Ministry of Transport and Communications
The Republic of the Union of Myanmar

DATA COLLECTION SURVEY ON NATIONAL LOGISTICS IN THE REPUBLIC OF THE UNION OF MYANMAR

FINAL REPORT

VOLUME 2 : APPENDIX

MARCH 2018

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Kensetsu Gijyutsu Center, Ltd.
Nippon Koei Co., Ltd.
The Overseas Coastal Area Development Institute of Japan
Nittsu Research Institute and Consulting, Inc.

EI
JR
18-040

Data Collection Survey on National Logistics in the Republic of the Union of Myanmar

Final Report

Volume 2: Appendix

Appendix 2. Supplementary Material for Port Development Plan

List of Figures

List of Tables

Appendix 1

Profile of Proposed Projects

The project profiles of the projects prioritized under Group-A, B, C and D with “Expected Key Potential Impact and Mitigation Measures for Target Projects” for selected priority projects under Group-A and B are shown in this section.

(1) SOFT COMPONENTS

The total 22 projects below are proposed to be carried out at the beginning of the plan period or prior to the implementation of major / large scale infrastructure developments projects as listed in the group of physical components of the master plan.

Sector	Logistics Project ID	Title of Project
Logistics	LGP-01	Improvement of Laws and Regulations for Logistics -Truck transport-
	LGP-02	Improvement of Laws and Regulations for Logistics (Foreign cargo handling, other than MACCS (Myanmar Automated Customs Clearance System))
	LGP-03	Capacity Building Program for Logistics System Management
	LGP-04	Training for Trainers of MOTC Aiming at Guiding Private Sector to Improve the Performance of the Logistics Industry
	LGP-05	Promotion of FDI / Domestic Investments for Integration and Modernization of Logistics Service Sector
	LGP-06	Enhancement of the containerization and palletization
Road	LGP-07	Improvement of Road Safety Program (TA + pilot projects)
Railway	LGP-08	Study on Legal System for accessibility improvement in freight railway services
	LGP-09	Study on Myanmar – Thailand Railway Link
	LGP-10	Study on Mandalay – Muse New Railway Line Development Project (431.00) km
	LGP-11	Study on Mandalay – Tamu New Railway Line Development Project (500.25) km
	LGP-12	Study on High Speed Railway Linking Between Yangon and Hanthawaddy
Waterborne	LGP-13	Legislation of Port Law
	LGP-14	Dawei Port Development Project (Study)
Inland Waterway	LGP-15	National Inland Waterway Master Plan Study
	LGP-16	Vessel Safety Improvement
	LGP-17	Strengthening Organization of IWT
	LGP-18	Enhancement of University (Human Resource Development, incl. Equipment Installation)
	LGP-19	Improvement of Statistics (Data Collection)
	LGP-20	Enhancement of Ship Registration and Categorization
	LGP-21	Enhancement of Captains and Helmsmen Education System
	LGP-22	Improvement of Bonded Transport

Project Profile

<table>
<tr><td>Sub-Sector</td><td colspan="5">Logistics</td></tr>
<tr><td>Reference No.</td><td colspan="5">LGP-01</td></tr>
<tr><td>Project Title</td><td colspan="5">Improvement of Laws and Regulations for Logistics
-Truck transport-</td></tr>
<tr><td>Organizer</td><td colspan="5">MOTC,</td></tr>
<tr><td>Cooperator</td><td colspan="5">MOTC, MOC, private sector</td></tr>
<tr><td colspan="6">Summary of project</td></tr>
<tr><td colspan="3">Purpose</td><td colspan="3">Location</td></tr>
<tr><td colspan="3">1. Unfortunately, the logistics related legal framework is not developed in Myanmar. While logistics activity consists of various players, truck transport is the key player.
2. In Myanmar the transport business is at the initial stage of development. Various levels of players can enter the business and provide operations.
3. Unfortunately, the service standard is poorer than other ASEAN countries. Some kind of entry regulations need to be established in order to grow the business standard of the transport sector.</td><td colspan="3">Nation wide</td></tr>
<tr><td colspan="3">Rationale</td><td colspan="3">Project plan</td></tr>
<tr><td colspan="3">1. Myanmar adopts the principle of ASEAN multimodal transport agreement for truck operators. There are 3 components: 1) good reputation. 2) Experience 3) financial background for entry.
2. Detailed factors for entry are neither fixed nor clarified.
3. Establish the entry regulation in order to foster business operators and to keep the service standard while ensuring fair competition.</td><td colspan="3">1. Identify the detailed requirement for entry regulation
-Necessarily experience (qualify)
-Financial background
-Necessary resources (Equipment and other resources as well as human resources)</td></tr>
<tr><td colspan="2">Necessary resource</td><td>Estimated Cost (US$ million)</td><td colspan="3">Schedule</td></tr>
<tr><td colspan="2" rowspan="7">Expert (truck operation)
Expert (legal framework)</td><td rowspan="7">US$ 1.0mil.
US$ 1.0mil.</td><td>Calendar year</td><td>Start</td><td>End</td></tr>
<tr><td>1. Preparation</td><td>2017</td><td>2018</td></tr>
<tr><td>2. Drafting</td><td>2018</td><td>2018</td></tr>
<tr><td>3 Discussion with private sectors</td><td>2017</td><td>2018</td></tr>
<tr><td>4. Finalizing draft</td><td>2019</td><td>2020</td></tr>
<tr><td>5. Enforcement</td><td>2020</td><td>-</td></tr>
<tr><td colspan="2">Total Estimated Cost</td><td>US$ 2.0mil.</td><td></td><td></td><td></td></tr>
<tr><td colspan="3">Expected result</td><td colspan="3">Planned actions</td></tr>
<tr><td colspan="3">1. Fostering qualified logistics providers
2. Activating safety and environment-friendly transport
3. Upgrading service standard s</td><td colspan="3">Pre-survey is expected to identify the situation, demand, and capability of the transport industry.</td></tr>
<tr><td colspan="6">Necessity of Technical Assistance</td></tr>
<tr><td colspan="6">1.Technical feasibility study</td></tr>
<tr><td colspan="6">Remark</td></tr>
<tr><td colspan="6">In advanced counties (EU, USA and Japan), the truck industry has been heavily regulated since the 1980s. After industry standards were established, entry regulations were deregulated. In Myanmar, local operators are likely to have insufficient resources for investment. This situation makes the transport market disorderly and the market cannot provide profits for both users and operators until some kind of qualified transporters appear. Advanced countries had experienced the following steps: 1) Entry regulation, 2) fostering industry and standards 3) Deregulation of entry 4) Competition 5) Cost reduction. The disorderly deregulation for entry makes it difficult for operators to hold resources for qualified practice because their competitiveness is likely to depend on “cost”.</td></tr>
</table>

Project Profile

Sub-Sector	Logistics			
Reference No.	LGP-02			
Project name	Improvement of Laws and Regulations for Logistics (Foreign cargo handling, other than MACCS (Myanmar Automated Customs Clearance System))			
Executing agency	Customs			
Cooperator	MOTC, MOC, private sector			
Summary of project				
Purpose		Location		
Fix the customs related procedure along with the MACCS		Nation wide		
Background and Rationale		Project Plan		
Since 2016 Nov, MACCS started however, regional framework for handling bonded transport, bonded area for clearance and bonded inventory facility/procedure are unclear. Now just the time only procedure for transportation between Thilawa port and ETZ is began as a test case. The regal framework for bonded transportation, warehouse should be fixed as soon as possible.		To formulate for following legal framework: -Transit procedure -Bonded transport -Bonded area (inland place) -Container duty exempt /temporary import scheme		
Necessary resource	Estimated Cost (US$ million)	Schedule		
1. Expert (customs, MACCS linkage) 2. Expert (business activity expert for bonded cargo handling)	US$ 2.5mil. US$ 1.0mil.	Calendar year	Start	End
		1. Preparation	2017	2018
		2. Drafting	2018	2019
		3 Discussion with private sectors	2018	2019
		4. Finalizing draft	2019	2020
		5. Enforcement	2020	
				-
Total Estimated Cost	US$ 3.5mil.			
Expected result		Planned actions		
1.Facilitation on foreign cargo handing 2.Activating customer's business activity through facilitating import/storage and bonded/transit transport		Pre-survey is expected to identifying the situation, demand, capability of transport industry.		
Necessity of Technical Assistance				
1. Law and regal framework 2. Business circumstance study 3. Financial background building 4. Linkage with MACCS				
Remark				

Project Profile

Sub-Sector	Logistics
Reference No.	LGP-03
Project name	Capacity Building Program for Logistics System Management
Organizer	MOTC,
Cooperator	MOTC, MOC, private sector

Summary of project

Purpose	Location
2. Poor finance background of truckers: they are unlikely to have sufficient capacity to develop their fleets. Some kind of capacity or finance assistance program seems necessary for upgrading fleets.	Nationwide

Rationale	Project plan
1. In accordance with economic development, it is definitely needed for upgrading transport quality. Unfortunately, the poor financial capacity of truckers constrains upgrading their truck fleets. 2. Some kind of financial support program provides incentives for improving fleets. In order to do this, Japan arranged a financial assistance system, the flow of which is through Government ⇒Truck associations⇒private companies, finance through Associations is to keep transparency of using official funds. 3. Enhancing association activity can provide benefit for upgrading truck industrial development, not only for truck fleet development but also for relatively soft components (training, education, sharing equipment and forming standardized service contract and so on)	1. Promoting truck association capability to enhance truckers standards and service levels 2. The following programs are taken into account through the association 1) Development on truck operator's capability 2) Financial assistance to procure truck fleets 3) Training and education for drivers/ fleet management

Necessary resources	Estimated cost (US$ million)	Schedule		
1. Expert (truck Association and related soft Component)	US$ 0.5mil.	Calendar year	Start	End
		1. Preparation	2017	2018
2. Expert (finance scheme for procurement of vehicles and ships)	US$ 0.5mil.	2. Association development plan	2019	2020
		3. Financial scheme	2019	2020
		4. Finance	2022	
		5. Soft component program	2018	2022
		6.Enforcment	2025	
Total	US$ 1.0mil.			

Expected result	Planned actions
1. Truck fleet development 2. Replacement of aged truck to contemporary ones 3. Transport service standard promotion 4. Safety/eco-friendly transport 5. Cost reduction 6. Keeping profitability	1.Capacity development for truck association 2.Funding 3.Monitoring 4.Other related truck industry development scheme initiated by association (safety driving, maintenance, fleet management practice etc)

Necessity of Technical Assistance

1. Association management
2. Financial plan for installing qualified trucks
3. Program formulation for truck industry development, including manger and driver
4. Collaboration with the public sector to keep industry development as well as secure customer satisfaction (institutional scheme).

Project Profile

Sub-Sector	Logistics			
Reference No.	LGP-04			
Project name	Training for Trainers of MOTC Aiming at Guiding Private Sector to Improve the Performance of the Logistics Industry			
Executing agency	MOTC, MOCom			
Cooperator	Customs, private sector			
Summary of project				
Purpose		Location		
Training the administrative staffs of MOTC / MOCom to enable them to guide the private sector to improve the performance of the private sector through the improvement and encouragement of logistics provider's capability		Nationwide		
Background and Rationale		Project Plan		
1. Since qualified logistics service is based on advanced practice and technology, training is indispensable. The administrative staffs of MOTC / MOCom are needed to be trained to become the trainers to guide the private sector for improved performance of the logistics services. 2. As a precedent, it is indicated that training for MACCS process was implemented for renewal for customs procedure, aiming at facilitation of speedy clearance. 3. Similar practice is necessary to be activated to provide qualified logistics service. 4."Diploma" system seems to be effective for keeping training status at a high level.		Following training programs are key components: -Warehouse operation (bonded or not bonded) -Inventory control -Truck fleet management (for efficient/safety) -Driver (for eco/driving, safety) -Folk lift/Crane operator -Customs license holders -		
Necessary resource	Estimated cost (US$ million)	Schedule (depending on training menu)		
Depending on training menu	US$ 1.0mil.	Calendar year	Start	End
			2019	2022
				-
Total Estimated Cost (Minimum)	US$ 1.0mil.			
Expected result		Planned actions		
1. Upgrading logistics quality 2. Enhancing safety and transparency for service standard		1. Pre-survey is expected to identify the situation, demand, and capability of the transport industry. 2. Location for training center, if required.		
Necessity of Technical Assistance				
1. Instructor selection 2. Finance 3. Training of trainers 4. Programming official certification system 5. Periodical checks				
Remark				

Project Profile

<table>
<tr><td>Sub-Sector</td><td colspan="5">Logistics</td></tr>
<tr><td>Reference No.</td><td colspan="5">LGP-05</td></tr>
<tr><td>Project name</td><td colspan="5">Promotion of FDI / Domestic Investments for Integration and Modernization of Logistics Service Sector</td></tr>
<tr><td>Executing agency</td><td colspan="5">MOTC, MOCom</td></tr>
<tr><td>Cooperator</td><td colspan="5">Private sector</td></tr>
<tr><td colspan="6">Summary of project</td></tr>
<tr><td colspan="3">Purpose</td><td colspan="3">Location</td></tr>
<tr><td colspan="3">1. Modernize the logistics sector as a whole
2. Preparation of necessary laws and regulations covering the area of freight transport, warehousing, cargo handling, development of truck terminal, etc.
3. Preparation of financial scheme for SMEs operating freight transport and logistics services.</td><td colspan="3">Nationwide</td></tr>
<tr><td colspan="3">Background and Rationale</td><td colspan="3">Project Plan</td></tr>
<tr><td colspan="3">1. Current domestic logistics providers (i.e. forwarders, trucking companies, inland waterway transport companies, coastal shipping companies) are fragmented thus a rationalization of logistics providers organization is needed to increase the logistics performance of Myanmar as a whole
2. Enhancement of logistics activities of FDI logistics providers to guide the domestic logistics providers to achieve the international standards of operation level and services.
3. Grading of domestic logistics providers</td><td colspan="3">● Organizing project stakeholders for the establishment of new truck terminals, logistics parks, etc.
● Learning sessions of the outline and practical operation of modern logistics services
● Legislation of necessary laws and regulations for realization and practical operation of modern logistics services
● Establishment of logistics data and information sharing system
● Establishment of cargo / truck – inland waterway transport – coastal shipping matching system</td></tr>
<tr><td colspan="2">Necessary resource</td><td>Estimated cost (US$ million)</td><td colspan="3">Schedule (depending on training menu)</td></tr>
<tr><td colspan="2" rowspan="6">Depending on training menu</td><td rowspan="6">US$ 1.0mil.</td><td>Calendar year</td><td>Start</td><td>End</td></tr>
<tr><td>Preparation</td><td>2018</td><td>2019</td></tr>
<tr><td>Execution</td><td>2019</td><td>2020</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="2">Total Estimated Cost (Minimum)</td><td>US$ 1.0mil.</td><td></td><td></td><td>-</td></tr>
<tr><td colspan="3">Expected result</td><td colspan="3">Planned actions</td></tr>
<tr><td colspan="3">1. Increase of freight transport efficiency and reduction of transport cost</td><td colspan="3">Request of technical assistance from advanced countries in view of logistics services</td></tr>
<tr><td colspan="6">Necessity of Technical Assistance</td></tr>
<tr><td colspan="6">Technical assistance is needed</td></tr>
<tr><td colspan="6">Remark</td></tr>
<tr><td colspan="6">The UMFCC has already organized the Myanmar Transport Logistics Federation and GMS Freight Forwarding Association. These two newly created organizations will be reinforced to be the core organization for promotion of modernization and grading up of Myanmar’s logistics sector.</td></tr>
</table>

