The Project will result in an increase in cross-border trade and/or reduction in the border crossing clearance time targets at cross-border railway crossings.
15.	**Social and Environmental Issues:** The project is not expected have significant environmental impacts. Nevertheless, appropriate mitigation measures (e.g., noise reduction) should be implemented.
16.	**Priority of Project/TA:** *** (see Chapter IX)

17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** Technical assistance from ADB
19.	**Pre-feasibility Study (Completed/Required):** Not applicable
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the Project.
21.	**Issues/Constraints:** Software should be in place before completion of the hardware, and accordingly it would be desirable if the activity envisaged in this Project could be completed by mid-2007, the expected completion date of new railway line to be constructed between Nong Khai, Thailand and Vientiane, Lao PDR.

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Sector	*Transportation and Communication*
Subsector	*Railway*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** Project to Establish a Legal Framework for Cross-Border Navigation on the Mekong River ["Navigation Without Frontiers", a motto adopted by the Mekong River Commission] (TAP 5)[1]
2.	**Loan or TA:** Advisory Regional Technical Assistance
3.	**Project Location:** Mekong River
4.	**Countries Involved:** Cambodia and Viet Nam (and possibly Thailand and Lao PDR)
5.	**Sector/Subsector:** Transportation/Inland Waterway
6.	**Background and Rationale:** Major active[2] legal instruments regarding navigation on the Mekong River include: (i) the Agreement on Commercial Navigation on Lancang-Mekong River among the Governments of the People's Republic of China, the Lao People's Democratic Republic, the Union of Myanmar and the Kingdom of Thailand [hereafter Upper Lancang-Mekong Commercial Navigation Agreement] (Tachileik,[3] Myanmar, 20 April 2000), which aims to open the Upper Mekong basin for international navigation; and (ii) the Mekong River Commission Agreement on the Co-operation for the Sustainable Development for the Mekong River Basin [hereafter MRC Agreement], which covers Freedom of Navigation in its Article 9.[4]

[1] The previous title of the TAP encompassed the "Lancang-Mekong River", but at the request of the PRC and Lao PDR, the word "Lancang" has been deleted and the geographic scope of the project narrowed accordingly. However, at the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City, Viet Nam on 8-9 December 2005, the PRC did indicate that "perhaps later it may be possible to combine the downstream and upstream legal frameworks". Summary of Proceedings, paragraph 23(ii) and Appendix 11, paragraph 5.

[2] Although the Bangkok Convention between France and Siam (1926) and the Paris Convention among Cambodia, Laos [a predecessor of the Lao People's Democratic Republic], and Viet Nam (1954) may be applicable from a theoretical point of view, it is not in effect in practice. See, e.g., Professor Dr. Eric Van Hooydonk, Formulation of the MRC Navigation Programme, Presentation Component 2: Legal Framework for Cross-Border Navigation, 3-4 September 2003.

[3] Also spelled Tachilek.

[4] Article 9 states that: "On the basis of equality of right, <u>freedom of navigation</u> shall be accorded throughout the mainstream of the Mekong River <u>without regard to territorial</u>

As the countries consider the upstream issues to largely have been resolved by the first agreement listed above,[1] this TAP focuses on the Lower Mekong.

Regarding the legal environment for the Lower Mekong River, while Article 9 of the MRC Agreement provides a mandate to promote and coordinate cross-border waterborne traffic, the MRC and international legal experts consider it insufficiently comprehensive or detailed to provide an adequate operational framework to govern navigation. In fact, it moves backward from the 1954 Paris Convention, which was at the time a model river navigation agreement.[2] It is noteworthy, however, that the MRC is executing Belgian-sponsored consulting services, which among other things, strive to develop Article 9 into clear principles on free navigation and harmonized technical and operational rules in line with the regime of other international rivers. These services will also describe the tasks and roles for agencies drafting a bilateral Cambodia-

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boundaries, for transportation and communication to promote regional co-operation and to satisfactorily implement projects under this Agreement. The Mekong River shall be kept free from obstructions, measures, conduct and actions that might directly or indirectly impair navigability interfere with this right or permanently make it more difficult. Navigational uses are not assured any priority over other uses, but will be incorporated in any mainstream project. Riparians may issue regulations for the portions of the Mekong River within their territories, particularly in sanitary, customs and immigration matters, police and general security" [underlining added in Dr. Eric Van Hooydonk, Formulation of the MRC Navigation Programme, Presentation Component 2: Legal Framework for Cross-Border Navigation, 3-4 September 2003, Slide 11].

[1] For consideration of the countries, the consultants have mentioned a few points to consider regarding the Upper Lancang-Mekong Commercial Navigation Agreement:

(i) Article 3 does not specify whether it relates to third-party liability insurance or hull insurance.

(ii) Article 4 allows the contracting parties to unilaterally withdraw their national ports from the list, a provision that could be misused.

(iii) Article 6 intends to allow only third and fourth freedom traffic rights, i.e., commercial traffic (in both directions) between a port in the vessel's home country and a port in another contracting party's territory. For the performance of commercial traffic between the ports of two contracting parties, other than the vessel's home country, special permission is required. It is not logical that Article 6 for that case only requires the permission of one of those two other countries. In the logic of the system, in that case, the permission of the two other countries should to be required.

(iv) Article 14 – which states that "[e]ach Contracting Party reserves the right to deny the entry into its territory of any crew member or any passenger it considers undesirable under its laws" - may foster arbitrariness.

(v) There is no clear mandate in Article 21 of the Agreement for the elaboration of the "Rules", "Regulations", and "Guidelines". Article 21 is too vague and could virtually cover any subsequent implementation measure. Important matters such as (a) operator licensing, (b) crew certification, (c) vessel technical requirements and inspection, and (d) transport service pricing and conditions should at least to be identified in the Agreement itself, even if the details are left to separate regulations. Now those issues are only addressed in the regulations[1]. Also, neither the Agreement nor the Regulations clearly define the legal status and binding force of the regulations.

[2] See, e.g., Professor Dr. Eric Van Hooydonk, Formulation of the MRC Navigation Programme, Presentation Component 2: Legal Framework for Cross-Border Navigation, 3-4 September 2003, Slides 7-10.

[3] Consultancy Services for the Design of the Master Plan for Waterborne Transportation on the Mekong River System in Cambodia – Invitation to Submit Technical/Financial Offers, financing by Belgian Technical Cooperation, for the Ministry of Public Works and Transport, Kingdom of Cambodia, 8 June 2005, pp. 30-34.

	Viet Nam navigation agreement, including coverage of the "maritime" stretch between the river ports of Cambodia and the sea.[3] There is also a Cambodia-Viet Nam bilateral agreement on waterway transportation (Hanoi, 1998), which aims to establish navigation regulations based on the MRC Agreement (prescribing a transit route), but which it is understood has not been ratified by Cambodia. Even after the completion of the Belgian-sponsored consulting services, the MRC recognizes that there will be gaps in the legal regime covering cross-border navigation on the Mekong River, e.g., the need to prepare a draft framework or frameworks for maritime/inland navigation, covering the stretch between Louang Prabang and the Khone Falls and taking the Upper Lancang-Mekong Commercial Navigation Agreement into account. In addition, the navigation regime could productively be integrated with the regime established by the GMS Cross-Border Transport Agreement (CBTA). Once new rules are established on an international basis, they will need to be incorporated/ transposed into the national law of the riparian countries.
7.	**Objective(s):** The goal of the TA is to promote economic cooperation and integration in the Greater Mekong Subregion, consistent with the GMS Program vision of a more integrated, prosperous, and equitable subregion. The specific objective of the RETA is to facilitate the cross-border transport of goods and people in the GMS by inland waterway transport.
8.	**Scope:** A Project to Establish a Legal Framework for Cross-Border Navigation on the Mekong River, analogous to Component 2 of the MRC Navigation Programme, is recommended. As developed by MRC project formulation studies, the aim of the Project would be to liberalize and harmonize legal, regulatory, and administrative conditions for cross-border navigation on the Mekong River in a manner similar to that of other international rivers worldwide. It would provide "Navigation Without Frontiers", a motto adopted in the MRC Navigation Strategy. Ideally, the framework would be integrated with that of the GMS CBTA and include reference to or incorporate provisions of relevant international conventions prepared by the International Maritime Organization (IMO) and Comité Maritime International (CMI).[1] Again, as envisaged by the MRC, the output of the Project would be a general navigation agreement or agreements along with harmonized rules, as well as assistance to the countries in the introduction of these rules. Specific project components may include: (i) undertaking of a comprehensive legal study of the Mekong river navigation regime, *de lege lat*a (what the law is) and *de lege ferenda* (what the law ought to be); (ii) preparation of a draft framework for maritime and inland navigation and associated rules, and (iii) providing assistance to the countries in incorporating these laws and rules into national legal regimes. Negotiations between and among the riparian countries, including the PRC and Myanmar, could be facilitated by the MRC along with ADB.

[1] E.g., the Convention on the Facilitation of Maritime Traffic (the London Facilitation Convention, the FAL Convention) (London, 1965).

9.	**Estimated Cost:** US$100,000
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2007-2009, broadly consistent with the timing for Component 2 of the MRC Navigation Programme, i.e., 2004-09.
13.	**Executing/Implementation Agency and Contact Persons:** Ministry of Public Works and Transport (Cambodia) and Ministry of Transport (Viet Nam) [and possibly Ministry of Communication, Transport, Post and Construction (Lao PDR)] **Mekong River Commission Contact Division/Person** Captain Lieven Geerinck, Operations Division, Navigation Programme Manager Email: geerinck@mrcmekong.org **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email**:** gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** The Project will result in an increase in cross-border trade and/or reduction in the border crossing clearance time targets at cross-border inland waterway checkpoints.
15.	**Social and Environmental Issues:** The project is not expected have significant environmental impacts. Nevertheless, appropriate mitigation measures should be implemented, e.g., with respect to river ecology, air pollution from motorized river vessels, waste emissions from port facilities.
16.	**Priority of Project/TA:** *** as relates to transport between Cambodia and Viet Nam; otherwise, ** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed

18.	**Status of Project/TA Preparation:** Technical assistance from ADB
19.	**Pre-feasibility Study (Completed/Required):** Not applicable
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the Project.
21.	**Issues/Constraints:** Software should be in place before completion of the hardware, and accordingly it would be desirable if the activity envisaged in this Project could be completed by 2010, the expected completion date for the Lancang-Mekong River Navigation Improvement Project.

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Sector	*Transportation and Communication*
Subsector	*Inland Waterway*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

PROJECT/TA CONCEPT PROFILE

1. Project Name (Number):

Establishment of Issuing and Guaranteeing Organizations under the GMS Cross-Border Transport Agreement (TAP 6)

2. Loan or TA:

Regional TA (RETA)

3. Project Location:

GMS-wide

4. Countries Involved:

All GMS countries

5. Sector/Subsector:

Transportation/Road Transport

6. Background and Rationale:

The Requirement: Implementation of three annexes to the GMS Cross-Border Transport Agreement (CBTA) requires establishment of issuing and guaranteeing organizations for implementation: (i) Annex 6: Transit and Inland Customs Clearance Regime, (ii) Annex 8: Temporary Importation of Motor Vehicles; and (iii) Annex 14: Container Customs Regime. From December 2004 to March 2005 national workshops on guaranteeing organizations were held in each GMS country under ADB RETA 6098: Implementing the Agreement for Facilitation of the Cross-Border Transport of Goods and People in the Greater Mekong Subregion - Phase 1, resulting in a number of clarifications.

The Principle: The basic principle is that in order for Customs Administrations to relinquish full control (e.g., escorts, routine exhaustive physical inspection, and bond deposit) from a customs duties perspective of transiting cargo, it requires some form of collateral security for the payment of the customs duties at risk.

The Nature of the Guarantee: In addition to abolishing escorts, routine exhaustive physical inspection, etc., the facilitation effect sought by a customs transit regime consists of avoiding a case-by-case individual bond deposit by the transport operator. Such an approach would be onerous and cumbersome. Consequently, in whatever format it is provided, in any instance for the sake of facilitation, the guarantee should be collective (as opposed to individual per transport operator) for the entire community of home country transport operators and continuous (as opposed to case-by-case per transport operation). Any system amounting to either an individual or a case-by-case guarantee is detrimental to the facilitation effect and is to be rejected.

The Organization Arranging the Guarantee: In order to avoid individual and/or case-by-case guarantees, an organization is to take care of providing

the guarantee to the customs administration collectively for the entire community of road transport operator, and on a continuous basis. The effect of scale of a collective guarantee provision will also allow gathering of the required collateral more easily and hence the "solidarity effect" will allow individual transport operators to engage in international operations, from which they would otherwise be excluded.

The organization charged with the task of acting as guarantor could be the national Road Transport Operators (Haulers) Organization or also the Chamber of Commerce (as per the TIR and ATA Convention[1] examples, respectively).

The Capacity of the Intervening Organizations: The home country organization of transport operators (or Chamber of Commerce) issuing the customs transit documents and arranging for the guarantee can be distinguished from the direct guarantor (e.g., bank or insurance company) vis-à-vis the host country customs administration, requested by or arranged for by the home country organization. The organization arranging for the guarantee and the direct guarantor, depending on the formula, do not necessarily coincide.

The Location of the Direct Guarantee: While in theory the guarantee could be located either in the host country territory (of customs) or in the home country territory (of the transport operators), GMS customs administrations generally express a preference or even the condition that the guarantee be located in its territory. Cashing the guarantee in a foreign country may indeed prove to be very difficult or virtually impossible. For this reason, the modality whereby the home country road transport operators' organization merely provides the guarantee commitment to the host country customs administration from its home country establishment is probably not acceptable for the customs administration. While previously a host country customs administration may have considered a foreign publicly owned transport undertaker sufficiently trustworthy, this may no longer be the case in times of an increasingly privatized transport sector.

The Type/Format of the Direct Guarantee: Various types/formats of direct guarantee are conceivable:

(i) the home country transport operators organization's commitment from its home country establishment, merely based on the faith, trust, and confidence the host country customs administration has in this organization;
(ii) the home country transport operators organization's commitment, backed up by the assets it maintains in its host country establishment;
(iii) the home country transport operators organization making a (collective and continuous) deposit of a bond on behalf of its members with the host country customs administration;
(iv) a host country sister transport operators organization representing its fellow home country organization for the purpose of acting as a guarantor (possibly on the basis of reciprocity);

[1] Customs Convention on the International Transport of Goods Under the Cover of TIR Carnets (Geneva, 1975); Customs Convention on the ATA Carnet for the Temporary Admission of Goods (Brussels, 1961).

(v) a host country local bank providing a bank guarantee (at the request of the home country transport operators organization); and
(vi) a host country local insurance company providing a guarantee insurance cover to the customs administration.

Differential or Harmonized Type/Format of Guarantee: Since the guarantee is a matter between the host country customs administration and the home country transport operators organization, the type/format of guarantee must not necessarily be harmonized and be the same for all six GMS Countries. Every GMS Country's customs administration tentatively will need a guarantee from the other five GMS countries' transport operators' organizations. The option chosen may differ according to country pairs. However, differential systems may increase the burden.

Amount of the Guarantee: In principle the guarantee can be limited in two respects: (i) per transit operation; and (ii) overall. Since in case of an irregularity, the transport operator infringing the customs laws of the host country is the first debtor of the customs duties, the guarantee is a collateral security for the customs administration. A limited guarantee per transport operation seems conceivable for Customs Administration (as per the example of TIR). In a collective guarantee system, the probability that all operators involved commit an infringement simultaneously is highly unlikely and improbable. Consequently, the collective guarantee can be a fraction of the sum of the individual amounts of customs duties at risk per transport operation. Thus, the overall guarantee to be provided could also be limited.

Based on these clarifications, the Fourth Negotiation Meeting of the Stage 3 Annexes and Protocols agreed on the following three articles of Annex 6 (subject to final editing by the ADB Team/Secretariat)), which were replicated in Annexes 8 and 14:

"Article 9: Issuing and Guaranteeing Organizations

(a) Each Contracting Party shall authorize a national organization/institution on the to issue the Transit and Inland Customs Clearance Document and to guarantee vis-à-vis the Customs Authority of the Host Country the payment of export and import duties and taxes (including interest) in case the document was not duly or timely discharged or in case of other irregularity

(b) The Contracting Parties shall mutually recognize the authorized issuing/guaranteeing organizations/institutions.
(c) For the purpose of payment of sums claimed by its Customs Authority, the Host Country shall provide the authorized issuing/guaranteeing organization/ institution with facilities for the transfer of currency.

Article 10: Liability of the Issuing/Guaranteeing Organization/Institution

(a) The authorized issuing/guaranteeing organization/institution shall be jointly and severally liable with the transport operator, from whom the sums are directly due, to pay the import and export duties, taxes, and interest, under the customs laws and regulations in the Host Country in respect of the irregularity (e.g., breach of customs laws and regulations, lack of response, lack of timely discharge of the Transit and Inland Customs Clearance Document) in connection with a cross-border transport operation under the regime of this Annex.

(b) The liability of the authorized issuing/guaranteeing organization shall cover not only the goods that are listed in the Transit and Inland Customs Clearance Document, but also any goods that, although not listed therein, may be contained in the sealed section of the road vehicle cargo compartment or be found on the load platform or among the enumerated goods in case of non-sealed heavy or bulky cargoes.

(c) At their discretion, the Host Country Customs Authority may also claim the duties, taxes, fines, and interest from the transport operator who is directly liable for them.

(d) After the Customs Authority of the Host Country establishes an irregularity, the authorized Home Country issuing/guaranteeing organization/institution is to deposit with or pay the duties, taxes, and interest due to the Customs Authority of the Host Country not later than 30 calendar days commencing from notification.

(e) The Host Country Customs Authority shall refund to the authorized issuing/guaranteeing organization/institution the amount paid upon the verification of the absence of any irregularity, without delay, provided that the authorized issuing/guaranteeing organization/institution shall claim such refund within the period of time specified by national laws/regulations.

(f) The authorized Home Country issuing/guaranteeing organization/institution is entitled to take recourse and claim reimbursement of the customs duties, taxes, and interest that were paid as a guarantor to the Host Country Customs Authority, from the transport operator from whom the sums are due.

(g) The liability of the authorized issuing/guaranteeing organization/institution shall be limited to SDR[1] 35,000[2] per Transit and Inland Customs Clearance Document issued.

Article 11: Guarantor Security to the Customs Authority

(a) General

In order to meet its guarantee obligation vis-à-vis the Host Country Customs Authority, the authorized issuing/guaranteeing organization/institution shall provide the Host Country Customs Authority with the security of the modality and monetary amount indicated in the following paragraphs (b) and (c).

(b) Modality

Among other things, the authorized issuing/guaranteeing organization/institution shall:

(i) maintain assets in the Host Country;
(ii) make a cash deposit;

[1] SDR refers to Special Drawing Rights of the International Monetary Fund. On 1 November 2005, US$1 = SDR 0.692962 and SDR1 = US$ 1.44308.
[2] This amount was set to be equivalent to US$50,000, the liability limit per customs transit document set by the TIR Convention. On 1 November 2005, US$50,000 = SDR 34,648.1.

(iii) deposit a collective and continuous bond with the Host Country Customs Authority:

- by arranging for a bank guarantee issued by a bank or financial institution established in the Host Country, or
- by contracting a guarantee insurance with an insurance company established in the Host Country, or
- be represented by its counterpart organization in the Host Country; or

(iv) provide combinations of two or more of the above.

subject to approval by the Host Country Customs Authority.

(c) Monetary Amount

The amount of security to be provided according to this Article shall be a maximum of SDR 70,000[1]. If the amount of security provided is partly or wholly consumed by an outstanding liability, it must be replenished up to the amount of SDR70,000.€ 35

The corresponding liability per document is SDR 20,000[2] for vehicles and SDR 3,000[3] per containers, respectively; the corresponding amount of security to be provided is SDR 40,000[4] for vehicles and SDR 600[5] for containers, respectively.

7. Objective(s):

The goal of the TAP would be to (i) assist in the establishment of the guaranteeing organizations envisaged in Annexes 6, 8, and 14 of the CBTA, and (ii) elaborate their contractual relationships with the transport operators association, customs administrations, and direct guarantors/providers of collateral (e.g., banks, insurance companies), in order to facilitate the cross-border movement of goods (Annex 6), vehicles (Annex 8), and containers (Annex 14) through the operation of customs transit regimes.

8. Scope:

The TAP will result in establishment of issuing and guaranteeing organizations for the implementation of Annexes 6, 8, and 14. Pursuant to the national workshops held under RETA 6098 from December 2004 to March 2005, issues that will need to be addressed include:

(i) terms and conditions of bank guarantee/guarantee insurance and insurance of defaulting on reimbursement;
(ii) the required collateral for such guarantee; and
(iii) the bank fee/insurance premium for these products.

[1] This amount was set to be equivalent to US$50,000 (the liability limit per customs transit document set by the TIR Convention and adopted in this Annex) multiplied by two. On 1 November 2005, US$100,000 = SDR 69,296.2.
[2] On 1 November 2005, SDR 20,000 = US$28,861.6.
[3] On 1 November 2005, SDR 300 = US$432.9.
[4] This amount was set to be equivalent to SDR 20,000 multiplied by two. On 1 November 2005, SDR 40,000 = US$57,723.2
[5] This amount was set to be equivalent to SDR 300 multiplied by two. On 1 November 2005, SDR 600 = US$865.6.

	In addition, the TAP will draft transport operator membership terms and conditions, agreement/approval conditions of customs authorities, and articles of incorporation/bylaws of transport operator organizations. The TAP will also assess the possible role of risk guarantees that ADB might be able to provide to facilitate the process. One possibility would be a partial credit risk guarantee[1] for claims by the customs administration against a transport operation in the host country. Another possibility would be a sovereign risk guarantee if the customs administration of the host country wrongfully claims against the transport operators association. For reference, a flow chart showing the GMS CBTA Customs Transit Guarantee System (Annexes 6, 8, and 14) Liability Scheme for Customs Duties, Interest, and Fines appears as an Attachment to this Project Profile.
9.	**Estimated Cost:** US$300,000
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public (from ADB TA funds)
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2006-2008; an additional phase may be required after 2008
13.	**Executing/Implementation Agency and Contact Persons:** Executing Agencies: National Transport Facilitation Committees (NTFCs) of the six GMS countries and the Joint Committee comprised of representatives of the respective NTFCs. **ADB Contact Division/Person:** Mekong Department, Operations Coordination (GMS) Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** The Project will result in an increase in transit transport and trade.
15.	**Social and Environmental Issues:** The project is not expected to have significant environmental impacts. Nevertheless, appropriate mitigation measures (e.g., noise reduction) should be implemented. The project will help alleviate poverty indirectly to the extent that employment is created in the road transport industry.

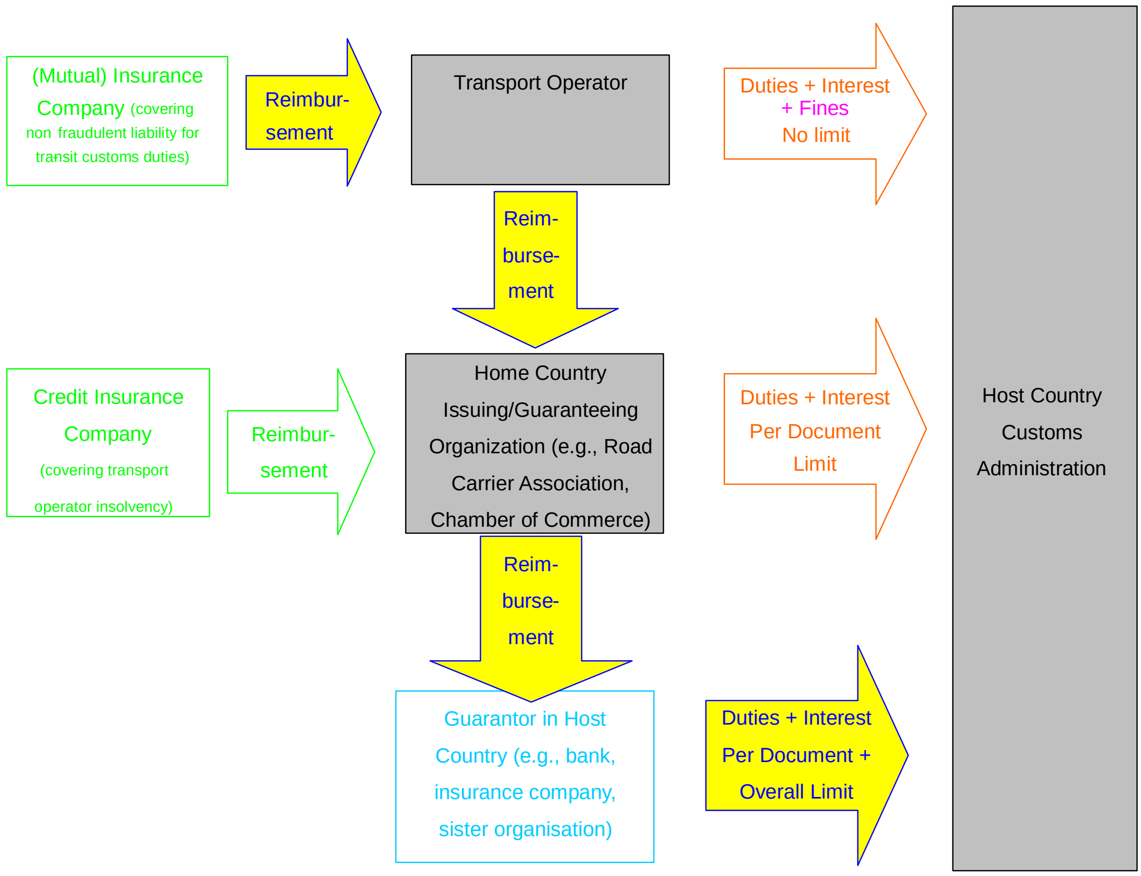
[1] A partial risk guarantee covers part (or all) of a lender's outstanding debt service against specific risks.

16.	**Priority of Project/TA:** **** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** This TA builds upon the national workshops and negotiations undertaken in 2004-05 under TA ADB RETA 6098: Implementing the Agreement for Facilitation of the Cross-Border Transport of Goods and People in the Greater Mekong Subregion – Phase 1.
19.	**Pre-feasibility Study (Completed/Required):** Not applicable
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.
21.	**Issues/Constraints:** For the expected outputs and deliverables to be achieved, it is assumed that the GMS customs administrations will establish conditions that the banking and insurance sectors in the GMS can reasonably meet. As noted, there may be scope for ADB to facilitate the process through the provision of partial credit risk and sovereign risk guarantees.

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*Road Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

Attachment to Project Profile:
GMS CBTA Customs Transit Guarantee System (Annexes 6, 8, and 14):
Liability Scheme for Customs Duties, Interest, and Fines



Normal flow of liabilities

Direct joint and several liability
for the type of debt and up to the limit indicated

Parties necessarily involved in the system

Parties possibly involved in the system

Parties usually involved in the system

Liability incurred by the transport operator only

Source: PADECO

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** Inclusion of a Substantive Health and Sanitary/Phytosanitary (SPS) Regime in the Cross-Border Transport Agreement[1] (TAP 7)
2.	**Loan or TA:** Regional TA (RETA)
3.	**Project Location:** GMS-wide
4.	**Countries Involved:** All GMS countries
5.	**Sector/Subsector:** Transportation/Road Transport (as well as Public Health and Agriculture)
6.	**Background and Rationale:** Article 9 of the GMS Cross-Border Transport Agreement (CBTA) states as follows: "Article 9: Phytosanitary and Veterinary Inspection The Contracting Parties shall comply with international agreements related to the regulations of the World Health Organization, Food and Agriculture Organization, and Office International des Epizooties [World Organization for Animal Health] in applying inspection of goods crossing the border.€ 35 Article 3 of Annex 5 to the CBTA on the Cross-Border Movement of People is as follows: "Article 3: Health Inspection of People (a) General: The Host Country shall apply its national laws and regulations in compliance with the International Health Regulations of the World Health Organization (WHO). (b) Principle: no examination As a rule, people who: (i) carry the prescribed WHO health documents;

[1] Alternatively, this TA could be a component of the TA for Implementing the GMS Agreement for Facilitation of the Cross-Border Movement of Goods and People in the Greater Mekong Subregion – Phase II, the TA for "Fine Tuning" of the GMS Cross-Border Transport Agreement, or both.

(ii) do not come from and have not passed through a known infected or risk area; and
(iii) do not show any external symptoms of a contagious disease endangering public health

will not be subjected to routine medical checks, inspection, or examination.

(c) Exception: examination is permissible in particular cases

People who may be subjected to medical examination are those who

(i) do not carry the prescribed WHO health documents;
(ii) come from or have transited through a known infected or risk area; or
(iii) show external symptoms of a contagious disease endangering public health.

(d) Reaction to Spotting Infected Individuals

Whenever people are, upon medical examination, found to be infected with a contagious disease endangering public health, the relevant competent authority**:**

(i) may deny access to the territory or repel foreign individuals if their health conditions enables them to travel and advise them to return to their Home Country;
(ii) if their health condition does not enable them to travel, shall offer appropriate medical care and treatment in isolation/quarantine to the individuals; and
(iii) shall notify promptly the WHO via the appropriate channels in accordance with the applicable rules.

(e) Health Documents: People may be required to carry personal health documents prescribed by the WHO (e.g., yellow fever vaccination certificate).€ 35

However, considering recent development in transboundary movements of human and animal health diseases in the GMS, it may be appropriate to revise the CBTA to include a more substantive health and SPS regime, particularly

[1] The consultants' original draft of Article 8 on Phytosanitary and Veterinary Inspection did in fact include provision for a substantive regime ("The Contracting Parties will apply the regulations set out in Annex….€ 35 See PADECO Co., Ltd., *T.A. No. 5749-REG: Cross-Border Movement of Goods and People in the Greater Mekong Subregion, Main Volume*, prepared for the Asian Development Bank, September 1998, p. 19.

[2] See, e.g., Asian Development Bank, *Technical Assistance to the Kingdom of Cambodia, Lao People's Democratic Republic, and Socialist Republic of Viet Nam for Preparing the Greater Mekong Subregion Regional Communicable Diseases Control Project*, TAR: OTH 37621, October 2004; Asian Development Bank, "ADB Support for the Fight Against Emerging Infectious Diseases Including Avian Flu", 5 February 2004; Asian Development Bank, *Action Plan to Address Outbreak of Severe Acute Respiratory Syndrome (SARS) in Asia and the Pacific*, May 2003; Asian Development Bank, *Proposed Technical Assistance to the People's Republic of China for Combating Severe Acute Respiratory Syndrome in the Western Region*, May 2003.

	the later. Bear in mind that the CBTA and CBTA Annex provisions were drafted in the late 1990s and may not adequately reflect[1] recent developments in the GMS and elsewhere, e.g., severe acute respiratory syndrome, avian influenza (bird flu; H5N1).[2]
7.	**Objective(s):** The objective of the TAP would be to protect human, animal, and plant health against the cross-border movement of diseases, while at the same time not adversely affecting the aim of cross-border transport facilitation.
8.	**Scope:** The TAP would draft and support negotiation of a (more) substantive health and SPS regime to be included in the CBTA and CBTA annexes. For the human health aspects, “inspiration” would be drawn from the latest version of the International Health Regulations [1] of the World Health Organization, which are designed to ensure maximum security against the international spread of disease with a minimum interference with cross-border transport. For animal and plant health aspects, “inspiration” would be drawn from the following legal texts, among others: (i) the WTO [World Trade Organization] Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), which recognizes the right of each WTO member to adopt an “appropriate level of protection” (ALOP) of trade-restricting measures to protect human, animal, and plant health, but mandates that such measures be based on a scientific assessment of the risks, be applied only to the extent necessary to achieve public health or environmental goals, and not discriminate between domestic and foreign products or threats; (ii) the Codex Alimentarius, of he Food and Agriculture Organization and the World Health Organization; (iii) the International Plant Protection Convention of the International; and (iv) the Terrestrial Animal Health Code, the Aquatic Animal Health Code, and the Manual of Diagnostic Tests for Aquatic Animals, of the Office International des Epizooties (World Organization for Animal Health).
9.	**Estimated Cost:** US$200,000
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public (from ADB TA funds)
11.	**Financing Status:** Proposed for financing

[1] Comprising the International Health Regulations of 1969 and the revised International health Regulations of 2005; the International Health Regulations of 1969 will be replaced by the 2005 regulations when they come into effect in June 2007.

12.	**Proposed Implementation Period/Schedule:** 2006-2008
13.	**Executing/Implementation Agency and Contact Persons:** Executing Agencies: National Transport Facilitation Committees (NTFCs) of the six GMS countries and the Joint Committee comprised of representatives of the respective NTFCs; and the Public Health and Agricultural Ministries of the six GMS Countries **ADB Contact Division/Person:** Mekong Department, Operations Coordination (GMS) Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** The TAP will benefit health, animal, and plant health, with associated economic benefits, while minimizing adverse transport facilitation effects, i.e., without unduly increasing border crossing times. The benefits of a properly crafted regime can be enormous. Consider, for example, that ADB research found that a SARS outbreak for one quarter would reduce GDP growth in East and Southeast Asian economies by 0.2-1.8%, while a SARS outbreak for two quarters would reduce GDP growth by 0.5-4.0%.[1] Or with respect to avian influenza, consider that chicken is a major export product, with the annual value of Thailand's chicken exports alone about US$1 billion.[2] The benefits may indeed be global and go beyond the GMS. Recall that the 1918-1919 "Spanish flu" infected 600 million people and killed between 20 and 50 million, while the 1967-1968 "Hong Kong (China) flu" killed about 700,000.[3]
15.	**Social and Environmental Issues:** The TAP will have positive public health impacts by controlling the spread of human, animal, and plant diseases. It may also alleviate poverty, as the poor are disproportionately affected by such diseases. Consider, for example, that a major avian influenza crisis would reduce the supply of chicken within the GMS, leading to increased prices, with disproportionate impacts on the poor, since chicken is a food staple.[4]
16.	**Priority of Project/TA:** *** (see Chapter IX)

[1] See Emma Xiaoqin Fan, *SARS: Economic Impacts and Implications*, ERD Policy Brief, Economics and Research Department, Series No. 15, published by the Asian Development Bank, May 2003, p. 3.
[2] Asian Development Bank, "ADB Support for the Fight Against Emerging Infectious Diseases Including Avian Flu", 5 February 2004, p. 2.
[3] See previous footnote.
[4] See previous footnote.

17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** The TA builds upon previous ADB TAs, e.g., T.A. No. 5749-REG: Cross-Border Movement of Goods and People in the Greater Mekong Subregion; Technical Assistance to the Kingdom of Cambodia, Lao People's Democratic Republic, and Socialist Republic of Viet Nam for the Greater Mekong Subregion Regional Communicable Diseases Control Project, TAR: OTH 37621; Action Plan to Address Outbreak of Severe Acute Respiratory Syndrome (SARS) in Asia and the Pacific; Proposed Technical Assistance to the People's Republic of China for Combating Severe Acute Respiratory Syndrome in the Western Region.
19.	**Pre-feasibility Study (Completed/Required):** Not applicable
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.
21.	**Issues/Constraints:** While the TAP has the potential of saving enormous potential losses caused by the spread of human, animal, and plant diseases, it will be important to devise a control regime that does not unduly affect achievement of the transport facilitation objective, i.e., the free flow goods and people across national borders, and its associated benefits, which are also of a great magnitude.

FOR ADB USE ONLY

Sector	*Transportation and Communication (as well as Public Health and Agriculture)*
Subsector	*Road Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Community*

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** Phased Liberalization of Visa Regimes for Travelers[1] (TAP 8) [2]
2.	**Loan or TA:** Regional TA (RETA)
3.	**Project Location:** GMS-wide
4.	**Countries Involved:** All GMS countries
5.	**Sector/Subsector:** Transportation/Road Transport
6.	**Background and Rationale:** Two different issues must be distinguished: (i) the intra-GMS movement of GMS nationals, for which a visa exemption or perhaps even a passport union may be envisaged; and (ii) the entry and movement in the GMS of outsiders (third-country aliens), for which a single (i.e., multi-country) visa may be envisaged. There have been a number of relevant initiatives to address these issues: (i) an ASEAN (Association of Southeast Asian Nations, which includes all GMS countries except the PRC) visa exemption arrangement for ASEAN nationals traveling within the ASEAN region, to be implemented by the end of 2005;[3] (ii) the GMS Visa, which would entail visa-free movement and a single visa for third country nationals (only tourists), beginning on an experimental basis, in 2009;

[1] Alternatively, this project could be a component of the TA for Implementing the GMS Agreement for Facilitation of the Cross-Border Movement of Goods and People in the Greater Mekong Subregion – Phase II, the TA for "Fine Tuning" of the GMS Cross-Border Transport Agreement, or both.

[2] Liberalization of visa regimes for crew/drivers of is provided for by Article 5(a) of the GMS Cross-Border Transport Agreement (CBTA), which provides that: "[t]he Contracting Parties undertake to grant to nationals of the other Contracting Parties engaged in transport operations and who are subject to visa requirements, multiple entry, transit, and exit visas for prolonged periods". In addition, Article 2(b)(c) of Annex 5 to the CBTA on the Cross-Border Movement of People sets out specific visa conditions for the driver/crew of commercially operated road vehicles.

[3] It is understood that only Indonesia has not ratified the relevant ASEAN agreement. United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), Asian Development Bank (ADB), and Agency for Coordinating Mekong Tourism Activities (AMTA), 16th Meeting of the Working Group on the Greater Mekong Subregion Tourism Sector, Report, 25-27 Siem Reap, March 2005, paragraph 62.

	(iii) an ACMECS (Ayerawady-Chao Phraya-Mekong Economic Cooperation Strategy) "one-visa, five-countries" initiative, involving Cambodia, Myanmar, Lao PDR, Thailand, and Viet Nam, and which as of August 2005 envisaged a gradual approach, which could be started between two countries and then expanded to other countries when ready; and (iv) an APEC (Asia Pacific Economic Cooperation) business travel card, which replaces visas for entries up to two months at a time, over a three-year period (a kind of single visa replacing the system for a particular category of people in APEC member countries, which include the PRC, Thailand, and Viet Nam in the GMS).
7.	**Objective(s):** The goal of the series of TAs is to liberalize visa regimes for travelers, leading eventually to a visa-free regime. Objectives include: (i) the facilitation of the movement of travelers to and within the GMS, (ii) increasing revenues from tourism, leading to poverty reduction, and (iii) facilitating business travel within and to the GMS.
8.	**Scope:** The TAs will propose and assist with the implementation of a phased approach to visa liberalization, acceptable to the GMS countries, but leading to a visa-free regime in the ultimate stage. Visa constraints for intra-GMS travel will need only to be addressed between the PRC and the other five GMS countries that are members of ASEAN, since ASEAN is to have implemented a visa-free regime by the end of 2005.[1] A GMS visa, which would entail visa-free movement and a single visa for third country nationals, would be promoted on a pilot basis, as per Strategic Project 7.1 (Single GMS Visa Pilot Project) of the GMS Tourism Sector Strategy, and the ACMECS "one-visa, five-countries" initiative (but would not be limited to tourists, i.e., it would also to include business travel), as a bridge toward eventual implementation of a visa-free regime.[2] Drawing upon Strategic Project 7.1 cited above, elements of the TA are likely to include: (i) inception and preparatory phase, involving TA design, surveys, preparatory studies, planning, and coordination;

[1] It has been stated that the GMS should first address the issue of making visits by GMS nationals visa-free before discussing a single visa for third country nationals, but the two are not mutually exclusive and indeed the latter action is likely to lead to greater economic benefits, particularly the former has already or is soon to be implemented among the GMS countries that are ASEAN members. See United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), Asian Development Bank (ADB), and Agency for Coordinating Mekong Tourism Activities (AMTA), 16th Meeting of the Working Group on the Greater Mekong Subregion Tourism Sector, Report, 25-27 Siem Reap, March 2005, paragraph 61.