Project Profile

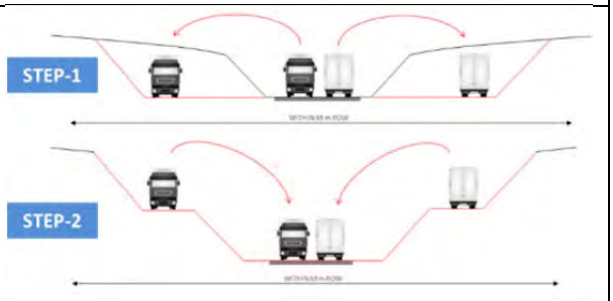
<table>
<tr><td>Sub-Sector</td><td colspan="5">Logistics</td></tr>
<tr><td>Reference No.</td><td colspan="5">LGP-06</td></tr>
<tr><td>Project name</td><td colspan="5">Enhancement of the containerization and palletization</td></tr>
<tr><td>Executing agency</td><td colspan="5">MOTC, MOCom</td></tr>
<tr><td>Cooperator</td><td colspan="5">Private sector</td></tr>
<tr><td colspan="6">Summary of project</td></tr>
<tr><td colspan="3">Purpose</td><td colspan="3">Location</td></tr>
<tr><td colspan="3">1. Modernize the freight transport especially for long distance haulage;
2. Rationalize the transport cost by use of containers and pallets that ensure the elimination of vanning and devanning operation cost as well as needed time for such operation.
3. Speedier door-to-door operation can be realized.
4. Increase the load factor</td><td colspan="3">Nationwide</td></tr>
<tr><td colspan="3">Background and Rationale</td><td colspan="3">Project Plan</td></tr>
<tr><td colspan="3">1. Most of the domestic cargo transportation is done by ordinary trucks thus vulnerable against rain and deterioration or loss of cargoes are problematic;
2. The cargoes are trans-loaded, loaded and unloaded manually thus the cost incurred for such operation;
3. If the cargoes are containerized various charges needed for storing, trans-loading, loading and unloading, vanning and devanning can be avoided thus the transport charges can be rationalized.</td><td colspan="3">● Organizing project stakeholders for the introduction of container freight operation.
● Learning sessions for containerization and palletization process
● Establishment of domestic container and pallet manufacturing companies</td></tr>
<tr><td colspan="2">Necessary resource</td><td>Estimated cost (US$ million)</td><td colspan="3">Schedule (depending on training menu)</td></tr>
<tr><td colspan="2" rowspan="6">Depending on training menu</td><td rowspan="6">US$ 1.0mil.</td><td>Calendar year</td><td>Start</td><td>End</td></tr>
<tr><td>Preparation</td><td>2018</td><td>2019</td></tr>
<tr><td>Execution</td><td>2019</td><td>2020</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="2">Total Estimated Cost (Minimum)</td><td>US$ 1.0mil.</td><td></td><td></td><td>-</td></tr>
<tr><td colspan="3">Expected result</td><td colspan="3">Planned actions</td></tr>
<tr><td colspan="3">Increase of freight transport efficiency and reduction of transport cost</td><td colspan="3">Request of technical assistance from advanced countries in view of logistics services</td></tr>
<tr><td colspan="6">Necessity of Technical Assistance</td></tr>
<tr><td colspan="6">Technical assistance is needed.</td></tr>
<tr><td colspan="6">Remark</td></tr>
<tr><td colspan="6">The UMFCC has already organized the Myanmar Transport Logistics Federation and GMS Freight Forwarding Association. These two newly created organizations will be reinforced to be the core organization for promotion of modernization and grading up of Myanmar’s logistics sector.</td></tr>
</table>

Project Profile

Serial No.:

Sub-Sector	Road
Reference No.	LGP-07
Project Title	Improvement of Road Safety Program (TA + pilot projects)
Executing Agency	Ministry of Construction, MOTC and Communication
Relevant Ministry	RTAD, Traffic Police

Outline of the Project

Objectives	Location
1. Improve traffic safety 2. Increase Skills of truck drivers 	 (Example of pilot project: Improvement of sub-standard vertical alignment)

Rationale	Project Plan (outline)
Upgrading of Asian/ASEAN Highways to international standards meeting the requirement of ASEAN Transport Strategic Plan	Through the technical assistance, heavy vehicle driver standards, a road safety improvement program (term-wise) and road safety design manual will be prepared.4 Pilot project(s) will be implemented for future road safety improvement action by GoM.

Input	Estimated Cost (US$ million)	Schedule		
1) Identification of the cause of accidents 2) Establish a road safety improvement program (short and long term program) 3) Road safety improvement pilot project(s) (installation of road safety devices, improvement of vertical alignment, etc.)	US$ 2.0mil.	Calendar Year	Start	End
		1. Preparation	2016	2017
		2. Feasibility Study		
		3. Funding Arrangement	2017	2017
		4. Execution	2017	2020
		5. Commissioning	2020	2020
Total Estimated Cost	US$ 2.0mil.			

Result of Evaluation	
Expected Output	Action Plan
- Heavy vehicle driver standards and safety training campaign - Road safety improvement program - Road safety design manual - Pilot project	
Necessity of Technical Assistance	
Remarks	

Project Profile

Serial No.:

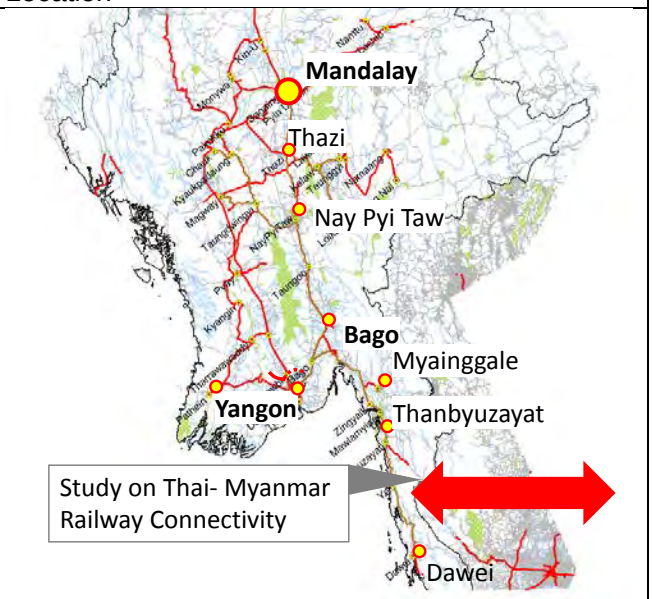
Sub-Sector	Railway			
Reference No.	LGP-08			
Project Title	Study on Legal System for Accessibility Iimprovement in Freight Railway Services			
Executing Agency	MR			
Relevant Ministry	MOTC			
Outline of the Project				
Objectives		Location		
To enhance bulk cargo transportation by railway To enhance cross-border transportation				
Rationale		Project Plan (outline)		
- Railway Law is not assumed cross-border transportation - For intermodal transportation enhancement, the soft components shall be reviewed.		Following task is included on the study -Review the relevant law on freight transportation by railway -Propose the attractive scheme for intermodal (including cross border) transport by railway -Propose private-owned wagons to promote bulk cargo transport by railway. -The other laws improvement shall be proposed for freight railway promotion		
Input	Estimated Cost (US$ million)	Schedule		
Railway Law Study	US$ 0.35mil.	Calendar Year	Start	End
		1. Preparation	2018	2018
		2. Feasibility Study	2018	2018
		3. Funding Arrangement	-	-
		4. Execution	-	-
		5. Commissioning	-	-
Total Estimated Cost	US$ 0.35mil.			
Result of Evaluation				
Expected Output		Action Plan		
Logistic Law is improved for intermodal freight transportation		Feasibility Study shall be started soon.		
Necessity of Technical Assistance				
Remarks				

Project Profile

Serial No.:

Sub-Sector	Railway
Reference No.	LGP-09
Project Title	Study on Myanmar – Thailand Railway Link
Executing Agency	MR
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location
To enhance railway cross-border cargo transportation between Myanmar and Thailand	

Rationale	Project Plan (outline)
-Linkage between Myanmar and Thailand has been studied so far. -KOIKA studied Thanbyuzayat- Three Pagoda railway route in 2007 but the project has stopped due to environmental issue. -State Railway of Thailand studied Dawei-Namtok railway route in 2015 but the project also not proceed due to project cost. -The highest volume importer is Thailand and the linkage between Myanmar and Thailand is important.	The study will find the feasible railway route between Myanmar and Thailand in view of updated demand forecasting.

Input	Estimated Cost (US$ million)	Schedule		
Feasibility Study	US$ 1.0 mil.	Calendar Year	Start	End
		1. Preparation	2018	2018
		2. Feasibility Study	2019	2020
		3. Funding Arrangement	-	-
		4. Execution	-	-
		5. Commissioning	-	-
Total Estimated Cost	US$ 1.0 mil.			

Result of Evaluation
New railway alignment is proposed according to updated demand forecasting.
Necessity of Technical Assistance
Remarks
Consensus between Myanmar and Thailand is needed.

Project Profile

Serial No.:

Sub-Sector	Railway
Reference No.	LGP-10
Project Title	Study on Mandalay – Muse New Railway Line Development Project
Executing Agency	MR
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location ; Muse-Lasho-Kyaukmae-Pyinoolwin-Mandalay (431.0) Km
● To meet with increasing cargo demand on the regional transportation network; ● To improve and expand the existing infrastructure; ● To upgrade the efficiency of operation of linkage between Muse the border city of Myanmar with China and Mandalay as a central hub of northern Myanmar: and ● To enhance railway cross-border cargo transport between Myanmar and China, and also to connect Trans Asian Railway (TAR) network.	
Rationale	Project Plan (outline)
● It is an important part of Myanmar-China international passageway that provide an access to the sea port for China; ● It is an important part of western Corridor for Trans-Asia Railway network. ● It enhances the economic and trade exchange in large volume through the logistics corridor by a rapid freight transport mean.	● To prepare a detailed and comprehensive Feasibility Study report.

Input	Estimated Cost (US$ollar)
Feasibility study on the development of a railway linking Muse and Mandalay with standard gauge and 20 ton axle load railway track. The estimated cost of the project is US$ 5.0 billion.	US$ 5.0 mil.
Total Estimated Cost for F/S	US$ 5.0 mil.

Schedule		
Calendar Year	Start	End
1. Preparation	2018	2019
2. Feasibility Study	2020	2022

Expected Output	Action Plan
● Lower the transport cost ● Shorter the lead time	Conduct feasibility study

Necessity of Technical Assistance
Technical and Financial Viability Study
Remarks

Project Profile

Serial No.:

Sub-Sector	Railway
Reference No.	LGP-11
Project Title	Study on Mandalay – Tamu New Railway Line Development Project
Executing Agency	MR
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location ; Tamu-Kalay-Kalewa-Segyi-Monywa-Mandalay
● To meet with the increasing cargo demand on the regional transportation network; ● To improve and expand the existing infrastructure; ● To upgrade the efficiency of operation and connectivity between Tamu the border city of Myanmar with India and Mandalay as a central hub of northern Myanmar; and ● To enhance railway cross-border cargo transport between Myanmar and India; and ● To connect Trans Asian Railway (TAR) network.	

Rationale	Project Plan (outline)
● Since 1990, India continuously strives to strengthen diplomatic, trade and investment relation with Myanmar. ● Existing railway line linking Pakkokku – Gangaw - Kalay is an approach to the border with India does not meet with an international standard condition.	● To finalize the route alignment of missing rail link between India and Myanmar. ● To make a Feasibility Study report. ● The study will find a feasible railway route ● To meet updated demand forecast.

Input	Estimated Cost (US$ollar)	Schedule		
Feasibility study on the development of a railway linking Tamu and Mandalay with standard gauge and 20 ton axle load railway track.	US$ 3.0 mil.	Calendar Year	Start	End
		1. Preparation	2018	2019
		2. Feasibility Study	2020	2022
Total Estimated Cost for F/S	US$ 3.0 mil.			

Expected Output	Action Plan
Lower the transport cost Shorter the lead time	Proposed to the Government of India in line with the SASEC program to arrange the technical assistance to conduct the F/S

Necessity of Technical Assistance
Technical and Financial Viability Study
Remarks

Project Profile

Serial No.:

Sub-Sector	Railway
Reference No.	LGP-12
Project Title	Study on High Speed Railway Linking Between Yangon and Hanthawaddy
Executing Agency	MR
Relevant Ministry	MOTC

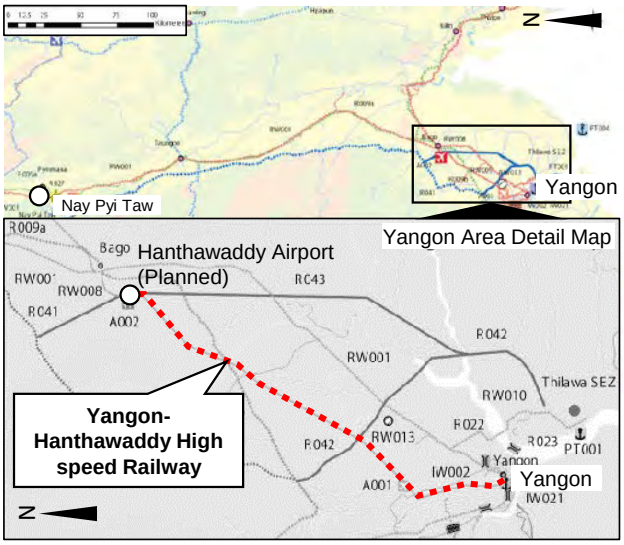
Outline of the Project

Objectives

- To develop a new railway link as a rapid access for the passenger movement between Yangon and newly built Hanthawaddy International Airport of which location is around 77 km away from Yangon.

Location

Alignment Image



Source: NTMP, JST Edited

Rationale

- A rapid passenger transport mean is needed to meet with the passenger demand for accessing between the newly built international airport and the capital city Yangon.

Project Plan (outline)

- New railway line will be prepared between Yangon and Hanthawaddy planned international airport

Input	Estimated Cost (US$ million)
Feasibility study on the high speed railway system linking between the Hanthawaddy International Airport and Yangon City	US$ 3.0 mil.
Total Estimated Cost	US$ 3.0 mil.

Schedule

Calendar Year	Start	End
1. Preparation	2018	2019
2. Feasibility Study	2020	2022

Expected Output

A rapid access connecting between the Hanthawaddy International Airport and Yangon City

Action Plan

Conduct the feasibility study

Necessity of Technical Assistance

Feasibility study is needed.

Remarks

The target year of completing the Hanthawaddy International Airport is 2023.