[2] At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City, Viet Nam on 8-9 December 2005, Thailand noted that it and Cambodia had agreed on a single visa for travelers from non-ACMECS countries, at the ACMECS Summit in November 2005. They suggested that ACMECS could share its experience as "lessons learned". Summary of Proceedings, paragraph 27.

	(ii) assessment of the enabling requirements for the recommended visa framework, including the design of a regional cross-border visa and information management capacity support project; and (iii) development of a detailed regional and country-by-country road map for the adoption of the recommended visa framework. Outputs of the TA will include: (i) information on the benefits and costs of a liberalized visa regime, and (ii) a framework for introduction of the liberalized visa regime leading ultimately to a visa-free regime.
9.	**Estimated Cost:** US$5 million (based on the estimated cost of Strategic Project 7.1 in the GMS Tourism Sector Strategy)
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public (from ADB TA funds)
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2006-2015 (series of TAs; that proposed by the GMS Tourism Sector Strategy TA was 2006-2010, but was limited to implementation of a single GMS visa pilot project)
13.	**Executing/Implementation Agency and Contact Persons:** Executing Agencies: National Transport Facilitation Committees (NTFCs) of the six GMS countries and the Joint Committee comprised of representatives of the respective NTFCs; the Immigration Departments of the six GMS countries; and the Tourism Authorities of the Six GMS Countries **ADB Contact Division/Person:** Mekong Department, Operations Coordination (GMS) Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** The TA will lead to benefits to the travel industry through simplified entry requirements for persons, leading to increased tourism product range and development and sales opportunities, as well as increased business-related exchanges. The poor and disadvantaged will benefit from increased employment and livelihood opportunities.
15.	**Social and Environmental Issues:** The TAP will help alleviate poverty by facilitating the movement of tourists interested in experiencing tourism resources in areas where rates of poverty incidence are high.

	The TAP may also have an indirect impact on the natural, cultural, and social environment through increased tourism volumes and connectivity. Site mitigation measures should be implemented, and information material on responsible behavior should be disseminated to travelers.
16.	**Priority of Project/TA:** **** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** The TA builds upon per Strategic Project 7.1 (Single GMS Visa Pilot Project) of the GMS Tourism Sector Strategy, but would also address visa constraints for intra-GMS travel by GMS nationals as between the PRC and the other five GMS countries, as well as addressing business travel (i.e., not only travel by tourists). Also, the project seeks an ultimate stage in which a visa-free regime would be in place.
19.	**Pre-feasibility Study (Completed/Required):** Not applicable
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.
21.	**Issues/Constraints:** The Report of the 16th Meeting of the Working Group on the Greater Mekong Subregion Tourism Sector indicated that Thailand is keen to implement a single GMS visa, while Cambodia and Myanmar[1] are "very interested", and Lao PDR[2] undecided because visa fees are an important source of its government revenue.[3] At the meeting, a representative of SNV, Lao PDR (a

[1] However, the "Myanmar Response to Pro-Poor Tourism Findings" indicated that a view that a GMS visa is difficult to implement, and it will take a long time to realize; they would prefer to see a strategy/action plan/activity that would explore other entry options, e.g., on a bilateral basis or on the basis of the ASEAN subregional model. Asia Pacific Projects, *Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Draft Report, Annex Volume*, 7 March 2005, p. 219.

[2] During the Lao PDR Country Workshop for the GMS Tourism Sector Strategy TA in February 2005, Lao PDR expressed general support for the concept of a GMS visa but was concerned about how to best divide the GMS visa revenue so that Lao PDR would not be disadvantaged. Asia Pacific Projects, *Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Draft Report, Annex Volume*, 7 March 2005, p. 206.

[3] United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), Asian Development Bank (ADB), and Agency for Coordinating Mekong Tourism Activities (AMTA), 16th Meeting of the Working Group on the Greater Mekong Subregion Tourism Sector, Report,

non-governmental organization) stated that if visas on arrival can be given quickly, a GMS visa is not required; however, as an ADB representative at the Meeting noted a single GMS visa would be a powerful marketing tool.[1]

Finally, it should be stated that since visa liberalization to date has been promoted mainly by the GMS Tourism Sector Working Group, it has not addressed business-related exchanges, as would the proposed project.

FOR ADB USE ONLY

Sector	*Transportation and Communication (as well as Tourism)*
Subsector	*All Modes of Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity, Competitiveness, and Community*

25-27 Siem Reap, March 2005, paragraphs 56-61. Viet Nam's position was not mentioned in the Report of the Siem Reap Meeting, but during the Viet Nam National Workshop for the GMS Tourism Sector Strategy TA in February 2005, it was noted that the Government of Viet Nam had not yet formed a positive opinion in favor of a multilateral approach other than that of ASEAN; it was stated that Viet Nam was pursuing a unilateral approach by which it is progressively implementing the ASEAN visa exemption approach. It was further stated that Thailand would benefit the most from the introduction of a GMS visa. Asia Pacific Projects, *Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Draft Report, Annex Volume*, 7 March 2005, p. 240. The PRC's position was not mentioned in the Report of the Siem Reap Meeting, but during the PRC National Workshop for the GMS Tourism Sector Strategy TA in February 2005, the Yunnan Provincial Tourism Administration (YPTA) strongly supported the concept of a single GMS visa although it understood that some countries were reluctant (e.g., for reasons of sovereignty); however, it must be cautioned that this is not necessarily the view of the PRC central government – indeed, YPTA urged ADB to influence the PRC central government on this issue. Asia Pacific Projects, *Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Draft Report, Annex Volume*, 7 March 2005, p. 247.

[1] United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), Asian Development Bank (ADB), and Agency for Coordinating Mekong Tourism Activities (AMTA), 16th Meeting of the Working Group on the Greater Mekong Subregion Tourism Sector, Report, 25-27 Siem Reap, March 2005, paragraph 56.

PROJECT/TA CONCEPT PROFILE[1]

1.	**Project Name (Number):** Specification of Transit Charges To Be Implemented Under Protocol 2 of the Cross-Border Transport Agreement[2] (TAP 9)
2.	**Loan or TA:** Regional TA (RETA)
3.	**Project Location:** GMS-wide
4.	**Countries Involved:** All GMS countries
5.	**Sector/Subsector:** Transportation/Road Transport
6.	**Background and Rationale:** Article 8 of the GMS Cross-Border Transport Agreement (CBTA) covers Transit Traffic: **"Article 8: Transit Traffic** (a) The Contracting Parties grant freedom of transit through their territory for Transit Traffic to or from the territory of the other Contracting Parties. (b) Transit Traffic shall be exempt fro any customs duties and taxes. (c) Charges related to Transit Traffic other than customs duties shall be gradually levied in two steps:

[1] Particularly useful sources for this Project Profile, especially regarding the downstream components (this project covers both upper and lower segments of the river), included: (i) Mekong River Commission, MRC Navigation Programme, December 2003; (ii) Mekong River Commission, MRC Navigation Strategy, August 2003; (iii) [Captain] Lieven Geerinck [Navigation Programme Manager, Mekong River Commission], Incorporation of Navigation into the Integrated Water Resources Development and Management Strategy, January 2005; (iv) Professor Dr. Eric Van Hooydonk, Formulation of the MRC Navigation Programme, Presentation Component 2: Legal Framework for Cross-Border Navigation, 3-4 September 2003; and (v) Consultancy Services for the Design of the Master Plan for Waterborne Transportation on the Mekong River System in Cambodia – Invitation to Submit Technical/Financial Offers, financing by Belgian Technical Cooperation, for the Ministry of Public Works and Transport, Kingdom of Cambodia, 8 June 2005. The MRC is the leading repository of data and expertise relating to the Mekong River, and as such, through its Navigation Programme, is uniquely positioned to lead implementation of projects relating to the inland waterway transport along the River.

[2] The need for further study of transit charges was noted at the Thailand Country Workshop held on 17 August 2005 in Bangkok.

- Step 1: Charges concerning Transit Traffic other than customs duties and taxes shall be levied as determined in Protocol 2.
- Step 2: Charges levied on Transit Traffic shall only be cost related.€[1]35

Protocol 2 of the CBTA covers Charges Concerning Transit Traffic and was signed at Kunming on 5 July 2005. Relevant provisions of Protocol 2 are as follows:

"**Article 2: Nondiscrimination**[2]

(a) Without prejudice to existing bilateral agreements governing special border zones, which provide preferential treatment, the Host Country shall, with regard to the levying of charges, not discriminate:

(i) among other grounds, on the basis of nationality of the transport operator, the place of registration of the vehicle, or the origin or destination of the transport operation; and

(ii) in particular, between cross-border and domestic traffic.

(b) However, the least developed Contracting Parties (determined on the basis of the United Nations' designation of least developed countries) [in the GMS: Cambodia, Lao PDR, and Myanmar] may apply preferential toll rates and other charges to the vehicles registered within their territories, when undertaking domestic transport.

…

Article 6: Permissible Charges

(a) The Contracting Parties may levy the following charges on cross-border traffic, subject to the conditions set out in this Protocol:

(i) Tolls: direct charges for the use of road sections, bridges, tunnels, and ferries;

(ii) Charges for excess weight, where permissible under the national law and/or regulations of the Host Country;

(iii) Charges for administrative expenses;

(iv) Charges for the use of other facilities or services;

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[1] This two-step process was inserted at the request of one original three signatory countries during negotiations of the original trilateral agreement (later acceded to by the GMS countries) in Bangkok in December 1998. The original draft provided by the consultants simply stated that "[c]harges levied on transit traffic may only be cost related". See PADECO Co., Ltd., *T.A. No. 5749-REG, Cross-Border Movement of Goods and People in the Greater Mekong Subregion, Main Volume*, prepared for the Asian Development Bank, September 1998, p. 19.

[2] As all GMS countries are either already members of the World Trade Organization or aspire to such membership, the nondiscrimination principle is mandatory.

(v) Taxes on fuel purchased in the Host Country; and
(vi) Road maintenance charges (to the extent not included in the charges mentioned above).

Article 7: Fuel Taxes

(a) The Host Country may collect its fuel tax from vehicles engaged in cross-border traffic refueling within its territory.

(b) The Host Country shall exempt in its territory, from its fuel tax, the fuel contained in the ordinary/original supply tanks of vehicles engaged in cross-border traffic in its territory.

(c) The Contracting Parties shall however ensure that no vehicles engaged in cross-border traffic (both transit and interstate) be compelled to refuel before leaving their territories.

Article 8: Road Maintenance Fees

The road maintenance fees levied by the Host Country on vehicles engaged in cross-border traffic (both transit and interstate) shall be commensurate to the road maintenance fees levied by the Host Country on its domestic vehicles. The road maintenance fee charged by the Host Country on vehicles engaged in cross-border traffic (both transit and intestate) may be based on the ratio of the length of their scheduled stay in its territory to the period covered by the road maintenance fee charged on its domestic vehicles.€ 35

However, it remains to specify the permissible transit charges to be assessed by each country, under the terms of Protocol 2. Some outstanding questions follow:

(i) Assuming that transit goods and people (both in through vehicles and in local vehicles after transshipment at the border) will pay all domestic and cross-border bridge tolls at the same rates as other vehicles, do Protocol 2 transit tolls cover just use of non-tolled sections of the transit routes?

(ii) Is the toll to be related only to the direct costs occasioned by the vehicles (e.g., road wear, accidents, increase in congestion, environmental impact) or should it also cover a share of sunk capital costs (and how are these to be calculated)?

(iii) Is a premium toll permitted where a less-developed country is providing exceptional transport cost savings to transit traffic by opening a route?

7. Objective(s):

The goal of the TA would be to establish a transit charges regime fully compatible with the principles of Protocol 2, including nondiscrimination and transparency, but allowing the GMS countries to recover fully all costs occasioned by transit traffic.

8. Scope:

The TA will define the actual transit charges to be assessed in Step 1. Specific tasks will include:

(i) evaluating the economic and financial benefits and costs occasioned for each of the GMS countries by the opening of the transit routes identified in Protocol 1 of the CBTA;

(ii) developing initial transit fee structure by route and vehicle category for Step 1 in accordance with the charging principles in Protocol 2 and propose an adjustment mechanism for inflation – to the extent possible, the transit fee structure should take into account factors such as willingness to pay and affordability, operations and maintenance cost, cost recovery, and an equitable distribution of transport cost savings; and

(iii) recommending a charging system and transit fee structure for each route in Protocol 2.

For example, the toll rates by vehicle type could be given as factors, based on international experience (e.g., truck-trailer x times light truck) and perhaps indicative transit toll rates per km for each country be given by road standard. Possibly there could then be derogation until Step 2 for a variation from the indicative rates within say +/- 40%, to allow for uncertainties in the cost estimates. The output would include a table of toll rates by vehicle class by transit route, both gross and net.[1]

In view of the concern expressed regarding axle loads at the Final Meeting on the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006, it may be useful for the recommended charging system to be based, at least in part, on axle loads.[2]

9. Estimated Cost:

US$150,000

10. Financing Plan and Financing Arrangement (Public/Private):

Public (from ADB TA funds)

11. Financing Status:

Proposed for financing

12. Proposed Implementation Period/Schedule: 2006-2007

13. Executing/Implementation Agency and Contact Persons:

Executing Agencies: National Transport Facilitation Committees (NTFCs) of the six GMS countries and the Joint Committee comprised of representatives of the respective NTFCs.

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[1] Gross, the total tolls payable for use of the route, and net the toll payable at customs (the balance to be paid at the toll plazas/bridges on route).

[2] Article 13 of the GMS Cross-Border Transport Agreement states that “[w]ith respect to weights axle loads and dimensions, Vehicles traveling to the territory of other Contracting Parties must comply with the technical standards of the Host Country” .

	ADB Contact Division/Person: Mekong Department, Operations Coordination (GMS) Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** Transport system users will benefit from provision of a system that allows for transit across GMS countries with payment of transit fees according to agreed principles. Governments of transiting countries will benefit from the collection.
15.	**Social and Environmental Issues:** The project is not expected have significant environmental impacts. Nevertheless, appropriate mitigation measures (e.g., noise reduction) should be implemented. The project will help alleviate poverty indirectly to the extent that employment is created in the road transport industry.
16.	**Priority of Project/TA:** **** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** The TA builds upon earlier work under the TA for Implementing the GMS Agreement for Facilitation of the Cross-Border Movement of Goods and People in the Greater Mekong Subregion – Phase II, including the joint ADB-ESCAP Study of Transit Charges To Be Assessed Under Protocol 2 of the Agreement for the Facilitation of the Cross-Border Transport of Goods and People in the Greater Mekong Subregion.
19.	**Pre-feasibility Study (Completed/Required):** Not applicable
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.
21.	**Issues/Constraints:** Protocol 2 will apply to transit routes that range from existing roads with a negligible share of transit traffic to newly rehabilitated/constructed links largely for use by transit traffic. Financing of the routes ranges from wholly domestic out of general taxation, to largely via multinational soft loans and bilateral grants. While these variations do not need to be fully addressed until cost-based charges are introduced in Step 2, the TA should address them.

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*Road Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Competitiveness*

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** Establishment of a Third-Party Motor Liability Insurance Regime[1] (TAP 10)
2.	**Loan or TA:** Regional TA (RETA)
3.	**Project Location:** GMS-wide
4.	**Countries Involved:** All GMS countries
5.	**Sector/Subsector:** Transportation/Road Transport
6.	**Background and Rationale:** As compulsory third-party liability insurance has as its primary goal assuring compensation for victims of road traffic accidents, the concern is to: (i) guarantee a minimum compensation threshold, (ii) guarantee the solvency of the debtor, and (iii) facilitate the victim's access to compensation. When vehicles enter a nation's territory, the first objective can be achieved through harmonization of liability regimes and/or insurance schemes, the second by harmonization of the insurance supervision legislation and regulation, and the third by requiring a representative of the vehicle's insurer in the host country. From a transport facilitation perspective, the ideal solution is to extend the home insurance cover to the foreign territory. Against this background, ADB TA 5749-REG: Cross-Border Movement of Goods and People in the Greater Mekong Subregion proposed different options for the article of the GMS Cross-Border Transport Agreement (CBTA)(now Article 16) addressing Compulsory Third-Party Motor Vehicle Liability Insurance that reconcile these requirements, to a lesser or greater extent. Unfortunately, negotiation of the CBTA by the original three parties in Bangkok in December 1998 resulted in another option with no transport facilitation effect ("Motor Vehicles traveling to the territory of other Contracting Parties shall comply with the compulsory third-party motor vehicle liability insurance required in the Host Country." [2]) However, at the First Negotiation Meeting on the Stage Annexes and Protocols of the CBTA, held at Halong City, Viet Nam, in January 2005, Viet Nam

[1] Alternatively, this TA could be a component of the TA for Implementing the GMS Agreement for Facilitation of the Cross-Border Movement of Goods and People in the Greater Mekong Subregion – Phase II, the TA for "Fine Tuning" of the GMS Cross-Border Transport Agreement, or both.
[2] Drafted against the advice provided by (indeed strong objection of) the consultant at the time.

	suggested that a conference be organized to gather national insurance sectors and establish a platform to consider a framework on third-party motor liability insurance in the GMS. Thus, it appears that the time is becoming ripe for revisiting this issue and providing a more efficient solution.
7.	**Objective(s):** The goal of the TA would be to explore the feasibility of alternative approaches for establishing a third-party motor vehicle liability insurance regime in relation to the GMS CBTA, and draft the necessary agreement and/or amendment to the CBTA, for consideration by the Joint Committee established under Article 29 of the CBTA. The aim of such an agreement and/or CBTA amendment would be to assure compensation for victims of road traffic accidents, by: (i) guaranteeing a minimum compensation threshold, (ii) guaranteeing the solvency of the debtor, and (iii) facilitating the victim's access to compensation.
8.	**Scope:** As requested by Viet Nam at First Negotiation Meeting on the Stage Annexes and Protocols of the CBTA, held at Halong City, Viet Nam, in January 2005, a conference would be organized to gather national insurance sectors and establish a platform to consider a framework on third-party motor liability insurance in the GMS. Based on a GMS-wide conference and/or national workshops,[1] the TA would draft the necessary agreement and/or CBTA amendment to establish a third-party motor vehicle liability insurance regime. One approach, as recommended by ADB TA 5749-REG, would be to consider two options that vary in terms of the approach toward minimum cover and the insurer and which provide intermediate solutions that would pave the way for a more sophisticated system in the long run. The recommended language for these two options follows: (a) Motor vehicles in international traffic shall carry third-party motor liability insurance cover. The vehicles shall carry an insurance certificate issued by the insurer of the model set out in Annex 12. [Option 1 for (b)] (b) The liability regimes for road accidents and third-party motor liability insurance cover will be harmonized in accordance with the conditions set out in Annex 17 [a new annex to the CBTA]. [Option 2 for (b)] (b) The foreign vehicle's insurance cover shall satisfy the minimum legal requirements in the Host Country.

[1] Holding national workshops initially is strongly recommended in order to assure the widest possible participation of stakeholders in each GMS country. The issues to be addressed in this project are similar to the issues involved with issuing and guaranteeing organizations in relation to the customs transit regime to be established by Annexes 6, 8, and 14 to the CBTA, and which were resolved by a series of national workshops between December 2004 and March 2005.

[Option 1 for (c)]

(c) The Host Country shall recognize the validity of the cover with a geographic extension issued by an insurer established in the vehicle's Home Country. For the purpose of claims settlement, the insurer will be represented in the Host Country by a branch office or a local insurance company.

[Option 2 for (c)]

(c) The insurance cover shall be issued by a Host Country insurance company in the vehicle's Home Country through the agency of a home insurance company.

Another approach would be to model a solution based on the European Green Card System, which provides the most advanced solution available, but which may not yet be practicable in the GMS. More details on the Green Card System and its applicability of the Green Card System to the GMS are provided in the Attachment to this Project Profile. The Blue Card system to be formulated by Protocol 5 to the ASEAN Framework Agreement on the Facilitation of Goods in Transit provides an analogous approach; the Protocol was signed on 8 April 2001 but still has not yet been ratified.[1]

9. Estimated Cost:

US$100,000

10. Financing Plan and Financing Arrangement (Public/Private):

Public (from ADB TA funds)

11. Financing Status:

Proposed for financing

12. Proposed Implementation Period/Schedule:

2006-2007

13. Executing/Implementation Agency and Contact Persons:

Executing Agencies: National Transport Facilitation Committees (NTFCs) of the six GMS countries and the Joint Committee comprised of representatives of the respective NTFCs.

ADB Contact Division/Person:

Mekong Department, Operations Coordination (GMS) Division
Email: gms@adb.org

[1] Outside of Europe, the Green Card has inspired other systems that work similarly, e.g., the Pink Card for six countries in Central Africa, the Brown Card for 14 countries in West Africa, and the Orange Card for 19 Arab countries.

14.	**Estimated Benefits and Beneficiaries:** While facilitating transport, the project will help assure compensation for victims of road traffic accidents, by: (i) guaranteeing a minimum compensation threshold, (ii) guaranteeing the solvency of the debtor, and (iii) facilitating the victim's access to compensation.
15.	**Social and Environmental Issues:** To the extent that it assures that road traffic victims are fully and adequately compensated, it will have a positive road safety impact. The project is not expected have significant environmental impacts. Nevertheless, appropriate mitigation measures (e.g., noise reduction) should be implemented. The project will help alleviate poverty indirectly to the extent that employment is created in the road transport industry.
16.	**Priority of Project/TA:** *** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** The TA reflects (and builds upon) one component of the TA for Implementing the GMS Agreement for Facilitation of the Cross-Border Movement of Goods and People in the Greater Mekong Subregion – Phase II, which is in the advanced preparation stage.
19.	**Pre-feasibility Study (Completed/Required):** Not applicable

Attachment to Project Profile:
The European Green Card System and Its Applicability to the GMS

(i) The Green Card System involves cooperation among the governments, national bureau, and the national insurance markets. It is administered by an organization established by all national Bureaus, the Council of Bureau, which has its Secretariat in London and employs a small staff. The Uniform Agreement between Bureaus is a standard text that is signed bilaterally between the Bureaus of two countries. There is a partnership, with a Handling Bureau (the Bureau in the country of the accident) and a Paying Bureau (the Bureau under the authority of which a Green Card held by a visiting motorist has been issued).

(ii) The two basic agreements of the Green Card System, the Uniform Agreement (subscribed to bilaterally) and a Multilateral Guarantee Agreement, have created a rational and flexible system for the settlement of third-party claims arising from accidents involving residents of two countries; each national Bureau guarantees the settlement of claims caused by its own national motorists abroad and also guarantees the settlement of claims resulting from the use of foreign vehicles in its territory. While the existing Green Card System—which has functioned well in spite of inherent problems such as different languages, different legal systems, different insurance markets, and different social security systems—is not open to membership by the Greater Mekong Subregion (GMS) countries because of their distance from Europe and the consequent lack of traffic between the two areas, it does provides inspiration for the GMS countries to move toward the development of a similar system.[1]

(iii) While implementation of the Green Card System or similar approaches requires confidence in the Handling Bureau's actions—and the need for such confidence might be considered an impediment—this trust is reciprocal in that each single Bureau, from time to time, serves the function of Paying Bureau or Handling Bureau. Should there be an insurmountable divergence of opinion between Bureaus, it is best to have an agreement that provides for arbitration, although as noted, it has never become necessary to use the arbitration facility in the Green Card System.

(iv) It has been suggested that to successfully implement a similar system the economic position of the countries should not differ substantially (as was the case in Europe immediately after World War II), although this is an actual or potential problem with the existing Green Card System. Compare, for example, the situation of Belgium, where there is unlimited liability for an accident, and Estonia, where the total value of all annual premiums collected is only US$2.3 million equivalent; the "solution" in such a case is a state or bank guarantee.

(v) An issue is whether there should be a specific premium for the international cover. In many European countries, such as Belgium and Germany, it is assumed that all vehicles travel internationally and therefore no incremental premium is charged for the insurance cover. In the GMS, however, as in many of the transitional members of the Green Card System, most vehicles do not

[1] In this sense the Green Card System differs from the TIR System, which is open to membership by any recognized country.

travel internationally, and therefore consideration may be given to assessing a separate premium for international cover.

(vi) A related issue is whether the Green Card System or some similar approach makes sense when only a relatively few vehicles travel internationally. Apart from the adverse facilitation impact of not having such a system, it may make more sense to have the few vehicles that travel internationally in less well-developed countries pay for insurance at the border, rather than risk the insolvency of a national motor insurance system. A cost-benefit assessment is required before implementation of the system, although no such formal assessments have been undertaken in Europe.

(vii) The difference in motor insurance systems among countries is not an insuperable obstacle to implementation of the Green Card System. Consider, for example, that Finland and Norway have no-fault motor insurance systems, while the other countries have fault-based systems.[1]

(viii) A system in which the vehicle registration plate itself functions as a guarantee for third-party liability in the country the motorist is traveling (e.g., as in Multilateral Guarantee Agreement of the Green Card System) is to be preferred to a system requiring insurance certificate inspection at borders, on facilitation grounds.

(ix) Another lesson for the GMS is that the international motor insurance certificate itself should be made “fraud-proof”, perhaps with the use of a credit-card type system rather than a paper document; there are currently too many counterfeit certificates in use in Europe, especially by drivers from the transitioning member countries of the System.

(x) If there is only one motor insurance company (i.e., a state enterprise) in a country, as in certain GMS countries, this will facilitate establishment of a Bureau, which is likely to be simply a sub-unit of the state enterprise in such a case; of course, having only one motor insurance provider in a country is generally not to be preferred considering the efficiency benefits of competition.

(xi) To minimize startup costs of a cross-border motor insurance system, it is usually better that the Bureau established in each country be small and that it utilize the services of existing insurance companies in dealing with claims.

(xii) The Council of Bureau, the managing organization of the Green Card System, regularly holds workshops and seminars explaining the operation and benefits of the system, mainly to candidate and transitioning member nations.

Source: PADECO Co., Ltd., *T.A. No. 5749-REG: Cross-Border Movement of Goods and People in the Greater Mekong Subregion, Appendixes*, prepared for the Asian Development Bank, September 1998, Appendix C, pp. C-35 to C-41.

[1]Also consider that initially many of the countries participating in the Green Card System did not have compulsory third-party motor insurance; however, to address this disparity, the Council of Bureaux adopted the practice of “deeming” such legislation to exist (where it did not) and have certain basic content regarding financial limits and scope.

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** Institutional Strengthening of National Transport Facilitation Committees (NTFCs)[1] (TAP 11)
2.	**Loan or TA:** Regional TA (RETA)
3.	**Project Location:** GMS-wide
4.	**Countries Involved:** All GMS countries
5.	**Sector/Subsector:** Transportation/Road Transport and Multimodal Transport
6.	**Background and Rationale:** Article 28 of the GMS Cross-Border Transport Agreement (CBTA) states as follows: "**Article 28: National Transport Facilitation Committees** The Contracting Parties will each establish a permanent National Transport Facilitation Committee chaired by a Minister or Vice Minister or its equivalent. It will bring together representatives of all parties concerned with implementation of the Agreement.€[2] 35 At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, Viet Nam suggested that a separate technical assistance project could be productively formulated for institutional strengthening of the NTFCs of each country, as they will have many tasks in implementing the CBTA.[3] This suggestion is consistent with the findings of the *Impact Evaluation Study of the GMS Program*,

[1] Alternatively, this TA could be a component of the TA for Implementing the GMS Agreement for Facilitation of the Cross-Border Movement of Goods and People in the Greater Mekong Subregion – Phase II (in which it is listed as one of a few components, the TA for "Fine Tuning" of the GMS Cross-Border Transport Agreement, or both.

[2] Article 29 of the CBTA on the Joint (Ministerial) Committee provides that: "(a) [r]epresentatives of the respective National Transport Facilitation Committees will form together the Joint Committee" and "(b) [t]he Joint Committee will monitor and assess the functioning of the Agreement. It will serve as a platform for discussion, a forum for amicable settlement of disputes, and it may address advice to the Contracting Parties and formulate proposals for amendment of the Agreement.€ 35

[3] Summary of Proceedings, Greater Mekong Subregion Economic Cooperation Program, Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study, Ho Chi Minh City, 8-9 December 2005, Appendix 11, paragraph 35.

	conducted by ADB's Operations Evaluation Office in February 2000, which found a need to strengthen institutions responsible for implementing GMS initiatives in the transport sector. As defined in a 1996 ADB TA report, NTFCs are to (i) provide a national forum for the facilitation of formalities, procedures, and documentation used in international transport; propose, for government approval, draft transport and trade-related regulations and practices; (iii) increase awareness of the methods and benefits of transport facilitation; and (iv) implement various transport facilitation projects. The NTFCs are to bring together representatives of all parties concerned with multimodal transport and trade in each GMS country, e.g., transport authorities, other government agencies such as Customs, banking institutions, insurance companies, transport users (shippers, consignees, importers, exporters, freight forwarders), port authorities and transport terminal operators, and inland transport operators.[1]
7.	**Objective(s):** The goal of the TA is to promote economic cooperation and integration in the Greater Mekong Subregion, consistent with the GMS Program vision of a more integrated, prosperous, and equitable subregion. The specific objective of the RETA is to prepare GMS government officials and representatives of the private sector to better implement the CBTA, e.g., by (i) creating an awareness of transport and trade issues among government officials and top executives from the private sector; (ii) creating a sound legal and institutional framework for the development of efficient transport and trade operations; (iii) suggesting instruments for the development of efficient transport and trade operations; and (iv) establishing the basis for adequate training programs in international trade and transport.
8.	**Scope:** The TA would provide advice and training, both to the public and private sector, related to the implementation of the CBTA, e.g., incorporation of CBTA provisions into national laws and regulations, reduction in documentation and procedures, providing English-language translation of all documents used for cross-border traffic. Specific areas of assistance, for government entities, may include: (i) assistance and advice on modernization and harmonization of national transport legislation and regulations on international transport, including the drafting of model legislation; (ii) implementation of facilitation measures related to documents and procedures used in international trade and transport; and (iii) identification of and assistance with the elimination of institutional and operational impediments to the introduction and/or promotion of multimodal transport. Specific areas of assistance to the private sector may include advice and assistance in the implementation of documentation simplification measures

[1] PADECO Co., Ltd., *Regional Technical Assistance to the Greater Mekong Subregion for the Mitigation of Non-Physical Barriers to Cross-Border Movement of Goods and People, Completion Report*, October 1996, pp. G-2- to G3.

related to Customs and other trade procedures (bank and insurance sectors), and preparation of for introduction of electronic data interchange systems.[1]

As explained in Section XI of the main text of this Report, the scope of this TAP could well be expanded to include the development of mechanisms to promote and coordinate training programs between and within GMS countries.

9. Estimated Cost:

US$300,000 (US$50,000 per country)

10. Financing Plan and Financing Arrangement (Public/Private):

Public (from ADB TA funds)

11. Financing Status:

Proposed for financing

12. Proposed Implementation Period/Schedule:

2006-2008

13. Executing/Implementation Agency and Contact Persons:

Executing Agencies: National Transport Facilitation Committees (NTFCs) of the six GMS countries and the Joint Committee comprised of representatives of the respective NTFCs

ADB Contact Division/Person:

Mekong Department, Operations Coordination (GMS) Division
Email: gms@adb.org

14. Estimated Benefits and Beneficiaries:

The Project will result in an increase in cross-border trade and/or reduction in the border crossing clearance time targets that are specified in the MOUs for IICBTA at the pilot border sites.

15. Social and Environmental Issues:

The project is not expected have significant environmental impacts. Nevertheless, appropriate mitigation measures (e.g., noise reduction) should be implemented.

The project will help alleviate poverty indirectly to the extent that employment is created in the transport industry. Also, increased cross-border accessibility will be provided for passengers who cannot afford air travel, even by low-cost carriers.

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[1] This aspect of the TA draws upon Nature of a Technical Assistance Project in Multimodal Transport, prepared by the United Nations Conference on Trade and Development. See: http://r0.unctad.org/en/subsites/multimod/mt2tch0.htm.

16. Priority of Project/TA:

**** (see Chapter IX)

17. Project Status (Proposed/Ongoing/Completed):

Proposed

18. Status of Project/TA Preparation:

The TA builds upon previous ADB TAs, e.g., T.A. No. 5749-REG: Cross-Border Movement of Goods and People in the Greater Mekong Subregion. Also, it is complementary to Implementing the GMS Agreement to Facilitate the Cross-Border Movement of Goods and People, Phase 2 (Project TAP 1)

19. Pre-feasibility Study (Completed/Required):

Not applicable

20. Follow-up Actions Required:

Approval of the respective national ministries concerned.

Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.

21. Issues/Constraints:

At the Second GMS Summit held in Kunming, the People's Republic of China (PRC) in July 2005, the GMS leaders were "encouraged by the considerable progress in negotiating the annexes and protocols of the Cross-Border Transport Agreement (CBTA) and the commencement of its implementation." They further reaffirmed their commitment "to move with speed and purpose to implement the Agreement at an increasing number of border crossings." GMS leaders also committed that GMS countries will "take all necessary domestic measures to ensure that the Agreement can be implemented starting in 2006."[1] The GMS countries requested the proposed TA to support their efforts to facilitate cross-border transport and trade in the subregion through the accelerated implementation of the CBTA at key border crossings. The TA will complement the GMS Strategic Framework for Action on Trade Facilitation and Investment, which will enhance the benefits of the CBTA through a comprehensive set of measures to facilitate trade.

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Sector	*Transportation and Communication*
Subsector	*Road Transport and Multimodal Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Community*

[1] Kunming Declaration adopted by the GMS leaders during the Second GMS Summit held on 4-5 July 2005.

PROJECT/TA CONCEPT PROFILE

1. Project Name (Number):

Support for Harmonization of GMS Road Signs and Signals (TAP 12)

2. Loan or TA:

Regional TA (RETA)

3. Project Location:

GMS-wide

4. Countries Involved:

All GMS countries

5. Sector/Subsector:

Transportation/Road Transport and Multimodal Transport

6. Background and Rationale:

Although historically the GMS countries have strived to follow the Vienna Convention on Road Signs and Signals, 1968, there have been some inconsistencies regarding road signs and signals, which might have an adverse impact on road safety if cross-border and interstate traffic increases substantially, as is envisaged.

Against this background, Article 26 of the GMS Cross-Border Transport Agreement (CBTA) states that "[t]he Contracting Parties undertake to gradually bring the traffic signs and signals on their territory in line with the standards set in Annex 7" .

Article 2 (Road Signs and Signals) of Annex 7 of the CBTA on Road Traffic Regulation and Signage provides that:

(a) Road signs, signals, symbols, and road markings on the routes and corridors designated in Protocol 1 of the Agreement shall be as prescribed in Attachment 2 to this Annex.

(b) A transition period of four years from the date of entry into force in their territory of this Annex is allowed to the Contracting Parties to gradually replace or supplement any sign, symbol, signal, and marking on the routes and corridors designated in Protocol 1 of the Agreement, which although it has the characteristics of a sign, symbol, signal, or marking belonging to the system prescribed by Attachment 2 of this Annex is used with a different meaning from that assigned in Attachment 2.

(c) A transition period of 15 years from the date of entry into force in their territory of this Annex is allowed to the Contracting Parties to gradually replace any sign, symbol, signal, and marking on the routes and corridors designated in Protocol 1 of the Agreement, which does not conform in principle to the system prescribed by Attachment 2 [titled

'Road Signs and Signals'] of this Annex. During this period, in order to familiarize road users with the system prescribed by Attachment 2, previous signs and symbols may be retained beside those prescribed in Attachment 2.

(d) Where Attachment 2 of this Annex does not prescribe a sign, symbol, or marking to signify a certain rule or convey certain information to road users, it shall be open to the Contracting Parties to use for these purposes any sign, symbol, or marking they wish, provided that such sign, symbol, or marking is not assigned a different meaning by Attachment 2 and provided that it conforms to the system prescribed by Attachment 2.

(e) Nothing in this Annex shall be construed as requiring the Contracting Parties to adopt all types of signs and markings prescribed by Attachment 2. On the contrary, Contracting Parties shall limit the number and types of signs or markings they adopt to what is strictly necessary.

(f) The Contracting Parties undertake to prohibit on their territory to affix to or install near a sign or other traffic control device, any object, board, notice, marking or other device that makes the sign less visible and understandable or risks confusing or distracting the road user in a way prejudicial to traffic safety.€ 35

In view of the CBTA requirement to replace signs, symbols, signals, and markings over a transition period of 4 to 15 years,[1] the Cambodia delegation at the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study in Ho Chi Minh City called for a technical assistance project Support for Harmonization of GMS Road Signs and Signals.[2]

7. Objective(s):

The goal of the TA is to promote economic cooperation and integration in the Greater Mekong Subregion, consistent with the GMS Program vision of a more integrated, prosperous, and equitable subregion. The specific objective of the RETA is to promote road safety by assisting GMS governments in their preparations to implement installation of new CBTA (and the Convention on Road Signs and Signals, Vienna, 1968) compliant signs, symbols, signals, and markings.

8. Scope:

The TA would analyze existing road signs, symbols, signals, or markings in the six GMS countries and provide a plan for their replacement with CBTA-compliant ones over the transition periods set by the CBTA (5-14 years), including the provision of required development partner assistance. As suggested by the Cambodia delegation at the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study in Ho Chi Minh City, joint missions may be undertaken by GMS countries for this purpose.

[1] These reflect the transition periods called for in the Convention on Road Signs and Signals, Vienna, 8 November 1968.
[2] Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study, Ho Chi Minh City, Summary of Proceedings, Appendix 11, paragraph 3.