Project Profile

<table>
<tr><td>Sub-Sector</td><td colspan="4">Waterborne Transport</td></tr>
<tr><td>Reference No.</td><td colspan="4">LGP-13</td></tr>
<tr><td>Project Title</td><td colspan="4">Legislation of Port Laws</td></tr>
<tr><td>Executing Agency</td><td colspan="4">Myanma Port Authority (MPA)</td></tr>
<tr><td>1. Relevant Ministry</td><td colspan="4">MOTC and Communications</td></tr>
<tr><td colspan="5">Outline of the Project</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">Location</td></tr>
<tr><td colspan="2">The objectives of the Project is to
1. Prepare a basic port development policy;
2. Prepare a national port location plan; and
3. Prepare a port layout plans
so as to materialize well-balanced national land development.</td><td colspan="3">Nation Wide</td></tr>
<tr><td colspan="2">Rationale</td><td colspan="3">Project Plan</td></tr>
<tr><td colspan="2">The National Port Development Policy does not exist at present. The new “Port Act” was formulated in April 2015 in Myanmar. In this new “Port Act”, the determination of the Port Limit is regulated but no concept of a public water area management system is stipulated. Accordingly, it is possible for the private sector to develop and utilize the public water area exclusively if the private entity owns the land in front of the water area. In addition, there is no clause in the “Port Act” which requires the establishment of a nation-wide port location plan and the necessary functions and capacities of ports from the national viewpoint which aims at achieving well-balanced country development.</td><td colspan="3">Amendment of Port Laws</td></tr>
<tr><td>Input</td><td>Estimated Cost (US$ million)</td><td colspan="3">Schedule</td></tr>
<tr><td rowspan="6">1. Amendment of current port laws</td><td rowspan="6">US$ 1.0mil.</td><td>Calendar Year</td><td>Start</td><td>End</td></tr>
<tr><td>1. Preparation</td><td>2018</td><td>2018</td></tr>
<tr><td>2. Feasibility Study</td><td>2019</td><td>2020</td></tr>
<tr><td>3. Funding Arrangement</td><td></td><td></td></tr>
<tr><td>4. Execution</td><td></td><td></td></tr>
<tr><td>5. Commissioning</td><td></td><td></td></tr>
<tr><td>Total Estimated Cost</td><td>US$ 1.0mil.</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Result of Evaluation</td><td colspan="3"></td></tr>
<tr><td colspan="2">Expected Output</td><td colspan="3">Action Plan</td></tr>
<tr><td colspan="2">Port development plans in order.</td><td colspan="3">Request of technical assistance to carry out the Project</td></tr>
<tr><td colspan="2">Necessity of Technical Assistance</td><td colspan="3"></td></tr>
<tr><td colspan="5">Technical assistance is needed.</td></tr>
<tr><td colspan="5">Remarks</td></tr>
</table>

Project Profile

<table>
<tr><td>Sub-Sector</td><td colspan="4">Waterborne Transport</td></tr>
<tr><td>Reference No.</td><td colspan="4">LGP-14</td></tr>
<tr><td>Project Title</td><td colspan="4">Study on Dawei SEZ Port Development Project</td></tr>
<tr><td>Executing Agency</td><td colspan="4">Myanma Port Authority (MPA)</td></tr>
<tr><td>2. Relevant Ministry</td><td colspan="4">MOTC</td></tr>
<tr><td colspan="5">Outline of the Project</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">Location</td></tr>
<tr><td colspan="2">1. To develop the area as a core of SEZ and industrial development (light industry, heavy and chemical industry and energy).
2. To develop the area as a logistic gate to the west (India, Africa and Middle East) from GMS and AEC zone.
3. To develop the area as a deep-sea gateway port at the southern part of Myanmar.</td><td colspan="3"> 
</td></tr>
<tr><td colspan="2">Rationale</td><td colspan="3">Project Plan (outline)</td></tr>
<tr><td colspan="2">1. A wide land area of 20,000 ha is secured and a part of road, reservoir, residential area and land filling is completed.
2. A deep-water area is available for the port development.
3. This area has the potential to be a core of Myanmar’s economic development.
4. This area is designated as the west side gate of the south coastal corridor of GMS.</td><td colspan="3">1. Initial Layout Plan
 
2. Further detailed study is needed for the formulation of a layout</td></tr>
<tr><td>Input</td><td>Estimated Cost (US$ million)</td><td colspan="3">Schedule</td></tr>
<tr><td rowspan="6">2. Feasibility Study</td><td rowspan="6"></td><td>Calendar Year</td><td>Start</td><td>End</td></tr>
<tr><td>1. Preparation</td><td>2018</td><td>2018</td></tr>
<tr><td>2. Feasibility Study</td><td>2019</td><td>2020</td></tr>
<tr><td>3. Funding Arrangement</td><td></td><td></td></tr>
<tr><td>4. Execution</td><td></td><td></td></tr>
<tr><td>5. Commissioning</td><td></td><td></td></tr>
<tr><td>Total Estimated Cost</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Result of Evaluation</td><td colspan="3"></td></tr>
<tr><td colspan="2">Expected Output</td><td colspan="3">Action Plan</td></tr>
<tr><td colspan="2">1. Economic development and an efficiency increase in logistics in Myanmar and GMS</td><td colspan="3">1. Conduct of a feasibility study</td></tr>
<tr><td colspan="2">Necessity of Technical Assistance</td><td colspan="3"></td></tr>
<tr><td colspan="5">1. Conduct of a feasibility study</td></tr>
<tr><td colspan="5">The Data Collection Survey for Development Planning in Tanintharyi Region and Dawei SEZ (DPTD)
is on-going.</td></tr>
</table>

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LGP-15
Project Title	National Inland Waterway Master Plan Study (incl. Pilot Project)
Executing Agency	DWIR and IWT
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To designate National Inland Waterways for systematic development
2. To make a Masterplan of phased development in accordance with road and railway transport development
3. To announce National Inland Waterways controlled by Myanmar Government

Rationale

1. Even though the current condition of the waterway transport network has deteriorated, many people are utilizing inland waterway transport.
2. However the routes of roads and railways are designated In Myanmar and there is a Masterplan for road and railways development.
3. DWIR has responsibility for the maintenance of navigation channels but it is difficult because of financial and technical issues.

Location and Project Plan (outline)

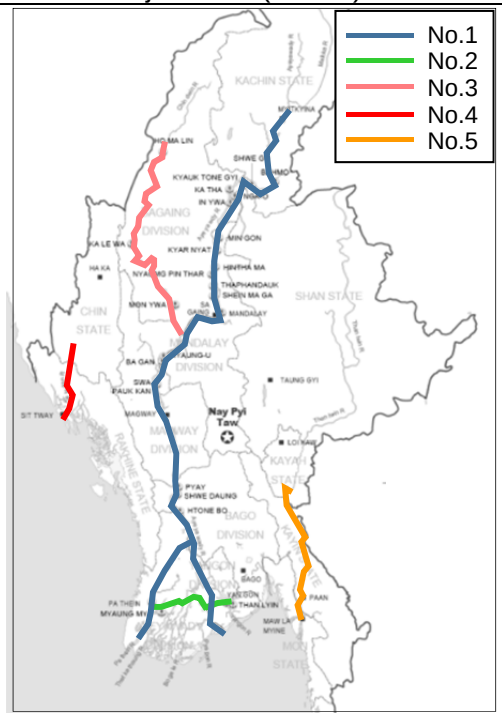


Figure: Location of Each National Inland Waterway
No.1: Delta-Myitkyina (Ayeyawaddy River)
No.2: Delta-Yangon (Ayeyawaddy River)
No.3: Delta-Sagaing Division (Chindwin River)
No.4: Sittwe-Upstream (Kaladan River)
No.5: Mawlamyine-Upstream (Thanlyin River)

Input	Estimated Cost (US$ million)
- Establishment of Masterplan for each national inland waterway	US$ 2.0mil.
- Pilot Project of route mapping including Surveys of natural conditions of each river such as water depth, current, wind, etc.	US$ 1.0mil.
Total Estimated Cost	US$ 3.0mil.

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Master Plan Study	2018	2018
3. Pilot Project	2019	2019

Expected Output

- National Inland Waterway Masterplan
- Partial Route Map by Pilot Project

Action Plan

- Preparation of Masterplan Study is needed.

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LGP-16
Project Title	Vessel Safety Improvement and TA (incl. Law)
Executing Agency	DMA
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To enhancement the rules and regulations regarding the safety of ships.
2. To prepare appropriate ship safety standards, safety practices and standard of competence required for its marine personal.
3. To prepare systematic safety records for registered vessels.
4. To improve the specific obligation to save lives and protect the marine environment.

Rationale

1. Many accidents occurred in the inland waterways
2. There are many aged vessels without sufficient maintenance.
3. There are many overloaded vessels.
4. Inland Vessel Law entered into force in Myanmar on 5th March 2015, but the rules and regulations and standard for the safety are insufficient.
5. DMA requested a long-term expert for improvement of safety standards in the past but did not get assigned one.
6. MLIT officials will visit Myanmar in March 2017.

Location and Project Plan (Outline)

Source: Myanmar Time
Figure: Aung Takon 3 ferry which sank in Rakhine on 13th March 2015.

Input	Estimated Cost (US$ million)
- Provide assistance on rules and regulations and safety standards.	2.0
- Technical assistance for the vessel safety improvement	1.0
- Technical assistance for capacity building and human resource development	1.0
Total Estimated Cost	4.0

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Rule making	2018	2018
3. Technical Assistance	2019	2019

Expected Output

- Human resource development - such as safety experts and technicians.
- Reporting the cause of accidents and systematic data keeping.
- Reduce accidents caused by old, damaged & overloaded vessels.

Action Plan

- Technical Assistance for the rules and regulations and safety standards.

Necessity of Technical Assistance

- Experts for securing safety and standardized dockyards are needed.
- A long-term expert for safety standards is needed.

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LGP-17
Project Title	Strengthening Organization of IWT
Executing Agency	IWT
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To improve the expertise and knowledge of IWT's staff such as the pilot technology
2. To acquire the know-how for the operation and management except for the technical matter
3. To strengthen the IWT's organization along with the human resources development with a long-term perspective based on the above

Rationale

1. In recent years, budgets and human resources for IWT are limited.
2. The barge for the transport of container cargo was built by JICA project.
3. IWT donated three ships and steel materials from Japan

Location and Project Plan (outline)

Source: The Irrawaddy Website
Figure: Old Passenger Ship Operated by IWT

Input	Estimated Cost (US$ million)
- Technical assistance	US$ 1.0mil.
- Dispatch of experts with the long-term support	US$ 1.0mil.
Total Estimated Cost	US$ 2.0mil.

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Technical Assistance	2018	2018
3. Dispatch of long-term experts	2019	2021

Expected Output

- Turnaround of fiscal soundness of IWT

Action Plan

- Determination of project executing agency

Necessity of Technical Assistance

- Technical assistance for management, account, marketing operation etc.

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LGP-18
Project Title	Enhancement of University (Human Resource Development, incl. Equipment Installation)
Executing Agency	Myanmar Maritime University, Myanmar Mercantile Marine College
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To improve university and other educational institutions
2. To develop human resources in universities and educational institutions.
3. To increase the number of qualified graduates in the maritime industry.

Rationale

1. The lecturer and student ratio of MMU is large.
2. The amount of annual intake for students is limited because of the limited number of lecturers.
3. Maritime background lecturers are needed for more effective education for students.
4. The research laboratories and equipment are needed to be repaired and new laboratories and equipment should be introduced.

Location and Project Plan (outline)

Figure: Location of Myanmar Maritime University and Myanmar Mercantile Marine College

Input	Estimated Cost (US$ million)
- Technical assistance (training, symposium and seminar) - Introduction of scholarship programs - Installation of research laboratories and equipment	US$ 2.0mil.
Total Estimated Cost	US$ 2.0mil.

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Installation of laboratories and equipment	2018	2018
3. Technical Assistance	2018	2020

Expected Output

- Improvement in universities and development in human resources in the maritime transport sector.
- Increase in the number of qualified graduates in the marine industry.

Action Plan

- Capacity development to new lecturers,
- Installation of new lab apparatus, hardware, software and technical assistance.
- Training and scholarship programs.

Necessity of Technical Assistance

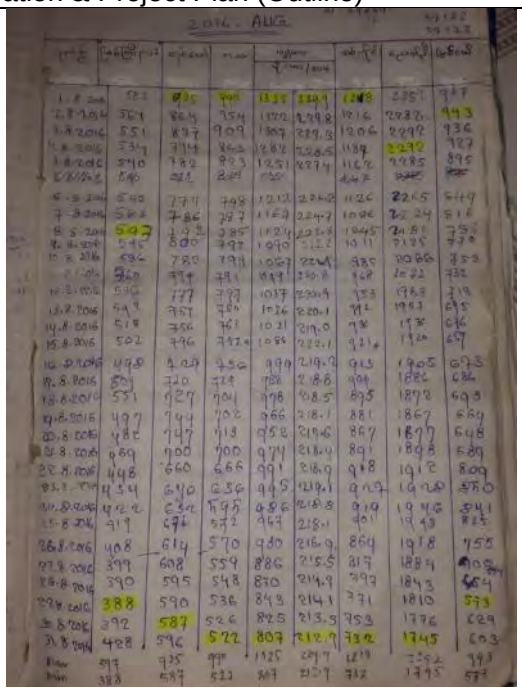
- Technical assistance shall be necessary for symposiums, seminars, and training.

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LGP-19
Project Title	Improvement of Statistics (Data Collection)
Executing Agency	DMA, IWT & DWIR
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location & Project Plan (Outline)
1. To understand the current situation based on the collected data. 2. To contribute to the budgetary measures properly and the establishment of investment plans. 3. To analyze the past volume of cargo and passenger movements for port statistics and future port development plans.	 Source: DWIR Sample of Statistical Data (Handwritten)
Rationale	
1. The Government of Myanmar has begun to establish a statistical system. 2. The electric data recording system has been introduced instead of handwritten records. 3. DMA has a list of registered vessels and the cargo and passenger volumes in each region. DMA is appropriate for establishment of a statistical system to collect and tabulate both private and public statistics. 4. A systematic format for statistics recording shall be introduced for statistical improvement in the port sector. 5. Technical assistance for establishing port statistics and port planning shall be provided.	

Input	Estimated Cost (US$ million)
1. Updating the data collection system. 2. Separating the data recording items for more systematic recording by technological assistance.	US$ 1.0mil.
Total Estimated Cost	US$ 1.0mil.

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Execution	2018	2018
3. Commissioning	2019	-

Expected Output	Action Plan
- Systematically recorded data of operations and cargo volume of each vessel to understand the current situation. - Reduction of data arrangement work - Good analysis of current data to consider future development plans.	- Computerization of the statistical data from hand written records.
Necessity of Technical Assistance	
- Proper system for Data Arrangement and Management.	
Remarks	

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LGP-20
Project Title	Enhancement of Ship Registration and Categorization
Executing Agency	DMA
Relevant Ministry	MOTC

Outline of the Project

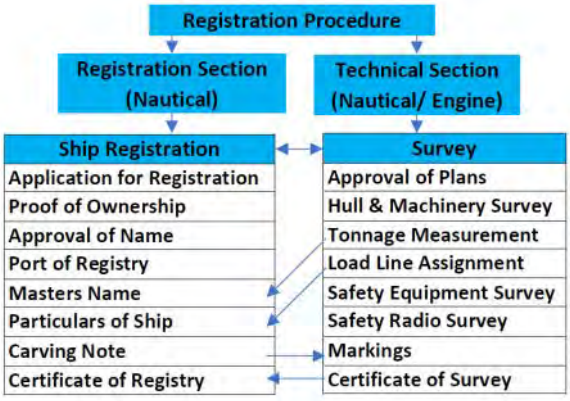
Objectives

1. To understand the current situation based on the registration and categorization data
2. To ensure a license for each vessel to operate so that it can provide a point of reference on ship safety
3. To provide reliable data for ship repairers
4. To assign the required class or grade to a vessel
5. To ensure the construction of vessels to be complied with their grading system

Rationale

1. DMA has a list of registered vessels but the vessels are categorized into only few classes.
2. Myanmar Registration of Ship Act was amended in 2003.
3. A new vessel registration law is under the drafting stage according to DMA.
4. Vessels with under 20hp engines are not needed to register at DMA.

Location and Project Plan (Outline)



Source: JICA Study Team

Figure: Ship Information of a IWT Vessel and registration procedure in DMA

Input	Estimated Cost (US$ million)
- Technical Assistance for Vessel Categorization	US$ 2.0mil.
Total Estimated Cost	US$ 2.0mil.

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Execution	2018	2018
3. Commissioning	2019	-

Expected Output

- Systematically categorized data for both coastal and inland vessels to understand the current situation
- Good analysis of current data to consider future development plan.

Action Plan

- Technical assistance for vessel categorization

Necessity of Technical Assistance

- Vessel Categorization

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LGP-21
Project Title	Enhancement of Captains and Helmsmen Education System
Executing Agency	DMA and IWT
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To develop the capacity of captains and helmsmen and their skills
2. To make a significant contribution to the maritime sector and economic development in the whole of Myanmar
3. To recruit educated captains for national development strategy and inland water transport improvement

Rationale

1. Only few training and seminars for captains and helmsmen can be provided nowadays.
2. The training facilities are also insufficient.
3. Most of the helmsmen working for inland water transport are not well-trained and they use their own traditional methods and experiences in operating the vessels.
4. Matters regarding issuing the competency certificates for the masters and engine drivers who will serve at the passenger and cargo vessels of inland water are described under the Inland Vessel Law.

Location and Project Plan (Outline)

Source: IWT
Figure: Pilot Operation of Cherry 1, 2 & 3

Source: Unique Marine Training Center Website
(The training facilities are not enough)
Figure: A DMA-Approved Training

Input	Estimated Cost (US$ million)
- Technical Assistance (Training and Seminars)	US$ 2.0mil.
- Training Facilities	US$ 1.0mil.
Total Estimated Cost	US$ 3.0mil.

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Technical Assistance	2018	2018

Result of Evaluation

Expected Output

- Skillful captains for inland water transport
- Inland water transport will become more safe and convenient

Action Plan

- Training and seminars for ship operations and safety

Necessity of Technical Assistance

- Trainers from maritime background
- Training Facilities

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LGP-22
Project Title	Improvement of Bonded Transport
Executing Agency	Custom Department
Relevant Ministry	MOTC, Ministry of Trade, Ministry of Finance

Outline of the Project

Objectives

1. To find the best way to coordinate the logistics system to save time and cost
2. To provide seamless and efficient movement of cargos between one transport mode to another
3. To reduce the number of custom clearance steps in cargo transport.
4. To reduce transport time and cost so that the unit price of cargoes becomes lower
5. To provide efficient and smooth custom procedures for bonded transport operators

Rationale

1. Myanmar is in a geographically strategic position to greatly benefit both South Asia and Southeast Asia.
2. Most transport routes often require the use of several different modes of transport.
3. Major coastal and inland ports shall become the logistic hubs and handle the transshipment of cargoes in future.
4. Custom processes in Myanmar are complicated and take a long time.
5. It takes time for custom clearing cargoes at the transit ports unless the cargos are bonded transported, so that the unit price of the cargo become higher.
6. Bonded transport should be introduced to reduce transport time and cost.

Location and Project Plan (Outline)

Source: JICA Study Team
Figure: Inland/ Oversea Container Vessel

Input	Estimated Cost (US$ million)
- Technical Assistance (Custom Clearance)	US$ 1.0mil.
- Buildings (administration building, bonded warehouse and custom office)	US$ 2.0mil.
- Pilot Project	US$ 1.0mil.
Total Estimated Cost	US$ 4.0mil.

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Feasibility Study	2018	2018
3. Funding Arrangement	2019	2019
4. Pilot Project	2020	2020
4. Execution	2020	2021
5. Commissioning	2021	-

Expected Output

- Easier and more convenient transit of cargo from one mode of transport to another
- Efficient custom clearance system
- Reduced transport time and cost

Action Plan

- Technical assistant in custom procedure
- Pilot project shall be done

Necessity of Technical Assistance

- Technical assistance in custom procedures

Remarks

(2) HARD COMPONENTS

Project Profile

Sub-Sector	Logistics
Reference No.	LLP-01
Project Title	Expansion and Improvement of Existing Yangon Truck Terminal
Executing Agency	MOTC, Yangon Regional Government
Relevant ministries	Yangon City Development Committee, Forwarder Association, Truck Association

Outline of the Project

Objectives	Location or project plan
1. Aimed at truck terminal development focusing on Yangon municipal area delivery, the current terminal lags far behind international standards. 2. A lacking of parking area is significant	Western part of existing truck terminal at Baying Naung Truck Terminal
Rational	
1. Current small size of the terminal is already at full capacity and there is no more room for future cargo handling expansion. 2. High truck turn-around time can be lowered thereby achieve a transport cost reduction, as idle times can be reduced. 3. Developing a terminal facility attribute to a reduction of dwell time, through expanded parking lots, provision of loading/unloading facilities and speedy operations (mechanical cargo handling). These actions are beneficial for increasing truck turn-around ratio, resulting in increased business opportunities and reductions of cost.	Image of Existing Truck Terminal 

Input	Estimated Cost (US$ million)
1.Parking lot	US$ 6.0 mil.
2.Warehouse (incl. loading and unloading space)	US$ 10.0 mil.
3.Management office	US$ 1.0 mil.
Total	US$ 17.0 mil.

Schedule

Calendar year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2018	2019
3. Funding Arrangement	2019	2020
4. Execution	2021	2022
5. Commissioning	2022	-

Expected output		Action plan
1. JIT delivery 2. Inventory control 3. Speedy delivery 4. Customer satisfaction 5. Elimination of opportunity for losses 6. Improvement of driver work conditions	Shorten truck dwell times from 27 hours to 6 hours	1. Infrastructure should be developed and provided by public investment 2. Common parking area to be provided 3. Warehouses should be leased to private operators. 4. A feasibility study is needed to determine the size and scale of facilities in detail

Necessity on Technical Assistance

1. Technical and financial viability analysis
2. Design of truck terminal facility including access road
3. Introduction and training on warehouse operations

Remark

The Truck association and the highway transport association have already started a discussion with Yangon Municipal Authority for expansion of parking lot.

Expected Key Potential Impact and Mitigation Measures for Target Project

Project –Expansion and Improvement of Existing Yangon Truck Terminal Project	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< Construction Phase > • Deterioration of air quality due to particulate matter such as dust and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling within the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< Operation Phase > • Noise and vibration due to activities of trucks	• Appropriate maintenance of trucks
• Wastewater generated from heavy cleaning, workshops and maintenance activities	• Installation of wastewater treatment system • Reuse of treated water by removal of suspended solids, oil and grease, organic matter and neutralization of pH through waste water treatment plant
Natural Environment	
< Construction Phase > • Effect on flora near construction area in case of accidental back filling	• Avoidance of accidental back filling
< Operation Phase > • Impact to local drainage due to accidental oil spill	• Avoidance of accidental oil spill • Provision of adequate drains to accommodate increased run-off
Social Environment	
<Construction Phase > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE
< Operation Phase > • Possible to occur the traffic accidents	• Provision of detour with adequate sign board and instruction • Provision of speed limit

Project Profile

<table>
<tr><td>Sub-Sector</td><td colspan="4">Logistics</td></tr>
<tr><td>Reference No.</td><td colspan="4">LLP-02</td></tr>
<tr><td>Project Title</td><td colspan="4">Establishment of New Yangon Truck Terminal at Ywatagyi</td></tr>
<tr><td>Executing Agency</td><td colspan="4">MOTC, Yangon Regional Government</td></tr>
<tr><td>Relevant ministries</td><td colspan="4">Yangon City Development Committee, Truck Association</td></tr>
<tr><td colspan="5">Outline of the Project</td></tr>
<tr><td colspan="3">Objectives</td><td colspan="2">Location or project plan</td></tr>
<tr><td colspan="3">1. Aimed at truck terminal development focusing on Yangon municipal area delivery, the current terminal lags far behind World standards.
2. Concerned parties already agreed to establish a new terminal which should meet with global standards (according to the highway transport association)</td><td colspan="2" rowspan="2">Several terminals (at least two) seem necessary at the following locations in consideration of the size of Yangon City.
-Beside Ywathargyi Railway ICD at a crossing point with the Yangon Outer Ring Urban Highway</td></tr>
<tr><td colspan="3">Rational</td></tr>
<tr><td colspan="3">1. Current small size of the terminal is already at full capacity and there is no more room for future cargo handling expansion.
2. High truck turn-around time can be lowered thereby achieve a transport cost reduction, as idle times can be reduced.
3. Developing a terminal facility attribute to a reduction of dwell time, through expanded parking lots, provision of loading/unloading facilities and speedy operations (mechanical cargo handling). These actions are beneficial for increasing truck turn-around ratio, resulting in increased business opportunities and reductions of cost.</td><td colspan="2">Image of New Truck Terminal
  </td></tr>
<tr><td>Input</td><td>Estimated Cost (US$ million)</td><td colspan="3">Schedule</td></tr>
<tr><td rowspan="2">1.Parking lot
2.Warehouse (incl. loading and unloading space）
3.Management office</td><td rowspan="2">US$ 13.0mil.
US$ 30.0mil.
US$ 3.0mil.</td><td>Calendar year</td><td>Start</td><td>End</td></tr>
<tr><td colspan="3"><table>
<tr><td>1. Preparation</td><td>2018</td><td>2018</td></tr>
<tr><td>2. Feasibility Study</td><td>2018</td><td>2019</td></tr>
<tr><td>3. Funding Arrangement</td><td>2019</td><td>2020</td></tr>
<tr><td>4. Execution</td><td>2021</td><td>2022</td></tr>
<tr><td>5. Commissioning</td><td>2022</td><td>-</td></tr>
<tr><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Total</td><td>US$ 46.0mil.</td><td colspan="3"></td></tr>
<tr><td colspan="2">Expected output</td><td colspan="3">Action plan</td></tr>
<tr><td colspan="2">1. JIT delivery
2. Inventory control
3. Speedy delivery
4. Customer satisfaction
5. Elimination of opportunity for losses
6. Improvement of driver work conditions</td><td>Shorten truck dwell times from 27 hours to 6 hours</td><td colspan="2">1. Infrastructure should be developed and provided by public investment
2. Warehouses should be leased to private operators.
3. A feasibility study is needed to determine the size and scale of facilities in detail</td></tr>
<tr><td colspan="5">Necessity on Technical Assistance</td></tr>
<tr><td colspan="5">1. Technical and financial viability analysis
2. Design of truck terminal facility including access road
3. Introduction and training on warehouse operations</td></tr>
<tr><td colspan="5">Remark:
The Truck association and the highway transport association have already started a discussion with Yangon Municipal Authority for new truck terminal.</td></tr>
</table>

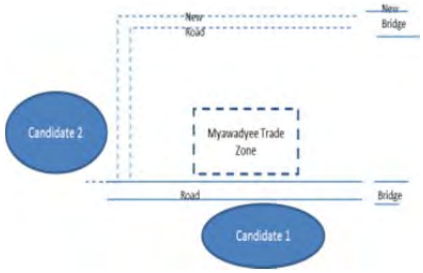
Expected Key Potential Impact and Mitigation Measures for Target Project

Project – Establishment of New Yangon Truck Terminal Project at Ywatagyi	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< Construction Phase > • Deterioration of air quality due to particulate matter such as dust and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling within the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< Operation Phase > • Noise and vibration due to activities of trucks	• Appropriate maintenance of trucks
• Wastewater generated from heavy cleaning, workshops and maintenance activities	• Installation of wastewater treatment system • Reuse of treated water by removal of suspended solids, oil and grease, organic matter and neutralization of pH through waste water treatment plant
Natural Environment	
< Construction Phase > • Effect on flora near construction area in case of accidental back filling	• Avoidance of accidental back filling
< Operation Phase > • Impact to local drainage due to accidental oil spill	• Avoidance of accidental oil spill • Provision of adequate drains to accommodate increased run-off
Social Environment	
<Construction Phase > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE
< Operation Phase > • Possible to occur the traffic accidents	• Provision of detour with adequate sign board and instruction • Provision of speed limit

Project Profile

Sub-Sector	Logistics
Reference No.	LLP-03
Project Title	Container Switching Station Development at Myawaddy Trade Zone
Executing Agency	Customs, MOC, Chamber of commerce
Relevant Ministry	MOTC,

Outline of the Project

Objectives	Location or project plan
1. Development for a container switching yard to achieve a faster transshipment (trans-loading) operation connecting Myanmar and Thailand. 2. The narrow Kawkareik mountain road and bridge constraints were removed to make it possible for full-loaded container transport.	・2 locations are candidates locations: 
Rationale	**Project plan**
1. Mountain road development and new bridges enables full loaded container (40) transport. Currently, transshipment operations are carried out manually. 2. ASEAN standards already involve containers in practice, which can provide benefits in operational time reduction as well as a decrease in cargo damages. As a result, the truck turn-around ratio will increase and lead to cost reductions 3. In addition to hardware aspects, it is necessary to consider the way to organize service providers	 Container switching practice (image)

Input	Estimated cost (US$ million)	Schedule	Start	End
1. Land preparation（4,000M2）	US$ 4.0mil.	Calendar year		
2. Parking lot	US$ 2.5mil.	1. Preparation	2016	2017
3. Empty van storage(2.000M3)	US$ 2.0mil.	2. Feasibility study	2016	2017
4. CIQ	US$ 1.5mil.	3.Funding arrangement	2017	2018
5.Reach stacker/mobile hydraulic crane	US$ 3.0mil.	4. Execution	2018	2019
3.Empty container handling equipment	US$ 2.0mil.	5.Commissioning	2019	-
4.Wrokshop	US$ 1.0mil.			
5.Warehouse	US$ 2.0mil.			
Total Expected cost	US$ 18.0mil.			

Expected output		Action plan
1. Shorten truck dwell times 2. Reduction of transshipment costs 1. Ensure safety of cargoes	Shorten dwell time from 10 hours to 2 hours	1. Feasibility study is needed to determine the size and scale of facilities in detail 2. Formulating operator organization strategy

Necessity of Technical assistance
Training on the operation of reach stackers Training on control and management of empty containers/chassis
Remark
1. Participation of forwarders association, chamber of commerce, etc. are indispensable

Expected Key Potential Impact and Mitigation Measures for Target Project

Project – Container Switching Station Development at Myawaddy Trade Zone	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< *Construction Phase* > • Deterioration of air quality due to particulate matter such as dust and gaseous emissions from construction equipment and vehicular traffic	• • Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling within the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< *Operation Phase* > • Noise and vibration due to activities of trucks	• Appropriate maintenance of trucks
• Wastewater generated from heavy cleaning, workshops and maintenance activities	• Installation of wastewater treatment system • Reuse of treated water by removal of suspended solids, oil and grease, organic matter and neutralization of pH through waste water treatment plant
Natural Environment	
< *Construction Phase* > • Effect on flora near construction area in case of accidental back filling	• Avoidance of accidental back filling
< *Operation Phase* > • Impact to local drainage due to accidental oil spill	• Avoidance of accidental oil spill • Provision of adequate drains to accommodate increased run-off
Social Environment	
<*Construction Phase* > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE
< *Operation Phase* > • Possible to occur the traffic accidents	• Provision of detour with adequate sign board and instruction • Provision of speed limit

Project Profile

Sub-Sector	Logistics
Reference No.	LLP-04
Project Title	Cross-border Trade Facility coupled with Container Switching Yard at Three Pagoda Pass
Executing Agency	MOTC, Customs
Relevant ministries	MOTC, Customs

Outline of the Project

Objectives	Location or project plan
1. Establishment of container switching practice is needed to achieve faster transshipment operations connecting Myanmar and Thailand.	Three Pagoda Pass on Myanmar's border with Thailand
Rationale	**Project plan**
1. Three pagoda route will be a short-cut route for Bangkok/Yangon, involving the highest potential for providing the fastest service. 2. In order to realize this advantage, it is necessary to provide a smooth cargo transshipment system as well as roads development. (Container switching system as at other ASEAN borders)	 Container switching practice (image)

Input	Estimated Cost (US$ million)
1. Land preparation（5,000M2）	US$ 5.0mil.
2. Parking lot	US$ 4.5mil.
3. Empty van storage(4.000M2)	US$ 4.0mil.
4. CIQ	US$ 1.5mil.
5. Reach stacker/mobile hydraulic crane	US$ 4.5mil.
3. Empty container handling equipment	US$ 3.0mil.
4. Wrokshop	US$ 2.0mil.
5. Small warehouse	US$ 2.0mil.
	US$ 26.5mil.