9.	**Estimated Cost:** US$120,000 (US$20,000 per country)
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public (from ADB TA funds)
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2007-2008
13.	**Executing/Implementation Agency and Contact Persons:** Executing Agencies: National Transport Facilitation Committees (NTFCs) of the six GMS countries and the Joint Committee comprised of representatives of the respective NTFCs **ADB Contact Division/Person:** Mekong Department, Operations Coordination (GMS) Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** The Project will result in an increase in improved road traffic safety in GMS countries even as cross-border and interstate traffic volumes increase substantially.
15.	**Social and Environmental Issues:** The project is not expected have positive significant social/environmental impacts as a consequence from reduced traffic accidents.
16.	**Priority of Project/TA:** *** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** The TA builds upon previous ADB TAs, e.g., T.A. No. 5749-REG: Cross-Border Movement of Goods and People in the Greater Mekong Subregion. Also, it is complementary to Implementing the GMS Agreement to Facilitate the Cross-Border Movement of Goods and People, Phase 2 (Project TAP 1)

19. Pre-feasibility Study (Completed/Required):

Not applicable

20. Follow-up Actions Required:

Approval of the respective national ministries concerned.

Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.

21. Issues/Constraints:

At the Second GMS Summit held in Kunming, the People's Republic of China (PRC) in July 2005, the GMS leaders were "encouraged by the considerable progress in negotiating the annexes and protocols of the Cross-Border Transport Agreement (CBTA) and the commencement of its implementation." They further reaffirmed their commitment "to move with speed and purpose to implement the Agreement at an increasing number of border crossings." GMS leaders also committed that GMS countries will "take all necessary domestic measures to ensure that the Agreement can be implemented starting in 2006.”[1] The GMS countries requested the proposed TA to support their efforts to facilitate cross-border transport and trade in the subregion through the accelerated implementation of the CBTA at key border crossings. The TA will complement the GMS Strategic Framework for Action on Trade Facilitation and Investment, which will enhance the benefits of the CBTA through a comprehensive set of measures to facilitate trade.

At the Final Meeting on the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006, Mr. Lattanamany Khounnyvong of Lao PDR called for the provision of facilities to complement the development of road infrastructure. Among other facilities, these would include road signs and signals and hence this TAP was specially mentioned in this regard.

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Sector	*Transportation and Communication*
Subsector	*Road Transport*
Themes	*Environmental Sustainability and Regional Cooperation*
GMS Theme	*Connectivity*

[1] Kunming Declaration adopted by the GMS leaders during the Second GMS Summit held on 4-5 July 2005.

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** Practicalities of Private Sector Participation in Transport Infrastructure (TAP 13)
2.	**Loan or TA:** Advisory Regional Technical Assistance
3.	**Project Location**: GMS-wide
4.	**Countries Involved:** All countries
5.	**Sector/Subsector:** Transportation/All Modes
6.	**Background and Rationale:** Private sector participation in transport sector infrastructure investment has been developing at varying rates across GMS countries – inevitably depending on their development stage and the relative attraction of the investment climate. A consistent theme of that participation, however, particularly in relation to the less developed economies, relates to the practicalities of responsible Government agencies screening applications from potential investors to ensure bone fide and streamline subsequent procedures. All too frequently, responsible officers are faced with the situation of having to devote valuable time and effort to inquiries that are subsequently found to be spurious or inadequately financially supported. There is therefore a need to establish practical working procedures within GMS countries to streamline the processing of investment applications and to facilitate determination of validity at an early stage to avoid the inappropriate deployment of scarce time and personnel resources. While individual countries will require assistance with specifying processing systems and associated procedures to meet localized conditions and requirements, there are also a range of appraisal and validation processes that will be applicable across the subregion.
7.	**Objective(s):** To promote economic efficiency by providing Governments, GMS wide, with the capacity to rapidly assimilate the validity and capacity of investment proposals and subsequently undertaken the associated processing on a speedy and time effective basis.

8.	**Scope:** The project will comprise two primary components: first to establish screening and monitoring processes to rapidly ascertain the validity of investment applications (common to all GMS countries), and second, to specify systems and procedures for the subsequent processing, promotion, and facilitation of investment activity in accordance with localized institutional structures and responsibilities (country specific). In each case the project will develop, specify, and facilitate the implementation of systems-based procedures for addressing the two core issues. In relation to the preliminary screening, it is anticipated that a GMS-wide workshop will be appropriate to present and train officers in the necessary procedures; in the case of country specific developments, the project will formulate systems directly tailored to localized needs – although wherever possible consistent approaches and system specifications will be adopted. The project will not be simply restricted to derivation of procedural and system specifications but will also seek to directly facilitate implementation and practical training where necessary, to ensure that on completion, systems are fully activated and all officers charged with responsibility therein are fully able to meet the demands placed on them.
9.	**Estimated Cost:** US$200,000 for technical assistance
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public[1]
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2007
13.	**Executing/Implementation Agency and Contact Persons:** National Ministries of Transport **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** Prime benefits to be realized from the project will be time and administrative savings in relation to investment proposal processing. Such savings will have a

[1] At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, Viet Nam noted that it will ask ADB or the World Bank form assistance in setting up appropriate models for public private partnerships (PPPs).

	direct impact on economic development but will also foster an environment where investments can be promoted more effectively by speedy resolution of initial practicalities and hence a more focused application of subsequent procedural necessities. Such streamlining will provide a facilitating environment for enhanced investment performance. Benefits can be measures by comparison of costs and success rates on a “with and without” project basis.
15.	**Social and Environmental Issues:** No direct impact although environmental and social issues will be an important element of project evaluation procedures.
16.	**Priority of Project/TA:** *** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** Proposal
19.	**Pre-feasibility Study (Completed/Required):** Required
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the Project.
21.	**Issues/Constraints:** No major constraints are envisaged. At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, Viet Nam stated that it will ask for ADB or World Bank assistance in setting up appropriate models for public private partnerships (PPPs).

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*All*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Competitiveness*

PROJECT/TA CONCEPT PROFILE[1]

1. Project Name (Number):

Cooperation between the ADB-ASEAN Regional Road Safety Program and the PRC[2] (TAP 14)

2. Loan or TA:

Regional TA

3. Project Location:

GMS-wide as well as non-GMS ASEAN countries and the remainder of the PRC

4. Countries Involved:

GMS-wide as well as non-GMS ASEAN countries and the remainder of the PRC

5. Sector/Subsector:

Transportation/Road Transport

6. Background and Rationale:

Road traffic safety is particular concern, for passenger as well as freight transport, domestically and cross-border. The following table presents data on the deaths, injuries, and losses from road traffic accidents in GMS countries in 2003; annual losses from road traffic accidents amount to 2.1-3.2% of GDP in the subregion.

Road Traffic Accident Data in GMS Countries, 2003

Country	Official Deaths	Official Injuries	Estimated Deaths	Estimated Injuries	Annual Losses (US$ m)	Percentage of GDP
Cambodia	824	645	1,017	20,340	116	3.2%
PRC	104,372	494,174	100,000+	NA	NA	NA
Lao PDR	415	6,231	415	6,231	47	2.7%
Myanmar	1,308	9,299	1,308	9,299	200	3.0%
Thailand	13,116	69,313	13,116	1,529,034	3,000	2.1%
Viet Nam	11,319	20,400	13,186	30,999	885	2.5%

[1] Useful sources for this Project Profile included: (i) Asian Development Bank, *Technical Assistance to the People's Republic of China for Preventing HIV/AIDS on Road Projects in Yunnan Province*, TAR: PRC 36399, July 2003; (ii) Asian Development Bank, *Technical Assistance for ICT and HIV/AIDS Preventive Education in the Cross-Border Areas of the Greater Mekong Subregion*, TAR: OTH 36648, December 2002; (iii) United Nations Development Programme and South East Asia HIV and Development Project, *Building an Alliance with Transport Sector in HIV Vulnerability Reduction*, March 2001; (iv) Japan Bank for International Cooperation, Approaches toward Greater Mekong Sub-region Development (Projects with HIV/AIDS components), PowerPoint presentation at the Ninth Meeting of the Subregional Transport Forum held in Beijing on 1-2 June 2005; and (v) HIV/AIDS in the GMS; Bulletin for Prevention Education in the Greater Mekong Subregion, Issue 1, 2004

[2] The Project draws from *ASEAN Region Road Safety and Action Plan, 2005-2010*, Final Draft, produced as a component of the ADB/ASEAN Regional Road Safety Program, 26 November 2004.

Source: Data for the five GMS countries that are members of ASEAN (i.e., all but the PRC) are from *ASEAN Region Road Safety and Action Plan, 2005-2010*, Final Draft, produced as a component of the ADB/ASEAN Regional Road Safety Program, 26 November 2004, p. 59. Data for the PRC are countrywide and are from CPCS Transcom in association with Meyrick and Associates and China Academy of Transportation Sciences, *Policy Reform in Road Transport, TA 4351-PRC, Inception Report*, March 2005, p. 11; estimated injuries were not available (NA) from this source and the estimate of annual losses (3.4 billion yuan or US$410 million seemed too low in relation to the PRC's GDP, which was US$1,414,000 million in 2003 according to http://www.worldbank.org/data/databytopic/GDP.pdf (a similar number is found at http://www.chinaconsulate.org.nz/eng/xwdt/t112575.htm). Official data used here for all countries are police data.

8. Scope:

Finally, to address the road traffic safety problem in the GMS, it is suggested that cooperation between the PRC and the ongoing ADB-ASEAN Road Safety Program be considered. This Program includes the following components:

(i) central development of modules (e.g., legislation on helmets, drunk driving) that will allow models to be prepared for easy adaptation;
(ii) centralized "train the trainer" courses that will allow systematic development of safety professionals in each road safety subsector[1] who can later become trainers in their own country;
(iii) support for centrally trained persons to run local courses in their sector in their country in order to develop pools of local experts in each sector to enable more effective implementation of country plans;
(iv) facilitation of exchange and cooperation between and among countries to enable sharing of best practices and expertise across the region;
(v) creation of special interest groups via the internet to allow for creation of expert working groups in each subsector in which the key persons can easily exchange information, documents, and information with their counterparts in neighboring countries, to facilitate harmonization and make optimal use of regional expertise;
(vi) creation of an internet-based knowledge database that will provide the technical information and references to assist implementers in each sector to find the information and references needed to help them implement their part of the action plan;
(vii) establishment of a Road Safety Working Group to ensure coordinated implementation and regular reporting of progress in individual countries and across the region as a whole;
(viii) annual conferences/workshops on road safety action plans to allow exchanges of ideas and experiences and opportunities to provide advice/guidance in different subsectors; and
(ix) ongoing availability of expertise to provide regular short advisory visits to action plan implementers in each country to keep the action plans on track for each subsector.[1]

[1] These include coordination and management of road safety, road accident data systems, road safety funding, safe planning and design of roads, improvement of hazardous locations, road safety education of children and young adults, driver training and testing, road safety publicity campaigns, vehicle roadworthiness and safety standards, traffic legislation, traffic police and law enforcement, emergency assistance to traffic victims, road safety research and costing, and cooperation and collaboration.

	The PRC's cooperation with the ADB-ASEAN Road Safety Program could be undertaken under the auspices of the Memorandum of Understanding between the Governments of the Member Countries of the Association of Southeast Asian Nations and the Government of the People's Republic of China on Transport Cooperation, Vientiane, 27 November 2004, Article II, 7 of which states that "[t]he Parties shall, with mutual consent, also cooperate in any other areas of the transport sector" [2].
9.	**Estimated Cost:** To be determined
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2006-2010
13.	**Executing/Implementation Agency and Contact Persons:** Various concerned agencies in the GMS and non-GMS ASEAN countries **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email**:** gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** With high traffic growth (sometimes 10% or more), it may not be possible to bring about drastic reductions in traffic deaths and injuries. However, an estimate of potential lives and savings during 2005-2010 from implementation of the country action plans in the ASEAN countries of the GMS has been made, indicating that 1,800 lives and 36,000 injuries could be saved in Cambodia, 919 lives and 29,408 injuries in Lao PDR, 940 lives and 32,900 injuries in Myanmar, 13,000 lives and 1,508,000 million injuries in Thailand, and 7,000 lives and 16,100 injuries in Viet Nam. Generally, abut a 12% reduction in deaths and injuries may be expected.
15.	**Social and Environmental Issues:** The project is expected to have significant positive social impact through the reduction of traffic deaths and injuries.

[1] *ASEAN Region Road Safety and Action Plan, 2005-2010, Final Draft*, produced as a component of the ADB/ASEAN Regional Road Safety Program, 26 November 2004, p. 26.

[2] A useful reference is ADB TA 3341-PRC: Capacity Building in Traffic Safety, Planning and Management, conducted in 1999-2000.

16.	**Priority of Project/TA:** * (see Chapter IX)	
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed	
18.	**Status of Project/TA Preparation:** Not yet prepared	
19.	**Pre-feasibility Study (Completed/Required):** Not applicable	
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.	
21.	**Issues/Constraints:** At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, in reply to query by Lao PDR, it was clarified that this TAP does not involve duplication with the ADB-ASEAN program but is an add-on to cover at least part of the PRC. Since road traffic safety is not one of the areas specifically included in Article 2 (Areas of Cooperation) of the Memorandum of Understanding between the Governments of the Member Countries of the Association of Southeast Asian Nations and the Government of the People's Republic of China on Transport Cooperation, Vientiane, 27 November 2004, agreement will be necessary to include it as another area of cooperation, as per section 7 of Article 2.	

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*Road Transport*
Themes	*Environmental Sustainability and Regional Cooperation*
GMS Theme	*Connectivity*

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** HIV/AIDS Component for all Road Transport Projects in the GMS[1] (TAP 15)
2.	**Loan or TA:** Regional TA (RETA)
3.	**Project Location:** GMS-wide
4.	**Countries Involved:** All GMS countries
5.	**Sector/Subsector:** Transportation/Road Transport
6.	**Background and Rationale:** The opening of borders in the GMS to trade and tourism and the associated increased flow of populations across borders has had major implications for the epidemiology of HIV/AIDS. Two of the top ten Asian countries in terms of HIV/AIDS infection rates are in the GMS, i.e., Cambodia and Thailand. Infection rates are also high and increasing in Yunnan Province and Guangxi Zhuang Autonomous Region in the PRC, Lao PDR, Myanmar, and Viet Nam, particularly in the border areas. The impact of road development on HIV/AIS infection rates in the GMS was clearly documented by the UNDP South East Asia HIV and Development Project, which conducted before-and-after studies of road development in Myanmar (Mandalay-Muse), the PRC (Kunming-Nanning), and Viet Nam (Highway 1), with the results shown in the following table.

[1] As suggested by Thailand at the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, this technical assistance project could be extended to other communicable diseases, as circumstances require. Summary of Proceedings, Appendix 11, paragraph 30. Details of approaches targeting other communicable diseases could be best determined at the time the TAP is finally prepared, as various factors relating to alternative diseases (e.g., rates of morbidity and mortality, mode of transmission, spatial dimensions) are subject to rapid changes. It is also noted that TAP 17 provides for Inclusion of a Substantive Health and Sanitary/Phytosanitary Regime in the Cross-Border Transport Agreement.

Table: HIV Prevalence Prior to and Post Construction or Improvement of Transport Corridors

Highway Routes	HIV Prevalence: Prior to Activity	HIV Prevalence: Post Activity
Myanmar: 1997 construction Mandalay-Muse Highway	Injecting drug users HIV+, 1996	Injecting drug users HIV+, 1998
Mandalay	51%	88%
Lashio	34%	74%
Muse	86%	92%
China: 1996 construction Yunnan-Nanning, Guangxi	Number of HIV+ cases 1995	Number of HIV+ cases 1998
Guangxi	10	525
Viet Nam: Highway one: Ho Chi Minh City (HCMC) (HCMC)-Hanoi highway improvement	Number of HIV+ cumulative cases 1997	Number of HIV+ cumulative cases 1998
Hanoi	51-100	101-1,000
Haiphong	11-50	101-1,000
HCMC	>1,000	>1,000

Notes: Although the estimates might not reflect the real levels of HIV infection, the changes over time are significant.

Activity for the PRC and Myanmar is the *construction* of the road, while for Viet Nam, it describes road *improvements.*

Source: United Nations Development Programme and South East Asia HIV and Development Project, *Building an Alliance with Transport Sector in HIV Vulnerability Reduction*, March 2001.

Against this background, ADB has been incorporating into the design of road and other infrastructure projects HIV/AIDS prevention programs targeting migrant construction workers and local communities.[1] Loan agreements for road projects typically include an assurance that the government borrower will promote HIV/AIDS awareness and implement prevention programs. In specific instances, contractors are induced to agree to undertaking education and communication programs on HIV/AIDs and other sexually transmitted infections (STIs).[2]

[1] One ADB staff member (Indu Bhushan, Senior Project Economist, ADB) stated the following: “As many of our projects in the region promote mobility, it is our moral obligation to provide guidelines on HIV/AIDS prevention, particularly among the mobile groups.” Omana Nair (External Relations Officer, ADB), *Halting the March of HIV/AIDS in UNESCO*, HIV/AIDS in the GMS; Bulletin for Prevention Education in the Greater Mekong Subregion, Issue 1, 2004, pp. 27-28.

[2] Asian Development Bank, Technical Assistance to the People’s Republic of China for Preventing HIV/AIDS on Road Projects in Yunnan Province, TAR: PRC 36399, July 2003, p. 1.

[3] Japan Bank for International Cooperation, Approaches toward Greater Mekong Sub-region Development (Projects with HIV.AIDS components), PowerPoint presentation at the Ninth Meeting of the Subregional Transport Forum held in Beijing on 1-2 June 2005 (footnote number appears on the following page).

	The importance of including HIV/AIDS components in all road transport projects was highlighted by the representative of the Japan Bank for International Cooperation (JBIC) at the Ninth Meeting of the Subregional Transport Forum held in Beijing on 1-2 June 2005. Specific JBIC projects with HIV/AIDS components in the GMS include: (i) the Sihanoukville Port Expansion Project in Cambodia; (ii) the Second Mekong International Bridge Construction Project involving Lao PDR and Thailand; and (iii) the Cai Mep Thi Vai International Port Construction Project in Viet Nam. Project components include awareness and education, training of peer educators, behavioral change communication, provision of condoms, referral for HIV testing and treatment, advocacy and capacity building, and partnership development.[3]
7.	**Objective(s):** The overall objective of the technical assistance project will be to prevent an increase in the incidence of poverty by reducing the risk of transmission of HIV/AIDS and other STIs resulting from road transport projects in the GMS. Specific objectives will include reduction in the risk of transmission of HIV and STIs among construction workers, commercial sex workers (CSWs), truck drivers and other crew members, and local resident communities, particularly the vulnerable poor and minority communities. [1]
8.	**Scope:** Drawing upon the ADB TA for Preventing HIV/AIDS on Road Projects in Yunnan Province, specific project elements for each road transport project in the GMS may include the following: (i) advocacy actions on HIV/AIDS and STIs organized through workshops targeting local resident communities in the project area, including contractors involved in road construction, transport enterprises; (ii) design of an HIV/AIDS information campaign to be imp[lamented along the road during the operation phase; (iii) information and education campaigns on prevention of HIV/AIDS and STIs through (a) posters, pamphlets, launch events, and focus group discussions at construction worksites and in local communities; (b) training of peer educators to be selected from construction workers, CSWs, and local communities; and (c) condom distribution; (iv) provision of comprehensive HIV/AIDS medical packages to construction workers and local communities, including voluntary testing and counseling (VTC), training of health workers in STI management and VTC, and introduction of improved STI treatment and VTC protocols following least-cost methodologies;[2] and

[1] "Inspiration" provided by Asian Development Bank, *Technical Assistance to the People's Republic of China for Preventing HIV/AIDS on Road Projects in Yunnan Province*, TAR: PRC 36399, July 2003, p. 4.

[2] A more holistic project may be considered; in other words, rather than focusing on HIV/AIDS, additional health services could be provided (e.g., blood pressure management, glucose testing), so that the individual feel less stigmatized for seeking health services. See, e.g., Horizons Report, Operations Research on HIV/AIDS, Southern Brazil – "Health on the Road" – Designing HIV.AIDS Programs for Truck Drivers, June 2004.

	(v) a project performance and monitoring system, with monitoring indicators to include measures of sexual behavior and treatment seeking.[1] It may also be helpful to encourage payment schemes for construction workers, drivers, and other crew members whereby a portion of their payment is made at their home bases rather than at the point of delivery, to reduce susceptibility to high-risk behavior (as well as reducing incentives for theft).[2]
9.	**Estimated Cost:** As a benchmark, consider that for a large road construction project, such as, e.g., the US$250 million Western Yunnan Roads Development Project, US$1 million was provided for technical assistance; additional project costs may be required for certain implementation elements.
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public (from ADB TA funds and from other development partners)
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2006-2015 (the need for the project will be continuous throughout the planning horizon)
13.	**Executing/Implementation Agency and Contact Persons:** Executing Agencies: Transport/Communications and Public Health Ministries of the six GMS countries **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** The Project will result in a decrease in poverty incidence by reducing the risk of transmission of HIV/AIDS and other STIs that may result from road projects. Specific beneficiaries will include road construction workers, CSWs, truck drivers and other crew members, and local communities, including vulnerable poor and minority communities.

[1] Asian Development Bank, *Technical Assistance to the People's Republic of China for Preventing HIV/AIDS on Road Projects in Yunnan Province*, TAR: PRC 36399, July 2003, pp. 4, 11-17.
[2] See United Nations Development Programme and South East Asia HIV and Development Project, *Building an Alliance with Transport Sector in HIV Vulnerability Reduction*, March 2001, Example 4.

15.	**Social and Environmental Issues:** To the extent that it assures reduces HIV/AIDS and other STIs, the project will have a positive public health impact. The project is not expected have significant environmental impacts.
16.	**Priority of Project/TA:** **** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** The TA seeks to replicate the ongoing TA for Preventing HIV/AIDS on Road Projects in Yunnan Province in other areas of the GMS.
19.	**Pre-feasibility Study (Completed/Required):** Not applicable
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.
21.	**Issues/Constraints:** There are a number of assumptions/risks related to implementation of the technical assistance project, e.g., commitments by national and provincial health and communications departments are followed through, project components do not cause negative reactions, selected peer educators are welcomed by target groups, construction companies facilitate information sessions and allow workers to attend training courses.[1] In addition to the proposed project, consideration may be given to going beyond a typical public health sector oriented approach, toward an approach that seeks to avert the potential number of HIV/AIDS infections and other STIs due to improvement in the transport system itself. Consider, for example, that one benefit of reducing the need for transshipment and reducing waiting times at borders is to reduce the demand for commercial sex.[2]

[1] Asian Development Bank, *Technical Assistance to the People's Republic of China for Preventing HIV/AIDS on Road Projects in Yunnan Province*, TAR: PRC 36399, July 2003, Appendix 1, last column, pp. 6-9.

[2] See, e.g., United Nations Development Programme and South East Asia HIV and Development Project, *Building an Alliance with Transport Sector in HIV Vulnerability Reduction*, March 2001.

FOR ADB USE ONLY

Sector	*Transportation and Communication/Public Health*
Subsector	*Road Transport*
Themes	*Regional Cooperation*
GMS Theme	*Connectivity and Community*

PROJECT/TA CONCEPT PROFILE[1]

1.	**Project Name (Number):** Road Maintenance Initiatives for Cambodia, Lao PDR, Myanmar, and Viet Nam (TAP 16)
2.	**Loan or TA:** Advisory Regional Technical Assistance
3.	**Project Location**: GMS-part
4.	**Countries Involved:** Cambodia, Lao PDR, Myanmar, and Viet Nam
5.	**Sector/Subsector:** Transportation/Roads
6.	**Background and Rationale:** As with many other areas, road maintenance practices in the GMS countries vary widely with the result that the current and projected network will never be a homogenous entity but rather comprises roadway facilities in various stages of disrepair depending on disparate financing, technical, management, and operational conditions for their continuing contribution to both economic development and poverty alleviation. Within that overall variation, however, there are also radical differences in maintenance standards and hence road conditions as between the more developed countries and less developed GMS countries. Those differences are reflected in concerns expressed by shippers in the more advanced countries as to the additional costs associated with poorly maintained roads in other GMS countries. Addressing that imbalance as between road conditions in GMS countries will therefore support the prime objective of reducing transportation costs, while simultaneously contributing to poverty alleviation and, by enhancing the connectivity of the network, provide meaningful stimuli to: subregional, national, and provincial economic growth. But focusing on road maintenance needs in ADB's Developing Member Countries is not merely a question of providing the necessary funding, but it also requires that such funds are disbursed effectively and efficiently within the context of a well-defined, prioritized, and consistent maintenance framework.

[1] Useful sources for this Project Profile included: (i) Initiating Paper on a GMS Visa System, prepared for the Asian Development Bank, February 2004; (ii) Discussion of the Visa Issue for Border Crossing of People Not Engaged in Transport Operations, prepared for the Asian Development Bank, 2004; (iii) Asia Pacific Projects, *Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Draft Report, Annex Volume*, 7 March 2005, especially pp. 127-30; and (iv) United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), Asian Development Bank (ADB), and Agency for Coordinating Mekong Tourism Activities (AMTA), 16th Meeting of the Working Group on the Greater Mekong Subregion Tourism Sector, Report, 25-27 Siem Reap, March 2005, paragraphs 56-62.

7.	**Objective(s):** To establish road maintenance regimes in the less developed countries of GMS that will provide the support needed to bring maintenance practice up to the standard of the more developed GMS countries.
8.	**Scope:** The technical assistance will seek to identify, specify, facilitate, and formulate action proposals for the best sustainable road maintenance framework applicable for Viet Nam, Cambodia, Lao PDR, and (possibly) Myanmar. Specifically, such determination will focus on optimal funding arrangement (Road Maintenance Fund or RMF, self reliance, or combinations thereof), planning, prioritization, implementation and technical standards required of the programs, institutional, and human resource development (HRD) implications. However, previous experience suggests that frameworks for the promotion of sustainability are the critical elements of these initiatives and as such the TA will identify the optimal structuring and agenda for change to meet identified status and conditions in individual countries the core requirement being to establish understanding and commitment beyond the period of the TA through such mechanisms as transformation forums, dialogue between/among countries, and information exchange and recommendations on the required flexible support from Development Agencies. The sustainability requirement will need to be further supported by specification of monitoring and assessment procedures, methodologies for the identification and application of remedial measures as may be necessary, and consistent stakeholder involvement. Work to be undertaken under the TAP will further include the necessary institutional and HRD components as may be appropriate at the time of TA provision.
9.	**Estimated Cost:** US$1,500,000 for technical assistance
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public; although private sector participation will be a critical component of subsequent facilitation assistance.
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2007-2009
13.	**Executing/Implementation Agency and Contact Persons:** National Departments of Roads/ Ministry of Transport

	ADB Contact Division/Person: Mekong Department, Infrastructure Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries**: The technical assistance is expected to reduce transport costs and make more effective use of existing road inventory this contributing to both economic growth and poverty alleviation. The project is expected to produce net economic/financial benefits, and: (i) it will provide tangible benefits at subregional, national, and provincial levels; (ii) continuity of financing and commitment will have a compound impact; and (iii) poverty alleviation impact will be significant. These economic/financial benefits may be measured by comparing reduction in transport costs and contributions to economic growth at the various levels. The direct benefits from the project, from reduced operating costs and improved product availability, will accrue to all GMS countries.
15.	**Social and Environmental Issues**: The project is not expected to have significant impact on the natural, cultural, and social environment, except to the extent that it results in increased road traffic. Appropriate traffic management measures should be implemented as appropriate. The project will help alleviate poverty indirectly to the extent that employment is created in the roads sector.
16.	**Priority of Project/TA:** ** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** Requests made at interim workshops are reflected by this proposed TA.
19.	**Pre-feasibility Study (Completed/Required):** Required

20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the Project.
21.	**Issues/Constraints:** Sustainability is the prime issue and as such it will be critical to acquire support from all GMS countries on a long-term basis. At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, Viet Nam. Viet Nam emphasized the importance of asset maintenance, particularly in the long-term, and suggested its more substantial consideration in the proposed strategy. The consultants concurred and mentioned that technical assistance projects concerning maintenance, e.g., this TAP providing for Road Maintenance Initiatives for Cambodia, Lao PDR, Myanmar, and Viet Nam. The Co-Chair noted the discussion during the 9th Subregional Transport Forum Meeting in Beijing about sharing of Thai expertise on road maintenance with other GMS countries.

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*Road Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Competitiveness*

PROJECT/TA CONCEPT PROFILE[1]

1.	**Project Name (Number):** Private Sector Participation in Road Maintenance (TAP 17)
2.	**Loan or TA:** Advisory Regional Technical Assistance
3.	**Project Location**: GMS wide
4.	**Countries Involved:** All GMS Countries
5.	**Sector/Subsector:** Transportation/Roads
6.	**Background and Rationale:** In many of the GMS countries roads maintenance presents a serious constraint in network effectiveness – and even in the more developed member nations, road maintenance comprises a heavy burden on the national budget – one that is all too frequently deferred in the context of more "pressing" expenditure. Private sector participation (PSP) therefore represents a potential solution not just in terms of bridging the financing gap but also as a means of facilitating the realization of efficiency gains, broadening the revenue base in the context of direct tolling, and re-allocating risk between parties best equipped to bear it. Prior to Asia's financial crisis in 1997 in response to these potential benefits, while there were difficulties, some advances were being made in structuring PSP in the road maintenance sector. With the advent of subsequent doubts as to the investment climate, the process has stagnated and sustainable progress has not been realized at a significant level. With the enhancement of the GMS road network now reaching fruition, it is appropriate to lay the foundations for effective and sustainable road maintenance with a clear focus on PSP.

[1] Useful sources for this Project Profile included: (i) Mekong River Commission, *MRC Navigation Programme*, Introduction and Volumes 1-5, December 2003; (ii) Mekong River Commission, *MRC Navigation Strategy*, August 2003; (iii) Mekong River Commission ([Captain] Lieven Geerinck, Navigation Programme Manager), Incorporation of Navigation into the Integrated Water Resources Development and Management Strategy (IWRDM), January 2005; and (iv) Mekong River Commission, Consultancy Services for the Design of the Master Plan for Waterborne Transportation on the Mekong River System – Invitation to Submit Technical/Financial Offers, project financed by Belgian Technical Cooperation, 8 June 2005. The last-named source was especially useful in providing "inspiration" for formulating this TAP.

7.	**Objective(s):** To promote economic efficiency by establishing road maintenance procedures which focus on proactive private sector participation.
8.	**Scope:** The project will assist Governments in the following areas identified as prerequisite for effective PSP, focusing initially on the road maintenance sub-sector: (i) Prepare the environment and procurement process for PSP including an appropriate PSP legal framework and securing competition for and within the market through appropriate regulatory instruments, concession agreements; (ii) Broaden the understanding of the range of PSP options that exist in the road sector; (iii) Assist with transport strategy formation that must be consistent with stakeholder aspirations, identifies the package of policies and priority projects that best promote development objectives, and specifically highlights apt PSP project potentials; and (iv) Assist in identifying priority projects as test cases for further elaboration. In each case the TA would take the form of advisory assistance to national road authorities with experience gained in one country being used as the basis for subsequent deployment in other countries – subject to localized needs.
9.	**Estimated Cost:** US$900,000 for technical assistance
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2007-2009
13.	**Executing/Implementation Agency and Contact Persons:** National Roads Authorities **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org

14. Estimated Benefits and Beneficiaries:

The project is expected to result in a liberalized market for road maintenance services, with resulting gains in economic efficiency.

The project is expected to produce net economic/financial benefits, as:

(i) sustainable road maintenance is undertaken at reduced cost and higher efficiency;
(ii) the road network is utilized over a prolonged period of time; and
(iii) material reductions occur in the burden on national budgets.

These economic/financial benefits may be measured by comparing productivity and costs on a "with and without" project basis.

The direct benefits from the project, from reduced operating costs and improved maintenance efficiency, will accrue to road users and taxpayers.

Indirect benefits will include: (i) road usage as a result of increased improved smoothness, (ii) improved government finances, due to increased tax revenues and reduced subsidies; (iii) increased employment; (iv) improved skill development in the roads sector; and (iv) increased industrial communication and regional economic integration.

15. Social and Environmental Issues:

The project is not expected to have significant impact on the natural, cultural, and social environment.

16. Priority of Project/TA (H/M/L):

** (see Chapter IX)

17. Project Status (Proposed/Ongoing/Completed):

Proposed

18. Status of Project/TA Preparation:

Technical assistance from ADB will be required.

19. Pre-feasibility Study (Completed/Required):

Required

20. Follow-up Actions Required:

Approval of the respective national ministries concerned.

Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the Project.

21. Issues/Constraints:

Primary difficulties will be experienced in ensuring an appropriate environment for PSP but the step-by-step approach to be adopted under the TAP will provide the groundwork for development of the required conditions.

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Sector	*Transportation and Communication*
Subsector	*Road Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Competitiveness*

PROJECT/TA CONCEPT PROFILE

1. Project Name (Number):

Revisiting of the Feasibility Study for the Singapore-Kunming [Nanning] Railway Link (TAP 18)

2. Loan or TA:

Project Preparation Technical Assistance

3. Project Location:

Existing and proposed railway lines in all GMS countries

4. Countries Involved:

All GMS countries

5. Sector/Subsector:

Transportation/Railway

6. Background and Rationale:

At present, the only cross-border railway passenger service within the GMS connects Beijing and Guangxi Zhuang Autonomous Region, PRC, with Lang Son Province and Hanoi, Viet Nam, which has been operating over the last ten years, with a current frequency of twice per week. The service takes about 33 hours with a fare of about US$260 equivalent for soft sleeper tickets. Cross-border railway passenger traffic is of the order of a few thousand per year (only) on the route. A railway service between Yunnan Province, PRC, and Lao Cai Province, Viet Nam, was discontinued a few years ago due to poor line quality; traffic was of the order of about 1,000 per year before discontinuation of the service.[1]

A useful basis for understanding the current subregional railway network in terms of cross-border traffic, present and potential, is the Feasibility Study for the Singapore-Kunming Rail Link undertaken by ASEAN and completed in November 2000.[2]

Forecasts of total freight and passenger traffic are presented on the next two pages.

[1] See, e.g., Japan International Cooperation Agency, *The Study on the National Transport Development Strategy in the Socialist Republic of Vietnam (VITRANSS), Technical Report No. 10, Rural Transport and Cross Border Transport*, July 2000, p. II-2-5.
[2] KTM, K.L. Consult, and Jurutera Perunding Zaaba Sdn BHd, *Feasibility Study for the Singapore-Kunming Rail Link, Final Report, Volume 1 – Report on Feasibility*, prepared for the Government of Malaysia, Ministry of Transport, November 2000.

Table 5.8: Forecasts of Freight Traffic (Tonne km) on SKRL Routes : Total Traffic

Baseline Scenario *(x 1,000)*

	2006		2015		2025		2035	
SKRL Routes & New Links	*Tonnes*	*Tonnes km*	*Tonnes*	*Tonnes km*	*Tonnes*	*Tonnes km*	*Tonnes*	*Tonnes km*
Route 1:								
i. CAN1	98.3	67,131.4	270.0	185,001.5	620.6	426,310.7	1,207.8	831,504.2
ii. CAN2, VTN1	45.3	28,722.1	155.9	98,976.7	419.1	265,999.1	971.8	616,122.7
iii. LAN2, LAN3 VTN2, VTN3	36.2	21,020.9	196.3	114,475.7	642.7	375,000.4	1,695.0	989,773.9
Route Total		*116,874.5*	*622.2*	*398,453.9*	*1,682.4*	*1,067,310.2*	*3,874.6*	*2,437,400.7*
Route 2A:								
i. THN1, MYN1	69.7	124,157.6	678.5	942,377.9	2,741.6	3,320,265.3	7,229.2	7,996,015.2
ii. MYN2, CHN1	79.9	130,471.7	382.8	645,411.0	1,298.6	2,210,285.7	4,257.7	7,560,711.2
Route Total		*254,629.3*	*1,061.3*	*1,587,788.9*	*4,040.2*	*5,530,551.1*	*11,486.8*	*15,556,726.3*
Route 3A:								
i. LAN1	83.4	46,956.1	350.7	203,960.7	1,114.6	665,749.5	2,907.4	1,778,935.8
ii. LAN2, LAN3 VTN2, VTN3	36.2	21,020.9	196.3	114,475.7	642.7	375,000.4	1,695.0	989,773.9
Route Total		*67,977.1*	*547.0*	*318,436.4*	*1,757.3*	*1,040,749.9*	*4,602.4*	*2,768,709.7*
Route 3B:								
i. LAN1	75.1	66,742.8	312.8	276,199.1	1,030.4	881,142.5	2,773.0	2,283,665.3
ii. LAN4, CHN2	5.1	6,414.1	33.3	42,129.3	95.8	121,355.1	199.7	252,735.4
Route Total		*73,156.9*	*346.0*	*318,328.4*	*1,126.2*	*1,002,497.6*	*2,972.6*	*2,536,400.7*
Route 3C:								
i. THN2, LAN5	78.8	47,978.5	347.2	219,695.6	1,117.1	751,441.2	2,916.2	2,085,268.1
ii. LAN6, VTN4	36.9	15,021.2	215.4	87,776.1	700.0	277,017.0	1,623.4	606,074.0
Route Total		*62,999.7*	*562.6*	*307,471.7*	*1,817.1*	*1,028,458.2*	*4,539.6*	*2,691,342.1*
Route 3D:								
i. THN3, LAN7	78.8	44,876.5	347.2	202,473.7	1,117.1	667,121.5	2,916.2	1,781,913.3
ii. LAN6, VTN 4	36.9	15,021.2	215.4	87,776.1	700.0	277,017.0	1,623.4	606,074.0
Route Total		*59,897.7*	*562.6*	*290,249.8*	*1,817.1*	*944,138.5*	*4,539.6*	*2,387,987.2*

Source: KTM, K.L. Consult, and Jurutera Perunding Zaaba Sdn BHd, *Feasibility Study for the Singapore-Kunming Rail Link, Final Report, Volume 1 – Report on Feasibility*, prepared for the Government of Malaysia, Ministry of Transport, November 2000, Table 5-8.