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2018	2019
3. Funding Arrangement	2019	2019
4. Execution	2020	2025
5. Commissioning	2026	

Result of Evaluation		
Expected Output		**Action Plan**
1. Shorten truck dwell 1. times 2. Reduction of transport costs	1. Target: 2hrs 2. 30 % less than the transport costs incurred on the Myawaddy route	1. Collaboration with road development between the Myanmar and Thai parties 2. Feasibility study is needed to determine the size and scale of facilities in detail 3. Formulating operator organization strategy

Necessity of Technical assistance
Training on operations of reach stackers Training on control and management of empty containers/chassis
Remarks
1. Participation of forwarders association, chamber of commerce, etc. are indispensable

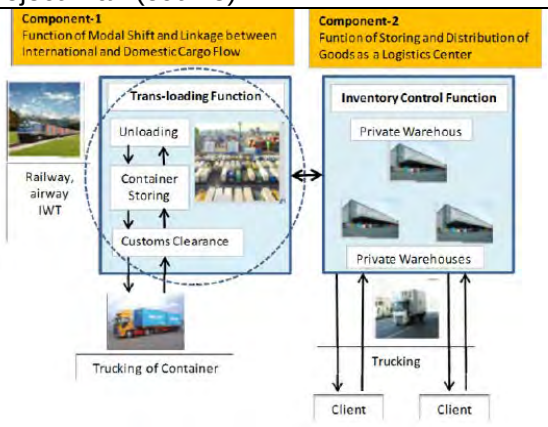
Expected Key Potential Impact and Mitigation Measures for Target Project

Project – Cross-border Trade Facility coupled with Container Switching Yard at Three Pagoda Pass	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< Construction Phase > • Deterioration of air quality due to particulate matter such as dust and gaseous emissions from construction equipment and vehicular traffic	• • Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling within the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< Operation Phase > • Noise and vibration due to activities of trucks	• Appropriate maintenance of trucks
• Wastewater generated from heavy cleaning, workshops and maintenance activities	• Installation of wastewater treatment system • Reuse of treated water by removal of suspended solids, oil and grease, organic matter and neutralization of pH through waste water treatment plant
Natural Environment	
< Construction Phase > • Effect on flora near construction area in case of accidental back filling	• Avoidance of accidental back filling
< Operation Phase > • Impact to local drainage due to accidental oil spill	• Avoidance of accidental oil spill • Provision of adequate drains to accommodate increased run-off
Social Environment	
<Construction Phase > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE
< Operation Phase > • Possible to occur the traffic accidents	• Provision of detour with adequate sign board and instruction • Provision of speed limit

Project Profile

Sub-Sector	Logistics
Reference No.	LLP-05
Project Title	Establishment of Yangon Multi-modal Logistics Complex
Executing Agency	MOTC, YCDC
Relevant ministries	Myanmar Railway, MOC, YCDC

Outline of the Project

Objectives	Location of project
Providing comprehensive logistics service through the logistics hub	Connecting point for 1) expressway(Mandalay/Yangon)、2) Yangon Urban Outer Ring, 3) New Yangon Truck Terminal and 4) new industrial areas
Rational	**Project Plan (outline)**
1. Yangon Multi-modal Logistics Complex is planned to be established adjacent to the New Yangon Truck Terminal and Ywathagy ICD to undertake logistics services for international cargoes, international transit cargoes and domestic cargoes. . 2. Multi-modal logistics hub can be benefit for Logistics performance, including reduction of cost.	 Image of logistics hub

Input	Estimated Cost (US$ million)
1. Truck pool	US$ 15.0mil.
2. Warehouses (incl. loading/unloading facilities)	US$ 45.0mil.
3. Rail siding	US$ 5.0mil.
Total estimated cost	US$ 65.0mil.

Schedule		
Calendar year	Start	End
1. Preparation	2020	2021
2. Feasibility Study	2021	2022
3. Funding Arrangement	2023	2023
4. Execution	2024	2028
5. Commissioning	2029	2030
		-

Expected output	Action plan
1. Reinforcement of collaboration amongst different transport modes 2. Enforcement of empty van pool, customs clearance, (bonded) storage, delivery, transshipment, resulting in a comprehensive logistics service 3. Promotion of investment for manufacturing sectors in this area	1. Determination of project site 2. Determination of project executing agency 3. Feasibility study is needed to determine the size and scale of facilities in detail 4. Selection of qualified developer and operators

Necessity of Technical Assistance

1. Technical and financial feasibility study
2. Inventory management system installation
3. Truck movement/parking management

Remark

Warehouse facility is leased not only to logistics providers but also to other businesses including manufacturing, wholesalers and retailers

Expected Key Potential Impact and Mitigation Measures for Target Project

Project – Establishment of Yangon Multi-modal Logistics Complex	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< Construction Phase > • Deterioration of air quality due to particulate matter such as dust and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling within the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< Operation Phase > • Noise and vibration due to activities of trucks and machines	• Appropriate maintenance of trucks and machines
• Wastewater generated from heavy cleaning, workshops and maintenance activities	• Installation of wastewater treatment system • Reuse of treated water by removal of suspended solids, oil and grease, organic matter and neutralization of pH through waste water treatment plant
Natural Environment	
< Construction Phase > • Effect on flora near construction area in case of accidental back filling	• Avoidance of accidental back filling
< Operation Phase > • Impact to local drainage due to accidental oil spill	• Avoidance of accidental oil spill • Provision of adequate drains to accommodate increased run-off
Social Environment	
<Construction Phase > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE
< Operation Phase > • Possible to occur the traffic accidents	• Provision of detour with adequate sign board and instruction • Provision of speed limit

Project Profile

Sub-Sector	Logistics
Reference No.	LLP-06
Project Title	City Truck Terminal Development Project (Bago)
Executing Agency	MOTC, Each municipal
Relevant ministries	Municipal development committee, truck association

Outline of the Project

Objectives	Location or project plan
1. It is aimed truck terminal development focusing local municipal area delivery.	Bago
Rational	**Project plan**
1. Currently, suburban logistics standard is poor, Enlargement of delivery lot/size is most basic way to reduce the transport cost even transship cost is necessary, thus smooth transshipment from/to large sized truck is key issue, especially for agriculture, construction goods. 2. The warehouse is also indispensable to realize full-load truck delivery. So collaboration of truck and warehouse is necessary for large size truck operation.	Even for local areas, the development of a regional truck terminal is essential. These facilities should focus on the linkage between the connection Yangon/Mandalay and regional as well as municipal/inter-regional delivery. Along with the development of inventory function, regional economy can enjoy smooth, speedy and JIT time basis cargo delivery.

Input	Estimated Cost (US$ million)
1. Parking lot	US$ 3.0mil.
2. Warehouse (incl. loading and unloading space)	US$ 3.0mil.
3. Management office	US$ 1.0mil.
Total	US$ 7.0.mil

Schedule

Calendar year	Start	End
1. Preparation	2018	2019
2. Feasibility Study	2020	2021
3. Funding Arrangement	2020	2022
4. Execution	2022	2024
5. Commissioning	2024	2025

Expected output		Action plan
1. JIT delivery 2. Inventory control 3. Speedy delivery 4. Customer satisfaction 5. Elimination on opportunity loss 6. Improvement driver's occupational condition 7. Shorten truck dwell time	Shorten dwell time from 27 hours to 6 hours	● Infrastructure is recommended to be developed and provided by public investment ● Warehouse is recommended to be leased to private operators. ● Feasibility study is needed to determine the Size and scale of facilities in details

Necessity on Technical Assistance

1. Technical and financial viability analysis
2. Design of truck terminal facility including access road
3. Introduction and training of warehouse operations

Remark

Expected Key Potential Impact and Mitigation Measures for Target Project

Project – City Truck Terminal Improvement Project (6 Cities)	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< *Construction Phase* > • Deterioration of air quality due to particulate matter such as dust and gaseous emissions from construction equipment and vehicular traffic	• • Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling within the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< *Operation Phase* > • Noise and vibration due to activities of trucks	• Appropriate maintenance of trucks
• Wastewater generated from heavy cleaning, workshops and maintenance activities	• Installation of wastewater treatment system • Reuse of treated water by removal of suspended solids, oil and grease, organic matter and neutralization of pH through waste water treatment plant
Natural Environment	
< *Construction Phase* > • Effect on flora near construction area in case of accidental back filling	• Avoidance of accidental back filling
< *Operation Phase* > • Impact to local drainage due to accidental oil spill	• Avoidance of accidental oil spill • Provision of adequate drains to accommodate increased run-off
Social Environment	
<*Construction Phase* > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE
< *Operation Phase* > • Possible to occur the traffic accidents	• Provision of detour with adequate sign board and instruction • Provision of speed limit

Project Profile

Sub-Sector	Logistics
Reference No.	LLP-07
Project Title	City Truck Terminal Development Project (Mawlamyine)
Executing Agency	MOTC, Each municipal
Relevant ministries	Municipal development committee, truck association

Outline of the Project

Objectives	Location or project plan
1. It is aimed truck terminal development focusing local municipal area delivery.	Mawlamyine
Rational	**Project plan**
3. Currently, suburban logistics standard is poor, Enlargement of delivery lot/size is most basic way to reduce the transport cost even transship cost is necessary, thus smooth transshipment from/to large sized truck is key issue, especially for agriculture, construction goods. 4. The warehouse is also indispensable to realize full-load truck delivery. So collaboration of truck and warehouse is necessary for large size truck operation.	Even for local areas, the development of a regional truck terminal is essential. These facilities should focus on the linkage between the connection Yangon/Mandalay and regional as well as municipal/inter-regional delivery. Along with the development of inventory function, regional economy can enjoy smooth, speedy and JIT time basis cargo delivery.

Input	Estimated Cost (US$ million)
1. Parking lot	US$ 3.0mil.
2. Warehouse (incl. loading and unloading space)	US$ 3.0mil.
3. Management office	US$ 1.0mil.
Total	US$ 7.0.mil

Schedule

Calendar year	Start	End
1. Preparation	2018	2019
2. Feasibility Study	2020	2021
3. Funding Arrangement	2020	2022
4. Execution	2022	2024
5. Commissioning	2024	2025

Expected output		Action plan
1. JIT delivery 2. Inventory control 3. Speedy delivery 4. Customer satisfaction 5. Elimination on opportunity loss 6. Improvement driver's occupational condition 7. Shorten truck dwell time	Shorten dwell time from 27 hours to 6 hours	● Infrastructure is recommended to be developed and provided by public investment ● Warehouse is recommended to be leased to private operators. ● Feasibility study is needed to determine the Size and scale of facilities in details

Necessity on Technical Assistance

1. Technical and financial viability analysis
2. Design of truck terminal facility including access road
3. Introduction and training of warehouse operations

Remark

Project Profile

Sub-Sector	Logistics			
Reference No.	LLP-08			
Project Title	City Truck Terminal Development Project (Dawei)			
Executing Agency	MOTC, Each municipal			
Relevant ministries	Municipal development committee, truck association			
Outline of the Project				
Objectives		Location or project plan		
1. It is aimed truck terminal development focusing local municipal area delivery.		Dawei		
Rational		Project plan		
5. Currently, suburban logistics standard is poor, Enlargement of delivery lot/size is most basic way to reduce the transport cost even transship cost is necessary, thus smooth transshipment from/to large sized truck is key issue, especially for agriculture, construction goods. 6. The warehouse is also indispensable to realize full-load truck delivery. So collaboration of truck and warehouse is necessary for large size truck operation.		Even for local areas, the development of a regional truck terminal is essential. These facilities should focus on the linkage between the connection Yangon/Mandalay and regional as well as municipal/inter-regional delivery. Along with the development of inventory function, regional economy can enjoy smooth, speedy and JIT time basis cargo delivery.		
Input	Estimated Cost (US$ million)	Schedule		
1. Parking lot 2. Warehouse (incl. loading and unloading space) 3. Management office	US$ 3.0mil. US$ 3.0mil. US$ 1.0mil.	Calendar year	Start	End
		1. Preparation	2018	2019
		2. Feasibility Study	2020	2021
		3. Funding Arrangement	2020	2022
		4. Execution	2022	2024
		5. Commissioning	2024	2025
Total	US$ 7.0.mil			
Expected output		Action plan		
1. JIT delivery 2. Inventory control 3. Speedy delivery 4. Customer satisfaction 5. Elimination on opportunity loss 6. Improvement driver's occupational condition 7. Shorten truck dwell time	Shorten dwell time from 27 hours to 6 hours	● Infrastructure is recommended to be developed and provided by public investment ● Warehouse is recommended to be leased to private operators. ● Feasibility study is needed to determine the Size and scale of facilities in details		
Necessity on Technical Assistance				
1. Technical and financial viability analysis 2. Design of truck terminal facility including access road 3. Introduction and training of warehouse operations				
Remark				

Project Profile

Sub-Sector	Logistics
Reference No.	LLP-09
Project Title	City Truck Terminal Development Project (Magway)
Executing Agency	MOTC, Each municipal
Relevant ministries	Municipal development committee, truck association

Outline of the Project

Objectives	Location or project plan
1. It is aimed truck terminal development focusing local municipal area delivery.	Magway, south of the city close to Magway railway station as well as a potential site for river port development
Rational	**Project plan**
7. Currently, suburban logistics standard is poor, Enlargement of delivery lot/size is most basic way to reduce the transport cost even transship cost is necessary, thus smooth transshipment from/to large sized truck is key issue, especially for agriculture, construction goods. 8. The warehouse is also indispensable to realize full-load truck delivery. So collaboration of truck and warehouse is necessary for large size truck operation.	Even for local areas, the development of a regional truck terminal is essential. These facilities should focus on the linkage between the connection Yangon/Mandalay and regional as well as municipal/inter-regional delivery. Along with the development of inventory function, regional economy can enjoy smooth, speedy and JIT time basis cargo delivery.

Input	Estimated Cost (US$ million)	Schedule		
1. Parking lot	US$ 3.0mil.	Calendar year	Start	End
2. Warehouse (incl. loading and unloading space)	US$ 3.0mil.	1. Preparation	2018	2019
		2. Feasibility Study	2020	2021
3. Management office	US$ 1.0mil.	3. Funding Arrangement	2020	2022
		4. Execution	2022	2024
		5. Commissioning	2024	2025
Total	US$ 7.0.mil			

Expected output		Action plan
1. JIT delivery 2. Inventory control 3. Speedy delivery 4. Customer satisfaction 5. Elimination on opportunity loss 6. Improvement driver's occupational condition 7. Shorten truck dwell time	Shorten dwell time from 27 hours to 6 hours	● Infrastructure is recommended to be developed and provided by public investment ● Warehouse is recommended to be leased to private operators. ● Feasibility study is needed to determine the Size and scale of facilities in details

Necessity on Technical Assistance

1. Technical and financial viability analysis
2. Design of truck terminal facility including access road
3. Introduction and training of warehouse operations

Remark

Project Profile

<table>
<tr><td>Sub-Sector</td><td colspan="5">Logistics</td></tr>
<tr><td>Reference No.</td><td colspan="5">LLP-10</td></tr>
<tr><td>Project Title</td><td colspan="5">City Truck Terminal Development Project (Pyay)</td></tr>
<tr><td>Executing Agency</td><td colspan="5">MOTC, Each municipal</td></tr>
<tr><td>Relevant ministries</td><td colspan="5">Municipal development committee, truck association</td></tr>
<tr><td colspan="6">Outline of the Project</td></tr>
<tr><td colspan="3">Objectives</td><td colspan="3">Location or project plan</td></tr>
<tr><td colspan="3">1. It is aimed truck terminal development focusing local municipal area delivery.</td><td colspan="3">Pyay, close to Pyay railway station as well as a potential site for the river port development.</td></tr>
<tr><td colspan="3">Rational</td><td colspan="3">Project plan</td></tr>
<tr><td colspan="3">9. Currently, suburban logistics standard is poor, Enlargement of delivery lot/size is most basic way to reduce the transport cost even transship cost is necessary, thus smooth transshipment from/to large sized truck is key issue, especially for agriculture, construction goods.
10. The warehouse is also indispensable to realize full-load truck delivery. So collaboration of truck and warehouse is necessary for large size truck operation.</td><td colspan="3">Even for local areas, the development of a regional truck terminal is essential. These facilities should focus on the linkage between the connection Yangon/Mandalay and regional as well as municipal/inter-regional delivery. Along with the development of inventory function, regional economy can enjoy smooth, speedy and JIT time basis cargo delivery.</td></tr>
<tr><td colspan="2">Input</td><td>Estimated Cost (US$ million)</td><td colspan="3">Schedule</td></tr>
<tr><td colspan="2" rowspan="5">1. Parking lot
2. Warehouse (incl. loading and unloading space)
3. Management office</td><td rowspan="5">US$ 3.0mil.
US$ 3.0mil.

US$ 1.0mil.</td><td>Calendar year</td><td>Start</td><td>End</td></tr>
<tr><td>1. Preparation</td><td>2018</td><td>2019</td></tr>
<tr><td>2. Feasibility Study</td><td>2020</td><td>2021</td></tr>
<tr><td>3. Funding Arrangement</td><td>2020</td><td>2022</td></tr>
<tr><td>4. Execution</td><td>2022</td><td>2024</td></tr>
<tr><td colspan="2">Total</td><td>US$ 7.0.mil</td><td>5. Commissioning</td><td>2024</td><td>2025</td></tr>
<tr><td colspan="3">Expected output</td><td colspan="3">Action plan</td></tr>
<tr><td colspan="2">1. JIT delivery
2. Inventory control
3. Speedy delivery
4. Customer satisfaction
5. Elimination on opportunity loss
6. Improvement driver’s occupational condition
7. Shorten truck dwell time</td><td>Shorten dwell time from 27 hours to 6 hours</td><td colspan="3">● Infrastructure is recommended to be developed and provided by public investment
● Warehouse is recommended to be leased to private operators.
● Feasibility study is needed to determine the Size and scale of facilities in details</td></tr>
<tr><td colspan="6">Necessity on Technical Assistance</td></tr>
<tr><td colspan="6">1. Technical and financial viability analysis
2. Design of truck terminal facility including access road
3. Introduction and training of warehouse operations</td></tr>
<tr><td colspan="6">Remark</td></tr>
</table>

Project Profile

Sub-Sector	Logistics			
Reference No.	LLP-11			
Project Title	City Truck Terminal Development Project (Taungyi)			
Executing Agency	MOTC, Each municipal			
Relevant ministries	Municipal development committee, truck association			
Outline of the Project				
Objectives		Location or project plan		
1. It is aimed truck terminal development focusing local municipal area delivery.		Taungyi or Heho		
Rational		Project plan		
11. Currently, suburban logistics standard is poor, Enlargement of delivery lot/size is most basic way to reduce the transport cost even transship cost is necessary, thus smooth transshipment from/to large sized truck is key issue, especially for agriculture, construction goods. 12. The warehouse is also indispensable to realize full-load truck delivery. So collaboration of truck and warehouse is necessary for large size truck operation.		Even for local areas, the development of a regional truck terminal is essential. These facilities should focus on the linkage between the connection Yangon/Mandalay and regional as well as municipal/inter-regional delivery. Along with the development of inventory function, regional economy can enjoy smooth, speedy and JIT time basis cargo delivery.		
Input	Estimated Cost (US$ million)	Schedule		
1. Parking lot 2. Warehouse (incl. loading and unloading space) 3. Management office	US$ 3.0mil. US$ 3.0mil. US$ 1.0mil.	Calendar year	Start	End
		1. Preparation	2018	2019
		2. Feasibility Study	2020	2021
		3. Funding Arrangement	2020	2022
		4. Execution	2022	2024
		5. Commissioning	2024	2025
Total	US$ 7.0.mil			
Expected output		Action plan		
1. JIT delivery 2. Inventory control 3. Speedy delivery 4. Customer satisfaction 5. Elimination on opportunity loss 6. Improvement driver's occupational condition 7. Shorten truck dwell time	Shorten dwell time from 27 hours to 6 hours	● Infrastructure is recommended to be developed and provided by public investment ● Warehouse is recommended to be leased to private operators. ● Feasibility study is needed to determine the Size and scale of facilities in details		
Necessity on Technical Assistance				
1. Technical and financial viability analysis 2. Design of truck terminal facility including access road 3. Introduction and training of warehouse operations				
Remark				

Project Profile

<table>
<tr><td>Sub-Sector</td><td colspan="5">Logistics</td></tr>
<tr><td>Reference No.</td><td colspan="5">LLP-12</td></tr>
<tr><td>Project Title</td><td colspan="5">City Truck Terminal Development Project (Pathein)</td></tr>
<tr><td>Executing Agency</td><td colspan="5">MOTC, Each municipal</td></tr>
<tr><td>Relevant ministries</td><td colspan="5">Municipal development committee, truck association</td></tr>
<tr><td colspan="6">Outline of the Project</td></tr>
<tr><td colspan="3">Objectives</td><td colspan="3">Location or project plan</td></tr>
<tr><td colspan="3">1. It is aimed truck terminal development focusing local municipal area delivery.</td><td colspan="3">Pathein close to the existing Pathein river port</td></tr>
<tr><td colspan="3">Rational</td><td colspan="3">Project plan</td></tr>
<tr><td colspan="3">13. Currently, suburban logistics standard is poor, Enlargement of delivery lot/size is most basic way to reduce the transport cost even transship cost is necessary, thus smooth transshipment from/to large sized truck is key issue, especially for agriculture, construction goods.
14. The warehouse is also indispensable to realize full-load truck delivery. So collaboration of truck and warehouse is necessary for large size truck operation.</td><td colspan="3">Even for local areas, the development of a regional truck terminal is essential. These facilities should focus on the linkage between the connection Yangon/Mandalay and regional as well as municipal/inter-regional delivery. Along with the development of inventory function, regional economy can enjoy smooth, speedy and JIT time basis cargo delivery.</td></tr>
<tr><td colspan="2">Input</td><td>Estimated Cost (US$ million)</td><td colspan="3">Schedule</td></tr>
<tr><td colspan="2" rowspan="6">1. Parking lot
2. Warehouse (incl. loading and unloading space)
3. Management office</td><td rowspan="6">US$ 3.0mil.
US$ 3.0mil.

US$ 1.0mil.</td><td>Calendar year</td><td>Start</td><td>End</td></tr>
<tr><td>1. Preparation</td><td>2018</td><td>2019</td></tr>
<tr><td>2. Feasibility Study</td><td>2020</td><td>2021</td></tr>
<tr><td>3. Funding Arrangement</td><td>2020</td><td>2022</td></tr>
<tr><td>4. Execution</td><td>2022</td><td>2024</td></tr>
<tr><td>5. Commissioning</td><td>2024</td><td>2025</td></tr>
<tr><td colspan="2">Total</td><td>US$ 7.0.mil</td><td colspan="3"></td></tr>
<tr><td colspan="3">Expected output</td><td colspan="3">Action plan</td></tr>
<tr><td colspan="2">1. JIT delivery
2. Inventory control
3. Speedy delivery
4. Customer satisfaction
5. Elimination on opportunity loss
6. Improvement driver’s occupational condition
7. Shorten truck dwell time</td><td>Shorten dwell time from 27 hours to 6 hours</td><td colspan="3">● Infrastructure is recommended to be developed and provided by public investment
● Warehouse is recommended to be leased to private operators.
● Feasibility study is needed to determine the Size and scale of facilities in details</td></tr>
<tr><td colspan="6">Necessity on Technical Assistance</td></tr>
<tr><td colspan="6">1. Technical and financial viability analysis
2. Design of truck terminal facility including access road
3. Introduction and training of warehouse operations</td></tr>
<tr><td colspan="6">Remark</td></tr>
</table>

Project Profile

Sub-Sector	Logistics
Reference No.	LLP-13
Project Title	Establishment of Mandalay Multi-modal Logistics Complex
Executing Agency	MOTC, MOC, MCDC
Relevant ministries	Mandalay City Development Committee, Mandalay truck association

Outline of the Project

Objectives

1. Aimed at truck terminal development focusing on Mandalay and the northern part of Myanmar. The situation at the Mandalay terminal is better than at Yangon, where a relatively large warehouse is already equipped. Even at the Mandalay terminal, the following are observed: poor parking lots, loading/unloading spaces, storage spaces and inferior cargo handling operations.
2. The Mandalay truck terminal development focuses not only on a truck terminal function but also on intermodal transport, warehouse management, empty container functions

Rationale

1. Development of truck terminal and warehouse can lead to transport cost reductions and provide higher inventory service, better working environment development. The short truck turn-around time leads to transport cost reductions.
2. It is necessary to achieve efficient connections to other modal terminals.
3. It is also important to consider the feasibility of returning empty container by rail or waterways. If possible, the empty containers can return at a lower cost.

Location or project plan

Input	Estimated Cost (US$ million)
1. Parking lots	US$ 15.0mil.
2. Warehouses (incl. loading and unloading spaces)	US$ 20.0mil.
3. Management office	US$ 5.0mil.
4. Empty container depots	US$ 5.0mil.
Total	US$ 45.0mil.

Schedule

Calendar year	Start	End
1. Preparation	2018	2019
2. Feasibility Study	2020	2021
3. Funding Arrangement	2017	2019
4. Execution	2022	2023
5. Commissioning	2024	2025

Expected output	
1. Shorten truck dwell times 2. Empty return container fees reduced	Shorten truck dwell times from 27 hours to 6 hours

Action plan

1. Infrastructure will be developed and provided by public investment
2. Warehouses are recommended to be leased to private operators.
3. Feasibility study is needed to determine the size and scale of facilities in detail

Necessity on Technical Assistance

1. Technical and financial viability analysis 2. Design of truck terminal facilities including access roads 3. Introduction and training on warehouse operations 4. Introduction and training on empty containers and inland depot operations (to connect to other transport modes)

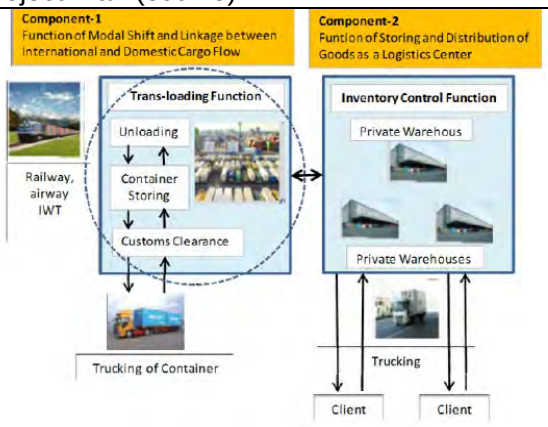
Expected Key Potential Impact and Mitigation Measures for Target Project

Project – Establishment of Mandalay Multi-modal Logistic Complex	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< Construction Phase > • Deterioration of air quality due to particulate matter such as dust and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling within the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< Operation Phase > • Noise and vibration due to activities of trucks and machines	• Appropriate maintenance of trucks and machines
• Wastewater generated from heavy cleaning, workshops and maintenance activities	• Installation of wastewater treatment system • Reuse of treated water by removal of suspended solids, oil and grease, organic matter and neutralization of pH through waste water treatment plant
Natural Environment	
< Construction Phase > • Effect on flora near construction area in case of accidental back filling	• Avoidance of accidental back filling
< Operation Phase > • Impact to local drainage due to accidental oil spill	• Avoidance of accidental oil spill • Provision of adequate drains to accommodate increased run-off
Social Environment	
<Construction Phase > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE
< Operation Phase > • Possible to occur the traffic accidents	• Provision of detour with adequate sign board and instruction • Provision of speed limit

Project Profile

Sub-Sector	Logistics
Reference No.	LLP-14
Project Title	Establishment of Bago Multi-modal Logistics Complex
Executing Agency	MOTC, Customs
Relevant ministries	Myanmar Railway

Outline of the Project

Objectives	Location or project plan
Providing comprehensive logistics service through the logistics hub	Connecting point for 1) expressway(Mandalay/Yangon)、 2)industrial area 3) New port, 4)Bangkok/Yangon route
Rational	**Project Plan (outline)**
3. Bago is at an intersection of two important corridors: Yangon-Mandalay and Yangon-Bangkok where transport routes cross each other. An Accumulation of industrial facilities is expected. 4. Multi-modal logistics hub can be benefit for Logistics performance, including reduction of cost.	 Image of logistics hub

Input	Estimated Cost (US$ million)
1.Truck pool	US$ 15.0mil.
2.Warehouses (incl. loading/unloading facilities)	US$ 45.0mil.
3.Rail siding	US$ 5.0mil.
Total estimated cost	US$ 65.0mil

Schedule	Start	End
1. Preparation	2018	2019
2. Feasibility Study	2019	2021
3. Funding Arrangement	2017	2019
4. Execution	2021	2023
5. Commissioning	2023	2025
1. Preparation	2025	-

Expected output	Action plan
1. Reinforcement of collaboration amongst different transport modes 2. Enforcement of empty van pool, customs clearance, (bonded) storage, delivery, transshipment, resulting in a comprehensive logistics service 3. Promotion of investment for manufacturing sectors in this area	● Determination of project site ● Determination of project executing agency ● Feasibility study is needed to determine the size and scale of facilities in detail

Necessity of Technical Assistance

1. Technical and financial feasibility study
2. Inventory management system installation
3. Truck movement/parking management

Remark

Warehouse facility is leased not only to logistics providers but also to other businesses including manufacturing, wholesalers and retailers

Expected Key Potential Impact and Mitigation Measures for Target Project

Project – Establishment of Bago Multi-modal Logistics Complex	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< *Construction Phase* > • Deterioration of air quality due to particulate matter such as dust and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling within the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< *Operation Phase* > • Noise and vibration due to activities of trucks and machines	• Appropriate maintenance of trucks and machines
• Wastewater generated from heavy cleaning, workshops and maintenance activities	• Installation of wastewater treatment system • Reuse of treated water by removal of suspended solids, oil and grease, organic matter and neutralization of pH through waste water treatment plant
Natural Environment	
< *Construction Phase* > • Effect on flora near construction area in case of accidental back filling	• Avoidance of accidental back filling
< *Operation Phase* > • Impact to local drainage due to accidental oil spill	• Avoidance of accidental oil spill • Provision of adequate drains to accommodate increased run-off
Social Environment	
<*Construction Phase* > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE
< *Operation Phase* > • Possible to occur the traffic accidents	• Provision of detour with adequate sign board and instruction • Provision of speed limit

Project Profile

<table>
<tr><td>Sub-Sector</td><td colspan="4">Road</td></tr>
<tr><td>Reference No.</td><td colspan="4">LRP-01</td></tr>
<tr><td>Project Title</td><td colspan="4">Yangon-Nay Pyi Taw-Mandalay Expressway (Upgrading)</td></tr>
<tr><td>Executing Agency</td><td colspan="4">Ministry of Construction</td></tr>
<tr><td>Relevant Ministry</td><td colspan="4"></td></tr>
<tr><td colspan="5">Outline of the Project</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">Location</td></tr>
<tr><td colspan="2">1. Reduce cargo transport time on the north-south corridor between Yangon and Mandalay

2. Shift heavy vehicle traffic to the expressway from the arterial road (NH-1)

3. Reduce traffic accidents on NH-1</td><td colspan="3">Yangon-Nay Pyi Taw-Mandalay Expressway (Implementation of the section 0-64km will be supported by ADB.)</td></tr>
<tr><td colspan="2">Rationale</td><td colspan="3">Project Plan (outline)</td></tr>
<tr><td colspan="2">1. Limitation of heavy vehicle use on the expressway
2. Increase of traffic accidents on NH-1 by heavy vehicles</td><td colspan="3">Section 0-64km:
- Construction of inner shoulder (1.5m) and outer shoulder (2.5m)
- AC overlay construction on the existing pavement
- Construction of a drainage system along the median
- Installation of safety facilities</td></tr>
<tr><td>Input</td><td>Estimated Cost (US$ million)</td><td colspan="3">Schedule</td></tr>
<tr><td>1. Section 0-64km:
- Improvement of the expressway
- Installation of road safety facilities
2. TA for the toll road management organization
3. Other sections</td><td>40