Table 6.3.4(a): Forecast of Total Passenger Traffic* on SKRL Routes, By Source of Traffic

Baseline Scenario (million passenger-km)

SKRL Routes & New Rail Links	2006 IC	2006 CB	2006 *Total*	2015 IC	2015 CB	2015 *Total*	2025 IC	2025 CB	2025 *Total*	2035 IC	2035 CB	2035 *Total*
Route 1:												
i. CAN1	1.02	0.38	*1.40*	3.73	0.80	*4.53*	14.93	1.70	*16.63*	59.66	3.12	*62.78*
ii. CAN2, VTN1	2.23	1.88	*4.11*	8.51	4.04	*12.56*	35.75	9.21	*44.96*	151.88	18.00	*169.88*
iii. LAN2, LAN3 VTN2, VTN3	0.77	0.45	*1.22*	2.87	1.01	*3.88*	11.78	2.35	*14.12*	48.60	5.29	*53.90*
Total Pass-km	*4.03*	2.71	*6.74*	*15.12*	5.85	*20.97*	*62.45*	13.26	*75.72*	*260.14*	26.41	*286.53*
Route 2:												
i. THN1, MYN1	0.79	0.81	*1.60*	2.84	1.56	*4.39*	11.29	2.89	*14.18*	44.99	4.63	*49.63*
ii. MYN2, CHN1	0.14	3.17	*3.31*	0.58	5.44	*6.02*	2.58	9.25	*11.83*	12.56	13.89	*26.45*
Total Pass-km	*0.93*	3.99	*4.91*	*3.42*	6.99	*10.41*	*13.86*	12.14	*26.00*	*57.56*	18.52	*76.08*
Route 3A:												
i. LAN1	0.82	0.01	*0.83*	3.00	0.02	*3.01*	12.05	0.04	*12.09*	45.58	0.09	*45.67*
ii. LAN2, LAN3 VTN2, VTN3	0.77	0.45	*1.22*	2.87	1.01	*3.88*	11.78	2.35	*14.12*	48.60	5.29	*53.90*
Total Pass-km	*1.59*	0.46	*2.05*	*5.87*	1.02	*6.89*	*23.83*	2.38	*26.22*	*97.19*	5.38	*102.57*
Route 3B:												
i. LAN1	1.15	0.01	*1.16*	4.13	0.02	*4.15*	16.39	0.04	*16.43*	64.77	0.09	*64.86*
ii. LAN4, CHN2	0.10	0.57	*0.67*	0.43	0.98	*1.41*	1.91	2.04	*3.95*	9.30	4.81	*14.11*
Total Pass-km	*1.25*	0.58	*1.83*	*4.56*	0.99	*5.56*	*18.30*	2.08	*20.38*	*74.07*	4.90	*78.96*
Route 3C:												
i. THN2, LAN5	1.29	0.55	*1.84*	4.72	1.04	*5.76*	18.89	2.31	*21.20*	75.63	5.53	*81.15*
ii. LAN6, VTN4	0.71	0.20	*0.92*	2.66	0.41	*3.07*	10.91	0.93	*11.85*	45.04	2.11	*47.15*
Total Pass-km	*2.00*	0.76	*2.76*	*7.38*	1.45	*8.83*	*29.80*	3.25	*33.05*	*120.67*	7.63	*128.30*
Route 3D:												
i. THN3, LAN7	0.96	0.50	*1.47*	3.52	0.95	*4.47*	14.10	2.12	*16.22*	56.46	5.06	*61.52*
ii. LAN8, VTN4	0.71	0.20	*0.92*	2.66	0.41	*3.07*	10.91	0.93	*11.85*	45.04	2.11	*47.15*
Total Pass-km	*1.67*	0.71	*2.39*	*6.18*	1.36	*7.54*	*25.01*	3.05	*28.06*	*101.50*	7.16	*108.67*

* Total Passenger Traffic comprises Cross-Border (CB) and Inter-Country Passengers (IC), inclusive of foreign tourists along SKRL Routes.

Source: KTM, K.L. Consult, and Jurutera Perunding Zaaba Sdn BHd, *Feasibility Study for the Singapore-Kunming Rail Link, Final Report, Volume 1 – Report on Feasibility*, prepared for the Government of Malaysia, Ministry of Transport, November 2000, Table 6-4(a).

7. Objective(s):

To facilitate exchange and development between and among the GMS countries.

8. Scope:

The critical constraint on the development of cross-border railway transport in the GMS relates to hardware or infrastructure, with a number of missing links (see the figure below). Forecasts of cross-border traffic in terms of passengers and passenger-km prepared by the Feasibility Study indicate that passenger traffic will be relatively light and insufficient to attract commercial investment due to the low incomes of the catchment population and the long travel times. Demand for cross-border travel involving Cambodia, the PRC, Lao PDR, Myanmar, and Viet Nam is expected to be low in the period from 2006-2015, i.e., the time horizon of the current study. The construction of new links is not expected to result in much additional cross-border rail travel, except for some commuter traffic over shorter distances, between Cambodia and Thailand, and between Cambodia and Viet Nam. Even over the 30-year time horizon of the Feasibility Study for the Singapore-Kunming Rail Link (to 2035), the volume of passenger travel generated by the study routes is expected to be low in relation to total passenger traffic carried by existing national railways operating in the region.

Nevertheless, particularly in view of potential freight traffic, a revisiting of the Feasibility Study for the Singapore-Kunming Railway Link in the latter part of the study time horizon (i.e., 2010-2015, say 2012-2013) is recommended. This new Feasibility Study could be undertaken at an earlier date, depending on the results of preliminary

assessment studies to be undertaken in subsequent stages of the ongoing GMS Transport Sector Strategy TA. Connections with Guangxi Zhuang Autonomous Region should also be explored, so that project may be newly considered as the Singapore-Kunming/Nanning Rail Link Project.

9. Estimated Cost:

US$2 million

10. Financing Plan and Financing Arrangement (Public/Private):

Public

11. Financing Status:

Proposed for financing

12. Proposed Implementation Period/Schedule:

In the latter part of the study time horizon (i.e., 2010-2015, say 2012-13)

13. Executing/Implementation Agency and Contact Persons:

Royal Railway of Cambodia (Cambodia), Ministry of Railways, Yunnan Province, and Guangxi Zhuang Autonomous Region (PRC); Railway Authority, Ministry of Communication, Transport, Post and Construction (Lao PDR); Myanma Railways, Ministry of Rail Transportation (Myanmar); State Railway of Thailand, Ministry of Transport (Thailand); and Vietnam Railways, Ministry of Transport (Viet Nam)

ADB Contact Division/Person:

Mekong Department, Infrastructure Division
Email: gms@adb.org

14. Estimated Benefits and Beneficiaries:

The Project would result in reduced transport costs relative to road transport, benefiting direct and indirect railway users.

15. Social and Environmental Issues:

The project may have social and environmental impacts during construction and/or during operation. Potential adverse impacts to be considered include spoil disposal, soil erosion, air pollution, water pollution, noise and vibration, solid waste, as well as land acquisition, population resettlement, and induced impacts.[1] Detailed mitigation measures would need to be examined, along with alternatives to the Project and project alternatives. An environmental management and monitoring plan would need to be developed.

All stakeholders must be consulted by governments, e.g., persons living near the railway alignments and in the catchment areas, shippers.

[1] See, e.g., *Summary Environmental Impact Assessment, Dali-Lijiang Railway Project in the People's Republic of China*, July 2004.

16.	**Priority of Project/TA:** * (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** The earlier feasibility study was completed in November 2000. Under the Initiative for ASEAN Integration (IAI), a Korean International Cooperation Agency (KOICA) study is examining CMLV [Cambodia, Lao PDR, Myanmar, and Viet Nam] railway initiatives. At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, it was noted that under the ASEAN Transport Ministers Meeting and ASEAN-Mekong Basin Development Cooperation, there is a sub-working group on railways and a special working group on SKRL project, respectively. They have identified cooperation with ADB and the PRC as key with respect to completion of the Singapore-Kunming Rail Link project.
19.	**Pre-feasibility Study (Completed/Required):** Required
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary feasibility studies and implement the Project.
21.	**Issues/Constraints:** Critical constraints include: (i) the likelihood of sufficiently high demand, passenger and/or freight, to justify new railway links; (ii) the need for institutional strengthening to improve the efficiency of railway management and operations in the countries served by the project; (iii) assuming a routing through Lao PDR, determining the operational control of that part of the Project within Lao PDR, which currently has no railways; and (iv) cooperation among the countries in the timing of construction.

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Sector	*Transportation and Communication*
Subsector	*Railway*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

PROJECT/TA CONCEPT PROFILE[1]

1.	**Project Name (Number):** Upper (Lancang-)Mekong River Maintenance Improvement and Management Project (TAP 19A [2] and D21), including Channel, Navigation, and Port Improvements on the Lancang and Mekong and Development of an Intermodal Terminal at Khone Falls (C3.2-1)
2.	**Loan or TA:** TA with subsequent loan
3.	**Project Location:** Upper Lancang and Mekong Rivers
4.	**Countries Involved:** PRC, Lao PDR, Myanmar, and Thailand
5.	**Sector/Subsector:** Transportation/Inland Waterway
6.	**Background and Rationale:** The Lancang-Mekong River is the potentially significant artery for cross-border inland water transport in the GMS.[3] Navigation on the river may be divided into major segments: (i) an upper segment, suitable for only inland navigation, from the PRC port of Simao to Kompong Cham in Cambodia (although there is no through traffic between Cambodia and Lao PDR because of the impassable Khone Falls in southern Lao PDR),[4] and from Kompong Chnnang to the Great [Tonlé Sap] Lake in Cambodia; and (ii) a lower segment, suitable both for inland and maritime navigation, from Kompong Cham to the sea and from Kampong Chnnang to the sea via the Mekong, Bassac, and Tonlé Sap rivers. **This Project Profile concerns the upper segment of the river.** While cross-border passenger transport along the Lancang-Mekong River is rather limited at present, there is domestic passenger travel along the river is of some importance in Lao PDR. Available passenger statistics in the upper

[1] This Project Profile draws particularly upon Asia Pacific Projects, *Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Draft Report, Annex Volume*, 7 March 2005, pp. 41-43. Also see Les M. Lumsdon and Stephen Page (eds.), *Tourism and Transport: Issues and Agenda for the New Millennium*, 2003.

[2] At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, Viet Nam suggested separating the upstream and downstream components of the Lancang-Mekong River Improvement Project. Summary of Proceedings, Appendix 11, paragraph 37.

[3] Cross-border passenger traffic on other international rivers in the GMS (e.g., the Red River) is not expected to be significant in the period to 2015.

[4] Prior to 1925, goods were transshipped over Khone Island by means of a 5 km railway to a point downstream of the falls. The ruins of this transshipment facility, including a slipway with a hauling winch at one end and a gantry crane at the other end, can still be seen at the site.

portions of the (Lancang-)Mekong River are shown in the following table. The Mekong River Commission (MRC) has concluded that passenger traffic data on the Lancang-Mekong River is insufficient and accordingly have called for systematic collection of this data.

While existing cross-border passenger flows along the Upper (Lancang-) Mekong River have been small, there is potential for relatively large passenger flows. One MRC document cited possible traffic along the Upper Lancang-Mekong River corridor as 400,000-500,000 by 2010, while officials of the Yunnan Provincial Navigation Affairs Bureau has expectations of passenger traffic of 1 million passengers per year in the next 5-10 years. [1]

Passenger Transport Flows along the Upper (Lancang-)Mekong River

Section	Annual Passengers (m)	Annual Passenger-Km
PRC-southern points-PRC	0.02 (2004)	NA
Lao PDR, domestic	1.8 (2000)	72.8 (2000)
Thailand-Lao PDR-Thailand	0.2 (2001)	0.4 (2001)

Source: Interviews conducted for this study and [Captain] Lieven Geerinck [Navigation Programme Manager, Mekong River Commission], Incorporation of Navigation into the Integrated Water Resources Development and Management Strategy, January 2005, p. 13.

Freight traffic is not yet well developed along the Upper (Lancang-)Mekong River, although rapid growth in freight traffic has been observed between Thailand and the PRC, up to 40% per year. Available data on freight traffic along Upper (Lancang-)Mekong River appears below.

Freight Transport Flows along the Upper (Lancang-)Mekong River

Section	Annual Metric Tons (m)	Annual Metric Ton-Km
Thailand-PRC-Thailand	0.4 (2001)	200.0
Lao PDR, domestic	0.7 (2000)	58.9 (2000)
Thailand-Lao PDR-Thailand	1.5 (2001)	2.9 (2001)

Source: Interviews conducted for this study and [Captain] Lieven Geerinck [Navigation Programme Manager, Mekong River Commission], Incorporation of Navigation into the Integrated Water Resources Development and Management Strategy, January 2005, p. 13.

7. Objective(s):

To facilitate exchange and development between and among the Upper (Lancang-) Mekong River countries.

8. Scope:

Consistent with Component 3 of the MRC Work Programme (Traffic Safety and Environmental Sustainability), an Upper (Lancang-)Mekong River

[1] Globally, river cruises are quite popular, e.g., on the Rhine, Donau, Po, Seine, Volga, Nile, Mississippi, Murray, and Yangtze (Changjiang) rivers.

	Improvement Project should be implemented mainly to address safety/efficiency constraints and provide necessary infrastructure to support the GMS Tourism Sector Strategy. Specific components[1] to be included in the project include the following: (i) development of river-based infrastructure, including channel, navigation, and port improvements, among other things to address the requirements of the Mekong World Tourism Corridor – An Endless Stream of Tourism Cooperation Project, Strategic Project 2.2 of the GMS Tourism Sector Strategy TA[2]; (ii) installation of navigation aids that meet adequate safety, and implementation of efficiency standards, and perhaps to allow for night navigation; (iii) development of an intermodal terminal at the Khone Falls in southern Lao PDR; and (iv) improvement of maintenance, through the development of a maintenance fund.[3]
9.	**Estimated Cost:** US$5 million
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2006-2010, i.e., consistent with the timetable proposed for Component 3 of the MRC Work Programme (Traffic Safety and Environmental Sustainability; 2004-2009) and the timetable proposed for Strategic Project 2.2 of the GMS Tourism Sector Strategy TA (2006-2010).
13.	**Executing/Implementation Agency and Contact Persons:** Ministry of Communications, Yunnan Province Bureau of Communications (PRC); Ministry of Communication, Transport, Post and Construction (Lao PDR); and Directorate of Water Resources and Improvement of River System (DWIR) under Ministry of Transport (Myanmar) – all of which have established the Joint Committee on Coordination of Commercial Navigation (JCCCN)

[1] More specific components will be defined during the recommended technical assistance project.
[2] Asia Pacific Projects, *Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Draft Report, Annex Volume*, 7 March 2005, pp. 46-48.
[3] At the Final Meeting on the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006, Mr. Silpachai Jarukasemratana, Thailand, suggested that ADB consider financial support for the establishment of the maintenance fund. Summary of Proceedings, paragraphs 21 and 27.

	ADB Contact Division/Person: Mekong Department, Infrastructure Division Email: gms@adb.org **Mekong River Commission[1] Contact Division/Person** Captain Lieven Geerinck, Operations Division, Navigation Programme Manager Email: geerinck@mrcmekong.org
14.	**Estimated Benefits and Beneficiaries:** The Project would result in reduced transport costs relative to road transport, benefiting direct and indirect waterway users.
15.	**Social and Environmental Issues**: The Project may have complex environmental impacts (e.g., with respect to river ecology, air pollution from motorized river vessels, waste emissions from port facilities, impacts on local forests) and these impacts need to be reviewed carefully,[2] and all stakeholders thoroughly consulted.[3]
16.	**Priority of Project/TA:** *** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** Technical assistance required for proper project preparation
19.	**Pre-feasibility Study (Completed/Required):** Further feasibility and environmental studies required; see earlier footnote referring to technical assistance for Design of the Waterborne Transport on the Mekong River System

[1] The MRC is the leading repository of data and expertise relating to the Mekong River, and as such, through its Navigation Programme, is uniquely positioned to lead implementation of projects relating to the inland waterway transport along the River.
[2] At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, Thailand Viet Nam stressed environmental concerns about upstream improvements. Summary of Proceedings, appendix 11, paragraphs 31 and 37.
[3] For a project recently implemented on the upper reaches, an environmental impact assessment formally known as The Report on Environmental Impact, the Navigation Channel Improvement of the Lancang-Mekong River from China-Myanmar Boundary Marker 243 to Ban Houei Sai of Lao PDR, was completed in September 2001, but it was criticized by NGOs and others (see, e.g., Milton Osborne, *River at Risk: The Mekong and the Water Politics of China and Southeast Asia*, Lowry Institute Paper 02, 2004). On 12 May 2004, a four-country expert group signed a joint final working report for the Project, which concluded that implementation was conducted according to the requirements specified in the EIA Report approved by the governments of the four countries, and there were no negative environmental impacts as the required environment protection measures had been taken.

20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the Project.
21.	**Issues/Constraints:** Satisfactory resolution of environmental issues is required before implementation.[1] With respect to environmental studies, however, as noted by the MRC, river transport improvement projects should be held to the same standards (neither higher nor lower) as those applied to transport projects in other subsectors (e.g., road, rail). Nonphysical barriers to cross-border inland water transport (e.g., lack of common navigation rules, inefficient customs and immigration procedures) are significant and need to be addressed; see TAP-5, Project To Establish a Legal Framework for Cross-Border Navigation on the Mekong River [“Navigation Without Frontiers”, a motto adopted by the Mekong River Commission].

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Sector	*Transportation and Communication*
Subsector	*Inland Waterway*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

[1] Thailand and Viet Nam stressed the importance of environmental improvement issues regarding navigation projects during the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005. Summary of Proceedings, Appendix 11, paragraphs 31 and 37.

PROJECT/TA CONCEPT PROFILE

1. Project Name (Number):

Lower Mekong River Navigation Improvement and Maintenance Project (TAP 19B[1] and D21), including Channel, Navigation, and Port Improvements on Mekong and for Access to Port at Siem Reap; and Development of a Floating Port on the Hamluong River (C3.2-3)

2. Loan or TA:

TA with subsequent loan

3. Project Location:

Lower Mekong River

4. Countries Involved:

Cambodia and Viet Nam

5. Sector/Subsector:

Transportation/Inland Waterway

6. Background and Rationale:

The Lancang-Mekong River[2] is the potentially significant artery for cross-border inland water transport in the GMS.[3] Navigation on the river may be divided into major segments: (i) an upper segment, suitable for only inland navigation, from the PRC port of Simao to Kompong Cham in Cambodia (although there is no through traffic between Cambodia and Lao PDR because of the impassable Khone Falls in southern Lao PDR),[4] and from Kompong Chnnang to the Great [Tonlé Sap] Lake in Cambodia; and (ii) a lower segment, suitable both for inland and maritime navigation, from Kompong Cham to the sea and from Kampong Chnnang to the sea via the Mekong, Bassac, and Tonlé Sap rivers. **This Project Profile concerns the lower segment of the river.**

While cross-border passenger transport along the Mekong River is rather limited at present, there is a well-developed domestic passenger transport

[1] At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, Viet Nam suggested separating the upstream and downstream components of the Lancang-Mekong River Improvement Project. Summary of Proceedings, Appendix 11, paragraph 37.

[2] The name “Lancang-Mekong” has been used to refer to the river in its entirety or in the upper reaches, while the term “Mekong” alone has been used to refer to the lower portions of the river.

[3] Cross-border passenger traffic on other international rivers in the GMS (e.g., the Red River) is not expected to be significant in the period to 2015.

[4] Prior to 1925, goods were transshipped over Khone Island by means of a 5 km railway to a point downstream of the falls. The ruins of this transshipment facility, including a slipway with a hauling winch at one end and a gantry crane at the other end, can still be seen at the site.

	system in the Mekong delta. Available passenger statistics indicate annual (2001) flows of 0.2 million passengers and 54.3 million passenger-km in Cambodia and 86.0 million passengers and 1,292.1 million passenger-km in Viet Nam. There are some notable services that have been initiated by private operators such as a tourist passenger boat service between Siem Reap and Ho Chi Minh City. The Mekong River Commission (MRC) has concluded that passenger traffic data on the Mekong River is insufficient and accordingly have called for systematic collection of this data. Freight traffic along the Mekong is concentrated in southern Viet Nam and Cambodia, where the transport system is based on a dense and efficient network of navigable waterways. Traffic in the Mekong Delta has been growing at a sustained rate of 10% per year. With Cambodia's accession to the World Trade Organization in October 2004, the link between Phnom Penh and the sea via the Mekong Delta has become more important.[1] Available data on freight traffic along Mekong indicate annual (2001) flows of 0.5 million tons and 53.2 million ton-km in Cambodia and 21.8 million tons and 2,316.5 million ton-km in Viet Nam.[2]
7.	**Objective(s):** To facilitate exchange and development between and among the Lower Mekong countries.
8.	**Scope:** Consistent with Component 3 of the MRC Work Programme (Traffic Safety and Environmental Sustainability), a Lower Mekong River Improvement Project should be implemented mainly to address safety/efficiency constraints and provide necessary infrastructure to support the GMS Tourism Sector Strategy. Specific components[3] to be included in the project include the following: (i) development of river-based infrastructure,[4] including channel, navigation, and port improvements, among other things to address the requirements of the Mekong World Tourism Corridor – An Endless Stream of Tourism Cooperation Project, Strategic Project 2.2 of the GMS Tourism Sector Strategy TA[5]; (ii) installation of navigation aids that meet adequate safety, and implementation of efficiency standards, and perhaps to allow for night navigation;

[1] Design of the Waterborne Transport on the Mekong River System, an ongoing technical assistance project under the auspices of the MRC, is seeking ways to improve the rural, domestic, and international transport networks using the Mekong River System in Cambodia.
[2] Data on passenger and freight traffic from [Captain] Lieven Geerinck [Navigation Programme Manager, Mekong River Commission], *Incorporation of Navigation into the Integrated Water Resources Development and Management Strategy*, January 2005, p. 13.
[3] More specific components will be defined during the recommended technical assistance project.
[4] At the Final Meeting of the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006, H.E. Mr. Chhin Kong Hean, Cambodia, stated that there should be provision for the development of more river ports along the Mekong River.
[5] Asia Pacific Projects, *Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Draft Report, Annex Volume*, 7 March 2005, pp. 46-48.

	(iii) improvement of maintenance, through the development of a maintenance fund; (iv) provision of access to a port at Siem Reap in northeastern Cambodia; and (v) development of a floating port on the Hamluong River in southern Viet Nam.
9.	**Estimated Cost:** US$10 million
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2006-2010, i.e., consistent with the timetable proposed for Component 3 of the MRC Work Programme (Traffic Safety and Environmental Sustainability; 2004-2009) and the timetable proposed for Strategic Project 2.2 of the GMS Tourism Sector Strategy TA (2006-2010).
13.	**Executing/Implementation Agency and Contact Persons:** Ministry of Public Works and Transport (Cambodia) and Ministry of Transport (Viet Nam) **Mekong River Commission[1] Contact Division/Person** Captain Lieven Geerinck, Operations Division, Navigation Programme Manager (Email: geerinck@mrcmekong.org) **ADB Contact Division/Person:** Mekong Department, Infrastructure Division (Email: gms@adb.org)
14.	**Estimated Benefits and Beneficiaries:** The Project would result in reduced transport costs relative to road transport, benefiting direct and indirect waterway users.

[1] The MRC is the leading repository of data and expertise relating to the Mekong River, and as such, through its Navigation Programme, is uniquely positioned to lead implementation of projects relating to the inland waterway transport along the River.

15. Social and Environmental Issues:

The Project may have complex environmental impacts (e.g., with respect to river ecology, air pollution from motorized river vessels, waste emissions from port facilities, impacts on local forests) and these impacts need to be reviewed carefully, and all stakeholders thoroughly consulted.

16. Priority of Project/TA:

*** (see Chapter IX)

17. Project Status (Proposed/Ongoing/Completed):

Proposed

18. Status of Project/TA Preparation:

Technical assistance required for proper project preparation

19. Pre-feasibility Study (Completed/Required):

Further feasibility and environmental studies required; see earlier footnote referring to technical assistance for Design of the Waterborne Transport on the Mekong River System.

20. Follow-up Actions Required:

Approval of the respective national ministries concerned.

Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the Project.

21. Issues/Constraints:

Nonphysical barriers to cross-border inland water transport (e.g., lack of common navigation rules, inefficient customs and immigration procedures) are significant and need to be addressed; see TAP-5, Project To Establish a Legal Framework for Cross-Border Navigation on the Mekong River ["Navigation Without Frontiers", a motto adopted by the Mekong River Commission].

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Sector	*Transportation and Communication*
Subsector	*Inland Waterway*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** GMS Airports Development Project (TAP 20)
2.	**Loan or TA:** Loans and Project Preparation Technical Assistance
3.	**Project Location:** Selected airports in the GMS
4.	**Countries Involved:** Most or all GMS countries
5.	**Sector/Subsector:** Transportation/Civil Aviation
6.	**Background and Rationale:** As noted in the 1993-94 GMS Subregional Transport Sector Study, air transport can play an important role in the economic development of the GMS. Air services linking the six countries with each other and with the rest of the world are necessary for two reasons (i) to allow business and professional persons to link with trading partners and with sources of capital and technology; and (ii) to facilitate (high-value) tourism, an important source of foreign exchange.[1] Air passenger growth in the Asia-Pacific region in general, and the GMS in particular, exceeds that of the world. Indicative airline passenger traffic growth rates in the GMS are summarized in the table below. Rapid growth in tourism arrivals is a major driver of the growth in air traffic in the GMS. Working Paper 9 of this TA, Traffic Forecast (2006-2015), will present a forecast of air passenger traffic (among other things) over the planning horizon of this TA. Major hardware developments in this environment of rapid air traffic passenger growth include the following: (i) Bangkok, already the largest air transport hub in the GMS, is aiming to serve as the air transport hub for all of Southeast Asia with the opening of the Second Bangkok International Airport (Suvarnabhumi Airport)[2] in

[1] PADECO Co., Ltd., *Regional Technical Assistance on Promoting Subregional Cooperation among Cambodia, the People's Republic of China, Lao PDR, Myanmar, Thailand, and Viet Nam – Subregional Transport Sector Study*, prepared for the Asian Development Bank, October 2004, p. 62.

[2] The New Bangkok International Airport Project, Project A4, was set out in the 1993-94 *GMS Subregional Transport Sector Study*. See PADECO Co., Ltd., *Regional Technical Assistance on_Promoting Subregional Cooperation among Cambodia, the People's Republic of China, Lao PDR, Myanmar, Thailand, and Viet Nam – Subregional Transport Sector Study*, prepared

2006, with capacity to accommodate up to 45 million passengers per year. Most operations will shift from the existing airport to the new airport, although low-cost airlines, chartered flights, and private aircraft may continue to use the existing facility.

(ii) Guangxi Zhuang Autonomous Region has plans to improve Nanning International Airport by extending the runway from 2,700 m to 3,200 m and building an additional 25,000 m^2 terminal (doubling current terminal capacity), by 2008. Similarly, Guangxi plans to improve Guilin International Airport by extending the current runway from 2,800 m to 3,200 m and expanding the existing 50,300 m^2 terminal by 30,000 m^2.

(iii) Société Concessionnaire de l'Aéroport (SCA), the manager of Phnom Penh and Siem Reap International Airports in Cambodia, has continuing plans for improvements of the two airports. At Phnom Penh's Pochentong Airport, the 2003-2007 capital expenditure program includes runway lengthening and expansion, expansion of the apron and warehouse facilities and modernization of the airport operating equipment. At Siem Reap, the program includes major repairs of the runway and taxiway, extension of the taxiway and aprons, construction of a new terminal building with a capacity of 1.4 million passengers per year, modernization of the airport operational equipment, and construction of a new airport warehouse). Also, in September 2005, SCA and the government signed an agreement for upgrading of Sihanoukville Airport.

(iv) Thailand has provided a concessionary loan to improve Vientiane (Wattay) Airport so that it can accommodate a B747 with 86% load factor by widening the shoulder (to provide runway width of 60 m including shoulders compared to the present 45 m), by November 2005, and to improve Pakse Airport in southern Lao PDR to serve A320 and B737 aircraft. [1]

(v) While runway length at Yangon International Airport currently limits use of the facility to B767-300-600R operations, the runway is currently being extended from 2,454 m to 3,400 m, the apron from 540 m x 180 m to 730 m x 180 m, and the international airport terminal expanded to accommodate 2.7 million passengers per year, with completion of all components expected by August 2006.[2]

(vi) Hanoi's Noi Bai Airport is being expanded to accommodate up to 21.5 million passengers per year by 2015. A new terminal and related facilities, for international traffic, are under construction at Tan Son Nhat Airport, with a JPY 22.7 billion loan from JBIC, giving a total capacity of 16 million passengers by 2006. A new terminal is to open at Da Nang by 2006-2007, providing a capacity of 4 million passengers per year.

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for the Asian Development Bank, October 2004, pp. D-37-D-43 [called the Second Bangkok International Airport Project at that time].

[1] Improvement of Pakse Airport is Project 2-8 in Infrastructure Development Institute – Japan, *Future Assistance for the Infrastructure Sector of the Mekong (Recommendations)*, November 2004, p. 29.

[2] Associated facilities for operational safety (e.g., radio-navigational aids, visual (lighting) aids), and electric power supply are still required to be installed and upgraded.

(v) Joint use of Savannakhet Airport by Thailand and Lao PDR has been under discussion.

(vi) The ADB-sponsored GMS Tourism Project is financing airport improvement projects at Rattanak Kiri and Stung Treng in northeastern Cambodia (resurfacing and extension of the runway, a new taxiway and apron, and a new passenger terminal) and at Louang Namtha Airport in northern Lao PDR (repairing and extension of the runway and construction of a passenger terminal).

Air Passenger Transport Volumes and Growth Rates at Selected GMS Locations (Indicative)[1]

Country	Location	Traffic ('000)	Annual Growth Rate
Cambodia	Phnom Penh Siem Reap	1,000 (2002) 580 (2002)	6.3% (1995-2002) 61.8% (1995-2002)
PRC	Kunming Jinghong Guangxi (province-wide)	9,800 (2004)[2] 951 (2004) 4,920 (2004)	18.2% (2002-04) 5.7% (2002-03) [3] 9.1% (1991-2004)
Lao PDR	Vientiane Louang Prabang	400 (2002) 99 (2002)	7.7% (1990-2002) -0.1% (1998-2002)
Myanmar	Yangon	548 (2003)[4]	16.7% (1988-2003)
Thailand	Bangkok Bangkok (GMS passengers only) Chiang Mai (GMS passengers only)	32,183 (2002) 2,501 (2004) 60,935 (2004)	8.6% (2002-2004) 4.6% (1999-2004) 2.8% (1999-2004)
Viet Nam	Hanoi Ho Chi Minh City Da Nang Other Airports	1,898 (2004) 2,397 (2004) 793 (2004) 1,051 (2004)	10.7 (1998-2004) 10.6 (1998-2004) 11.3 (1998-2004) 10.6 (1998-2004)

Notes:
[1] Based on available data.
[2] 2004 data based from interview.
[3] Statistic affected by SARS.
[4] International traffic only.
[5] To be provided.
Source: GMS governments

7. Objective(s):

To facilitate exchange and development between and among the GMS countries, and between the GMS and the rest of the world; to upgrade the subregional air transport infrastructure to meet current and anticipated future traffic; and to support planned initiatives in tourism.

8. Scope:

Recommended initiatives as part of a GMS Airports Improvement Project include (but are not necessarily limited to the following):

(i) Development of a new Kunming International Airport, as the current site, only 4.5 km from the city, is saturated and is an important gateway for southwestern PRC;[1]

(ii) improvement of Nanning International Airport by extending the runway from 2,700 m to 3,200 m and doubling current terminal capacity, by 2008;

(iii) improvement of Guilin International Airport by extending the current runway from 2,800 m to 3,200 m and expanding the existing 50,300 m^2 terminal by 30,000 m^2;

(iv) undertaking certain improvements called for by Lao PDR's Civil Aviation Master Plan that are not yet funded, e.g., improvements to Vientiane (Wattay) Airport including upgrading of taxiways, apron, firefighting and rescue facilities; enhancement of passenger terminal and other functional facilities; improvements at Louang Prabang Airport, including runway, taxiway, apron, passenger terminal, and firefighting and rescue station improvements, first to address aircraft operational safety requirements, and second to accommodate traffic demand and operational needs; and

(v) promoting joint use of Savannakhet Airport by Thailand and Lao PDR, to avoid costly construction of a new airport at Mukdahan.[2]

As suggested by H.E. Mr. Chhin Kong Hean, Cambodia, at the Final Meeting on the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006, considering the large growth in tourist traffic, a Siem Reap airport project should also be formulated in this TAP 20, on which basis it could be considered as an investment project toward 2015.

As suggested by the Government of Myanmar, a feasibility (project preparation) study should first be carried out to: (i) identify the airports, including secondary gateways,[3] which are significant for trade, business, and tourism as part of an intra-GMS network and also for direct international

[1] As noted by the PRC delegation at Draft Final Report Workshop of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, some airlines already hold air services rights from Kunming to GMS countries but they cannot obtain the requisite slots to operate. Summary of Proceedings, Appendix 11, paragraph 10.

[2] Construction of an 821 million baht airport at Mukdahan was proposed in Pacific Consultants International, *The Study on Airport Development Master Plan in the Kingdom of Thailand, Final Report, Volume 1: Summary*, prepared for the Department of Aviation, Ministry of Transport and Communications, Kingdom of Thailand, and the Japan International Cooperation Agency, January 2000, pp. 78-82.

[3] Myanmar has provided a list of airports with potential subregional significance (together with their development status and facilities requirements), including not only Yangon but also Mandalay, Nyaung Oo, Heho, Dawei, and Myeik.

access, (ii) determine, in order of priority, the upgrade measures required for the airports in terms of operational safety and facilities, and (iii) estimation of costs in phases.

Also as recommended by the Government of Myanmar (in written comments on the Draft Final Report), this TAP should take into account and/or complement similar initiatives under the GMS Tourism Sector Strategy Study (e.g., Strategic Project 2.1, Transport Requirements of Tourism Development in the GMS) and the Ayeyawady-Chao Phraya-Mekong Economic Cooperation Strategy (ACMECS) to avoid overlapping of implementation objectives (e.g., ACMECS initiatives to conduct a feasibility study to upgrade the existing airports; to encourage air linkages between existing airports in major cities and smaller towns to strengthen air linkages to expand cooperation in the tourism sector).

9. Estimated Cost:

To be determined in the project preparation technical assistance study.

10. Financing Plan and Financing Arrangement (Public/Private):

Elements of both public and private financing are envisaged. Airport development projects generate revenues and therefore offer some scope for cost recovery. However, given the magnitude of funds required for the project components, even with substantial user charge increases it is likely that large bilateral or multilateral loans will be required.

Present development partners in the GMS civil aviation subsector include the Asian Development Bank, the International Finance Corporation (IFC) of the World Bank Group, and the Japan Bank for International Cooperation. These and others may be interested in supporting the Project, or certain project components.

11. Financing Status:

Proposed for financing

12. Proposed Implementation Period/Schedule:

Phased implementation of improvements over the 2006-2015 period.

13. Executing/Implementation Agency and Contact Persons:

Executing Agencies: Department of Civil Aviation (Cambodia); Civil Aviation Administration of China, Yunnan Province, and Guangxi Zhuang Autonomous Region (PRC)[1]; Department of Civil Aviation (Lao PDR); Department of Civil Aviation (Myanmar); Department of Civil Aviation (Thailand); and Civil Aviation Administration of Vietnam (Viet Nam)

ADB Contact Division/Person:

Mekong Department, Infrastructure Division
Email: gms@adb.org

[1] In June 2004 CAAC completed the transfer of ownership and management of 90 airports across the country to local governments.

14.	**Estimated Benefits and Beneficiaries:** The project will result in improvements of a number of GMS airports, thereby improving the overall subregional air transport infrastructure and increasing connectivity. Economic benefits from the Project would likely include the development of international trade and tourism, time benefits for flight passengers, increased safety, and increased economic activity in export-oriented high-value perishable manufactured and agricultural goods. Financial benefits of the Project would likely include increased revenue to the airport operating authorities. The project will strengthen linkages between and among GMS countries by providing the infrastructure necessary for improved air linkages. Also, it would increase the value provided by development partner financing (e.g., from JBIC) for current projects by upgrading the infrastructure in the overall subregional air transport system.
15.	**Social and Environmental Issues:** The project may have impacts on the natural, cultural, and social environment during construction and/or during operation. Possible impacts relate to subsurface contamination, fuel/hazardous materials storage/handling, air emissions, storm water drainage and effluent discharges, solid and liquid waste management, aircraft noise, employee health and safety, and cultural and archeological heritage. Appropriate mitigation measures (e.g., noise reduction) should be implemented. The project will help alleviate poverty indirectly to the extent that employment is created in the tourism industry and secondarily in the airline industry. All stakeholders must be consulted by governments, e.g., persons living near the airports, airlines, airline employees. Airport terminals developed under the project should meet the needs of the disabled, providing, e.g., convenient drop-off points near main entrances, adequate auxiliary services within airports (e.g., accessible toilets), airline flight dissemination for the hearing and vision impaired.[1]
16.	**Priority of Project/TA:** ** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation**: Some projects components are ready for implementation with limited additional studies (e.g., the Nanning and Guilin airport improvement projects), while others (e.g., joint use of Savannakhet Airport by Thailand and Lao PDR) will require extensive feasibility study.

[1] See, e.g., Economic and Social Commission for Asia and the Pacific, *Barrier-Free Tourism for People with Disabilities in the Asian and Pacific Region*, 2003, p. 54.

19.	**Pre-feasibility Study (Completed/Required):** Required
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary feasibility studies and implement the Project.
21.	**Issues/Constraints:** Main constraints or risks include the difficulty of procuring adequate funding, the need for a sustainable and adequate repair and maintenance budget, the requirement for user charges to be sufficiently high to cover costs, and institutional development issues.

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Sector	*Transportation and Communication*
Subsector	*Civil Aviation*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

PROJECT/TA CONCEPT PROFILE[1]

1. Project Name (Number):

Rail Maintenance in Cambodia (TAP 21)

2. Loan or TA:

Technical Assistance

3. Project Location:

Cambodia

4. Countries Involved:

Cambodia

5. Sector/Subsector:

Transportation/Rail

6. Background and Rationale:

Maintenance activity throughout Cambodia's rail network has been at levels consistently below those needed to maintain facilities at an acceptable level. The growing levels of maintenance arrears have primarily been caused by acute cash flow shortages that have beset the whole organization in recent years.

An advisory technical assistance AOTA CAM 37534-01 for Cambodian Railways (Royal Railways of Cambodia, RRC) is currently pending with the following:

(i) to support integration of Cambodia into the regional railway network in the western GMS by providing railway access to Thailand;
(ii) to increase the efficiency of transport services within Cambodia and to its neighbors by providing efficient alternative routes and modes of transport for Cambodia's import and export trade;
(iii) to reduce the cost of road maintenance and traffic risks by transferring heavy and dangerous cargo to a safe and reliable railway system;
(iv) to pave the way for further subregional integration in the future by facilitating achievement of the Singapore-Kunming railway link; and

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[1] Useful sources for this Project Profile included: (i) SAPI Team for Japan Bank for International Cooperation (comprising a team dispatched by PADECO Co., Ltd.), *Special Assistance for Project Implementation (SAPI) for Second Mekong International Bridge Construction Project in Thailand and Lao PDR, Final Report*, March 2004; (ii) O'Farrell, Sally, FIATA Advisory Board on Vocational Training, GFP-DLI Activities in 2004, September 2004; (iii) Molnar, Eva, World Bank, World Bank Distance Learning Initiative, in *TransFormation*, the international newsletter of the IRU Academy, December 2001, no. 2, p. 3; and (iv) Schöni, Markus, FIATA Shares IRU Academy Aims and Improves Professional Standards among Freight Forwarders, in *TransFormation*, the international newsletter of the IRU Academy, July 2003, no. 7, pp. 2-3

(v) to increase the transparency and eliminate the current financial losses from the railway by restructuring the railway into a Public Private Partnership, and by establishing a transparent regulatory framework for the railway.