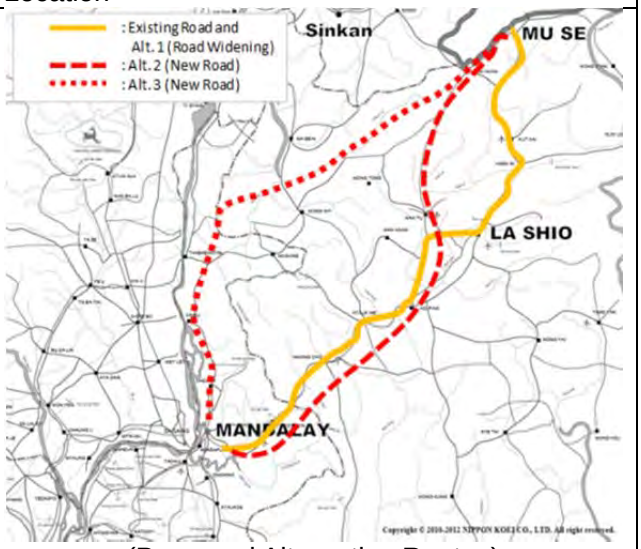
1

453</td><td colspan="3"><table><tr><td>Calendar Year</td><td>Start</td><td>End</td></tr><tr><td>1. Preparation</td><td>2018</td><td>2018</td></tr><tr><td>2. Feasibility Study</td><td>2017</td><td>2018</td></tr><tr><td>3. Funding Arrangement</td><td>2017</td><td>2018</td></tr><tr><td>4. Execution</td><td>2018</td><td>2020</td></tr><tr><td>5. Commissioning</td><td>2020</td><td>2020</td></tr></table></td></tr>
<tr><td>Total Estimated Cost</td><td>494</td><td colspan="3"></td></tr>
<tr><td colspan="2">Result of Evaluation</td><td colspan="3"></td></tr>
<tr><td colspan="2">A huge transport cost reduction attainable</td><td colspan="3"></td></tr>
<tr><td colspan="2">Expected Output</td><td colspan="3">Action Plan</td></tr>
<tr><td colspan="2">- Reduce traffic accidents on NH-1
- Reduce cargo transportation time</td><td colspan="3">Scope of works has been discussed between MOC and ADB in March 2017.</td></tr>
<tr><td colspan="5">Necessity of Technical Assistance</td></tr>
<tr><td colspan="5">It is suggested to establish an expressway (toll road) management organization such as a toll road authority. Experience of the developed country is expected to be introduced.</td></tr>
<tr><td colspan="5">Remarks</td></tr>
<tr><td colspan="5"></td></tr>
</table>

Project Profile

Sub-Sector	Road
Reference No.	LRP-02
Project Title	Alternative Route of Mandalay-Muse Road
Executing Agency	Ministry of Construction
Relevant Ministry	

Outline of the Project

Objectives	Location
1. Ensure redundancy of logistics for border trade between Myanmar and China 2. Strengthen existing Mandalay-Muse Road capacity for both cargoes and passengers 3. Reduce traffic accidents between Mandalay and Muse	 (Proposed Alternative Routes)
Rationale	Project Plan (outline)
1. Ease traffic congestion between Mandalay and Muse 2. National security enhancement by redundancy logistic route for border trade	The existing Mandalay-Lashio-Muse Road has mountainous sections with hairpin alignment and traffic volume (cargo volume) is increasing. Increase of road capacity is expected to meet future cargo transport demand.

Input	Estimated Cost (US$ million)	Schedule		
Three routes are under study by FS. Widening of the existing road or new alignment will be determined in FS. (450 km long)	664.0	Calendar Year	Start	End
		1. Preparation		
		2. Feasibility Study	2018	2019
		3. Funding Arrangement		
		4. Execution	2020	2022
		5. Commissioning		
Total Estimated Cost	664.0			

Result of Evaluation	
Reduce transport risks	
Expected Output	Action Plan
Reduce traffic congestion by heavy vehicles	- Funding arrangement (Feasibility Study in on going.)
Necessity of Technical Assistance	
Remarks In case of the widening of the existing road, the Goat Twin Viaduct will be included in the project.	

Expected Key Potential Impact and Mitigation Measures for Target Project

Project – Alternative Route of Mandalay-Muse Road	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< Construction Phase > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Disruption and loss of productive top soil from agricultural fields due to creation of borrow pits and development of detour section • Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills • Proper disposal of used bentonite slurry
< Operation Phase > • Noise and vibration due to the traffic	• Provision by speed limit
Natural Environment	
< Construction Phase > • Increased incidence and duration of floods due to obstruction of natural drainage courses by the embankment	• Provision of adequate drains along the route • Augmentation of capacity of existing drainage works • Provision of adequate drainage works for smooth passage of runoff to avoid flooding and formation of water pool
• Loss of flora due to felling of trees along the ROW	• Compensation for forest land and trees to be felled in forest area and private land • Mixed plantation consisting of flowering shrubs and evergreen ornamental trees
< Operation Phase > • Impact to local drainage due to formation of road embankment	• Provision of longitudinal drains of sufficient capacity on both sides of the car road to accommodate increased run-off.
Social Environment	
<Pre-Construction Phase > • Loss of livelihood and properties	• Compensation and assistance package will be planned in the Rehabilitation and Resettlement Plan, separately from the EIA.
<Construction Phase > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

Sub-Sector	Road
Reference No.	LRP-03
Project Title	Myota-Tada U Road
Executing Agency	Ministry of Construction
Relevant Ministry	

Outline of the Project

Objectives

1. Ensure logistics access road for the industrial zone (IZ) at Myota
2. Separation of heavy vehicle traffic from the communication road to reduce traffic accidents
3. Upgrading of airport access road (gateway road)

Location

(Proposed Road)

Rationale

1. Myota IZ is under operation without appropriate access road
2. Causeway structures constantly hinder access to IZ
3. Villages, school on the existing access road
4. Access road from the airport to the expressway shall be upgraded as an international gateway to Mandalay

Project Plan (outline)

- Construction of new alignment between Tada U and Myota IZ applying high standard design including road safety facilities (40km)
- Upgrading of the airport access road (6km)

Input	Estimated Cost (US$ million)	Schedule		
- Construction of new road to IZ - Upgrading of the airport access road	92.0	Calendar Year	Start	End
		1. Preparation		
		2. Feasibility Study	2019	2020
		3. Funding Arrangement		
		4. Execution	2021	2024
		5. Commissioning		
Total Estimated Cost	92.0			

Result of Evaluation	
Transport cost reduction attainable. Ensure all year / all-weather efficient passage of road traffic.	

Expected Output	Action Plan
- Fast and safe access to IZ International gateway	- Feasibility study shall be required.

Necessity of Technical Assistance

Remarks

Expected Key Potential Impact and Mitigation Measures for Target Project

Project – Myota-Tada U Road	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< *Construction Phase* > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Disruption and loss of productive top soil from agricultural fields due to creation of borrow pits and development of detour section • Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills • Proper disposal of used bentonite slurry
< *Operation Phase* > • Noise and vibration due to the traffic	• Provision by speed limit
Natural Environment	
< *Construction Phase* > • Increased incidence and duration of floods due to obstruction of natural drainage courses by the embankment	• Provision of adequate drains along the route • Augmentation of capacity of existing drainage works • Provision of adequate drainage works for smooth passage of runoff to avoid flooding and formation of water pool
• Loss of flora due to felling of trees along the ROW	• Compensation for forest land and trees to be felled in forest area and private land • Mixed plantation consisting of flowering shrubs and evergreen ornamental trees
< *Operation Phase* > • Impact to local drainage due to formation of road embankment	• Provision of longitudinal drains of sufficient capacity on both sides of the car road to accommodate increased run-off.
Social Environment	
<*Pre-Construction Phase* > • Loss of livelihood and properties	• Compensation and assistance package will be planned in the Rehabilitation and Resettlement Plan, separately from the EIA.
<*Construction Phase* > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

Sub-Sector	Road
Reference No.	LRP-04
Project Title	Yangon Urban Expressway (YUEX)
Executing Agency	Ministry of Construction
Relevant Ministry	YCDC

Outline of the Project

Objectives

1. Construction of R2-1, R2-2(south half along Lower Mingalardon Road) and W sections of YUEX (Refer to RHS figure)
2. Reduce travel time on the route to/from Yangon Port
3. Reduce traffic congestion in the CBD by splitting the logistic route from the built-up area
4. Connection with the new truck terminal proposed in the western area (Hlaingtharya) and the existing terminal (Bayint Naung)

Location

Rationale

1. Ease traffic congestion in Yangon City
2. Fast access for Yangon Port

Project Plan (outline)

Construction of R2-1, R2-2 (south-half) and W Section of YUEX
with ON/OFF ramps to the existing port road

Input	Estimated Cost (US$ million)
- R2-1 section (6.5km elevated)	869
- R2-2 section (9.1km elevated)	579 (1,158/2)
- W section (7.9km at-graded)	293
- ITS facilities	
Total Estimated Cost	1,741

Schedule

Calendar Year	Start	End
1. Preparation	2018	2019
2. Feasibility Study	2020	2021
3. Funding Arrangement	2022	2023
4. Execution	2024	2027
5. Commissioning	2028-	

Expected Output

Reduce traffic congestion in Yangon city center

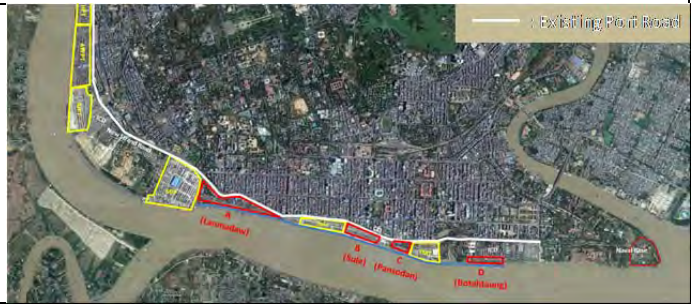
Action Plan

- Feasibility study shall be conducted.
- Pre-FS was conducted by YUTRA in 2013.

Necessity of Technical Assistance : Establishment of Toll Road Authority

Remarks

There is the port road along Strand Street that is exclusively provided for port related vehicles. The western-half section of YUEX can connect with this road by ON/OFF ramps to release heavy vehicles on the arterial road in the City.



Expected Key Potential Impact and Mitigation Measures for Target Project

Project – Yangon Urban Expressway (YUEX) West Sections	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< *Construction Phase* > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Disruption and loss of productive top soil from agricultural fields due to creation of borrow pits and development of detour section • Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills • Proper disposal of used bentonite slurry
< *Operation Phase* > • Noise and vibration due to the traffic	• Provision by speed limit
Natural Environment	
< *Construction Phase* > • Increased incidence and duration of floods due to obstruction of natural drainage courses by the embankment	• Provision of adequate drains along the route • Augmentation of capacity of existing drainage works • Provision of adequate drainage works for smooth passage of runoff to avoid flooding and formation of water pool
• Loss of flora due to felling of trees along the ROW	• Compensation for forest land and trees to be felled in forest area and private land • Mixed plantation consisting of flowering shrubs and evergreen ornamental trees
< *Operation Phase* > • Impact to local drainage due to formation of road embankment	• Provision of longitudinal drains of sufficient capacity on both sides of the car road to accommodate increased run-off.
Social Environment	
<*Construction Phase* > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

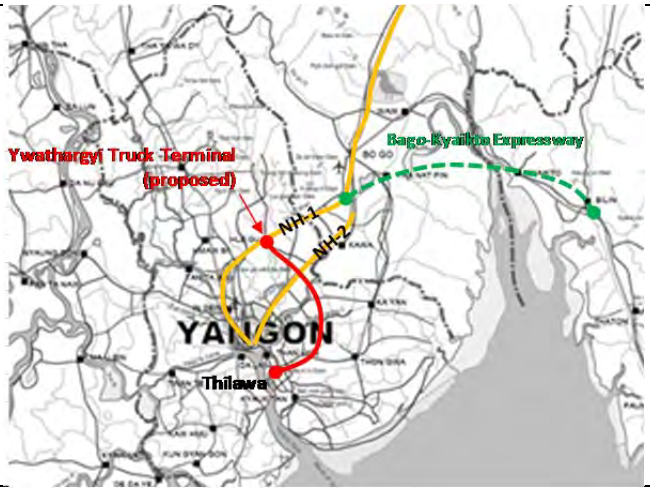
Sub-Sector	Road
Reference No.	LRP-05
Project Title	Yangon Outer Ring Road (YORR) East Section
Executing Agency	Ministry of Construction
Relevant Ministry	YCDC

Outline of the Project

Objectives

1. Reduce travel time on the route between Thilawa SEZ and East-West Economic Corridor (EWEC)
2. Reduce travel time on the route between Thilawa SEZ and NH-1 toward upper Myanmar
3. Reduce traffic congestion in the CBD by splitting the logistic route from the built-up area
4. Connection with the proposed new truck terminal (multi modal terminal)

Location



Rationale

1. Ease traffic congestion in Yangon City
2. Ease access for Thilawa SEZ
3. Land available before urban sprawl

Project Plan (outline)

Outer ring road has been planned by YCDC/MOC to alleviate traffic congestion in Yangon central area. Multi truck terminal has been proposed in Ywathargyi.

Input	Estimated Cost (US$ million)
- 55km long new heavy loaded urban outer ring road (upgrade to expressway will be implemented later) - 1.0km long Bago River Bridge - ITS System	570
Total Estimated Cost	570

Schedule

Calendar Year	Start	End
1. Preparation	2018	2019
2. Feasibility Study	2020	2020
3. Funding Arrangement	2021	2021
4. Execution	2022	2028
5. Commissioning	2028	

Result of Evaluation

Considerable reduction of transport cost and ensure higher speed of cargo transit

Expected Output	
Reduce traffic congestion in Yangon center	

Action Plan

- Feasibility study shall be conducted.
- Optimum route shall be determined in consideration of the connection with Yangon Outer Ring Road.

Necessity of Technical Assistance

Establishment of Toll Road Authority

Remarks

Synchronization with Bago-Kyaikto Expressway will be much effective.

Expected Key Potential Impact and Mitigation Measures for Target Project

Project – Yangon Outer Ring Road (YORR) East Section	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< Construction Phase > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Disruption and loss of productive top soil from agricultural fields due to creation of borrow pits and development of detour section • Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills • Proper disposal of used bentonite slurry
< Operation Phase > • Noise and vibration due to the traffic	• Provision by speed limit
Natural Environment	
< Construction Phase > • Increased incidence and duration of floods due to obstruction of natural drainage courses by the embankment	• Provision of adequate drains along the route • Augmentation of capacity of existing drainage works • Provision of adequate drainage works for smooth passage of runoff to avoid flooding and formation of water pool
• Loss of flora due to felling of trees along the ROW	• Compensation for forest land and trees to be felled in forest area and private land • Mixed plantation consisting of flowering shrubs and evergreen ornamental trees
< Operation Phase > • Impact to local drainage due to formation of road embankment	• Provision of longitudinal drains of sufficient capacity on both sides of the car road to accommodate increased run-off.
Social Environment	
<Pre-Construction Phase > • Loss of livelihood and properties	• Compensation and assistance package will be planned in the Rehabilitation and Resettlement Plan, separately from the EIA.
<Construction Phase > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

Sub-Sector	Road
Reference No.	LRP-06
Project Title	Hanthawaddy Airport Access Road
Executing Agency	Ministry of Construction
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location
1. Reduce travel time on the route to/from the proposed Hanthawaddy International Airport (HIA) 2. Promote Bago industrial zone (IZ)	

Rationale	Project Plan (outline)
1. Well existing access road 2. HIA will be opened by 2023.	Construction of international design standard highway to access the HIA

Input	Estimated Cost (US$ mill)
- Construction of new road (9.5km)) - ITS facilities	79.0
Total Estimated Cost	79.0

Schedule

Calendar Year	Start	End
1. Preparation	2018	2019
2.Feasibility Study	2019	2019
3. Funding Arrangement	2019	2019
4. Execution	2020	2023
5. Commissioning	2023	

Result of Evaluation	
Expected Output	Action Plan
Reduce traffic congestion in Yangon center	- Feasibility study shall be conducted.

Necessity of Technical Assistance
Remarks
Hanthawaddy International Airport is expected to be commissioned in 2023.