Findings and implementation under this TA will of course be critical to the proposed maintenance TA and as such the current proposal is dependent on ensuing development. In particular it is assumed that funding and operational structures will be determined as a result of that TA, which will provide RRC with the capacity to extend service delivery effectively but will still necessitate undertaking maintenance activities from “in house” resources, which are currently not available.

7. Objective(s):

To promote economic efficiency by RRC with the practical and managerial experience to maintain all operational assets at a level consistent with network optimization in terms of both traffic flow and cost minimization.

8. Scope:

The TA will focus on the practical (engineering) aspects of railway maintenance together with the associated management functions of planning and implementation. TA coverage will therefore comprise:

(i) examination of historical and current maintenance patterns, procedures, technical standards, and capacities;
(ii) comparison of findings from the previous task with best practice applied to other comparable rail networks;
(iii) identification and detailing of maintenance activated needed for the RRC situation;
(iv) derivation of a maintenance manual and scheduling program;
(v) derivation of maintenance planning, prioritization and implementation procedures;
(vi) training and workshops to meet technical and management needs as indicated; and
(vii) procedures for monitoring and benchmarking maintenance activities and promoting sustainability.

9. Estimated Cost:

US$300,000 for technical assistance

10. Financing Plan and Financing Arrangement (Public/Private):

Public.

11. Financing Status:

Proposed for financing

12. Proposed Implementation Period/Schedule:

2007-08

13.	**Executing/Implementation Agency and Contact Persons:** Royal Railways of Cambodia **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries**: The project is expected to result in radically enhanced and sustainable operating conditions of the rail network. The project is expected to produce net economic/financial benefits, by: (i) materially reducing transport costs; (ii) facilitating more effective use of existing and rehabilitated network assets; and (iii) developing continuous and regular maintenance practices and as such promoting sustainable operations. These economic/financial benefits may be measured by comparing productivity and costs on a "with and without" project basis. The direct benefits from the project, from reduced operating costs and improved product availability, will accrue to airline customers (e.g., passengers) and to the airlines. Indirect benefits will include: (i) increased rail traffic (ii) improved government finances, due to increased tax revenues and reduced subsidies; (iii) increased employment; (iv) improved skill development in the rail sector; and (iv) increased transport led communication and regional economic integration.
15.	**Social and Environmental Issues**: The project is not expected to have significant impact on the natural, cultural, and social environment, except to the extent that it results in increased train movements. Appropriate mitigation measures (e.g., noise reduction) should be implemented. The project will help alleviate poverty directly to the extent that employment is created in the rail sector.
16.	**Priority of Project/TA:** * (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** Project Proposal

19.	**Pre-feasibility Study (Completed/Required):** Required
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the Project.
21.	**Issues/Constraints:** The necessity for this TA is dependent on findings and actions taken under the forthcoming TA for RRC. The work envisaged could be combined with TAP 28, Railways Management Improvement Project.

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Sector	*Transportation and Communication*
Subsector	*Rail Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Competitiveness*

PROJECT/TA CONCEPT PROFILE[1]

1.	**Project Name (Number):** GMS Andaman Sea/Indian Ocean Deep Sea Port Study for Myanmar[2] (TAP 22)
2.	**Loan or TA:** Regional Technical Assistance
3.	**Project Location**: Myanmar
4.	**Countries Involved:** Myanmar
5.	**Sector/Subsector:** Transportation/Ports
6.	**Background and Rationale:** Currently there are three projected locations for a deep sea port facility in Myanmar that will constitute the Myanmar terminus of the GMS East-West Economic Corridor. The potential for each of the locations has been studied at various points in the last decade but, predominantly for political reasons, further progress has been suspended. In order to complete the East-West Corridor, it is now desirable that a specific decision is made as to the location of the Myanmar deep sea port. Characteristics of the three candidate locations are as shown on the following page.

[1] Useful sources for this Project Profile included: (i) International Road Transport Union (IRU), New Training Initiatives by the IRU Academy, Harmonization – Facilitation – Education, Istanbul, 30 September 2005; (ii) various issues of Trans Formation, the international newsletter of the IRU Academy; (iii) Krausz, Peter, IRU, Knowledge Across Frontiers, The IRU Academy – an Initiative by the Road Transport Industry, ECMT [European Conference of Ministers of Transport] Seminar on Access to and the Ruling of the Profession of Road Haulage Operator, Knowledge Across Frontiers, The IRU Academy– an Initiative by the Road Transport Industry Paris, 13 June 2003; (iv) Krausz, Peter, Seminar: Admission to, and the Ruling of, the Profession of Road Haulage Operator, Paris, 13 June 2003; and (v) IRU Guide to Sustainable Development at:
http://www.iru.org/Publications/Downloads/GuideIRUsustain.E.pdf.

[2] The title of this TAP was revised based on a suggestion of Myanmar at the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005. Summary of Proceedings, Appendix 11, paragraph 22.

Site	Kalegauk	Dawei	Bokpyin
Location	Between Mawlamyine and Yi township	Tanintharyi Division	Between Myeik and Kawthaung
Studied by	Power P PCL, Thailand,	Ital Thai Co. Ltd. Thailand, 1996	Sahaviriya Group, Thailand, 1997
Attributes	Close to Three Pagoda Pass to Thailand	Saving of 200 km between Bangkok and Colombo. Three feasible sites proposed in another study by Nippon Koei in the same area	Suggests combination of two DS Ports, cross border highway and industrial zone. Pipeline link to Bang Saphan
Navigation Channel	12m+	12m+	?

It therefore is now appropriate for an updated assessment to be made of the relative attributes and operating facilities applicable to these various sites, as a means of facilitating a final decision.

7. Objective(s):

To determine an optimal site for Myanmar deep sea ports and hence contribute to subsequent economic development.

8. Scope:

The project will be focused on following tasks:

- Review existing feasibility studies and determine adequacy for the current situation;
- Evaluate the potential for additional sites through discussions with stakeholders and review of available documentation;
- Undertake detailed feasibility studies of all possible sites on a prioritized basis, to identify the optimal selection from financial/economic and operational viewpoints; and
- Discuss findings with stakeholders and formulate structured recommendations.

9. Estimated Cost:

US$500,000 for technical assistance

10 Financing Plan and Financing Arrangement (Public/Private):

Public

11 Financing Status:

Proposed for financing

12 Proposed Implementation Period/Schedule:

2006-2007

13	**Executing/Implementation Agency and Contact Persons:** Myanma Port Authority, Ministry of Transport **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org
14	**Estimated Benefits and Beneficiaries**: The project is expected to result in provision of a pathway to the completion of the East-West Economic Corridor and as such subsequently contribute to resulting gains in economic efficiency.
15	**Social and Environmental Issues**: To be determined in the indicated feasibility studies
16	**Priority of Project/TA:** *** (see Chapter IX)
17	**Project Status (Proposed/Ongoing/Completed):** Proposed
18	**Status of Project/TA Preparation:** Proposal
19	**Pre-feasibility Study (Completed/Required):** Required
20	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the Project.
21	**Issues/Constraints:** Resolution of ongoing political constraints.[1]

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*Ports*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Competitiveness*

[1] At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, Myanmar requested assistance for a feasibility study of a new deep-sea port near Dawei. ADB indicated that it would examine that possibility. Summary of Proceedings, paragraph 21(ii).

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** Training in Logistics (TAP 23)
2.	**Loan or TA:** Regional TA (RETA)
3.	**Project Location:** GMS-wide
4.	**Countries Involved:** All GMS countries
5.	**Sector/Subsector:** Transportation/Road Transport
6.	**Background and Rationale:** The development of the multimodal transport sector in the GMS is uneven, with Cambodia and Lao PDR not yet having members of the International Federation of Freight Forwarders Association, FIATA ("Fédération Internationale des Associations de Transitaires et Assimilés, in French), while the other four GMS countries do, and to varying extents have acquired the standard trading conditions to provide accredited freight forwarders with the legal and commercial basis to write the FIATA Multimodal Transport Bill of Lading as a principal for the shipper. At least one GMS country (Thailand) has been in the process of enacting a multimodal transport law in order to institutionalize such operators and impose standards of operation and thus ensure the orderly development of the industry. However, Cambodia and Lao PDR in particular (and to some extent the other countries) have not yet reached this stage of development and thus do not have freight forwarders who are qualified to operate as multimodal transport operators. Yet, the proper development of this sector is fundamental to transit transport, as the absence of nationally domiciled multimodal transport operators in a country effectively implies the transfer of control of the international supply chain to the foreign trader instead of retaining such control by a local trader.
7.	**Objective(s):** The goal of the TAP will be to promote the training and professional competence of multimodal transport operators following accreditation standards along the path set by FIATA, which is recognized as representing the international freight forwarding industry by governments and international organizations (e.g., the International Chamber of Commerce, the International Road Transport Union, the World Customs Organization, the World Trade Organization). In this connection, the standard of accreditation under Annex 13b of the GMS Cross-Border Transport Agreement (CBTA) is anticipated to be in line with FIATA's standard trading conditions.

8. Scope:

The TAP will provide institutional support and resources to the Cambodian and Lao International Freight Forwarder Associations to prepare for their entry as members of FIATA. The TAP will also train existing freight forwarders (including freight forwarders in other countries) in international freight forwarding skills to prepare them for qualification into the their national freight forwarders associations and, by extension, vesting them with the authority to write FIATA bills of lading.[1] The training should address the subject of multimodal transport operations, covering a range of topics such as the role of freight forwarders as principal, legal liability for the carriage of goods, scope of services (value added) provided, organizational structure, staff functions and responsibilities, overseas representation, and marketing.[2] Methods of training may vary from traditional classroom-based learning, to apprenticeships that mix on-the-job learning with attendance at vocational training colleges, to interactive distance learning (e-learning) over the Internet (the latest trend).

It is envisaged that a significant role would be played by the FIATA Foundation – Vocational Training, an institution that aims to assist freight forwarders associations in less privileged countries to build up and enhance professional skills. FIATA's Advisory Body for Vocational Training (ABVT) has developed a set of standards (the FIATA Minimum Standards) that have been used to benchmark existing training and education programs and develop new ones. About 40 countries have had their training programs validated by FIATA and graduates of these programs are entitled to apply for the FIATA Diploma in Freight Forwarding (given on the basis of an examination).

In addition, the respective national freight forwarders associations could partner with European, North American, or Japanese national associations under the FIATA umbrella. Thailand also has indicated the availability of quality institutions that can be assessed. A joint venture between extra-regional and subregional partners would offer a variety of perspectives.[3]

Also, reference may be made to the work of the Global Facilitation Partnership for Transportation and Trade, which was launched by the World Bank Group in 1999, which has in turn launched a Global Distance Learning Initiative with the mission of facilitating the emergence of global communities of qualified and

[1] FIATA documents have an excellent reputation and are recognized as documents of tradition and trust that have contributed to the facilitation of international exchanges in trade.

[2] Example programs identified by the World Bank in the context of the Global Distance Learning Initiative of the World Bank include: (i) Customs Broker, (ii) Road Dispatcher, (iii) Maritime Transport Specialist, (iv) Multimodal Specialist, (v) Multimodal Dispatcher, (vi) Logistic IT Specialist, (vii) Warehousing Specialist, (viii) Inventory Specialist, (ix) Logistic Customer Service Specialist, (x) Logistic Marketing Specialist, (xi) E-Commerce Specialist, (xii) Logistic Finance Specialist, (xiii) Transport Banker, (xiv) Supply Chain Specialist, (xv) Supply Chain Designer, (xvi) Merchandising and Distribution Channel Specialist, (xvii) Merchandising and Distribution Channel Specialist, (xviii) Service Quality Specialist, (xix) Marketing Specialist, and (xx) International Trade "101".

[3] At the Final Meeting on the GMS Transport Sector Strategy Study, Mr. Vasim Sorya, Cambodia, expressed appreciation for the inclusion the TAP for Training in Logistics, but suggested that instead of just conducting training programs, the establishment of institutions to train/educate people on logistics be considered to ensure more sustained benefits in this area. Summary of Proceedings, paragraph 13.

	recognized professionals providing trade, transport, and logistic services, based on knowledge and know-how sharing.[1]
9.	**Estimated Cost:** US$300,000 over three years
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public (from ADB or other development partners)
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2007-2009
13.	**Executing/Implementation Agency and Contact Persons:** Executing Agencies: Ministry of Public Works and Transport (Cambodia); Provincial Department of Communications, Yunnan Province and Guangxi Zhuang Autonomous Region (PRC); Ministry of Communication, Transport, Post and Construction (Lao PDR); Ministry of Rail Transportation (Myanmar); Ministry of Transport (Thailand); and Ministry of Transport (Viet Nam) **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** A number of benefits will accrue to freight forwarders as they participate in international supply chains, which in turn will expand trade.
15.	**Social and Environmental Issues:** The project is not expected to have significant negative environmental impacts. Nevertheless, appropriate mitigation measures (e.g., noise reduction) should be implemented.
16.	**Priority of Project/TA:** *** (see Chapter IX)

[1] This initiative was piloted under the Trade and Transport Facilitation Program in Southeast Europe with investment loans to Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Macedonia, Moldova, Romania, and Yugoslavia. It features "blended" learning, i.e., a system that combines classroom sessions, on-line courses, and/or CD/ROMs, testing, tutoring, technical, and administrative assistance.

17.	**Project Status (Proposed/Ongoing/Completed):** Proposed	
18.	**Status of Project/TA Preparation:** This TAP was put forward in similar form by a JBIC Special Assistance for Project Implementation Study for the Mukdahan-Savannakhet bridge.	
19.	**Pre-feasibility Study (Completed/Required):** Not applicable	
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.	
21.	**Issues/Constraints:** At the Final Meeting on the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006, Mr. Lattanamany Khounnyvong, Lao PDR, commented that with regard to developing “seamless” transport services, the GMS cannot depend just on public agencies but must depend largely on private transport operators and therefore we will have to strengthen the latter with training and financial support. The consultants agreed with the observation and noted that there is also a need to address the uneven levels of development of the transport services industry among the GMS countries. TAP 23 (Training on Logistics) was specially noted in this context. The involvement of internationally recognized professional associations in the TAP is a prerequisite for ensuring that it is industry responsive. ADB (and/or the World Bank and/or bilateral development partners) may play a catalytic role in matching resources, expertise, and networks in optimizing the systematic use of existing content. To be effective and sustainable, all teaching modules must promote the profitability of freight forwarding companies.	

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*Multimodal Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Competitiveness*

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** Development of Inland Container Freight Depots (TAP 24)
2.	**Loan or TA:** Advisory Regional Technical Assistance (RETA)
3.	**Project Location**: GMS wide
4.	**Countries Involved:** All GMS countries
5.	**Sector/Subsector:** Transportation/Roads (and possibly Rail)
6.	**Background and Rationale:** The construction of Nam Thuen 2 dam in Lao PDR is likely to dramatically increase traffic through the Mukdahan-Savannakhet Corridor from the present level of 150,000 mt. An increase in truck traffic through the corridor from 120 trucks per day in 2002 to 872 in 2014 and 3,386 in 2027 is forecast.[1] The bridge is scheduled to open in 2006/07. In support of that projected traffic increase, a container freight station along Route 9 would be appropriate. Other locations within GMS will also be identified.
7.	**Objective(s):** To promote economic efficiency by reducing containerized freight shipping costs through the provision of inland container depots (ICDs) providing the full range of receiving, marshalling, storing, distribution, and dispatching services.
8.	**Scope:** The project will identify suitable locations for ICDs throughout GMS by reviewing and analyzing current and projected traffic flows and stakeholder discussions. A series of potential locations will then be established and feasibility studies (FS) undertaken to determine their viability in the economic/financial context together with other relevant operating considerations. On the basis of these studies, recommendations for ICD positioning will then be formulated.

[1] Japan Bank for International Cooperation, *Special Assistance for Project Implementation (SAPI) for Second Mekong International Bridge Construction Project in Thailand and Lao PDR, Final Report*, March 2004, Chapter 5.

	In addition, the project will also address financing and structuring considerations for each ICD with a particular focus on fostering private sector participation and adoption of international best practice in terms of management and operations. Further, as requested at the Final Meeting on the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006, the acquisition of related facilities and equipment, including ICT, will be addressed, to the extent possible.[1] The project will also consider and formulate recommendations for the development of goods distribution centers along GMS corridors as part of the system to support intermodal transport.
9.	**Estimated Cost:** US$300,000 for technical assistance
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public but with potential for Private participation in individual ICDs.
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2007
13.	**Executing/Implementation Agency and Contact Persons:** National Ministries of Transport **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries**: The project is expected to result in an enhanced containerized freight shipping market as a result of upgraded logistical support and as such contribute to improved economic efficiency and development. The project is expected to produce net economic/financial benefits, as: (i) strategically located ICDs will generate freight traffic throughout the subregion and provide the necessary backbone for sustainability;

[1] At the Final Meeting on the GMS Subregional Transport Sector Strategy, Mr. Lattanamany Khounnyvong, Lao PDR, suggested consideration of the application of information and communications technology (ICT) to transport operations, as this is an important trend currently. Summary of Proceedings, paragraph 29. Mr. Silpachai Jarukasemratana, Thailand, suggested that TAP 24 should not just focus on identifying locations but also include the acquisition of related facilities and equipment. Summary of Proceedings, paragraph 30.

	(ii) contribute to corridor based economic activity; and (iii) facilitate consolidation services leading to net increased in container usage. These economic/financial benefits may be measured by comparing container based shipping productivity and costs in the GMS on a "with and without" project basis. The direct benefits from the project, from reduced operating costs and improved service availability will accrue to shippers and freight operators. Indirect benefits will include enhanced employment potential, a more balanced logistical structure, and integration of service profiles.
15.	**Social and Environmental Issues**: The project is not expected to have significant impact on the natural, cultural, and social environment. The project will help alleviate poverty indirectly to the extent that employment is created in the transport industry.
16.	**Priority of Project/TA:** * (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** Proposed
19.	**Pre-feasibility Study (Completed/Required):** Required
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the Project.
21.	**Issues/Constraints:** At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, Cambodia stated that not only a study, but also investment is required. An ADB staff member and the consultants noted that normally such facilities are built by the private sector, so it is best to first seek private sector participation. Cambodia also suggested that this TA could perhaps be done in parallel with TAP 23, Training in Logistics. The importance of having such logistics training at an early stage was stressed.

This TAP on the Development of Inland Container Freight Depots is mainly concerned with fostering expertise for the development and siting of ICDs. Financing of subsequent construction and formulation of the required expertise in logistics management are, however, also important components of the overall initiative. This TAP should therefore be closely integrated with the TAP on Practicalities of Private Sector Participation in Transport Infrastructure and the TAP on Training in Logistics. Ideally, the three TAPs should be initiated concurrently as each will have interlinking impact. It may therefore be appropriate to include a coordinating component in whichever TAP is last to be undertaken.

At the Final Meeting on the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006, Lao PDR called for the provision of facilities to complement the development of road infrastructure. Among other facilities, these would include ICDs and hence this TAP was specially mentioned in this regard.

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*Road / Rail Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Competitiveness*

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** Cambodia Freight Forwarders (FF) Competitiveness Project (TAP 25) CONSOLIDATED within TAP 23
2.	**Loan or TA:**
3.	**Project Location**:
4.	**Countries Involved:**
5.	**Sector/Subsector:**
6.	**Background and Rationale:**
7.	**Objective(s):**
8.	**Scope:**
9.	**Estimated Cost:**
10.	**Financing Plan and Financing Arrangement (Public/Private):**
11.	**Financing Status:**
12.	**Proposed Implementation Period/Schedule:**
13.	**Executing/Implementation Agency and Contact Persons:** **ADB Contact Division/Person:**
14.	**Estimated Benefits and Beneficiaries:**
15.	**Social and Environmental Issues:**

16.	**Priority of Project/TA (H/M/L):**
17.	**Project Status (Proposed/Ongoing/Completed):**
18.	**Status of Project/TA Preparation:**
19.	**Pre-feasibility Study (Completed/Required):**
20.	**Follow-up Actions Required:**
21.	**Issues/Constraints:**

PROJECT/TA CONCEPT PROFILE

1. Project Name (Number):

Training in Road (Passenger and Freight) Transport Operations (“Knowledge Across Frontiers”[1] (TAP 26)

2. Loan or TA:

Regional TA (RETA)

3. Project Location:

GMS-wide

4. Countries Involved:

All GMS countries

5. Sector/Subsector:

Transportation/Road Transport

6. Background and Rationale:

Broadly speaking, road transport industries (both freight and passenger) in the GMS countries are at various stages of development (both passenger and freight), ranging from rather undeveloped (Cambodia, Lao PDR, Myanmar, and Viet Nam) to moderately well developed (the People’s Republic of China and Thailand). As noted in Working Paper 7 on Strategy Considerations for Freight Transport, road transport services need upgrading in a number of GMS countries in order to exploit the possibilities offered for the operation of modern, efficient road haulage service. With reference to Annex 9 to the GMS Cross-Border Transport Agreement (CBTA) on Criteria for the Licensing of Transport Operators for Cross-Border Transport Operations, and Annex 16 to the CBTA on Criteria for Driving Licenses, it will be necessary or at least beneficial to upgrade the capacity of transport operators and drivers in the GMS.

7. Objective(s):

The goal of the TAP will be to be to promote the training and professional competence of transport operators and drivers and reinforce the quality of services offered by the road freight and passenger industry.[2]

8. Scope:

The TAP will establish road transport training institutes in selected GMS countries, perhaps with accreditation by the IRU Academy of the Geneva-based International Road Transport Union (IRU) and offering a Certificate of

[1] Borrowing a slogan of the International Road Transport Union (IRU).
[2] A similar objective is found in Article 2 of the IRU Constitution.

	Professional Competence (CPC), which would bring international recognition and transparency to the programs.[1] Guide modules developed by the IRU and others may be adopted for use by the road transport training institutes established by the TAP. Such modules would include: (i) the promotion of "best industry practices", to facilitate learning from leaders; (ii) a "well driven" campaign, aimed at improving vehicle safety standards and driver behavior, and offering benefits such as lower insurance costs, greater availability of vehicle fleets, and improved customer relations; and (iii) a driver training program focusing on road safety, fuel efficiency, and load securing, which would go beyond the basic acquisition of a driving license and obeying of laws and regulations, to include higher standards through additional and specific driver training, thereby adding real value to transport companies. The curricula offered may be supplemented by road transport operator distance learning courses developed by the World Bank on a pilot basis in Albania, Bosnia-Herzegovina, and Macedonia, adapted to GMS conditions.
9.	**Estimated Cost:** US$300,000 over three years
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public (from ADB or other development partners)
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2009-2011 (at the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, Lao PDR and Thailand suggested that this TAP and the TAP on Training in Logistics commence somewhat earlier; the suggested started date for this TAP may be reasonable, however, considering capacity considerations)
13.	**Executing/Implementation Agency and Contact Persons:** Executing Agencies: Ministry of Public Works and Transport (Cambodia); Provincial Department of Communications, Yunnan Province and Guangxi

[1] As of March 2005, the IRU had accredited 30 training institutes in 28 countries. The framework of the IRU Academy includes: (i) elaboration and publication of IRU Academy training, testing, and diploma issuing standards; (ii) accreditation of training courses/institutes according to these standards, and (iii) issuance of diplomas to graduates, who go through accredited training courses at the institutes and pass tests/receive national certificates according to national laws.

	Zhuang Autonomous Region (PRC); Ministry of Communication, Transport, Post and Construction (Lao PDR); Ministry of Rail [Surface] Transportation (Myanmar); Ministry of Transport (Thailand); and Ministry of Transport (Viet Nam) **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** A number of benefits will accrue to road transport operators including better qualified and more motivated staff; savings from reduced fuel costs, accident (repair) costs, and insurance premiums, with less damage to vehicles and loads; and increased reliability with fewer road accidents and less damage to goods increasing the availability of the vehicle fleet and reliability vis-à-vis customers. The larger society will also benefit, e.g., through reduced road accidents.
15.	**Social and Environmental Issues:** The project is not expected to have significant negative environmental impacts. In fact, road safety will be improved, and there may be further environmental benefits if environmental modules are incorporated into the curriculum, e.g., a module to introduce an environmental management system in road transport companies; a module for environmental controlling including "green accounting" [1]; a module on dangerous goods in connection with the ADR Agreement [the European Agreement Concerning the International Carriage of Dangerous Goods by Road, signed in Geneva on 30 September 1957, and regularly amended], which is referred to in Annex 1 to the CBTA on the Carriage of Dangerous Goods.
16.	**Priority of Project/TA:** ** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** The TAP as regards freight transport was referred to in Working Paper 6 on Strategy Considerations for Freight Transport. A request for similar support for passenger transport operators was made at the Lao PDR Interim Report Workshop held in Vientiane on 10 August 2005 and is reflected here.[2]

[1] ISO 14031 [standard of the International Organization for Standardization] on Environmental Performance Evaluation could serve as a basis for developing such systems.

[2] A request by the Lao [PDR] National Tourism Authority for financial support for the purchase of new vehicles was considered difficult to meet within the context of the GMS Transport Strategy TA, however.

19.	**Pre-feasibility Study (Completed/Required):** Not applicable
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.
21.	**Issues/Constraints:** At the Final Meeting on the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006, Mr. Lattanamany Khounnyvong, Lao PDR, commented that with regard to developing “seamless” transport services, the GMS cannot depend just on public agencies but must depend largely on private transport operators and therefore we will have to strengthen the latter with training and financial support. The consultants agreed with the observation and noted that there is also a need to address the uneven levels of development of the transport services industry among the GMS countries. TAP 26 (Training in Road (Passenger and Freight) Transport Operations) was specially noted in this context. At the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005, Lao PDR suggested that road transport projects in the GMS should include a road safety component, and in reply it was noted that perhaps this issue could be considered as part of the TAP on Training in Road Transport Operations. As indicated in the project scope, road safety considerations will constitute an important part of the work undertaken. To be effective and sustainable, all teaching modules must promote the profitability of road transport companies.

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*Road Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Competitiveness*

PROJECT/TA CONCEPT PROFILE

1. Project Name (Number):

Upgrading of Inland Water (Passenger and Freight) Transport Industry (TAP 27)

2. Loan or TA:

Regional TA (RETA)

3. Project Location:

GMS-wide

4. Countries Involved:

All GMS countries

5. Sector/Subsector:

Transportation/Inland Water Transport

6. Background and Rationale:

As stated in the 1993-94 GMS Subregional Transport Sector Study, inland water transport is a traditional mode in most countries in the subregion and is often cost-effective, especially for bulk commodities and those not requiring rapid delivery.[1] And, as noted by the Mekong River Commission (MRC), river navigation provides a cheap mode of transportation for remote areas, offering communication to the rural population for transportation of agriculture produce and other goods to and from consumption centers; also, navigation enhances the opportunities for both men and women to increase their participation in economic and social development by increasing opportunities for the movement of people and goods by river transport.[2]

However, the MRC has found that a major constraint on efficiency and productivity in the inland water transport subsector in the GMS is the inadequate training of waterway users and operators. In some areas of the Mekong River, including the Delta, accidents have been increasing, due in large part to the lack of training of operators. In this context, the MRC has

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[1] PADECO Co., Ltd., *Subregional Transport Sector Study*, October 1994, prepared for the Asian Development Bank, p. 62. A recent ESCAP report has further noted that: (i) inland water transport (IWT) is not slow and delivers cargo "just-in-time", (ii) IWT is not doomed where it does not carry bulk cargoes or operate over long distances; (iii) IWT is not an outdated technique, nor is it receding; (iv) IWT is intermodal and multimodal in essence; and (v) IWT is not doomed if its vessels are not huge – there is also a market for medium-size consignments. Economic and Social Commission for Asia and the Pacific, *Manual on Modernization of Inland Water Transport for Integration within a Multimodal Transport System*, 2004, pp. 69-75.

[2] Mekong River Commission ([Captain] Lieven Geerinck, Navigation Programme Manager), Incorporation of Navigation into the Integrated Water Resources Development and Management Strategy (IWRDM), January 2005, pp. 56-59.

identified a number of specific difficulties that transport operators along the Mekong face, including: (i) extremely difficult and dangerous passages, (ii) insufficient knowledge of boat handling and boat building, (iii) poor maintenance of vessels and propulsion modes, (iv) lack of awareness of safety procedures, (v) the handling and carriage of dangerous goods, (vi) lack of navigation aids, and (vii) absence of international navigation rules and regulations.

Specifically, in at least one GMS country (Cambodia), the MRC has identified deficiencies regarding (i) training for commercial operators, e.g. regarding landings and river port operations; (ii) training for masters, engineers, pilots, and small boats helmsman for operating boats and barges; (iii) training for port managers, safety inspectors, and freight forwarders; and (iv) training for inland water transport managers, planners, and workers.[1]

7. Objective(s):

The goal of the TAP will be to promote the training and professional competence of inland water transport operators in the GMS countries, to among other things, improve safety (resulting in fewer injuries and loss of cargo) and reduce river pollution. It will identify training requirements and a capacity building program for inland water transport, and enhance the capacity of line agencies, the private sector, and other stakeholders to manage and implement inland water transportation along the Mekong and other rivers in the GMS.

8. Scope:

Drawing upon the ongoing Belgian-funded work executed by the MRC in Cambodia, the TAP will: (i) assess training needs (educational and vocational) for all inland water transport activities; (ii) assess all ongoing and planned navigation training programs (including training methods and facilities), and identify available training facilities; and (iii) identify beneficiaries and participants. The TAP will plan for education training programs for: (i) river pilots, (ii) port management, (iii) waterway designers and engineers, (iv) information technology specialists, (v) navigation-related environmental specialists, (vi) stevedores and port workers, (vii) surveyors and inspectors, (viii) shipbuilders and naval architects, (ix) freight forwarders, (x) transport planners, (xi) transport economists, and (xii) inland water transport legal specialists, among others. In connection with the foregoing, the TAP will assess the potential of establishing a GMS Inland Water Transport Training Center, probably located in Phnom Penh or Vientiane. A further project would be required to establish such a center, if deemed feasible. In all aspects of the work described here, reference should be made to Conventions, Recommendations and Guidelines of the International Labor Organization and the International Maritime Organization.[2]

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[1] Regarding the preceding three paragraphs, see Mekong River Commission, Consultancy Services for the Design of the Master Plan for Waterborne Transportation on the Mekong River System – Invitation to Submit Technical/Financial Offers, project financed by Belgian Technical Cooperation, 8 June 2005.

[2] Again, refer to Mekong River Commission, Design of the Master Plan for Waterborne Transportation on the Mekong River System – Invitation to Submit Technical/Financial Offers, project financed by Belgian Technical Cooperation, 8 June 2005

9.	**Estimated Cost:** US$100,000 (for the initial work outlined here)
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public (from ADB or other development partners, e.g., Belgium, which has financed a similar initiative in Cambodia under the auspices of the MRC)
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2008
13.	**Executing/Implementation Agency and Contact Persons:** Executing Agencies: Ministry of Public Works and Transport (Cambodia); Ministry of Communications Yunnan Province Bureau of Communications (PRC); Ministry of Communication, Transport, Post and Construction (Lao PDR); Inland Water Transport, Ministry of Transport (Myanmar); Ministry of Transport (Thailand); and Ministry of Transport (Viet Nam) **Mekong River Commission[1] Contact Division/Person** Captain Lieven Geerinck, Operations Division, Navigation Programme Manager Email: geerinck@mrcmekong.org **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email**:** gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** A number of benefits will accrue to inland water transport operators including better qualified and more motivated staff; savings from reduced fuel costs, accident (repair) costs, and insurance premiums, with less damage to vessels and loads; and increased reliability with fewer accidents and less damage to goods increasing the availability of the vessel fleet and reliability vis-à-vis customers.
15.	**Social and Environmental Issues:** The project is not expected to have significant negative environmental impacts. In fact, inland water transport safety will be improved and river pollution reduced, as these will be important targets of the training.
16.	**Priority of Project/TA:** ** (see Chapter IX)

[1] The MRC is the leading repository of data and expertise relating to the Mekong River, and as such, through its Navigation Programme, is uniquely positioned to lead implementation of projects relating to the inland waterway transport along the River.

17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** The TA builds upon the education and training component of the MRC's ongoing work for the Design of the Master Plan for Waterborne Transportation on the Mekong River System, financed by Belgian Technical Cooperation.
19.	**Pre-feasibility Study (Completed/Required):** Not applicable
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.
21.	**Issues/Constraints:** To be effective and sustainable, education and training programs arising from the TAP must promote the profitability of inland water transport enterprises. The TAP should take due regard of relevant initiatives in the region, e.g., the Belgian-financed Regional Inland Waterway Training Center in Palembang, Indonesia; a Flanders (Belgium)-assisted Feasibility Study on the Establishment of a Nautical Training Center in Cambodia, ESCAP's development of a Training Modules for Inland Water Transport and a Training of Trainers Manual for Inland Water Transport.

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*Inland Water Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Competitiveness*

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** Railways Management Improvement Project (TAP 28)
2.	**Loan or TA:** Technical Assistance
3.	**Project Location**: Along the subject countries' railway networks
4.	**Countries Involved:** Cambodia, Lao PDR, Myanmar, and Viet Nam
5.	**Sector/Subsector:** Transportation/Rail
6.	**Background and Rationale:** The operation and management of railway networks in a context of commercial success and hence market awareness demands a range of management skills that have been finely tuned to recognize and monitor the harsh realities of railway cost and revenue profiles. Frequently, railways seeking to survive in transitional economies find themselves devoid of that expertise and simply strive to cope with short-term problems effectively on a day-to-day basis. With the exception of Lao PDR where rail services are still in the development stage, the other three countries targeted for this TAP are, to varying degrees, experiencing the same conditions as noted above. In order to realize core GMS objectives of connectivity and competitiveness it is therefore important to ensure that the referenced rail networks are managed effectively, particularly in relation to commercial objectives, marketing, and business planning. Typically production considerations have been at the forefront of operations – it is now an appropriate juncture to assist in putting customer needs, market conscious pricing, and planning as a day-to-day business tool into the core thrust of strategic development.
7.	**Objective(s):** To provide the railways with the necessary expertise to operate in a commercially successful manner while meeting public service obligations effectively and hence contributing to economic development.

8. Scope:

The project may be divided into two phases for each railway with Phase One initially structured to assess the specific needs of each railway in relation to core management functional responsibilities such as:

(i) Business Objectives and Strategic Planning;
(ii) Financial Management particularly in relation to internal reporting capacities;
(iii) Financial and Nonfinancial Management Information Systems;
(iv) Costing and Tariff Modeling;
(v) Budgeting and profit/cost center management structures;
(vi) Role and potential for ICT applications and development in the railways;
(vii) Planning and human resource development functions;
(viii) Marketing and business development;
(ix) Public Service Obligation and implications; and
(x) Non-core rail activities.

In each case the central focus will be to determine strengths and weaknesses pertinent to the focus area, and to the entities' overall commercial operations, as a basis for formulating recommendations and action proposals for subsequent implementation.

Phase 2 of the project will assist with implementation including the necessary training and human resource development work.

Assistance to be provided to Royal Cambodia Railways will be dependent on findings and structural arrangements adopted as a result of the pending ADB TA.

9. Estimated Cost:

US$1,500,000 for technical assistance

10. Financing Plan and Financing Arrangement (Public/Private):

Public

11. Financing Status:

Proposed for financing

12. Proposed Implementation Period/Schedule:

The Implementation schedule should be within the period 2007-2009

13. Executing/Implementation Agency and Contact Persons:

National Transport Ministries and Railways

ADB Contact Division/Person:

Mekong Department, Infrastructure Division
Email: gms@adb.org

14. Estimated Benefits and Beneficiaries:

The project is expected to result radically enhanced railway management with associated improvements in profitability, passenger service, reduction in Government subsidies, and hence material contributions to economic development.

The project is expected to produce net economic/financial benefits, as:

(i) existing assets will be used more efficiently in response to market indicators;
(ii) passenger and shipper needs will be recognized and services delivered in a cost effective and commercially viable context; and
(iii) the need for Government subsidies will be reduced.

These economic/financial benefits may be measured by comparing productivity and costs in the railways on a “with and without” project basis.

The direct benefits from the project, from reduced operating costs and improved product availability will accrue to passengers, shippers, and governments in the form of reduced subsidies.

Indirect benefits will include: (i) increased inbound tourism as a result of increased rail service delivery (ii) improved government finances, due to reduced subsidies and increased tax revenues; (iii) increased employment; (iv) improved skill development in the rail industry; and (iv) increased industrial communication and regional economic integration.

15. Social and Environmental Issues:

The project is not expected to have significant impact on the natural, cultural, and social environment,

The project will help alleviate poverty indirectly to the extent that employment is created in the rail industry and secondarily local environs. .

16. Priority of Project/TA:

* (see Chapter IX)

17. Project Status (Proposed/Ongoing/Completed):

Proposed

18. Status of Project/TA Preparation:

Proposal

19. Pre-feasibility Study (Completed/Required):

Required

20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the Project.
21.	**Issues/Constraints:** No major difficulties are envisaged.

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*Rail Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Competitiveness*

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** Development of Traffic Engineering Capacity in Myanmar (TAP 29) Development of Highway Engineering Capacity in Myanmar (TAP 30) Financial and Economic Assessment Expertise in Myanmar (TAP 31)
2.	**Loan or TA:** TA
3.	**Project Location**: Myanmar
4.	**Countries Involved:** Myanmar
5.	**Sector/Subsector:** Transportation/Multi-Modal
6.	**Background and Rationale:** During the course of the prioritization mission to Myanmar, the need for training in traffic and highway engineering and the broader issues of infrastructure project evaluation (particularly from the financial and economic viewpoints) were expressed. **These matters may need to be addressed at some stage in the future but at this juncture the need is simply noted.**
7.	**Objective(s):**
8.	**Scope:**
9.	**Estimated Cost:**
10.	**Financing Plan and Financing Arrangement (Public/Private):**
11.	**Financing Status:**

12.	**Proposed Implementation Period/Schedule:**
13.	**Executing/Implementation Agency and Contact Persons:** **ADB Contact Division/Person:**
14.	**Estimated Benefits and Beneficiaries**:
15.	**Social and Environmental Issues**:
16.	**Priority of Project/TA:**
17.	**Project Status (Proposed/Ongoing/Completed):**
18.	**Status of Project/TA Preparation:**
19.	**Pre-feasibility Study (Completed/Required):**
20.	**Follow-up Actions Required:**
21.	**Issues/Constraints:**

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** Transformation of Economic Corridors into Transport Corridors (TAP 32)
2.	**Loan or TA:** Regional TA(s) [RETA(s)]
3.	**Project Location:** GMS-wide
4.	**Countries Involved:** All GMS countries
5.	**Sector/Subsector:** Transportation/Economic Development
6.	**Background and Rationale:** In order to improve subregional transport and maximize benefits, the GMS countries have adopted a holistic approach to development, pursuing the concept of economic corridors. According to this approach, investments in priority infrastructure sectors (e.g., energy, telecommunications, and tourism, as well as transport) will be focused in the spatial dimension in order to maximize development impact and minimize cost.[1] In essence, the economic corridors concept integrates physical infrastructure facilities and links them to and supports streamlined policies and procedures (e.g., related to trade and investment, to minimize nonphysical cross-border barriers), and facilitates the development and expansion of cooperation in production and trade centers and linkages in various forms along a geographic corridor; the concept "presents a focused, limited and 'bounded' way of expanding cooperation beyond infrastructure projects" [2].The concept was first introduced at the Eighth GMS Ministerial Conference held in Manila in October 1998 as a strategic initiative under the GMS program to facilitate recovery from the Asian economic crisis. It was first applied to the East-West Economic Corridor, and ADB is now applying the concept to a North-South Economic Corridor.[3] It is

[1] See, e.g., http://www.adb.org/GMS/Projects/1-flagship-summary-north-south.pdf.
[2] ADB Institute, *Facilitating Regional Cooperation in Asia*, 2003.
[3] Asian Development Bank, *Technical Assistance Greater Mekong Subregion: Development Study of the North South Economic Corridor*, Technical Assistance Report, Project Number 39084, March 2006. An analogous approach has been applied in the Spatial Development Initiative in Southern Africa, e.g., in the successful Maputo development corridor linking South Africa and Mozambique, which links the landlocked northern provinces of South Africa, rich in gold and coal mines, with the Mozambican port of Maputo. Before establishment of this corridor, the mining areas were not internationally competitive because transport costs to the port were too high. United Nations Commission for Europe, *From Analysis to Implementation, Introducing Trade and Transport Facilitation Measures in an Integrated Environment*, Almaty, 29 August 2003, p. 13.

	urged that this multisectoral approach be applied to additional corridors, reviewing spatial development options, addressing practical infrastructure, human resource, policy, regulatory, and institutional barriers to trade, investment, and the movement of goods and people. An important element for the transformation of transport corridors into economic corridors will be the implementation of transport and trade facilitation measures, e.g., as provided by the GMS Cross-Border Transport Agreement, the implementation of which is to be supported by a number of Technical Assistance Projects proposed in the current study. At the Final Meeting on the GMS Transport Sector Strategy, held in Vientiane on 21 March 2006, Mr. Sunant Gliengpradit of Thailand noted that several new corridors have been proposed but the important question is how to transform these corridors into full-fledged economic corridors. Mr. Peter Broch of ADB remarked that ADB has so far done only one investment study for a corridor (on the East-West Economic Corridor in 2002) and is about to do a second one (on the North-South Economic Corridor); once the findings of these two studies are both in, we may have a more substantial basis for specifying approaches to achieving this objective. He noted the TAs that ADB has undertaken in this regard are advisory TAs and not project preparation TAs, and therefore do not say anything about how the identified projects would be implemented. Mr. Vasim Sorya, Cambodia, noted that each corridor should have some potential for generating economic activity. Mr. Sunant further commented that the end product of transport and other infrastructure development is to generate economic activity. Mr. Broch requested the consultants' report call for formulation of this TAP to help transform transport corridors into economic corridors.[1]
7.	**Objective(s):** The objective of the TAP is to foster development through the implementation of transport corridors integrated with related initiatives, including both infrastructure and facilities ("hardware") as well as streamlined policies and procedures ("software"). The TAP will thereby accelerate the process of converting transport corridors into economic corridors where the movement of goods, people, and capital within and across the GMS can take place with optimal economic and development benefits.[2]
8.	**Scope:** The TAP will first prepare a methodology or approach for transforming transport corridors into economic corridors. This methodology/approach should draw on practical international experiences, including lessons from the GMS experience to date. Applying this methodology/approach to each GMS transport corridor, the project will specifically:

[1] Summary of Proceedings, pargagraph 34.

[2] See Asian Development Bank, *Technical Assistance Greater Mekong Subregion: Development Study of the North South Economic Corridor*, Technical Assistance Report, Project Number 39084, March 2006, p.3

(i) identify major development issues facing each subject corridor and define the corridors' strategic position, strengths, and weaknesses relative to the GMS and larger area; [1]
(ii) prepare a multi-sectoral facility/infrastructure development plan for each subject corridor; and
(iii) prepare a set of streamlined policies and procedures, e.g., for facilitation of investment, for facilitation of cross-border movement in line with the CBTA.

The subject corridors may include the following:

1 East-West Economic Corridor (EWEC): Mawlaymine-Da Nang (R2)
2 North-South Economic Corridor (NSEC)
2.1 NSEC Western Corridor: Kunming-Bangkok via Lao PDR/Myanmar (R3A/R3B)
2.2 NSEC Central Corridor: Kunming-Hanoi-Haiphong (R5)
2.3 NSEC Eastern Corridor: Kunming-Nanning-Hanoi
3 Southern Economic Corridor (SEC)
3.1 SEC Central Subcorridor: Bangkok-Phnom Penh-Ho Chi Minh-Vung Tau (R1)
3.2 SEC Southern Coastal Subcorridor: Bangkok-Trat-Koh Kong-Kampot-Ha Tien-Ca Mau-Nam Can (R10)
3.3 SEC Northern Subcorridor: Bangkok-Siem Reap-Stung Treng-Rattanakiri-O Yadov-Play Ku-Quy Nhon
3.4 SEC-NSEC Inter-Corridor Link: Dong Kralor-Stung Treng-Kratie-Phnom Penh-Sihanoukville (R6)
3.5 SEC Western Subcorridor: Dawei-Kanchanaburi-Bangkok Extension
4 Northwestern Corridor (NWC): India-Myanmar-Thailand: Bangkok-Mae Sot- Paan-Payagyi-Meiktila-Tamu-Imphal
5 Proposed Northern Corridor (NC): Yunnan-Myanmar-India: Kunming-Dali-Ruili-Lashio-Mandalay-Tamu-Imphal
6 North-South via Lao PDR Corridor: Kunming-Simao-Mohan-Louang Prabang-Vientiane-Thakhek-Pakse-Veunekham-Stung Treng-Phnom Penh-Sihanoukville
7 Northeastern Corridor: Nanning-Lang Son-Hanoi-Moc Hau-Xam Nua-Xieng Khouang-Vientiane-Khon Kaen-Nakhon Ratchasima-Bangkok/Laem Chabang

9. Estimated Cost:

US$5.0 million

10. Financing Plan and Financing Arrangement (Public/Private):

Public (from ADB TA funds)

11. Financing Status:

Proposed for financing

[1] See Asian Development Bank, *Technical Assistance Greater Mekong Subregion: Development Study of the North South Economic Corridor*, Technical Assistance Report, Project Number 39084, March 2006, p. 10.

12.	**Proposed Implementation Period/Schedule:** 2006-2015
13.	**Executing/Implementation Agency and Contact Persons:** Executing Agencies: **ADB Contact Division/Person:** Mekong Department, Operations Coordination (GMS) Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** The project will benefit stakeholders residing and operating businesses in the subject corridors, as well as transport system users transiting the subject corridors.
15.	**Social and Environmental Issues:** The project will have positive social and environmental impacts
16.	**Priority of Project/TA (H/M/L):** *** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** The TA builds upon previous ADB TAs addressing the East-West and North-South Corridors.
19.	**Pre-feasibility Study (Completed/Required):** Not applicable
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.
21.	**Issues/Constraints:** At the Final Meeting on the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006, Mr. Lattanamany Khounnyvong, Lao PDR, called for the provision of facilities to complement the development of road infrastructure. Mr. Nguyen Van Thach, Viet Nam, supported the comment by Lao PDR on the need for facilities to complement road projects. Mr. Peter Broch of ADB remarked that the issue of complementary facilities is related to

the concept of economic corridors, where the aim is not just to build the transport channel but also to make it a basis for generating economic activity, including trade, industrial, and agricultural development in the area.[1]

Also at the Final Meeting on the GMS Transport Sector Strategy Study, Mr. Silpachai Jarukasemratana, Thailand, shared the Thai experience with regard to the provision of facilities apart from the road infrastructure, e.g., bus terminals, rest areas, and stated that the appropriate approach may be through purely private investments and PPPs (Public Private Partnerships).[2]

In implementing the TA, it is important that the economic corridor concept be well understood. The pre-investment study for the East-West economic corridor identified some 70 subsectors for business opportunity, at least arguably a contradiction of industry clusters that underlies the economic corridor concept.[3]

Also, it will be important to enhance public-private partnerships through effective, ongoing dialogue.[4]

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Sector	*Transportation and Communication/Economic Development)*
Subsector	*Various*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Competitiveness, Connectivity, and Community*

[1] Summary of Proceedings, paragraphs 11 and 20.
[2] Summary of Proceedings, paragraph 22.
[3] PADECO Co., Ltd. Assessment of GMS Achievements and Outstanding Challenges, Working Paper 1 of the Interim Report of the GMS Transport Sector Strategy Study, July 2005, p. 16 [prepared by David Husband, the Team's Macroeconomist].
[4] Asian Development Bank, *Technical Assistance Greater Mekong Subregion: Development Study of the North South Economic Corridor*, Technical Assistance Report, Project Number 39084, March 2006, p. 2.

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** Further Development and Enhancement of GMS Transport Model (TAP 33)
2.	**Loan or TA:** Regional TA (RETA)
3.	**Project Location:** GMS-wide
4.	**Countries Involved:** All GMS countries
5.	**Sector/Subsector:** Transport (all surface modes)
6.	**Background and Rationale:** The terms of reference (TOR) for TA 6195-REG: GMS Transport Sector Strategy Study (TSSS) required “analysis of demand-side factors and supply-side constraints affecting the establishment and effectiveness of a GMS transport network.€ 35 In order to achieve this objective, the TOR required “modeling of derived demand for transport services based on projected levels of economic activity and trade, particularly along major economic corridors.” In addition, a transport model was also required to assess the factors affecting the performance of different modes and corridors as multimodal routes. The transport model was also developed to help rank the attractiveness of different schemes. The GMS Transport Model (or GTM) thus constructed considered both demand-side factors (e.g., economic development corridors) and supply-side issues (e.g., current transport costs and constraints on development) on the current network, both in 2004 and for a forecast of 2015. Furthermore, by evaluating the changes (improvements) realized through implementing both investment projects and technical assistance projects, the relative benefits of each may be assessed, in terms of: (i) journey time savings, and (ii) monetary cost savings of journeys. The current GTM contains 254 zones, of which 216 relate to domestic areas within GMS, a further 30 were defined for seaports, and 8 for external land connections (Malaysia, India, Bangladesh and Tibet, Sichuan, Guizhou, Hunan, and Guangdong in the PRC). The network model covers key road, rail, and waterway links within the GMS and was coded to a level of detail consistent with the zoning. Nodes were coded representing key towns/cities and junctions, including interchanges between modal networks (i.e., road-rail, rail-water, road-water) and also borders. Planning data, such as population, GDP and/or vehicle ownership, were collected on a zonal basis, depending on data availability. In most cases the

zoning was specified as finely as possible given the availability of planning data. In some cases, the zoning was aggregated in some instances (mainly in a few cases in Thailand and Viet Nam). In other cases, the zoning was finer than the definition of planning data, most notably in Myanmar. This was to enable a reasonable overall definition of zoning.

Traffic counts were obtained from a variety of sources, such as the Asian Highway Database, the ASEAN Highway Database, previous study reports, and a variety of national sources. In some instances multiple traffic counts were available for a given link. In such cases the most recent data were generally taken. In those instances where a number of counts from the same source for the same link were available, for instance where a sequence of count data sites all corresponded with the same link in the GTM, the count site that appeared to best represent interurban, rather than shorter-distance urban-suburban movements was taken.

In a few cases, preliminary trip matrices for some countries/modes were available. In these instances they were "growthed" to 2004 for use as prior matrices. In other cases, a set of initial prior trip matrices were obtained by benchmarking between countries and modes. Following initial assignment runs, comparisons were made between modeled and observed flows by country and these initial prior trip matrices re-scaled accordingly.

Trip matrices for 2004 were ultimately generated using matrix estimation. As a consequence, trip matrices are seen as more reliable where there were more traffic count data. In areas lacking traffic counts, the trip matrices are probably less robust.

Do Minimum forecasts for 2015 were obtained by including committed projects into the coded network. For scheme tests, the scheme was additionally reflected in the network coding.

Forecast travel demand (trip matrices) were derived based on trip-end growth factoring on a zonal basis, with the growth factors defined by sector. Multimodal this provided a reasonable overall picture of travel growth and of cross-border growth, it was not possible to consider in detail growth in any locality in response to specific plans or schemes.

During the initial forecasts, the growth factors used included adjustments to take account of mode shifting from bus to car (in Thailand) and from bus to motorcycle and car (in other countries), with reference to domestic traffic only. A subsequent set of forecasts were generated without adjustments to growthing factors, but rather on reallocating trips from the bus passenger matrix to the car matrix and where appropriate also the motorcycle matrix, after the Frataring.[1]

The GTM represents the first attempt to construct a multimodal passenger and freight surface transport model in the subregion. Within the context of the TSSS, the transport model was used to gauge demand for proposed infrastructure projects, to assist in estimating their economic cost-benefit and

[1] The Fratаring algorithm is a trip growthing technique that applies an iterative process to scale up the current origin-destination matrix according to forecast year growth factors on a zonal basis. The Fratering technique tends to preserve relative trip distributions between the base and forecast matrices.

to analyze likely systemwide impacts of individual infrastructure projects.
There were differences in reporting conventions between countries and modes, as well as differences in data coverage. Similarly, in some instances data collected were several years old and had to be growth factored to estimated 2004 levels.
Even with a number of data shortfalls and data consistency issues, during the course of the TSSS the GTM attracted substantial interest from a number of GMS countries, in terms of:

(i) providing a central, unified database of transport supply (network), demand (matrix and count) and parameters across the GMS;
(ii) enabling transport linkages and missing links alike to be analyzed in a pan-GMS context; and
(iii) as a consequence, enabling demand-side investigation of proposed projects.

Moreover, at the TSSS Workshop in Ho Chi Minh City on 8-9 December 2005, the potential to further develop the GTM was discussed and supported by GMS stakeholders (Governments of the GMS countries and ADB). It was noted that further development of the GTM could provide:

(i) a framework for improving data collection;
(ii) a framework for analyzing projects, with potential to analyze policies as well as infrastructure projects, in terms of impacts on transport within and across the GMS, demand for projects, prioritization of projects;
(iii) a framework for analyzing projects in more detail in terms of: (a) analysis of project impacts on different sections of a scheme (e.g., Cambodia requested functionality to enable the impacts of interurban corridors linking through with Phnom Penh on traffic levels around Phnom Penh to be investigated; (b) project phasing (e.g., urban bypasses first, inter-urban sections later); and (c) analysis of social impacts of projects, through creating linkages with databases from social and economic development studies, as well as linking with other sectors (probably via a GIS database)
(iv) a framework for monitoring project outturn performance, through comparison of pre-opening forecasts against traffic flow realized, being used to iteratively improve the GTM and hence provide a continually improved basis from which to forecast impacts of future projects;
(v) a method to assess demand-side project risks;
(vi) in connection with (iv) and (v), to provide a methodology to ascertain the linkage between transport infrastructure development and economic development, which would provide he GMS countries and ADB with firmer guidance on levels of project-induced traffic and thus economic development, in addition to the “traditional” forecast linkage from economic development to traffic growth levels;
(vii) a basis for transport modeling to countries currently lacking transport models, as well as supplementing existing transport models existent in certain GMS countries;
(viii) a basis for capability development in transport planning, modeling, forecasting, and scheme appraisal;
(ix) a method of providing support to planning and decision-making processes within GMS countries;

(x) a method of providing governments (and ADB) with their own model of interurban and cross-border transport, e.g., to assist in negotiations with potential investors or donors;
(xi) a training tool: using the model, via dissemination to government officials backed up with workshops on model use and updating;
(xii) potential dissemination of ADB project profiles, including scheme impacts, to the public at large, via an internet interface;
(xiii) a forum through which appropriate officials from GMS countries could cooperate, wherein each government ultimately can be responsible for data collection and updating (at least initially with support from ADB), and with data then shared between governments via model updates (which bring together country updates);
(xiv) a quantitative framework through which to assess likely impacts of changes to transport policies at subregional, quadrilateral/trilateral/bilateral, and national levels;
(xv) an improved, common starting point for undertaking feasibility studies of individual projects (as the initial appraisal and screening process would be more thorough and rigorous).

The above list is long but not necessarily exhaustive of the uses to which a further-developed GTM might be put. Indeed, through involving appropriate persons/bodies from GMS countries in its development it is hoped that the specification of the GTM can be gradually extended. In such a way, the GTM could become central to the transport planning process in the GMS and contribute to the coordination of transport with other sectors of ADB activity.

Given the success of the GMS to date, from which other regional groupings are learning, it is believed that developing the GTM as a “flagship project” could also provide benefits to other subregional groupings of ADB Developing Member Countries.

7. Objective(s):

The goal of the TA is to promote economic cooperation and integration in the Greater Mekong Subregion, consistent with the GMS Program vision of a more integrated, prosperous, and equitable subregion. The specific objectives of the RETA are to promote:

(i) coordination in infrastructure planning;
(ii) improved forecasts of likely project benefits;
(iii) project outturn performance monitoring, to further improve the planning and evaluation processes;
(iv) better coordination between transport planning and economic and social appraisal;
(v) technology transfer and capability development in the above; and
(vi) optimization of expenditure in the transport sector, for instance by enabling prioritization of phases of individual projects at an earlier stage in the project life cycle.

Further development of the GTM would be in accordance with proven industry standards in transport modeling. In some instances, given the cross-border nature of the GTM, it may even be used to set standards for possible future international transport models elsewhere in the ADB’s remit.

8. Scope:

While a long-term objective is to enable government agencies to use and develop the GTM themselves (as well as national transport models derived from the GTM), it should be remembered that transport modeling is very much a specialist field.

As such, it is not expected that staff in designated government agencies would rapidly develop the capabilities to scope, construct, and enhance multimodal strategic transport models. Rather it is envisaged that the process of model development would facilitate a general understanding of transport modeling among all concerned parties and that designated individuals within the relevant agencies would learn to update and operate the GTM in due course. Once they have learned what information to collate, and how to code it, operate the model and interpret outputs, it would be possible for them to receive further training in model specification, coding, and improvement.

It should also be recognized that key transport planning models used by leading cities, countries, and regions throughout the world have typically been developed over a number of generations (or versions). Examples include London's London Transportation Studies model, Singapore's Strategic Transport Model, and Hong Kong's Comprehensive Transport Studies model. In each case a number of versions were developed, each building on the last.

This is not to say that it would take decades to get the GTM "right"; however, a multi-year development, dissemination, and enhancement program is likely to be required and this should be acknowledged by all stakeholders at the outset. It is also not to say that the GTM cannot be used until it is in a "late" version; rather, functionality, accuracy, and robustness can be developed over the course of a few years, with each new version of the model enabling both a wider range of analyses and more detailed analyses than the previous version.

It is therefore recommended that the GTM be further developed in phases. This would enable:

(i) stakeholders to "take stock" of developments in the model and any implications for policy;
(ii) suggest and prioritize additional functionality in an iterative manner with the GTM's development;
(iii) facilitate a rolling program of data collection and model updates, with successive improvement from one version of the model to the next;
(iv) facilitate ongoing capability development in GMS countries in data collection and transport modeling; and
(v) identify any specific issues with the GTM and address such issues promptly thereafter.

Based on discussions at the GMS TSSS Workshop in Ho Chi Minh City of 8-9 December 2005, a proposed phasing[1] for model development beyond the current TA 6195-REG is as follows:

[1] Any actual program and dates to be followed would of course depend upon acceptance of the program by the GMS governments.

Within TA 6195-REG:

March 2006:

(i) Each country to designate agency to have ownership of the GTM
(ii) Drawing up a “long list” of enhanced model functions and data collection requirements to achieve (i) above

Version 2:

While actual specification for Version 2 can hopefully be reached by consensus following the finalization of TA 6195-REG, it is envisaged that the key elements of Version 2 of the GTM would comprise:

(i) migration of model to more powerful and user-friendly software;
(ii) increased zoning definition (say from the current 254 zones to 500-1,000 zones;
(iii) increased network definition, mainly in terms of subdividing existing model links, but with some scope to add new links currently omitted from Version 1 of the GTM;
(iv) enhanced volume-delay relationships on links, including improved consideration of wet/dry season impacts on transport times and more detailed consideration of congestion near to urban centers caused by local traffic (note: specific wet/dry season modeling is not included);
(v) updating of transport demand databases, e.g., latest traffic count data, customs data, especially in areas where Version 1 is relatively weak (e.g., inland waterway) - where citable count data are not available, close liaison with nominated agencies in each country to estimate flows will be required;
(vi) improved definition of transport costs to improve treatment of intermodal interchange in particular; and
(vii) enabling GTM outputs to be input into a GIS for interrogation by non-transport modelers (one-way data transfer).

The envisaged scheduling of development of Version 2 is given below, based on a start immediately after the Luang Prabang TSSS Workshop in March 2006. However, the work can be deferred to enable all stakeholders to be better prepared (e.g., government agencies to designate officers to assist, ADB to designate staff to oversee and to arrange financing).

March 2006 to April 2006:

(i) specify program for updating traffic data and network databases;
(ii) agree on technical modifications and priorities thereof;
(iii) agree on modeling software to be used for (ii) above; and
(iv) appoint Lead Transport Modeler to undertake and coordinate GTM development work.

April 2006 to December 2006:

(i) Purchase of requisite software to enable further GTM development. It is suggested that ADB procure software, albeit with coordination with the designated Lead Transport Modeler. This should enable ADB to procure software more cheaply than going through a consultant. That

the GTM would ultimately be one of the key transport models resident in each GMS country's government might enable ADB to secure software at a very competitive price (i.e., substantially below list price). At this stage one software license may be sufficient, although ADB might wish to have one license in-house for its own testing/review of the model;

(ii) An additional round of data collection, with an emphasis on identifying continued data shortfalls. This to be conducted in conjunction with the agencies identified in March 2006 (item (i) thereunder). Data to be collected to include zoning data (e.g., socioeconomic, demographic, vehicle ownership data by zone), network data, and transport cost data;

(iii) Subject to data availability, re-specify model zoning and network definition at a finer level of detail (say between 500 and 1,000 zones in total versus the current 254 zones). This may require substantial liaison between the Lead Transport Modeler and local agencies in determining appropriate zoning definitions and estimates of splits from current zones to finer zoning. Likewise, substantial liaison may be required to update transport network definitions satisfactorily;

(iv) Recalibrate the enhanced Version 2 of the GTM; and

(v) Document strengths and weaknesses of Version 2 of the model.

December 2006-February 2007:

(i) Hold workshop to demonstrate new model and canvass views on further improvements;

(ii) Migrate appropriate GTM data and outputs to a GIS;

(iii) Mount a form of the Version 2 model on a public portal (e.g. internet) and/or via CD-ROM and/or intranet of government agencies and ADB. Such a model would enable tested projects to be investigated on-screen by users, although commissioning of model runs through such a portal would be developed at a later date (see Version 3); and

(iv) Agree on a timetable for development of Version 3 of the model.

Version 3:

The precise scoping of Version 3 at this stage would be premature. However, whereas the emphasis in Version 2 is on increasing the level of detail in modeling, it is envisaged that the emphasis of Version 3 would be on:

(i) Linking the GTM with a GIS and other appropriate databases in a two-way format, i.e., allowing the GTM to both use data from and export data to other related applications;

(ii) Providing greatly improved input data to improve robustness, including (a) instituting a program of transport flow data collection, such as traffic counts to supplement other available data, defining common standards for transport flow data collection across the GMS, e.g., into which to convert data routinely or periodically collected by governments, analyzing vehicle occupancy/load factors, cargo types, trip purposes, and the like, especially at border crossings (to achieve better equivalence vehicles with tonnages/passengers as appropriate); (b) developing a comprehensive database of transport cost data, such as interurban fares, interurban tariffs, duties payable at borders, delays caused by transshipment, customs/immigration clearance, and any other costs associated therewith; (c) developing a comprehensive transport network inventory database, in a unified format, which can

	also be used by a GIS; and (d) journey time surveys, covering both wet and dry seasons; (iii) Enabling broader functionality, such as integrating economic assessment into the transport modeling process and enabling accessibility analysis of projects, to assist in comprehensive cost-benefit evaluations and in identifying where local access/egress routes might need to be improved to fully benefit from improvements to inter-urban routes; (iv) Developing a user-friendly interface to the GTM to enable non-specialists to commission and analyze certain project tests; (v) Using the user-friendly interface to facilitate training (capability development) in transport modeling; (vi) Linking the GTM with a GIS (or other similar interface) in a two-way manner, i.e., enabling the GIS (or other similar interface) to invoke runs of the GTM and "interrogation" of outputs; (vii) Addressing any issues arising from Version 2 of the GTM; (viii) Adding other functionalities to be agreed by stakeholders; (ix) Possibly considering the feasibility of different "wet" and "dry" season analyses; (x) Possibly also considering further refining of zoning system; (xi) Enabling the generation of National Transport Models, using the GTM as the starting point; and (xii) Providing a copy of the model with appropriate software license to each GMS Member Country and provision of training and ongoing support in use thereof.
9.	**Estimated Cost:** For Version 2, depending on precise specification required: US$350,000. For Version 3, potentially up to US$1 million, but very dependent on survey and training requirements, in addition to the ultimate specification of Version 3.[1]
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public (from ADB TA funds)
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2006-2007 (Version 2) 2007-2009 (Version 3)

[1] Although this still looks like a "big number", if five countries plus two provinces of the PRC "buy in" and request support, coordination, and the like, US$1 million could be consumed quite quickly. Assuming US$1 million, this would be equivalent to under US$150,000 for each country/ PRC Province on average. Given one of the likely objectives of Version 3 would be to generate a robust "starting point" for national/PRC provincial models, this would still represent excellent value for money.

13. Executing/Implementation Agency and Contact Persons:

Executing Agencies Ministry of Public Works and Transport (Cambodia); Provincial Department of Communications, Yunnan Province and Guangxi Zhuang Autonomous Region (PRC); Ministry of Communication, Transport, Post and Construction (Lao PDR); Ministry of Rail Transportation (Myanmar); Ministry of Transport (Thailand); and Ministry of Transport (Viet Nam)

ADB Contact Division/Person:

Mekong Department, Operations Coordination (GMS) Division
Email: gms@adb.org

14. Estimated Benefits and Beneficiaries:

Benefits would include:

(i) coordination in infrastructure planning;
(ii) improved forecasts of likely project benefits;
(iii) project outturn performance monitoring, to further improve the planning and evaluation processes;
(iv) better coordination between transport planning and economic and social appraisal;
(v) technology transfer and capability development in the above; and
(vi) optimization of expenditure in the transport sector, e.g., by enabling prioritization of phases of individual projects at an earlier stage in the project life cycle.

Beneficiaries include:

(i) governments of the GMS countries;
(ii) working level officical in designated government agencies;
(iii) residents of GMS countries, through improved planning; and
(iv) ADB, both as custodian of an example of a "best practice" in transport planning and international cooperation, and through enabling better targeting of future TAs and loans in the GMS.

15. Social and Environmental Issues:

Improved planning and analysis of projects by use of the GTM should have positive significant social/environmental impacts as a consequence of better planning and initial scheme screening, as well as improved project phasing.

16. Priority of Project/TA:

*** (see Chapter IX)

17. Project Status (Proposed/Ongoing/Completed):

Proposed

18. Status of Project/TA Preparation:

The TA builds especially upon on the current ADB technical assistance project, i.e., TA 6195-REG GMS Transport Sector Strategy Study.

19.	**Pre-feasibility Study (Completed/Required):** Not applicable
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.
21.	**Issues/Constraints:** A number of important issues were raised at the Final Meeting on the GMS Transport Sector Strategy Study, held in Vientiane on 21 March 2006. First, Mr. Silpachai Jarukasemratana of Thailand raised the question, for example, of whether the model can determine the impact of rising fuel prices, since it has been observed that this distorts transport patterns. He also noted that the Thai government has a national transport model, but every time they need it they have to seek assistance from outside experts. Mr. Peter Broch remarked that having a running national model gives the advantage of already having the data. He also stated, with regard to the first question, that a transport model could measure the impact of such factors as rising fuel costs. Within the current formulation of the GTM, distance-based transport costs could be amended to take some account of changing fuel prices. However, more detailed/robust checks of the impacts of rising fuel prices would require a more sophisticated model, so as to allow for differential impacts of fuel prices between countries and modes. This would require data from GMS countries on how rising oil prices are passed on to travelers. The process might be relatively straightforward for road-based car trips (although impacts of any fuel subsidies would need to be known). However, for bus passengers, rail passengers, water transport passengers, and for freight by all modes, the mechanism through which fares/tariffs are set/changed in response to changes in fuel prices would need to be known, e.g., whether there is a mandated formula for fares/ tariffs, how often prices are revised, etc. It may for example be the case that there is a long-term relationship, but that in the short term changes in fares in response to changes in fuel price (and in turn to underlying crude oil prices), are less easy to determine (i.e., to what extent operators have to absorb fuel price increases in the short term). In terms of policy planning, it may be desirable to employ a transport model such as the GTM to test what the likely impacts of raising fares/tariffs would be. Analyses based on model outputs could then determine what elements of the economy benefit/lose in what amount (e.g., the traveling public/freight users, operators, government treasuries). Regarding the problems with using existing transport models (even assuming full access to them is possible), one of the key objectives of further development of the GTM would be in the short term to provide a resource for GMS countries that is effectively free to use, so that they can have access both to the model and to the expertise necessary to set up, execute, and interpret model tests. Over the longer term, the aim would be to develop suitable capabilities within each GMS member country (where appropriate with

development of national transport models in parallel); in-house experts for the nominated agencies would thus be established in each GMS country. For specific projects, specialist external support might still be considered on a case-by-case basis; however, the modeling work should ultimately be conducted in house, with the GTM management/specialists offering “helpdesk” support if required.

Also at the Final Meeting on the GMS Transport Sector Study, Mr. Lattanamany Khounnyvong of Lao PDR observed that a transport model usually determines the impact of transport and infrastructure development in terms of savings in time and costs, but said he has not yet seen a model that can assess impact on socioeconomic development. Mr. Math shared Lao PDR’s experience with regard to comprehensive transport studies modeling, e.g., the National Transport Study done in the late 1980s, which did not result in any practical benefits. He therefore suggested that some countries may not be ready for transport models, and instead would find it more useful to exchange experiences and lessons with other countries to guide it in its transport-related decisions.

Seeking guidance from neighboring countries regarding transport-related decisions is something that would in general be recommended whether or not a transport modeling resource is present. However, differences between and among countries should be borne in mind. One common problem with agency-funded transport planning and modeling work is that on project “completion” the budget is used up and work terminates. This leaves little or no allowance for either follow-on maintenance of the model itself or for the maintenance and ongoing development of capabilities in transport planning and analysis. Having undertaken the GMS Transport Sector Strategy Study, it is hoped that the model would not, like many national transport models before it, be allowed to become obsolete. The idea has been to provide a method by which the GTM could be maintained and indeed enhanced. Central to this process is a program to enable ongoing capability development within GMS countries, where such capabilities are currently lacking. In other words, should funding for ongoing model development be obtained, then this would include budget to provide ongoing support for transport planning and modeling capability development. However, this would require GMS countries to provide some staffing support. The phased development proposed was intended to allow countries to make a small commitment to the process at first and hopefully, as the benefits of the program became apparent, to increase the level of staffing required, e.g., to start off with a point of contact to assist on a part-time basis (scheduling of such inputs to be agreed by all parties on an as-needed basis), then as the GTM develops these points of contacts (or their assistant(s) as nominated by them) would receive more technical training, so that eventually there would be a sustainable capability within the countries concerned.

The specialist nature of transport modeling was one reason why a program was proposed for the development, enhancement, and dissemination of the GTM. Skills could be developed jointly between GMS member countries. Moreover, these capabilities would then be available to assist individual countries in undertaking project evaluation. Further, should a country ever be considering undertaking infrastructure development via means of co-financing, be it through Public-Private Partnership (PPP) or through partial financing by development agencies (equity and/or debt), then a transport model would provide a means by which to assess risk factors for all concerned parties. This would include assistance on both the sizing and scheduling/structuring of

payments (equity investment and debt) and in assessing the riskiness of any underwriting required. Even if development agencies undertake to underwrite the scheme, e.g., through revenue guarantees to investors, it would be useful to the GMS country in question to have an idea of the riskiness of the scheme: as any project cash flow shortfall would either require the country to cover the shortfall or rely on its development partner agency to do the same, which in turn would adversely affect the country's risk rating for future infrastructure schemes (both transport and non-transport).

In the event of PPP, it is likely that any potential private sector partner would conduct its own demand and risk analyses. If the GMS member in question does not undertake such analyses itself, it would be dependent on the private sector sponsor's analyses. This is not advisable; it is strongly recommended that the country concerned undertaken their own independent risk analyses. While the GTM itself might require some modification and refinement on a project-by-project basis (and would not remove the requirement to use specialist advice), the GTM would nevertheless represent a starting point for these analyses and would assist the country concerned in completing the analyses required within a potentially tight timeframe. (It would reduce the chances of a country being "railroaded" into accepting a set of contract conditions too quickly that may later prove to be onerous (at the very least suboptimal) for the country.

Regarding the impacts of transport infrastructure development on economic development (and vice versa), this is indeed an area that is not addressed by most transport models, at least in part because economic development is a product of a number of different phenomena of which transport (both infrastructure and policy elements) is only one. Where an area has poor transport services, upgrading transport provision (e.g., through road rehabilitation) can lead to large increases in transport activity (in technical terms, this is due to trips being suppressed prior to rehabilitation and then there may be additional induced transport demand emanating from the upgrade, over and above initial estimates of trip induction). Indeed, the concept of economic corridors within GMS reflects this fact; transport may help unlock development potential, but other factors are also important. These factors would typically include population and other resources within the catchment area of a project.

Using economic definitions, most travel demand is referred to as "derived demand", meaning that it is a byproduct of other economic activities. Goods vehicles provide the means by which commodities and products are transported, in order to match demand with supply. Likewise, passenger transport is the means by which people are transported in response to economic forces. In some instances upgrading transport infrastructure will lead to a switching of say, supply sources, particularly where transport connectivity and costs were previously the key factor in deterring goods being sourced from a particular location. Previous ADB TAs have investigated, for example, the impacts of high transport costs on restraining demand for goods manufactured in Cambodia. Equally, it could be argued that transport connectivity and costs have thus far constrained the development of natural resource exports elsewhere in GMS (e.g., mineral exports from Savannakhet Province, Lao PDR).

The GTM development program proposed by the consultants took account of these factors. The aim has been to monitor the performance of transport

projects. In the first instance, this is concerned with performance in terms of patronage (traffic) levels on new or upgraded transport links; increased traffic levels would be used as a proxy for economic development, given that transport demand is primarily a derived demand (as explained above). However, the intention is to use the GTM in conjunction with other data analysis tools (e.g., Geographic Information Systems or GIS) in order to improve pre-construction forecasts of likely impacts (e.g., through refining the GTM's zoning detail). Similarly, this would be linked to a finer level of analysis, wherein supporting transport infrastructure upgrades such as link roads from a GMS route to individual villages could be identified. Equally, should data be available on resource deposits (or on possible mining concessions), then the transport requirements to link these to upgraded key routes could also be determined (although in the case of mining concessions, it is likely that upgrading of roads and the like would form part of the concession agreement, i.e., to be undertaken and/or financed at least in part by the concession holder).

Such analyses might require the use of the GTM in conjunction with other techniques. However, it is envisaged that the GTM and in particular the capability development associated with the GTM would provide skills both directly applicable to transport analysis and to the other accessibility analyses that may be required. Once again, it was intended that such capabilities could be developed as part of the overall GTM development program.

The consultants appreciate that over and above the costs of providing a suitably able government officer, a computer, and some office space (even on a part-time basis), the opportunity cost of such provision may be significant. Given the current pace of development within the GMS, for the foreseeable future there are likely to be a series of "priority" tasks could override the priority of the GTM. Nevertheless, given that the first version of GTM has now been developed, there is an opportunity to exploit this work now and thus prevent the need to start over completely in a few years with completely fresh data collection, model definition, and the like. Also, in the interim, the GTM could assist on other projects. Given the phased development proposed for the GTM, the aim was to start with relatively small commitments required from GMS countries and to build-up the GTM over time.

There were some additional comments at the Final Meeting on the GMS Transport Sector Strategy. Cambodia stated that they can assign staff, but indicated that the issue is how to attain sustainability. Viet Nam stated that it would be a useful tool, but the issue is how to maintain it. Thailand stated that if we continue with the model, it would be preferable if the projection period be shortened from 2006-2015 to 2006-2012; and the consultants stated that the the model is data dependent, so they would propose routine annual data collection.

By way of further comment, In order to attain model sustainability, a rolling program for its updating, development, and most importantly for developing capabilities within GMS countries is required. Initially, a further round of data collection has been proposed, together with incorporating outputs from other studies either ongoing or recently completed, which could assist in further developing the model. This would be the first step in a phased approach to developing the model and would require a point of contact in each GMS country to assist in the facilitation of data collection. The next step would be to review what all stakeholders would wish the GTM to do for them. Based on this

assessment, a second version of the GTM would then be developed, with improved functionality. This would require an increase in support from GMS countries in the form of at least one nominated official per country (who might be either the initial point of contact or one of their assistants) to assist with further data collection and model coding. These people would receive training in use of the second version of the GTM, so as to be able to “interrogate” the model and to set up and execute model runs, in order to provide support to their countries.

Following the completion of the second version of the GTM, views would be canvassed on what further functionality GMS countries (and other stakeholders) desire. Based on the outcome of this canvassing, a third version of GTM would be scoped. In order to develop Version 3, it is envisaged that the staff in GMS countries previously assigned during Version 2 development would receive substantially more training, such that much of the model development works could be undertaken by them with support and supervision from ADB.

In parallel with technical model development, it is envisaged that the management of the GTM would also evolve. Initially, the GTM might be managed by an ADB Project Officer, plus a designated Transport Modeler to liaise with GMS countries. During Version 2, a Steering Group might be established to help set model development priorities, including training/capability development and data dissemination priorities. At some point during development of Version 3, possibly as soon as commencement or as late as initial completion of Version 3, a Secretariat with its own office(s) might be established to administer the model and act as a focal hub both for developing the model and providing support in its execution, including provision of support on an on-demand basis to GMS countries.

The above approach should ensure that the model development process is sustainable over the long term and that in the short term the model does not fall into disuse and obsolescence.

Should the GTM be further developed, it would indeed be advisable to set up a number of forecast years; for example 2012, 2015, and 2020 might be considered. Multi-year analyses would also assist in projecting project cost-benefit flow over time, to assist with the phasing of projects. These analyses would also enable different countries to focus on different years, based on their own requirements, if necessary.

Finally, at the Final Meeting on the GMS Transport Sector Strategy Study, Mr. Peter Broch of ADB stated that he finds the phased approach proposed by the consultants appealing, i.e., to start small and gradually expand capabilities as demand for the model’s outputs increases. But he noted that there is a minimum investment involved, in terms of effort, cost, the staff to be assigned to collect data and undertake maintenance work, etc. In this regard, he requested the consultants to give indications of the minimum magnitude of effort and cost that would be required (e.g., data collection, actual administration, possible need for co-financing) to help the countries to decide on where they would want to go with the model.

The consultants acknowledge that each GMS country potentially has its own unique set of constraints in committing to the ongoing development of the GTM. Equally, there may be differing demands for the exercise itself: some

countries may already have national models *in situ*, although in the case of Thailand it has already been noted that although national transport models exist, access to them and the availability of suitably qualified modelers to operate them may be an issue. Any detailed development program for the GTM should therefore be responsive to these differences, as far as is practical. Certainly, the phased approach recommended would initially require a point of contact for data collection, who might also act as a reviewer of the model in each country. The initial minimum commitment required would be to facilitate further data collection from existing sources. However, if staff were available to assist in model coding work (for instance), subject to funding availability, they could be included in the model development exercise.

However, in some countries data collection might require additional surveys, for instance where extensive transport surveys have not been collected for many years, or where recent enhancements to transport networks have resulted in rapid changes in transport patterns. It is recommended that during a round of data collection through the GMS that any such additional survey requirements be identified, possibly to be conducted as part of Version 2 development rather than an initial Version 1 Update. (Flexibility is probably the greatest requirement).

These survey requirements should then be discussed in more detail with the governments concerned. In some cases it may be that the necessary data have already been collected, but simply not reported in the desired format. In other cases, technical assistance may be required in the scoping of transport surveys, identifying suitable locations, etc. Where other agencies are active and have conducted their own transport surveys, it would be useful if their data could be shared, so as to minimize re-surveying requirements.

Based on the consultants' current understanding of the availability of transport data, such additional surveys may be required in the following countries:

- Cambodia: where road rehabilitation coupled with economic development has led to rapid changes in transport patterns, it might be advisable to re-survey some traffic count locations from a recent Japan International Cooperation Agency (JICA) study. Equally, more detailed data on bus services and water transport services should be collected.
- PRC: highway counts were available in Yunnan, Guangxi could not provide much traffic data, so traffic counts in Guangxi should be considered. While network-wide statistics are available on railway and water transport, link-based data would be useful (it is possible that these are currently collected in some form, but not currently reported on a link basis).
- Lao PDR: there is a relative lack of data on water transport flows, which may very well be linked to low longitudinal volumes along the Mekong in Lao PDR, but further discussions with Lao PDR (and possibly the Mekong River Commission) are recommended. Some road traffic counts are also quite old and might require re-surveys.
- Myanmar: much of the available traffic count data was from the 1990's and hence a program of nationwide travel and transport surveys may be required. However, this could be a significant undertaking, in terms of the range of locations and hence the logistics of the required surveys. Closer liaison with the Government of Myanmar may be required to determine what data are available.

- Thailand: in general, Thailand already collects on a routine basis most of the transport statistics necessary. However, some liaison may be required to obtain statistics in link-based format. More detailed data on inland water transport flows in particular might be useful.
- Viet Nam: much of the data required for Viet Nam have already been collected during VITRANSS and the Study of Following-Up on VITRANSS. However, some periodically updated transport surveys might be useful.

The above assessment would be subject to review following further discussions with governments concerned, ADB, and other development partners. Similarly, the logistical requirements for undertaking such data collection would need to be discussed in more detail with the countries concerned (and with ADB regarding any financing of such surveys).

The consultants have prepared this Project Concept Profile for GTM development, outlining some of the anticipated costs. However, in terms of the country inputs required, specific additional survey requirements aside, it is envisaged that initial support would be similar to that provided during the GMS Transport Sector Strategy Study. Where there are substantial data shortfalls or other reasons where transport surveys are required in the short term, additional staffing may be required from the countries concerned. However, such inputs are best discussed between each GMS country and ADB in turn.

Where other agencies have model data available it is hoped that it would be made available to the GTM, in exchange for which those agencies would have access to the GTM. Whether there is potential for co-financing of model development could also be discussed bilaterally between ADB and any interested agencies. In any event, assuming that a phased approach is taken to further developing the GTM, then co-financiers (possibly including support in technical work) could be included as the GTM is developed, e.g., as detailed plans for new versions of the GTM are specified, the inclusion of other agencies could be discussed.

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsectors	*Road Transport, Rail Transport, Inland Water Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

PROJECT/TA CONCEPT PROFILE

1. Project Name (Number):

Development of Scheduled[1] Cross-Border Bus Routes (TAP 34)

2. Loan or TA:

Not required

3. Project Location:

GMS-wide

4. Countries Involved:

All GMS countries

5. Sector/Sub sector:

Transportation/Road Transport

6. Background and Rationale:

Cross-border bus services[2] in the GMS currently include the following routes (some of which are unofficial) and service frequencies in parentheses:

<u>Cambodia-Thailand</u>

Phnom Penh-Bangkok (variable)

<u>Cambodia-Viet Nam</u>

Phnom Penh-Ho Chi Minh City (variable)

<u>PRC-Lao PDR</u>

Mengla-Louang Namtha (once every two days)
Jinghong-Muang Xai (three times per week)
Mengla-Phongsali (once every two days)
Mengxing-Mengman (twice per day)

[1] The word "scheduled" was added to the title in response to a request of the PRC delegation at the Workshop on the Draft Final Report of the GMS Transport Sector Strategy Study held in Ho Chi Minh City on 8-9 December 2005. Summary of Proceedings, Appendix 11, paragraph 8.

[2] The symbolic importance of cross-border bus services has been illustrated dramatically in another subregion, with the opening of a Kashmir bus link between India and Pakistan. See, e.g., John Lancaster, "Kashmir Bus Link Boosts Hope", Washington Post Foreign Service, 8 April 2008, http://www.washingtonpost.com/wp-dyn/articles/A35839-2005Apr7.html ["Amid threats of violence and tears of joy, India and Pakistan kicked off a historic bus service Thursday across the divided Himalayan province of Kashmir, reuniting relatives who had not seen each other for decades and boosting hopes for a lasting peace between the nuclear-armed rivals"]

	Mengla-Vientiane (twice per week) PRC-Viet Nam Nanning-Halong City (twice per day) Lao PDR-Thailand Vientiane-Nong Khai (four times per day) Vientiane-Udon Thani (four times per day) Vientiane-Bangkok[1] (variable) Lao PDR-Viet Nam Vientiane-Hanoi[2] (one per day) Louang Prabang-Hanoi (variable) There are no cross-border bus routes involving Myanmar at present, and there is scope for further bus routes involving other countries. Cross-border bus frequencies change from time to time depending on demand and currently vary from twice a week between Vientiane, Lao PDR and Mengla, PRC to four times per day between Vientiane, Lao PDR and Nong Khai and Udon Thani, Thailand. Fares are relatively low, typically of the order of US$0.02-0.04 per passenger-km, e.g., 142 RMB between Vientiane and Mengla (738 km), 30 baht between Vientiane and Nong Khai (about 25 km), US$9 between Phnom Penh and Ho Chi Minh City (about 240 km). Since load factors are also often low (e.g., only 24% at the start of the Vientiane-Udon Thani service in April 2004, although this had increased to 63% by December 2004), and border crossing charges are sometimes excessive, some cross-border bus operators have experienced financial difficulty.
7.	**Objective(s):** To facilitate exchange and development between and among the GMS countries and to support planned initiatives in tourism.
8.	**Scope:** As a continuing initiative, new bus routes should be developed, as warranted by demand. These may include: (i) capital-to-capital links between the five GMS countries that are members of ASEAN and between these countries and the two participating provinces of the PRC, Yunnan and Guangxi; and (ii) other links as warranted by demand, e.g.: (a) between northern Cambodia (Phnom Penh, Kratie, Stung Treng, Dong Kralor) and southern Lao PDR (Veunekham, Pakse, Seno, Thakhek, Ban Lao, and Vientiane),

[1] Operated unofficially by private operators.
[2] With a stopover in Vinh and with southern connections to Hue, Da Nang, and Ho Chi Minh City

(b) between southern Cambodia (Cham Yeam, Koh Kong, and Sihanoukville) and northeastern Thailand (Hat Lek and Trat),
(c) between northern Lao PDR (Houayxay and Louang Namtha) and Thailand (Chiang Khong and Chiang Rai);
(d) between southern Lao PDR (Pakse and Wang Tao; Savanakhet-Dansavanh)) and northeastern Thailand (Chong Mek and Ubon Ratachathani; Mukdahan)/Bangkok;
(e) between eastern Guangxi Zhuang Autonomous Region (Beihai) and northern Viet Nam (Ha Long City and Hanoi);
(f) between western Yunnan Province (Kunming, Chuxiong, Dali, Baoshan, Mengshi, Wanding, and Ruili) and upper Myanmar (Lashio, Muse, and Kyukok),
(g) between southern Yunnan Province (Jinghong, Menghai, and Daluo), and upper Myanmar (Maila, Wan Tarpin, and Kengtung),
(h) between southern Yunnan Province (Kunming, Mile, Yinshao, Kaiyuan, Mengzhi, and Hekou) and northern Viet Nam (Lao Cai, Hanoi, and Haiphong),
(i) between upper Myanmar (Kengtung and Tachilek) and northern Thailand (Mae Sai); and
(j) between eastern Myanmar (Mawlamyine and Myawaddy) and northern Thailand (Mae Sot, Phitsanulok, Khon Kaen, Kalasin, and Mukdahan).

9. Estimated Cost:

Planning costs to be borne within existing and planned governmental budgets

10. Financing Plan and Financing Arrangement (Public/Private):

Public (for planning)

11. Financing Status:

Proposed for financing

12. Proposed Implementation Period/Schedule:

Phased implementation from 2006 to 2015.

13. Executing/Implementation Agency and Contact Persons:

Executing Agencies: Ministry of Public Works and Transport (Cambodia); Provincial Department of Communications, Yunnan Province and Guangxi Zhuang Autonomous Region (PRC); Ministry of Communication, Transport, Post and Construction (Lao PDR); Ministry of Rail Transportation (Myanmar); Ministry of Transport (Thailand); and Ministry of Transport (Viet Nam)

ADB Contact Division/Person:

Mekong Department, Infrastructure Division
Email: gms@adb.org

14.	**Estimated Benefits and Beneficiaries:** The Project will provide improved cross-border accessibility for passengers who cannot afford air travel, even by low-cost carriers. It will also facilitate the development of overland tourism.
15.	**Social and Environmental Issues:** The project is not expected have significant environmental impacts. Nevertheless, appropriate mitigation measures (e.g., noise reduction) should be implemented. The project will help alleviate poverty indirectly to the extent that employment is created in the road transport industry. Also, increased cross-border accessibility will be provided for passengers who cannot afford air travel, even by low-cost carriers.
16.	**Priority of Project/TA:** ** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** Project preparation will be undertaken by the governments concerned.
19.	**Pre-feasibility Study (Completed/Required):** Required
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of the resources necessary for project preparation.
21.	**Issues/Constraints:** Implementation of the GMS Cross-Border Transport Agreement, particularly Annex 5 on the Cross-Border Movement of People and related initiatives, is necessary for efficient implementation of this Project.

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*Road Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

PROJECT/TA CONCEPT PROFILE

1. Project Name (Number):

Marketing and Container Train Concessions between Laem Chabang, Thailand and Thanaleng, Lao PDR (TAP 35)

2. Loan or TA:

TA

3. Project Location:

Between Laem Chabang, Thailand and Thanaleng, Lao PDR

4. Countries Involved:

Lao PDR and Thailand

5. Sector/Subsector:

Transportation/Rail

6. Background and Rationale:

With the extension of the rail link from Nong Khai Thailand, across the Friendship Bridge to Thanaleng, Lao PDR, there is significant potential for the introduction of concessioning arrangements for container trains from the deep-sea port at Laem Chabang to Lao PDR. At present, all traffic on the route must go by road and as such there are significant potentials for a container-based service that would reduce both transport costs and road congestion. Currently, there are no firm proposals for establishment of such a service by either the State Railway of Thailand (SRT) or Lao PDR Railway Authority and as such concessioning arrangements are expected to provide the best solution.

7. Objective(s):

To promote economic efficiency by reducing transport costs through facilitation of container train concessions arrangements.

8. Scope:

The project will strengthen rail linkages between and Thailand and Lao PDR, by facilitating the shipment of containerized commodities on a cost-effective basis and hence utilizing existing and projected rail infrastructure to its maximum potential.

The TA will comprise the following tasks:

(i) Undertake a traffic forecast for the proposed routes and determine modal implications;
(ii) Prepare detailed feasibility study based on identified traffic forecast to determine investment costs, economic and financial returns and operating structures;

(iii) Consider appropriate concessioning arrangements and formulate recommendations for financial arrangements;
(iv) Prepare and facilitate Concessioning bidding and assist with award process as necessary;
(v) Devise and facilitate marketing strategy as indicated from feasibility study findings; and
(vi) Examine potential for expansion of Concessioning arrangements to other GMS rail corridors and routes.

9. Estimated Cost:

US$500,000 for technical assistance

10. Financing Plan and Financing Arrangement (Public/Private):

Public

11. Financing Status:

Proposed for financing

12. Proposed Implementation Period/Schedule:

2006-2007

13. Executing/Implementation Agency and Contact Persons:

State Railway of Thailand / Lao PDR Railway Authority / National Ministries

ADB Contact Division/Person:

Mekong Department, Infrastructure Division
Email: gms@adb.org

14. Estimated Benefits and Beneficiaries:

The project is expected to result in a liberalized market for rail transport services, with resulting gains in economic efficiency and road decongestion.

The project is expected to produce net economic/financial benefits, as:

(i) modal competition tends to reduce transport costs;
(ii) comparative competitive advantages between modes are exploited; and
(iii) removal of heavy and dangerous goods from the road network reduces environmental costs.

These economic/financial benefits may be measured by comparing pre- and post-project transport costs between the specified points and associated traffic movements.

The direct benefits from the project, from reduced operating costs and improved product availability will accrue to shippers and to the rail operators.

	Indirect benefits will include: (i) increased traffic due to cost reduction (ii) improved government finances, due to increased tax revenues; (iii) increased employment; (iv) improved skill development in the rail sector; and (iv) increased industrial communication and regional economic integration.
15.	**Social and Environmental Issues**: The project is not expected to have significant impact on the natural, cultural, and social environment, except to the extent that it results in increased rail movements. Appropriate mitigation measures (e.g., noise reduction) should be implemented. The project will help alleviate poverty indirectly to the extent that employment is created in the rail and freight handling sectors.
16.	**Priority of Project/TA:** ** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** TA.
19.	**Pre-feasibility Study (Completed/Required):** Required
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the Project.
21.	**Issues/Constraints:** The acceptability of concessioning arrangements in the two countries will need to be established during project preparation.

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*Rail Transport*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Competitiveness*

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** Promotion of Marketing Functions of GMS Ports (TAP 36)
2.	**Loan or TA:** Advisory Regional Technical Assistance
3.	**Project Location**: GMS-part
4.	**Countries Involved:** Thailand, PRC, Myanmar, and Viet Nam
5.	**Sector/Subsector:** Transportation/Ports
6.	**Background and Rationale:** Relatively few potential shippers in northeastern Thailand and in Lao PDR are aware of the full range of port facilities available within GMS. A program to promote the full range of port facilities within GMS would therefore have potential benefit both to shippers and in relation to the balanced utilization of GMS ports. Whilst ASEAN has a Port Association with a website (but which provides little other than contact information), a small TA to determine the desirability of forming a GMS Ports Association that could present GMS ports capacities in a more focused and proactive manner is therefore seen as desirable.
7.	**Objective(s):** To promote economic efficiency by enhancing the marketing of GMS port facilities.
8.	**Scope:** The TA will initially determine the potential support for the formation of a GMS Ports Association through discussions with the full range of stakeholders. Subsequent tasks will focus on: (i) structuring and determining the Association's role and responsibilities; (ii) developing the initial marketing plan; (iii) building an Association web page and other forms of information dissemination; and (iv) developing links with other transport associations and operators.
9.	**Estimated Cost:** US$50,000 for technical assistance

10.	**Financing Plan and Financing Arrangement (Public/Private):** Public
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2007
13.	**Executing/Implementation Agency and Contact Persons:** Internationally, the project may be implemented through the ASEAN Secretariat, with an arrangement with the PRC (the one non-ASEAN GMS country) to be separately negotiated. At the national level, the project would be implemented by the respective Port Authorities (and in the case of the PRC, also the provincial governments concerned). **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries**: The project is expected to result in an enhanced awareness of GMS Port facilities and, as such, better utilization of those capacities. The project is expected to produce net economic/financial benefits, as: (i) competition pressures ports to keep their costs low, resulting in lower fees; and (ii) port traffic can be expected to increase particularly in relation to the smaller GMS ports. These economic/financial benefits may be measured by comparing productivity and costs in the GMS with and without the project.
15.	**Social and Environmental Issues**: The project is not expected to have any environmental or social impact The project will help alleviate poverty indirectly to the extent that employment is created in the port industry.
16.	**Priority of Project/TA:** ** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed

18.	**Status of Project/TA Preparation:** Proposal
19.	**Pre-feasibility Study (Completed/Required):** Not required
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the Project.
21.	**Issues/Constraints:** Preliminary evaluation of national Port Authority interest in the proposal is required.

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*Ports*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Competitiveness*

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** Promotion of Short Sea Shipping Services (TAP 37)
2.	**Loan or TA:** Advisory Regional Technical Assistance
3.	**Project Location:** GMS Wide (ports) and ports of contiguous ASEAN non-GMS Countries including the rest of the PRC
4.	**Countries Involved:** All GMS countries and contiguous ASEAN non-GMS Countries including the rest of the PRC
5.	**Sector/Subsector:** Transportation/Maritime
6.	**Background and Rationale:** The Government of the PRC is currently developing a policy on International Shipping and the Department of Comprehensive Planning of the Ministry of Communications (MOC) asked, at the PRC Country Workshop held in Beijing on 15 August 2005, that the RETA consider short sea shipping and the interrelation between short sea shipping and other modes in the GMS, particularly in view of Guangxi's participation in the GMS. The importance of this matter had also been emphasized during a Videoconference held on 25 August 2005 to discuss the Executive Summary of the TA Interim Report.[1] At the Videoconference, a an ADB staff member stated that short sea shipping services would be of considerable importance to Guangxi Zhuang Autonomous Region, which could be considered a gateway to Western China. It was stated that short sea shipping services (S4) could also expand the range of modal choices for ASEAN shippers as part of a general expansion of multimodalism. The Proposed Transport Strategy to 2015 for the GMS contained in Chapter 7 of the Draft Final Report, Volume 2, has, inter alia, as overarching goals: (i) Move towards an open market for transport services; (ii) Facilitate economic efficiency to reduce transport costs; (iii) Complete the GMS network and improve links with South Asia; and (iv) Encourage multi-modalism.[2]

[1] ADB Head Office Staff and ADB Country Officers from Cambodia, PRC, Lao PDR, and Viet Nam. The TA was represented by the Team Leader and the Reform and Development (Institutional Strengthening) Specialist, participating from ADB's Resident Mission in Hanoi.
[2] Such efforts to improve links with South Asia are discussed in Section C of Chapter III of Volume 2 of this DFR.

It is argued that this proposed TAP would contribute significantly to these overarching goals.

REPSF Project No. 04/001 identified a total of ten ports in the GMS members of ASEAN, namely Cambodia (2), Myanmar (3), Thailand (3), and Viet Nam (2). The RETA GMS Transport Model included most of these ports. Within the GMS, the RETA identified 30 seaports in these countries and in Guangxi Zhuang Autonomous Region. A majority of these would be considered suitable for the promotion of S4.

There are a number of constraints on the development of Intra-ASEAN shipping services in ASEAN that apply equally to the GMS:[1]

(i) shortcomings in port infrastructure and equipment, particularly in the lesser ports serving ASEAN trades;
(ii) the tendency for break-bulk/general cargo, still important in Intra-ASEAN trades, to have been neglected by ports in the push for containerization ;
(iii) lack of data on cargo flows and the intra-ASEAN shipping system, especially smaller scale operations within ASEAN
(iv) concerns about trends in international shipping and ASEAN's helplessness in strengthening its role when many shipping decisions are made by external shippers, customers and their logistics agents located outside the region;
(v) related concerns about the domination of international liner services through regional hubs and the tendency for ASEAN shipping services to be pushed down the distribution chain[2];
(vi) ASEAN's slow pace (aside from Singapore, Thailand, and Malaysia) in developing cooperative logistics relationships between/among customers, service providers, and governments;
(vii) regulations restricting cabotage;
(viii) need to ensure cargo safety and security, particularly in view of the prevalence of sea piracy in the region[3]; and
(ix) need to preserve the marine environment. The need is particularly great in environmentally sensitive areas, such as the UNESCO World Heritage Site in Ha Long Bay.

In terms of institutions, it is recommended in REPSF Project 04/001 that the ASEAN Senior Transport Officials form a Maritime Transport Working Group by December 2006 to develop a "single voice" for ASEAN as regards a common policy for on maritime matters of common interest to ASEAN countries. Within the GMS, the grouping of Senior Officials that has negotiated the various parts, annexes and protocols of the GMS Cross-Border Transport Agreement (CBTA) provides a model for a Steering Committee that could guide the implementation of this TAP.

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[1] Much of the information in this TA Concept Profile is derived from the ASEAN/AUSAID supported *Study Promoting Efficient and Competitive Intra-ASEAN Shipping Services* (REPSF Project No. 04/001) issued in March 2005 and carried out by PDP Australia PTY. Ltd. and Meyrick and Associates.

[2] It is not the case that the development of hubs need hinder the development of S4. Many modern container berths in, for instance, Viet Nam have been developed at green field sites leaving the older ports with some capacity available for S4.

[3] See, e.g., "Combating Piracy and Armed Robbery at Sea, Charting the Future in Asia Pacific Waters", Bangkok, 24-25 March 2001; the Tokyo Appeal aims at implementing measures to address the threat of sea piracy.

	Several constraints identified above have been identified in the course of this RETA and are addressed through TAP 23, Training in Logistics, and TAP 35, Promotion of Marketing Functions for GMS Ports.
7.	**Objective(s):** To promote short sea shipping services within the GMS, in order to provide lower costs through increased competition between points on the GMS littoral stretching from Guangxi Zhuang Autonomous Region in the east to Myanmar in the west; to enhance shipper modal choice; and to provide for potential surface transport links between South Asia and the GMS.
8.	**Scope:** TAP 14 recommends development of a program of cooperation in the area of road safety with ASEAN. The PRC's cooperation with ASEAN intra-ASEAN initiatives could be undertaken under the auspices of the Memorandum of Understanding between the Governments of the Member Countries of the Association of Southeast Asian Nations and the Government of the People's Republic of China on Transport Cooperation, Vientiane, 27 November 2004, of which Article II, 3 covers maritime safety and security (including marine environmental protection), and Article 7 states that "[t]he Parties shall, with mutual consent, also cooperate in any other areas of the transport sector" . Elements of the road map presented in the "Proposed Development of Efficient and Competitive Intra-ASEAN Shipping Services", which encompass a step-by-step strategy, include:[1] (x) Infrastructure – Ensuring that the transport infrastructure exists to support the effective and efficient operation of Intra-ASEAN shipping services; (xi) Integration – The development of a single integrated ASEAN market for shipping services in which all ASEAN operators can operate without restriction; (xii) Harmonization – Ensuring that the single ASEAN Shipping Market is effective by ensuring that competition takes place on equitable terms and conditions; and (xiii) Human resources and capacity development – developing and spreading throughout ASEAN the management capacity and technology required to manage shipping and port operations safely, efficiently and in an environmentally friendly manner. It has been noted that several proposed TAPs (23, Training in Logistics, and 34, Promotion of Marketing Functions for GMS Ports) address HRD issues. The development of port infrastructure is well in hand throughout the GMS. It is thus recommended that discussions be initiated with ASEAN about a GMS contribution to the Integration and Harmonization elements, with a focus on the promotion of short sea shipping services. The experience of the GMS in these matters, particularly as regards to the CBTA, was noted in the Kunming Declaration[2] with the Heads of States endorsing the completion of the

[1] In addition to the "Development of a Single ASEAN Voice" mentioned previously.
[2] The Kunming Declaration can be found on the GMS website at www.adb.org.

	negotiations of remaining annexes and protocols by the end of 2005, and the taking of all domestic measures for implementation by 2006.[1]
9.	**Estimated Cost**: US$500,000
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule**: 2007-2010
13.	**Executing/Implementation Agency and Contact Persons:** Ministry of Public Works and Transport; Ministry of Communications and Guangxi Zhuang Autonomous Region Department of Communications (PRC); Ministry of Communication, Transport, Post and Construction, Lao PDR; Ministry of Myanma Port Authority (Myanmar); Marine Department, Ministry of Transport (Thailand); and Ministry of Transport (Viet Nam) **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries**: Economic benefits include lower transport costs through increased competition in the littoral areas of the GMS and contiguous non-GMS ASEAN members; increased choice for shippers in the littorals of participating countries; and potential opening of links to non-GMS BIMSTEC countries more quickly than might have been the case with opening of links on other surface modes.
15.	**Social and Environmental Issues**: Social and environmental issues are addressed in Element 5 of the Road Map for REPSF Project 04/001, which are therefore proposed to be excluded from the scope of this TAP.
16.	**Priority of Project/TA:** *** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):**

[1] REPSF Project 004/001 mentioned the CBTA as a regional cooperation model in the Country Papers for Cambodia, Lao PDR, Myanmar, Thailand, and Viet Nam.

	Proposed
18.	**Status of Project/TA Preparation**: Technical assistance from ADB
19.	**Pre-feasibility Study (Completed/Required):** Not applicable
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the TAP in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the TAP.
21.	**Issues/Constraints**: It will be important to reach agreement with ASEAN on the division of labor and the latter's interest during 2006 in order to achieve a procurement date of 2007.

FOR ADB USE ONLY

Sector	*Transportation and Communication*
Subsector	*Shipping/Ports*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Competitiveness*

PROJECT/TA CONCEPT PROFILE

1.	**Project Name (Number):** TA on Transport Requirements for the Development of Tourism (TAP 38)
2.	**Loan or TA:** Regional TA (RETA)
3.	**Project Location:** GMS-wide
4.	**Countries Involved:** All GMS countries
5.	**Sector/Subsector:** Transportation/All Modes of Transport (and Tourism)
6.	**Background and Rationale:** The GMS Tourism Sector Strategy, formulated in 2004-2005, put forward Strategic Project 2.1 on the Transport Requirements of Tourism Development in the GMS. It also developed a series of GMS Strategic Projects with infrastructure components, including: (i) the Mekong World Tourism River Corridor – An Endless Stream of International Cooperation (Strategic Project 2.2); (ii) Development of the Tourism Potential of the North-South Economic Corridor Quadrangle Area (Strategic Project 2.3); (iii) East-West Economic Corridor (EWEC) Tourism Development (Strategic Project 2.4); (iv) Tourism Development Plan with Infrastructure Support for the Implementation of the Emerald Triangle (Strategic Project 2.5); [1] (v) Tourism and Infrastructure Feasibility Study Along Coastal Route of the Southern Economic Corridor (Strategic Project 2.6); (vi) Pro-Poor Tourism Sector Development in the Cambodia-Lao PDR-Viet Nam Green Triangle Development (i.e., the Cambodia-Lao PDR-Viet Nam Development Triangle)(Strategic Project 2.7); (vii) Infrastructure, Conservation, and Development Support for the Development of the Heritage Necklace Circuit [2] (Strategic Project 2.8); Andaman Coast and Islands Tourism Development Plan (Strategic Project 2.9); and (viii) the Red River Valley Tourism Corridor (Strategic Project 2.10). The current GMS Transport Sector Strategy TA has proposed a number of projects with impacts on transport to, from, and within the GMS by tourists,

[1] The Emerald Triangle is centered on North-Central Cambodia around Stung Treng, the southern part of Northeastern Thailand around Ubon Ratchathani, and Southern Lao PDR around Champassak. The Mekong river links the area. *Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Draft Report, Annex Volume*, 7 March 2005, p. 57.

[2] The Heritage Necklace Circuit includes World Heritage Locations in the six GMS countries, e.g., Siem Reap, Hue, Bagan, Sukhothai, Louang Prabang, Dali/Lijiang. *Greater Mekong Subregion Tourism Sector Strategy (TA 6179-REG), Final Draft Report, Annex Volume*, 7 March 2005, p. 68.

	including air transport, road transport, river transport, sea cruise shipping, and rail transport projects. However, it was beyond the scope of the current TA to comprehensively analyze the transport requirements of the various tourism sector projects proposed by the GMS Tourism Sector Strategy TA, including the required stakeholder consultations in relation to each of the proposed tourism sector projects. Accordingly, a TA is proposed in order to merge and build upon the results of the tourism and transport strategy TAs to formulate an integrated tourism/transport development plan.
7.	**Objective(s):** The objective of the TA would be to develop a comprehensive and integrated transport and tourism development plan, with the aims of alleviating poverty, generating employment, and catalyzing the provision of infrastructure and facilities by the private sector.
8.	**Scope:** Weaving together and building upon the results of the GMS Tourism Sector Strategy and the GMS Transport Sector Strategy TAs, undertaken in 2004-2005, the proposed TA (broadly comparable to Strategic Project 2.1 of the GMS Tourism Sector Strategy TA) will analyze the transport requirements of tourism, taking into account management capacity building, infrastructure and superstructure, and socioeconomic and cultural needs. While elements of the TA have been covered in the current GMS Transport Strategy TA (e.g., in consideration of air transport, road transport, river transport, sea cruise shipping, and rail transport projects), the TA (and this perhaps goes beyond what is proposed in Strategic Project 2.1) will undertake a comprehensive assessment of the transport requirements of various proposed GMS Strategic Projects in the tourism sector listed above (e.g., the Mekong World Tourism River Corridor – An Endless Stream of International Cooperation, Development of the Tourism Potential of the North-South Economic Corridor Quadrangle Area, East-West Economic Corridor. The work will include market research in relation to each tourism corridor/project, including exhaustive interviews with representatives of the travel trade. A key focus of the TA will be to examine how public sector funding can promote sector funding of facilities that would not otherwise be built.
9.	**Estimated Cost:** US$1-2 million (as estimated by the GMS Tourism Sector Strategy TA; excluding project implementation/development cost)
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public (from funds of ADB or other development partners)
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** 2006-2010 (corresponding with the timeline proposed for Strategic Project 2.1 of the GMS Tourism Sector Strategy TA, which called for preparation in the

	first half of 2006, a planning study in mid-2006 to mid-2007, institutional analyses in the second quarter of 2007, program planning the last three quarters of 2007, implementation from mid-2008 until the end of 2010), and evaluation at various junctures from 2007 to 2010)
13.	**Executing/Implementation Agency and Contact Persons:** Executing Agencies: Transport/Communications and Tourism Ministries of the six GMS countries **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org
14.	**Estimated Benefits and Beneficiaries:** As international, subregional, and domestic tourists will be provided with a new tourism experience, the project will lead to increased tourism in the GMS, which in turn will increase the revenues of private enterprises serving tourism, increase governmental revenues, and provide jobs for local people, especially the poor.
15.	**Social and Environmental Issues:** The TAP will help alleviate poverty, e.g., through improved accessibility and creation of employment in tourism and related industries. The TAP may have significant impacts on the natural, cultural, and social environment. An optimal solution maximizing positive impacts and minimizing negative impacts will need to be found, drawing upon the results of stakeholder meetings.
16.	**Priority of Project/TA:** ** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** The TAP builds upon Strategic Project 2.1 of the GMS Tourism Sector Strategy TA, as well as elements of the current GMS Transport Sector Strategy, merging the two threads so as to provide a truly <u>integrated</u> transport and tourism development plan.
19.	**Pre-feasibility Study (Completed/Required):** Not applicable

20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of the necessary technical assistance resources.
21.	**Issues/Constraints:** Workshops, seminars, and related stakeholder participation in development of proposed plans and programs will be essential to maximize positive environmental and social impacts and minimize negative environmental and social impacts.

FOR ADB USE ONLY

Sector	*Transportation and Communication (as well as Tourism)*
Subsector	*All Modes of Transport (and Tourism)*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity and Competitiveness*

PROJECT/TA CONCEPT PROFILE

1. Project Name (Number):

Sea Cruise Development in cooperation with ASEAN (TAP 39)

2. Loan or TA:

Advisory Regional Technical Assistance

3. Project Location:

GMS Wide (sea cruise ports)

4. Countries Involved:

All GMS countries except for (landlocked) Lao PDR

5. Sector/Subsector:

Transportation/Maritime

6. Background and Rationale:

This Project relates to (sea) cruise shipping, a combination of the transport and tourism sectors that is potentially an important driver of economic development in the GMS. Cruise ships can be massive, e.g., a few times longer than a jumbo jet. In a sense, the cruise industry is supply-led as it "creates its own demand". Economic benefits include increased employment and tax revenues in homeports/ports of call, and secondary benefits through tourist consumption in local communities, followed by "knock-on" multiplier effects.[1]

The most significant sea cruise ports, present and potential, in the region include the following:

(i) Sihanoukville and Phnom Penh in Cambodia;
(ii) Beihai, Guangxi Zhuang Autonomous Region, PRC;
(iii) Yangon-Thilawa in Myanmar;
(iv) Phuket, Bangkok, Chon Buri (Laem Chabang), Ranong, Satune, and Narathiwas in Thailand; and
(v) Ho Chi Minh City, Da Nang, and Ha Long in Viet Nam.

The only dedicated cruise terminal in the GMS is at Chon Buri (Laem Chabang), which allows it to serve as a homeport (i.e., a starting and end point of a cruise tour, as opposed to a port of call, which does not need to develop exclusive infrastructure and facilities); Phuket is expected to serve such function in the future.

Country-by-country issues with respect to cruise development in the GMS include the following:

[1] One study in Singapore found that considering indirect impacts, the cruise industry multiplier was 1.46, compared to 1.18 for air transport, 1.25 for water transport, 1.44 for restaurants, and 1.54 for hotels. See http://www.cybercruises.com/leeloongkoonspeech.htm

(i) Cambodia: limited cruise traffic may not justify construction of an exclusive cruise terminal; Sihanoukville has limited tourism resources and Phnom Penh and Siem Reap are quite far from Sihanoukville; Phnom Penh is a river port, with associated constraints;

(iii) Myanmar: Yangon is a river port not a seaport, with associated constraints; the Andaman Sea, with it unexploited marine resources, offers great cruise potential;

(iv) Thailand: lack of a dedicated cruise terminal, apart from Chon Buri (Laem Chabang); after opening of the New Bangkok International Airport, greater opportunity to market fly-cruise packages using Chon Buri (Laem Chabang); customs-immigration-quarantine (CIQ) services not located at the ports; and

(v) Viet Nam: strategic location between regional cruise hub ports of Hong Kong, China, and Singapore; tourist attractions are spread along the country€31long coastline; but no dedicated cruise shipping facility at present.

Indications are that cruise ship passenger traffic in the GMS may have decreased in recent years, due to SARS and other factors. For example, Phuket, the busiest cruise port in the GMS, had 455 calls by cruise ships in 1995, 138 calls in 1999, but only 81 in 2003; however, the passenger volume per ship has increased significantly. Cruise passengers per year in Viet Nam were 403,464 in 2001, 228,209 in 2002, 132,241 in 2003, and 120,343 in 2004; two PRC ships (one 400-passenger ship and one 1,000-passenger ship), which accounted for a considerable amount of passengers, were sold for scrap, causing a collapse in the cruise market from Beihai and other PRC cities to Ha Long Bay, Viet Nam. To date, the number of cruise ships calls and passengers has been relatively insignificant in Cambodia and Myanmar. For example, Myanmar averaged about 3,000 sea cruise passengers per year between 1998 and 2004. One study estimated passenger spending around US$150 per day for each sailing guest, although the actual figure may be lower in the GMS. An ASEAN study estimated that one job is created for every 100 cruise passengers.

There are a number of constraints on the development of sea cruise shipping in the GMS:

(i) <u>Status of cruise infrastructure, both “soft” and “hard€</u>, 35including CIQ handling capacity, fresh water and fuel supplies, drainage and waste disposal systems, access to inland tourist sites, safety and rescue facilities, as well as the basic quality of port and harbor facilities: Most GMS cruise ports cannot receive large cruise ships, and passenger facilities are limited or nonexistent. General ports accord priority to cargo ships over cruise ships at mixed-use berths. Some ports, such as Yangon and Bangkok, are river ports with restricted nighttime navigation and long waiting times for tidal change. CIQ procedures tend to be ad hoc and case-by-case. More liberalized arrangements on a region-wide basis could be adopted for cruise ships and passengers, such as on-board immigration clearance, issuance of visas on arrival, and simplified CIQ procedures.

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[1] See, e.g., “Combating Piracy and Armed Robbery at Sea, Charting the Future in Asia Pacific Waters”, Bangkok, 24-25 March 2001; the Tokyo Appeal aims at implementing measures to address the threat of sea piracy.

(ii) Regulations prohibiting cabotage, even though there are very few domestic cruise operations in the region: As the ASEAN Cruise Development study noted, very little is being protected under such circumstances. Alternatives may be sought, e.g., issuance of special permits to foreign operators organizing irregular domestic cruises, free operation when a foreign operator sells cruise tours abroad.

(iii) Need for calm seas: This may be an issue during monsoon seasons, e.g., from May to September in the Andaman Sea.

(iv) Need to ensure passenger safety and security, particularly in view of the prevalence of sea piracy in the region:[1] While there have been no instances of attacks on cruise ships in the GMS or elsewhere in the (ASEAN) region, partly due to the safeguards on board and the high deck structure of cruise ships, the risk still needs to addressed, given the catastrophic consequences of even one incident.

(v) Need to preserve the marine environment, e.g., through facilities to handle wastewater and oil residues at ports and harbors, strict penalties for violators including suspension of cruise licenses: The need is particularly great in environmentally sensitive areas, such as the UNESCO World Heritage Site in Ha Long Bay.

In terms of institutions, the ASEAN Cruise Working Group established under the ASEAN Senior Transport Officials Meeting and supported by the Government of Japan, has taken a leading role, with respect to the ASEAN countries, which include all GMS countries except the PRC. Such regional cooperation is vital since a seamless cruise experience promotes customer satisfaction and hence the success of the industry.

7. Objective(s):

To promote tourism, with consequent economic development benefits expected to include increased employment and tax revenues in homeports/ports of call, and secondary benefits through tourist consumption in local communities, followed by "knock-on" multiplier effects.

8. Scope:

There is already an active endeavor under ASEAN including ASEAN-Japan cooperation to address constraints on the development of sea cruise shipping in the GMS. It is therefore recommended that the proposed GMS initiative be carried out in close collaboration with the ASEAN initiatives, but supplementing it with collaboration with ports in Guangxi Zhuang Autonomous Region (e.g., Beihai) and perhaps other ports in the PRC (e.g., Xiamen). The PRC's cooperation with ASEAN cruise development initiatives could be undertaken under the auspices of the Memorandum of Understanding between the Governments of the Member Countries of the Association of Southeast Asian Nations and the Government of the People's Republic of China on Transport Cooperation, Vientiane, 27 November 2004, of which Article II, 3 covers maritime safety and security (including marine environmental protection), and Article 7 states that "[t]he Parties shall, with mutual consent, also cooperate in any other areas of the transport sector".

Elements of the current ASEAN initiatives for cruise development, which encompass a step-by-step strategy, include:

	(i) promotion of cruise-related information exchanges (e.g., the ASEAN-Japan cruise information center);[1] (ii) joint marketing, including the holding of cruise forums to stimulate interest from the private sector, with attendees to include cruise lines from Europe, North America, and Japan, as well as travel agencies and airlines; (iii) implementation of pilot projects to, among other things, develop new routes and attract first-time cruise passengers to the (sub)region, with project elements to include cooperation with airlines for development of combined flight-cruise packages, improvements to improving cruise infrastructure, and liberalization of CIQ procedures; (iv) enhancement of cruise safety and security, with priority accorded to safe nighttime sailing, curbing piracy, and promoting environmental protection; and (v) encouragement private sector participation in cruise ports, as the GMS may require more dedicated cruise ports. In addition, it is noted that within the subregion, most countries could gain from better positioning cruise ship development within their economic development and tourism promotion plans. Also, there is a need for closer cooperation between and among tourism authorities, marine departments, and harbor improvement offices.
9.	**Estimated Cost**: US$500,000
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule**: 2006-2015 (continuing activity)
13.	**Executing/Implementation Agency and Contact Persons:** Ministry of Public Works and Transport and Sihanoukville Port Authority (Cambodia); Ministry of Communications and Guangxi Zhuang Autonomous Region Department of Communications (PRC); Myanma Port Authority, Ministry of Transport (Myanmar); Marine Department, Ministry of Transport (Thailand); and Ministry of Transport (Viet Nam) **ADB Contact Division/Person:** Mekong Department, Infrastructure Division Email: gms@adb.org

[1] See http://www.asean.or.jp/eng/tourism/cruise-e.html.

14.	**Estimated Benefits and Beneficiaries**: Economic benefits include increased employment and tax revenues in homeports/ports of call, and secondary benefits through tourist consumption in local communities, followed by “knock-on” multiplier effects. [1] One study in Singapore, a homeport, found that considering indirect impacts, the cruise industry multiplier was 1.46, compared to 1.18 for air transport, 1.25 for water transport, 1.44 for restaurants, and 1.54 for hotels. .
15.	**Social and Environmental Issues**: Adequate facilities to handle wastewater and oil residues at ports and harbors, along with penalties (e.g., suspension of cruise licenses) for polluters, are essential to protect the marine environment, which itself is an important attraction for the cruise industry. Regulations may be drawn from the International Convention for the Prevention of Pollution from Ships (MARPOL) under the International Maritime Organization (IMO).
16.	**Priority of Project/TA:** * (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation**: Technical assistance from ADB
19.	**Pre-feasibility Study (Completed/Required):** Not applicable
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the Project.
21.	**Issues/Constraints**: Liberalized air services under an open skies program (see TAP 39, Phased Implementation of Open Skies), is a important factor is developing the regional cruise industry, as competitive air services result in reasonable fares, convenient flight schedules, comfort, and reliability. In order to promote direct spending in local economies, it is necessary not only to attract cruise ships, but also move cruise passengers to land-based activities.

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Sector	*Transportation and Communication; Tourism*
Subsector	*Maritime*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

PROJECT/TA CONCEPT PROFILE

1. Project Name (Number):

Phased Implementation of Open Skies[1] (TAP 40)

2. Loan or TA:

Advisory Regional Technical Assistance

3. Project Location:

GMS-wide

4. Countries Involved:

All GMS countries

5. Sector/Subsector:

Transportation/Civil Aviation

6. Background and Rationale:

Traditionally, the GMS countries have relied heavily on bilateral air services agreements (ASAs), which constitute the dominant form of airline regulation and reflect a range of government policies. While some of these bilateral agreements are liberal, others limit the number of airlines that can compete and the amount of capacity that they can offer.

Specific software constraints on air transport currently in place in at least some GMS countries include:

(i) restrictions on fares (double approval of fares is commonly required in bilateral ASAs), which limit the ability of airlines to respond quickly to market changes;
(ii) investment and ownership controls, e.g., when an air services agreement specifies that only airlines from particular countries may operate on specific routes, which prevents airlines from competing on the basis of efficiency to provide lower fares and better services;
(iii) application of single designation, in which only one airline from the two countries having a bilateral ASA may serve a route, which limits competition and the range of choices available to the consumer;
(iv) controls on market access, e.g., by regulating the total capacity to be offered, the capacity to be offered by specific airlines, or the type of aircraft to be used;

[1] This Project Profile draws extensively from: (i) Monash International Pty Ltd (Peter Forsyth, John King, Cherry Lyn Rodolfo, and Keith Trace), *Preparing ASEAN for Open Sky*, AADCP [ASEAN Australia Development Cooperation Program] Regional Economic Support Facility Project 02/008, Final Report, February 2004; and (ii) Concept Paper on China-ASEAN Regional Air Services Arrangements, Agenda Item 5, Fourth ASEAN and China Senior Transport Officials Meeting (4th STOM + China), Vientiane, 15 November 2005.

(v) restrictions on fifth freedom rights, within the GMS and beyond the GMS, which make it difficult to develop routes on which traffic demand is low;
(vi) for cargo, restrictions on frequencies, tonnage, and access to gateways, which limit the efficiency of carriers in using back-haul space;
(vii) restrictions on gateways (i.e., airports) that must be used for international routes, which limits new routes and competition; and
(viii) restrictions on charter flights, which can promote the development of tourist destinations not served by existing routes.

ASEAN has formulated a Roadmap for Integration of the Air Travel Sector, which was adopted by the Ninth ASEAN Transport Ministers Meeting in Yangon in October 2003. The Roadmap calls for liberalization of Scheduled Passenger Services, with liberalization of scheduled passenger services with no limitations on third and fourth freedom rights for all designated points with ASEAN subregions by December 2005; no limitations on third and fourth freedom rights for at least two designated points in each country between the ASEAN subregions by December 2006; no limitations on fifth freedom rights for all designated points within the ASEAN subregions also by December 2006;[1] no limitations on fifth freedom rights for at least two designated points in each country between the ASEAN subregions by December 2008; ASEAN-wide liberalization of scheduled passenger services, with no limitations on third and fourth freedom rights in each capital city in each ASEAN country by December 2008; and no limitations on fifth freedom rights for the capital city in each ASEAN country by December 2010. In line with the "ASEAN-X" formula, the Roadmap provides that two or more ASEAN countries that are ready can negotiate, conclude, and sign implementing agreements on a plurilateral, multilateral, or subregional basis.[2]

Under the ASEAN umbrella, the CMLV [Cambodia-Myanmar-Lao PDR-Viet Nam] Multilateral Agreement on Air Services, done at Hanoi on 4 December 2003 (although not signed by Lao PDR until 29 April 2005),[3] covers air services between the four contracting parties. Key points of this Agreement include the following:

(i) the bilateral ASAs signed between the CMLV countries will terminate upon the Multilateral Agreement's entry into force;
(ii) third, fourth, and fifth freedom traffic rights within the CMLV subregion

[1] The PRC has indicated that the granting of fifth freedom rights to countries other than the PRC and ASEAN nations may not necessarily be included in such arrangements. Concept Paper on China-ASEAN Regional Air Services Arrangements, Agenda Item 5, Fourth ASEAN and China Senior Transport Officials Meeting (4th STOM + China), Vientiane, 15 November 2005, p. 5

[2] ASEAN also has adopted the Protocol to Implement the Fourth Package of Commitments on Air Transport Services under the ASEAN Framework Agreement on Services, at Phnom Penh, on 23 November 2004. Also, there are projects in the ACMECS Plan of Action that call for increased air links among its member countries but no specific projects for air services liberalization.

[3] As of this writing, it had been ratified by Myanmar and Viet Nam.

[4] The Agreement also calls for substantial ownership and control by the contracting party designating the airline or by nationals of such contracting party (Article 3 2. a)); such is not in keeping with the approach of liberalization.

[5] The PRC has called for a "step by step" and "soft issues first" approach. Concept Paper on China-ASEAN Regional Air Services Arrangements, Agenda Item 5, Fourth ASEAN and China Senior Transport Officials Meeting (4th STOM + China), Vientiane, 15 November 2005, p. 4.

are granted for the designated points, which include Phnom Penh in Cambodia, Vientiane (Wattay), Louang Prabang and Pakse in Lao PDR, Yangon and Mandalay in Myanmar, and Hanoi (Noi Bai), Da Nang, Ho Chi Minh City (Tan Son Nhat), Dien Bien Phu, Phu Bai, Haiphong (Cat Bi), and Lien Khoung in Viet Nam;

(iii) multiple designation arrangements (which permit an unlimited number of schedule carriers to operate) and substantial and effective control criteria are included; and

(iv) the Agreement is open to accession by other countries subject to acceptance by all contracting parties.[4]

While most of the GMS countries are prepared to move toward liberalization under a subregional approach (i.e., the CMLV Multilateral Agreement on Air Services), each country is naturally concerned how its airlines will perform under an open skies regime. Accordingly, consistent with the ASEAN Roadmap for Integration of the Air Travel Sector, it is recommended that a phased or gradual approach be adopted rather than a single "big bang" approach.[5]

7. Objective(s):

To promote economic efficiency by reducing airline costs through competition and allowing airlines to design optimal networks.

8. Scope:

The project will strengthen air linkages between and among all GMS countries, and help implement the ASEAN "Roadmap for Integration of the Air Travel Sector", which was adopted by the Ninth ASEAN Transport Ministers Meeting in Yangon in October 2003.

It is helpful to first clarify what "open skies" means, as it does not refer to single policy option but rather to a package of policy options. Most importantly, these may include (i) removing investment and ownership controls, (ii) permitting multiple designation; (iii) removing route capacity controls, (iv) relaxing restrictions on gateways, and (v) allowing wet leasing[1] of aircraft; additional policy options that comprise the building blocks of an open skies package include (i) relaxing fare restrictions, (ii) granting fifth freedom rights, both within the GMS and beyond, (iii) allowing seventh freedom operations, (iv) liberalization of charters, (v) enhancing market competition, (vi) allowing domestic cabotage, (vii) removing restrictions on ground handling, and (viii) cargo liberalization.

As envisaged by the recent Australian study conducted for the ASEAN Secretariat, it may make sense to build upon[2] the CMLV open skies arrangements,[3] but in view of the relative strength of Thai as well as to some

[1] Wet leasing refers to a lease of an aircraft plus crew.

[2] An analogy might be made to the GMS Cross-Border Transport Agreement, which began as a trilateral agreement in November 1999 between and among Lao PDR, Thailand, and Viet Nam, but which was acceded to by Cambodia in November 2001, the PRC in November 2002, and Myanmar in September 2003.

[3] Some revisions may be considered in response to points raised in the appendix presenting an assessment of the CMLV Multilateral Agreement on Air Services (e.g., more clearly

extent PRC airlines, allow for entry of these other GMS countries in stages.[1] According to this proposal, the first stage would be the provision of fifth freedom access to CMLV carriers at regional hubs, such as Chiang Mai[2] and Phuket in Thailand, as an initial step to Thailand's admission to the CMLV Agreement. In the next stage of expansion of the CMLV arrangements, controls in terms of capacity and time-based limitations on fifth freedom rights might be implemented to limit, particularly, the impacts of Thai Airways International on smaller carriers. At this stage, all points in Thailand would be available for third, fourth, and fifth freedom traffic, which in practical terms means Bangkok, but the designated Thai carrier could only provide the level of service at the date of implementation or daily service (if the level of service at the date of implementation was less than daily), until the carrier of the partner CMLV country operates a matching frequency level, after which each may increase service frequency in equal increments.

In the whole of the GMS, as well as in non-GMS ASEAN countries, one may envisage something analogous to the Australian proposal for a three-phase implementation of open skies in ASEAN, with implementation of several of the menu of policy options according to a staged approach. The PRC has called for initiating liberalization by (i) adopting multiple airline designations, (ii) removing restrictions on the number of origin and destination points, (iii) undertaking cargo services liberalization before passenger services liberalization, (iv) encouraging cooperation among airlines (e.g., through interlining, space blocking, code sharing), (v) allowing third-country code sharing within PRC and ASEAN nations, and (vi) granting fifth freedom rights with the PRC and ASEAN nations.[3] The drafting of a liberalized subregional air services agreement may be considered, perhaps with ADB assistance.[4]

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addressing charter traffic, addressing slot allocation, aircraft operator third-party liability and insurance, protection against arrest).

[1] The PRC has noted that special and favorable considerations should be accorded to nations with comparatively weak air transport industries. They have further noted that arrangements may commence with progressive liberalization of bilateral traffic rights arrangements, which after liberalization, may be consolidated into regional arrangements. They further stated that due attention should be given to measures that would integrate the regional transport market and optimize the entire air services system. Concept Paper on China-ASEAN Regional Air Services Arrangements, Agenda Item 5, Fourth ASEAN and China Senior Transport Officials Meeting (4th STOM + China), Vientiane, 15 November 2005, p. 4.

[2] It is noteworthy that Thailand's admission to the CMLV Agreement would help Thailand create a northern hub at Chiang Mai, a location that is difficult to establish as a hub.

[3] Concept Paper on China-ASEAN Regional Air Services Arrangements, Agenda Item 5, Fourth ASEAN and China Senior Transport Officials Meeting (4th STOM + China), Vientiane, 15 November 2005, p. 5.

[4] The PRC has recommended that it and ASEAN could establish an expert team to work on a simplified agreement identifying "soft" items that could be liberalized earlier on a (sub)regional basis, and "hard" items that should be liberalized first bilaterally and later (sub)regionally. See source in the previous footnote.

[5] Comments by the Department of Civil Aviation on the Draft Final Report of the GMS Transport Sector Study, Section B. 2, faxed to Mr. Peter Broch, ADB, 27 January 2006.

[6] The PRC has proposed a number of initiatives in this regard, e.g., exchanging experience and expertise in the field of accident investigation, exchanging information on safety and security regulations and practical measures with a view of harmonizing them, exchanging information and experience on infrastructure financing and construction, promoting joint research and human resources building, sharing traffic growth statistics, coordinating closely in air traffic control under the auspices of the International Civil Aviation Organization. See source in the previous footnote.

	At the same time, it may be argued (as has the Department of Civil Aviation of Myanmar) that any plans to implement open skies in the GMS would inevitably overlap to some degree other bilateral, regional, and subregional initiatives and, considering the peculiarities of regulation of international air services, might make it somewhat difficult for GMS countries to adapt to varying levels of liberalization in different fora. Therefore, instead of aiming to implement Open Skies in GMS, the objective should be to assist GMS countries to be better prepared for implementation of open skies or significant liberalization of air services in other regional and subregional initiatives as well as bilateral arrangements through which all of the GMS countries will be involved. The assistance could possibly be in the form of capacity building and technical assistance in, among other things, air transport regulatory reform and policy formulation, airline operational, financial and marketing management, and harmonization of rules and regulations, especially for the majority of GMS countries whose air services environment is comparatively immature.[5] This would also be an ideal juncture for enhancing cooperation and networking between/among GMS CAA authorities through the establishment of regular consultative channels at both the working and policy levels.[6]
9.	**Estimated Cost:** US$500,000 for technical assistance
10.	**Financing Plan and Financing Arrangement (Public/Private):** Public; however, the GMS governments should seek the view of the airlines registered in their country when formulating their respective negotiating positions, since different policy options can affect airline profits, positively by reducing airline costs, or negatively, by reducing airline yields.
11.	**Financing Status:** Proposed for financing
12.	**Proposed Implementation Period/Schedule:** As noted, in the whole of the GMS, as well as in non-GMS ASEAN countries, one may envisage something analogous to the Australian proposal for a three-phase implementation of open skies in ASEAN (from 2005 or 2006 to 2012),[1] with implementation of various of the menu of policy options according to a staged approach. An alternative would be the drafting of a liberalized subregional air services agreement, perhaps with ADB assistance.

[1] The PRC has called for implementation of PRC-ASEAN cooperation to establish regional air services agreements by 2010, corresponding with the timetable for establishing a China-ASEAN free trade region; while the time for participation may be decided by each ASEAN country, the PRC noted that participation in the arrangements and commitments to concrete measures may not be later than 2015, taking into account the progress of general goals agreed by PRC and ASEAN national leaders. Concept Paper on China-ASEAN Regional Air Services Arrangements, Agenda Item 5, Fourth ASEAN and China Senior Transport Officials Meeting (4th STOM + China), Vientiane, 15 November 2005, pp. 3-4.

13. Executing/Implementation Agency and Contact Persons:

Internationally, the project may be implemented through the ASEAN Secretariat, with an arrangement with the PRC (the one non-ASEAN GMS country) to be separately negotiated.[1] At the national level, the project would be implemented by the respective Departments of Civil Aviation (and in the case of the PRC, also the provincial governments concerned).

ADB Contact Division/Person:

Mekong Department, Infrastructure Division
Email: gms@adb.org

14. Estimated Benefits and Beneficiaries:

The project is expected to result in a liberalized market for air transport services, with resulting gains in economic efficiency.

The project is expected to produce net economic/financial benefits, as:

(i) competition pressures airlines to keep their costs low, resulting in lower fares;
(ii) the airlines best suited to serve particular markets serve the markets, regardless of their home country; and
(iii) airlines design networks to maximize efficiency.

These economic/financial benefits may be measured by comparing productivity and costs in the GMS with that of other subregions with liberalized airline markets.

The direct benefits from the project, from reduced operating costs and improved product availability, will accrue to airline customers (e.g., passengers) and to the airlines.

Indirect benefits will include: (i) increased inbound tourism as a result of increased air travel, (ii) improved government finances, due to increased tax revenues and reduced subsidies; (iii) increased employment; (iv) improved skill development in the airline industry; and (iv) increased industrial communication and regional economic integration.

15. Social and Environmental Issues:

The project is not expected to have significant impact on the natural, cultural, and social environment, except to the extent that it results in increased aircraft movements. Appropriate mitigation measures (e.g., noise reduction) should be implemented.

[1]Building upon the Memorandum of Understanding between the Governments of the Member Countries of the Association of Southeast Asian Nations and the Government of the Peoples C31
Republic of China on Transport Cooperation, Vientiane, 27 November 2004; Article 2 4 a) states that: “[t]he Parties shall actively expand the air services arrangements and connectivity either on a bilateral, regional or sub-regional basis, to support and facilitate the traffic and movement of passengers and cargo to increase the trade and economy of ASEAN and China” .

	The project will help alleviate poverty indirectly to the extent that employment is created in the tourism industry and secondarily in the airline industry. All stakeholders must be consulted by governments in formulating their respective negotiating positions. For example, these may include airlines registered in the country,[1] which may be affected positively or negatively by different policy options, as well as their employees, who may be affected by airline profits/losses through higher/lower wages and better/worse working conditions.
16.	**Priority of Project/TA:** *** (see Chapter IX)
17.	**Project Status (Proposed/Ongoing/Completed):** Proposed
18.	**Status of Project/TA Preparation:** Technical assistance from ADB may necessary for implementation of open skies (e.g., through assistance in the drafting of a liberalized subregional air services agreement). The ASEAN Secretariat, which has formulated a Roadmap for Integration of the Air Travel Sector, may also been involved.
19.	**Pre-feasibility Study (Completed/Required):** Required
20.	**Follow-up Actions Required:** Approval of the respective national ministries concerned. Inclusion of the Project in the development matrix, and mobilization of resources to prepare the necessary technical assistance to implement the Project.

[1] Coordination of aviation policy has proven difficult in Cambodia as the country has no operating state-owned “national” or private sector carrier.

21. Issues/Constraints:

Difficulties in implementation can arise if for individual GMS countries, open skies policies may result in negative net benefits, or even if a country experiences net gains, within the country there may be significant groups that lose from open skies policies (e.g., a long-established but inefficient national airline). Accordingly, the main constraint or risk stems from the need for crafting of policy packages with generally accepted policy components, even if limited agreements are only possible in the short run.[1] When there are cases in which one or more countries lose from a policy, it will be necessary to explore whether any modifications would reduce these costs while preserving much of the gains to other countries, or whether there are packages of policy options that may cancel out the losses so that agreement can be reached.

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Sector	*Transportation and Communication*
Subsector	*Civil Aviation*
Themes	*Sustainable Economic Growth and Regional Cooperation*
GMS Theme	*Connectivity*

[1] A particular concern is Cambodia, as Cambodian airlines are not positioned to take advantage of an open sky policy. The country has not had a national carrier since November 200, when Royal Air Cambodge stopped operating. Current Cambodian-owned carriers have limited routes and marketing capabilities. Nevertheless, Cambodia stands to gain from open skies mainly due to an increase in receipts from inbound tourists.

APPENDIX 5

GMS TRANSPORT SECTOR STRATEGY RESULTS FRAMEWORK (2006-2015)

APPENDIX 5: TRANSPORT GMS SECTOR STRATEGY RESULTS FRAMEWORK (2006-2015)

Long-Term Transport Sector Development Goals of GMS Countries	Key Transport Constraints to Achievement of Overarching Goals	Dominant GMS Strategic Theme and Overarching Goals		Projects to Support the GMS Transport Sector Strategy	Possible Development Partners
		Outcomes That ADB Expects to Influence Through Its Interventions	**Milestones/Tracking Indicators to Assess Strategy Implementation**		
Dominant Strategic Theme: Towards Seamless Transport Services on a Fully Connected and Integrated GMS Network					
• Reinforcing Infrastructure for Development	• Considerable Further Investment Needed to Complete Links and Nodes of GMS Transport Network • Lack of Sustainable Infrastructure Maintenance in Some GMS Countries • Continuing Impediments to Free Cross-Border Movement of People and Goods • Logistics Industry Characterized by Uneven Development in GMS Countries	• Denser More Connected GMS Network over All Modes • Increasingly Sustainable Infrastructure Maintenance Throughout GMS Transport Network • Free Movement of Goods and People Across GMS Frontiers • Further Promotion of Multimodal Transport • GMS Logistics Industry Rises to World Levels of Efficiency	• Number of Route/Mode Alternatives between GMS Country Capital Cities and Economic Centres • Number of through surface transport services linking GMS Country Capital Cities and Economic Centres • Roads – Decreasing IRI and VOCs • Railways – Decreasing Speed Restrictions • Inland Waterways – Increasing Maintenance Dredging Volumes • Average border passage time per passenger • Average border passage time per consignment, vehicle or rail conveyance • Number of licenced cross-border intermodal transport operators between GMS Countries • Cost per tkm for cross-border intermodal services	• Identified Investment and Technical Projects	• ADB (roads, rail, inland waterways, ports multimodal, HRD in logistics, CBTA) • AFD (roads and rail) • ASEAN Secretariat (transport and trade facilitation) • PRC (transport facilitation, roads, inland waterways) {via CMLV Initiative} • EIB/EC (roads) • IBRD/IDA (roads, rail, inland waterways, ports multimodal, HRD in logistics and facilitation via GTFP • JBIC (roads, ports, Bridges, airports) • JICA (TA) • MRC (inland waterways) • NDF (roads) • SIDA (roads) • Thailand (roads, logistics and trade facilitation) {via ACMECS initiative} • UNESCAP (transport and trade facilitation, transport issues re : tourism)

Long-Term Transport Sector Development Goals of GMS Countries	Key Transport Constraints to Achievement of Overarching Goals	Dominant GMS Strategic Theme and Overarching Goals		Projects to Support the GMS Transport Sector Strategy	Possible Development Partners
		Outcomes That ADB Expects to Influence Through Its Interventions	**Milestones/Tracking Indicators to Assess Strategy Implementation**		
		Overarching Goal 1 : Exploit Synergies in the GMS Transport System			
• Initiatives to strengthen the sub-regional infrastructure linkages through holistic a multi-sector and holistic approach	• Lack of defined officially recognized GMS transport network • Conceptual and instititutional difficulties encountered in transforming transport corridors into economic corridors	• Definition and official approval and adoption of GMS transport network • Further development of GMS transport model • Further integrated transport infrastructure investment project, production project investment and trade facilitation intiatives on Corridor transformation • Create climate for further cross-border initiatives such as use of Savannakhet Airport by Mukdahan passengers	• Official adoption of approved GMS transport network • Model adopted and maintained in up-to-date form by GMS Countries • Increased packaging of multi-sectoral interventions designed to assist in transformation of transport corridors into economic corridors • Emergence of cross-border initiatives such as use of Savannakhet Airport by Mukdahan Passengers	**TAP 4**: Updating or Improving Existing Bilateral Railway Agreements and/or Amending the GMS Cross-Border Transport Agreement (CBTA) To Cover Cross-Border Railway Transport **TAP 5**: Project to Establish a Legal Framework for Cross-Border Navigation on the Mekong River ["Navigation Without Frontiers", a motto adopted by the Mekong River Commission] **TAP 18**: Revisiting of the Feasibility Study for the Singapore-Kunming [Nanning] Railway Link **TAP 19A**: (Lancang)-Mekong River Navigation Improvement and Maintenance Project **TAP 19B**: Lower Mekong Navigation Improvement and Maintenance Project **TAP 20**: GMS Airports Development Project **TAP 21**: Rail Maintenance in Cambodia **TAP 27**: Upgrading of Inland Water (Passenger and Freight) Transport Industry **TAP 28**: Railways Management Improvement Project	To be determined

Long-Term Transport Sector Development Goals of GMS Countries	Key Transport Constraints to Achievement of Overarching Goals	Dominant GMS Strategic Theme and Overarching Goals: Outcomes That ADB Expects to Influence Through Its Interventions	Dominant GMS Strategic Theme and Overarching Goals: Milestones/Tracking Indicators to Assess Strategy Implementation	Projects to Support the GMS Transport Sector Strategy	Possible Development Partners
			• Exploitation of synergies arising from membership of ASEAN (5 GMS countries) or association (PRC)	**TAP 33**: Further Development and Enhancement of the GMS Transport Model **TAP 34**: Development of Scheduled Cross-Border Bus Routes **TAP 35**: Marketing and Container Train Concessions between Laem Chabang Thailand and Thanaleng, Lao PDR **TAP 36**: Promotion of Marketing Functions for GMS Ports **TAP 37**: Promotion of Short Sea Shipping Services **TAP 39**: Sea Cruise Development in Cooperation with ASEAN	
Overarching Goal 2: Move Towards an Open Market for Transport Services					
• Fully Connect the GMS • Improve Trade and Investment Environment	• Continuing Restrictions on Rights of GMS Operators to Carry Out Commerce in Other GMS Countries	• Increasinglly open market for transport services across GMS borders over all modes • Further development of intermodal services across borders	• % increase in number of cross-border services licensed in each GMS country by mode and service type • % increase in service frequency • % increase in numbers of service types • % Increase in number of entities licenced to carry out cross-border intermodal transport in each GMS country	**TAP 1**: Implementing the GMS Agreement to Facilitate the Cross-Border Movement of Goods and People, Phase 2 **TAP 2**: "Fine Tuning" of the GMS Cross-Border Transport Agreement **TAP 3**: Processing and Facility Improvements at Border Crossing Points **TAP 26**: Training in Road (Passenger and Freight) Transport Operations ("Knowledge Across Frontiers")	To be determined.

Long-Term Transport Sector Development Goals of GMS Countries	Key Transport Constraints to Achievement of Overarching Goals	Dominant GMS Strategic Theme and Overarching Goals: Outcomes That ADB Expects to Influence Through Its Interventions	Dominant GMS Strategic Theme and Overarching Goals: Milestones/Tracking Indicators to Assess Strategy Implementation	Projects to Support the GMS Transport Sector Strategy	Possible Development Partners
				TAP 40: Phased Implementation of Open Skies	
Overarching Objective 3: Facilitate Economic Efficiency to Reduce Transport Costs					
• Increased Competitiveness for GMS Countries in World Markets	• Lengthy border crossing times for passengers and freight at some GMS crossings • Difficulties encountered in ensuring revenues raised for road maintenance actually deployed for this purpose • Lack of transit charges designed to recoup incremental maintenance costs occasioned by use of a member country's road network by road transport operators from other GMS countries • Persistence of informal payments at various points	• More operator friendly regulalory and border crossing regimes • Fully transparent road maintenance funding mechanisms in place throughout GMS • Equitable transit charging regime in force throughout the GMS • GMS road authorities able to recoup incremental costs of road maintenance occasioned by operators from other GM S countries thus enhancing ustainability of road maintenance • Further progress in improving governance and control of transport operations by GMS authorities	• % reduction in variance in actual as opposed to quoted service times • % reduction in tkm and pkm rates on major GMS transports axes • % reduction in passenger and freight passage times at selected border points • % reduction in Road roughnesses and VOCs arising from enhanced maintenance • Transit charges system adopted and pereceived by users as equitable • % reduction in informal charges paid	**TAP 1**: Implementing the GMS Agreement to Facilitate the Cross-Border Movement of Goods and People, Phase 2 **TAP 2**: "Fine Tuning" of the GMS Cross-Border Transport Agreement **TAP 3**: Processing and Facility Improvements at Border Crossing Points **TAP 6**: Establishment of Issuing and Guaranteeing Organizations under the GMS Cross-Border Transport Agreement **TAP 7**: Inclusion of a Substantive Health and Sanitary/Phytosanitary (SPS) Regime in the Cross-Border Transport Agreement **TAP 8**: Phased Liberalization of Visa Regimes for Travelers **TAP 9**: Specification of Transit Charges To Be Implemented Under Protocol 2 of the Cross-Border Transport Agreement **TAP 10**: Establishment of a Third-Party Motor Liability Insurance Regime	To be determined

Long-Term Transport Sector Development Goals of GMS Countries	Key Transport Constraints to Achievement of Overarching Goals	Dominant GMS Strategic Theme and Overarching Goals: Outcomes That ADB Expects to Influence Through Its Interventions	Dominant GMS Strategic Theme and Overarching Goals: Milestones/Tracking Indicators to Assess Strategy Implementation	Projects to Support the GMS Transport Sector Strategy	Possible Development Partners
	in the transport chain • Varying levels of service quality to shippers and passengers • Relatively expensive services on some routes and through some facilities to shippers and travelers • Limited involvement of private sector in provision and maintenance of infrastructure in several GMS countries • Unsafe operating conditions and practices on many GMS road links • High incidence of HIV/AIDs along major road links • Limited understanding of marketing function in some GMS ports	• Further involvement of private sector in operations of port, maritime, rail and road subsectors • Further involvement of private sector in operations of port, maritime, rail and road subsectors • Increased provision and maintenance of infrastructure by private sector • Enhanced road safety • Increased awareness of HIV/AIDs prevention • Enhanced marketing of services available through GMS ports	on major GMS transport routes • Reduction in variance in actual as opposed to quoted service times • Increasing % of on-demand and contracted services • % Reduction in tkm and pkm rates on major GMS transports axes • Increase in % of transport networks provided by private sector • Increase in % of networks maintained by private sector • % reduction in accident casulties, fatalities and property damage • % reduction in new HIV/AIDs infections along major road links • % increase in GMS port throughput in comparison to non-GMS alternatives	**TAP 11**: Institutional Strengthening of National Transport Facilitation Committees **TAP 12**: Support for Harmonization of GMS Road Signs and Signals **TAP 13**: Practicalities of Private Sector Participation in Transport Infrastructure **TAP 14**: Cooperation between the ADB-ASEAN Regional Road Safety Program and the PRC **TAP 15**: HIV/AIDS Component for all Road Transport Projects in the GMS **TAP 16**: Road Maintenance Initiatives for Cambodia, Lao PDR, Myanmar, and Viet Nam **TAP 17**: Private Sector Participation in Road Maintenance **TAP 21**: Rail Maintenance in Cambodia **TAP 26**: Training in Road (Passenger and Freight) Transport Operations (“Knowledge Across Frontiers€35 **TAP 27**: Upgrading of Inland Water (Passenger and Freight) Transport Industry **TAP 32:** Transformation of Transport Corridors into Economic Corridors	

Long-Term Transport Sector Development Goals of GMS Countries	Key Transport Constraints to Achievement of Overarching Goals	Dominant GMS Strategic Theme and Overarching Goals		Projects to Support the GMS Transport Sector Strategy	Possible Development Partners
		Outcomes That ADB Expects to Influence Through Its Interventions	**Milestones/Tracking Indicators to Assess Strategy Implementation**		
				TAP 33: Further Development and Enhancement of the GMS Transport Model **TAP 35**: Marketing and Container Train Concessions between Laem Chabang Thailand and Thanaleng, Lao PDR **TAP 36**: Promotion of Marketing Functions for GMS Ports **TAP 37**: Promotion of Short Sea Shipping Services **TAP 38**:TA on Transport Requirements for the Development of Tourism **TAP 39**: Sea Cruise Development in Cooperation with ASEAN **TAP 40**: Phased Implementation of Open Skies	
Overarching Goal 4: Complete the GMS Network and Improve Links with South Asia					
• Enhanced Connectivity within GMS and to South Asia	• Lack of Definition of GMS Primary and Secondary Transport Networks • Links to South Asia not developed	• Definition of GMS Primary and Secondary Transport Networks • Completion of links to South Asia in concert with other development partners	• GMS Primary and Secondary transport networks defined and adopted by STF • % of defined Primary and Secondary Transport Networks Completed and Maintained to an Acceptable Standard on a Sustainable Basis • Links to South Asia defined and adopted for Development • % completion of South Asian Links	**TAP 22**: GMS Andaman Sea/Indian Ocean Deep Sea Port Study for Myanmar **TAP 28**: Railways Management Improvement Project **TAP 29**: Development of Traffic Engineering Capacity in Myanmar **TAP 30**: Development of Highway Engineering Capacity in Myanmar	To be determined

Long-Term Transport Sector Development Goals of GMS Countries	Key Transport Constraints to Achievement of Overarching Goals	Dominant GMS Strategic Theme and Overarching Goals: Outcomes That ADB Expects to Influence Through Its Interventions	Dominant GMS Strategic Theme and Overarching Goals: Milestones/Tracking Indicators to Assess Strategy Implementation	Projects to Support the GMS Transport Sector Strategy	Possible Development Partners
	• Limited mode choice for many GMS shippers and passengers	• Enhanced mode choice for GMS shippers and passengers	• Modal choice survey on major GMS axes	**TAP 31**: Financial and Economic Assessment Expertise in Myanmar **TAP 39**: Sea Cruise Development in Cooperation with ASEAN Note: Refer to the list of finalized prioritized investment projects in Chapter XI.	
Overarching Goal 5: Encourage Multimodalism					
• Strengthen Sub-regional Infrastructure Linkages through a Multi-Sector and Holistic Approach		• Encourage the provision of and cometition between modes on routes/subcorridors • Increasing role for Intermodal Transport in Intra-GMS Shipments	• As per milestones/tracking indicators for elements of work under “Complete the GMS Network and Improve Links with South Asia” • % increase in number of intermodal operators licensed for cross-border trade • % of Intra-GMS shipments shipped intermodally • % of Intra-GMS tonnage shipped intermodally • % of GMS Intermodal operators offering consolidation services	**TAP 1**: Implementing the GMS Agreement to Facilitate the Cross-Border Movement of Goods and People, Phase 2 **TAP 4**: Updating or Improving Existing Bilateral Railway Agreements and/or Amending the GMS Cross-Border Transport Agreement (CBTA) To Cover Cross-Border Railway Transport **TAP 5**: Project to Establish a Legal Framework for Cross-Border Navigation on the Mekong River [“Navigation Without Frontiers”, a motto adopted by the Mekong River Commission] **TAP 18**: Revisiting of the Feasibility Study for the Singapore-Kunming [Nanning] Railway Link **TAP 19A**: (Lancang)-Mekong River Navigation Improvement and	

Long-Term Transport Sector Development Goals of GMS Countries	Key Transport Constraints to Achievement of Overarching Goals	Dominant GMS Strategic Theme and Overarching Goals		Projects to Support the GMS Transport Sector Strategy	Possible Development Partners
		Outcomes That ADB Expects to Influence Through Its Interventions	**Milestones/Tracking Indicators to Assess Strategy Implementation**		
				Maintenance Project **TAP 19B**: Lower Mekong Navigation Improvement and Maintenance Project **TAP 20**: GMS Airports Development Project **TAP 21**: Rail Maintenance in Cambodia **TAP 23**: Training in Logistics **TAP 24**: Development of Inland Container Freight Depots **TAP 25**: Cambodia Freight Forwarders (FF) Competitiveness Project **TAP 27**: Upgrading of Inland Water (Passenger and Freight) Transport Industry TAP 28: Railways Management Improvement Project **TAP 35**: Marketing and Container Train Concessions between Laem Chabang Thailand and Thanaleng, Lao PDR **TAP 36**: Promotion of Marketing Functions for GMS Ports **TAP 37**: Promotion of Short Sea Shipping Services	

Notes: 1) List of Acronyms : ADB – Asian Development Bank, ACMECS – Ayeyawaddy-Chao Phraya-Mekong Economic Cooperation Strategy, AFD – Agence Francaise de Developpement, ASEAN – Asssociation of Southeast Asian Nations, CBTA – Cross-Border Transport Agreement, CMLV – Cambodia – Myanmar – Lao PDR – Viet Nam, EIB – European Investment Bank, EC – European Commission, FF – Freight Forwarder, GMS _ Greater Mekong Subregion, GTFP – Global Trade Facilitation Partnership, HIV/AIDS – Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome, HRD – Human Resources Development, IBRD – International Bank for

Reconstruction and Development, IDA – International Development Association, JBIC – Japan Bank for International Cooperation, JICA – Japan International Cooperation Agency, MRC – Mekong River Commission, NDF – Nordic Development Fund, OPEC – Organization of Petroleum Exporting Countries, PRC – People's Republic of China, SIDA – Swedish International Development Agency, SPS – Sanitary – Phytosanitary, TAP – Technical Assistance Project, UNESCAP – United Nations Economic and Social Commission for Asia and the Pacific.

2) As Investment and Technical Assistance Projects can impact on more than one overarching objective, some Investment and Technical Assistance Projects appear in the Interventions to Support the GMS Transport Sector Strategy more than once.