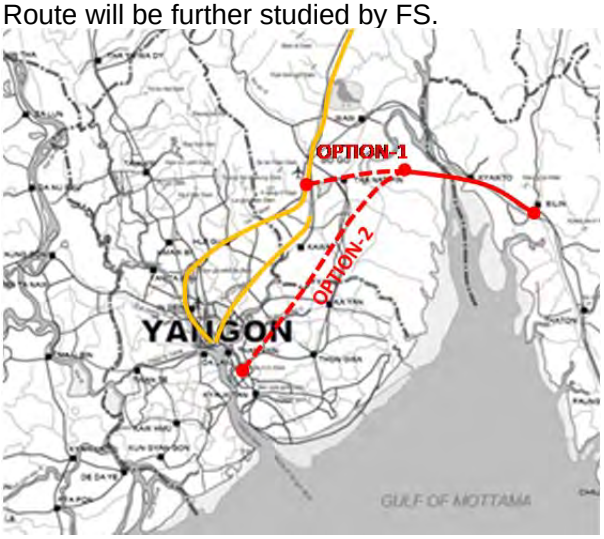
Expected Key Potential Impact and Mitigation Measures for Target Project

Project –Hanthawaddy Airport Access Road	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< *Construction Phase* > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Disruption and loss of productive top soil from agricultural fields due to creation of borrow pits and development of detour section • Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills • Proper disposal of used bentonite slurry
< *Operation Phase* > • Noise and vibration due to the traffic	• Provision by speed limit
Natural Environment	
< *Construction Phase* > • Increased incidence and duration of floods due to obstruction of natural drainage courses by the embankment	• Provision of adequate drains along the route • Augmentation of capacity of existing drainage works • Provision of adequate drainage works for smooth passage of runoff to avoid flooding and formation of water pool
• Loss of flora due to felling of trees along the ROW	• Compensation for forest land and trees to be felled in forest area and private land • Mixed plantation consisting of flowering shrubs and evergreen ornamental trees
< *Operation Phase* > • Impact to local drainage due to formation of road embankment	• Provision of longitudinal drains of sufficient capacity on both sides of the car road to accommodate increased run-off.
Social Environment	
<*Pre-Construction Phase* > • Loss of livelihood and properties	• Compensation and assistance package will be planned in the Rehabilitation and Resettlement Plan, separately from the EIA.
<*Construction Phase* > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

<table>
<tr><td>Sub-Sector</td><td colspan="4">Road</td></tr>
<tr><td>Reference No.</td><td colspan="4">LRP-07</td></tr>
<tr><td>Project Title</td><td colspan="4">New Expressway between Bago and Kyaikhto</td></tr>
<tr><td>Executing Agency</td><td colspan="4">Ministry of Construction</td></tr>
<tr><td>Relevant Ministry</td><td colspan="4"></td></tr>
<tr><td colspan="5">Outline of the Project</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">Location</td></tr>
<tr><td colspan="2">1. Enlarge road capacity of East-West Economic Corridor (EWEC).

2. Reduce travel time on EWEC by short-cut of the existing Payagyi (or Thilawa) -Kyaiktiyo Road

3. Reduce traffic accidents on the existing road by splitting the logistic route from the communication road for local residents</td><td colspan="3">Route will be further studied by FS.
 

(Optional Routes)</td></tr>
<tr><td colspan="2">Rationale</td><td colspan="3">Project Plan (outline)</td></tr>
<tr><td colspan="2">1. Strengthen of EWEC road capacity for both passenger and cargo
2. Existing Payagyi-Kyaiktiyo Road is going to be saturated by 2030.</td><td colspan="3">Construction of the new alignment along EWEC between Yangon/Bago and Kyaiktiyo for a shortcut the existing Payagyi-Kyaiktiyo Road. The project road shall be designed for heavily loaded vehicles.</td></tr>
<tr><td>Input</td><td>Estimated Cost (US$ Million)</td><td colspan="3">Schedule</td></tr>
<tr><td>- 70km long (Option-1) new heavy loaded expressway road
- 1.5km long Sittan River Bridge</td><td>770.0</td><td colspan="3"><table>
<tr><td>Calendar Year</td><td>Start</td><td>End</td></tr>
<tr><td>1. Preparation</td><td>2018</td><td>2018</td></tr>
<tr><td>2. Feasibility Study</td><td>2019</td><td>2020</td></tr>
<tr><td>3. Funding Arrangement</td><td>2019</td><td>2020</td></tr>
<tr><td>4. Execution</td><td>2021</td><td>2025</td></tr>
<tr><td>5. Commissioning</td><td>2025</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Total Estimated Cost</td><td>770.0</td><td colspan="3"></td></tr>
<tr><td colspan="2">Result of Evaluation</td><td colspan="3"></td></tr>
<tr><td colspan="2">Considerable reduction of transport cost</td><td colspan="3"></td></tr>
<tr><td colspan="2">Expected Output</td><td colspan="3">Action Plan</td></tr>
<tr><td>Reduce travel time
Reduce traffic accident</td><td colspan="2">L: 105km > 70km
V: 50km/h > 60km/h
(1.0 hour reduce)</td><td colspan="2">- Feasibility study shall be conducted.
- Optimum route shall be determined in consideration of the connection with Yangon Outer Ring Road.</td></tr>
<tr><td colspan="5">Necessity of Technical Assistance</td></tr>
<tr><td colspan="5">Establishment of Toll Road Authority</td></tr>
<tr><td colspan="5">Remarks</td></tr>
<tr><td colspan="5">Synchronization with Yangon Outer Ring Road will be much more effective.</td></tr>
</table>

Expected Key Potential Impact and Mitigation Measures for Target Project

Project – New Expressway between Bago-Kyaikto	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< *Construction Phase* > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Disruption and loss of productive top soil from agricultural fields due to creation of borrow pits and development of detour section • Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills • Proper disposal of used bentonite slurry
< *Operation Phase* > • Noise and vibration due to the traffic	• Provision by speed limit
Natural Environment	
< *Construction Phase* > • Increased incidence and duration of floods due to obstruction of natural drainage courses by the embankment	• Provision of adequate drains along the route • Augmentation of capacity of existing drainage works • Provision of adequate drainage works for smooth passage of runoff to avoid flooding and formation of water pool
• Loss of flora due to felling of trees along the ROW	• Compensation for forest land and trees to be felled in forest area and private land • Mixed plantation consisting of flowering shrubs and evergreen ornamental trees
< *Operation Phase* > • Impact to local drainage due to formation of road embankment	• Provision of longitudinal drains of sufficient capacity on both sides of the car road to accommodate increased run-off.
Social Environment	
<*Pre-Construction Phase* > • Loss of livelihood and properties	• Compensation and assistance package will be planned in the Rehabilitation and Resettlement Plan, separately from the EIA.
<*Construction Phase* > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

Sub-Sector	Road
Reference No.	LRP-08
Project Title	Thaton Bypass Road
Executing Agency	Ministry of Construction
Relevant Ministry	

Outline of the Project

Objectives	Location
1. Enlarge road capacity of East-West Economic Corridor (EWEC). 2. Reduce travel time on EWEC by a short-cut of CBD area of Thaton City 3. Reduce traffic accidents on the existing road by splitting the logistic route from the communication road for local residents	

Rationale	Project Plan (outline)
1. Strengthen of EWEC road capacity for both passenger and cargo 2. Existing Payagyi-Thaton Road is going to be saturated by 2030.	Construction of the new 30km bypass road for shortcut the Thaton city. The project road shall be designed for heavily loaded vehicles.

Input	Estimated Cost (US$ million)
- 30km long new heavy loaded expressway road	200.0
Total Estimated Cost	200.0

Schedule

Calendar Year	Start	End
1. Preparation	2018	2019
2. Feasibility Study	2020	2021
3. Funding Arrangement	2021	2022
4. Execution	2023	2025
5. Commissioning	2026	

Result of Evaluation	
Considerable reduction of transport cost	

Expected Output		Action Plan
Reduce travel time Reduce traffic accident	L: 45km > 30km V: 40km/h > 60km/h (0.5 hour reduce)	- Feasibility study shall be conducted.

Necessity of Technical Assistance
Remarks

Expected Key Potential Impact and Mitigation Measures for Target Project

Project – Thaton Bypass Road	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< Construction Phase > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Disruption and loss of productive top soil from agricultural fields due to creation of borrow pits and development of detour section • Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills • Proper disposal of used bentonite slurry
< Operation Phase > • Noise and vibration due to the traffic	• Provision by speed limit
Natural Environment	
< Construction Phase > • Increased incidence and duration of floods due to obstruction of natural drainage courses by the embankment	• Provision of adequate drains along the route • Augmentation of capacity of existing drainage works • Provision of adequate drainage works for smooth passage of runoff to avoid flooding and formation of water pool
• Loss of flora due to felling of trees along the ROW	• Compensation for forest land and trees to be felled in forest area and private land • Mixed plantation consisting of flowering shrubs and evergreen ornamental trees
< Operation Phase > • Impact to local drainage due to formation of road embankment	• Provision of longitudinal drains of sufficient capacity on both sides of the car road to accommodate increased run-off.
Social Environment	
<Pre-Construction Phase > • Loss of livelihood and properties	• Compensation and assistance package will be planned in the Rehabilitation and Resettlement Plan, separately from the EIA.
<Construction Phase > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

Sub-Sector	Road
Reference No.	LRP-09
Project Title	Three Pagoda Pass Road (Upgrading)
Executing Agency	Ministry of Construction
Relevant Ministry	

Outline of the Project

Objectives

1. Enlarge road capacity of East-West Economic Corridor (EWEC).
2. Reduce travel time on EWEC
3. Logistics route for the regional hub port in Mon State (Kyaikami)
4. Poverty reduction of Kayin State providing market access

(Corruption of minor bridge in 2016)

Location

Rationale	Project Plan (outline)
1. Strengthen of EWEC road capacity for both passenger and cargo 2. Existing Thaton-Myawaddy Road is going to be saturated by 2030.	Upgrading of the on-going construction project by widening to 4-lane. The project road shall be designed for heavily loaded vehicles.

Input	Estimated Cost (US$ million)
- 100km long road upgrading works for heavily loaded traffic	325.0
Total Estimated Cost	325.0

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2019	2019
3. Funding Arrangement	2019	2019
4. Execution	2020	2024
5. Commissioning	2025	

Result of Evaluation

Expected Output	Action Plan
Ensure national redundancy of logistics lifeline for border trade	- Feasibility study shall be conducted.

Necessity of Technical Assistance

Remarks

Gateway for the proposed new regional hub port of Mon State at Kyaikami

Expected Key Potential Impact and Mitigation Measures for Target Project

Project – Three Pagoda Pass Road (Upgrading)	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< Construction Phase > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Disruption and loss of productive top soil from agricultural fields due to creation of borrow pits and development of detour section • Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills • Proper disposal of used bentonite slurry
< Operation Phase > • Noise and vibration due to the traffic	• Provision by speed limit
Natural Environment	
< Construction Phase > • Loss of flora due to felling of trees along the ROW	• Compensation for forest land and trees to be felled in forest area and private land • Mixed plantation consisting of flowering shrubs and evergreen ornamental trees
Social Environment	
<Construction Phase > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

Sub-Sector	Road
Reference No.	LRP-10
Project Title	Mawlamyine Peripheral Road
Executing Agency	Ministry of Construction or Mon State Government
Relevant Ministry	

Outline of the Project

Objectives

1. Enlarge road capacity of East-West Economic Corridor (EWEC).
2. Reduce travel time on EWEC
3. Logistics route for the regional hub port in Mon State (Kyaikami) and the on-going industrial zone (IZ)

Location

Currently HV is entering in the city through NH-8. Before increase the trade volume, the logistics route (to/from GMS and Dawei) shall be diverted from CBD area of Mawlamyne City.

Gyaing (Zarthapyin) Bridge and Atran Bridge will be constructed. The bridges can accept HV releasing the current loading restriction.

Mawlamyine Ring Road was proposed by 3-City MP with DUHD, MoC in 2016.

Rationale	Project Plan (outline)
1. Strengthen of EWEC road capacity for both passengers and cargoes 2. Reduce traffic congestion and accidents in Mawlamyine City	Construction of the peripheral road to detour CBD area of Mawlamyine City. The project road shall be designed for heavily loaded vehicles. New truck terminal is to be developed along this peripheral road.

Input	Estimated Cost (US$ million)
- 5.5km long road upgrading works for heavy loaded traffic	8.0
Total Estimated Cost	8.0

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2019	2019
3. Funding Arrangement	2019	2019
4. Execution	2020	2022
5. Commissioning	2022	

Expected Output	Action Plan
Improve EWEC corridor	

Necessity of Technical Assistance

Remarks

Gateway for the proposed new regional hub port of Mon State at Kyaikami

Expected Key Potential Impact and Mitigation Measures for Target Project

Project –Mawlamyine Peripheral Road	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< Construction Phase > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Disruption and loss of productive top soil from agricultural fields due to creation of borrow pits and development of detour section • Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills • Proper disposal of used bentonite slurry
< Operation Phase > • Noise and vibration due to the traffic	• Provision by speed limit
Natural Environment	
< Construction Phase > • Loss of flora due to felling of trees along the ROW	• Compensation for forest land and trees to be felled in forest area and private land • Mixed plantation consisting of flowering shrubs and evergreen ornamental trees
Social Environment	
<Construction Phase > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

Sub-Sector	Road
Reference No.	LRP-11
Project Title	Pong Taung-Pone Nyar Tunnel between Magway and Sagain
Executing Agency	Ministry of Construction
Relevant Ministry	

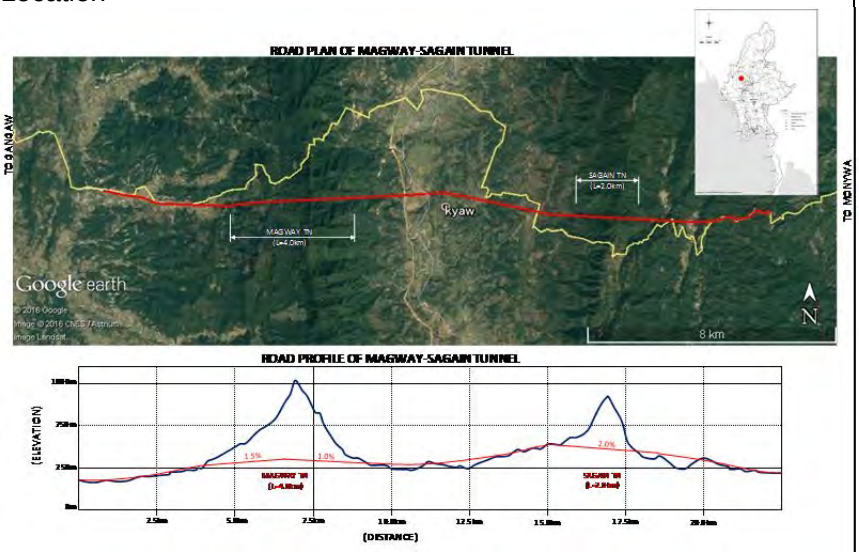
Outline of the Project

Objectives

1. Strengthen the logistics corridor between Myanmar and India
2. Provision of border access for the industrial zones (Kale, Monywa, Myota, Mandalay)
3. Poverty reduction providing market access for agricultural products

(Land slide on the existing Monywa Gangaw Road)

Location



Rationale

1. Frequent road closure by slope landslip disasters
2. Limited capacity of cargo transport to/from Indian border

Project Plan (outline)

Construction of 2 road tunnels to ensure all-weather logistics access for the Myanmar-India corridor

Input	Estimated Cost (US$ million)
- 6km (4km+2km) long road tunnel - Construction of new alignment of approach road (10km)	190.0
Total Estimated Cost	190.0

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2019	2019
3. Funding Arrangement	2020	2020
4. Execution	2021	2026
5. Commissioning	2027	

Expected Output

Strengthen the Myanmar-India trade corridor

Action Plan

- Feasibility study shall be conducted.

Necessity of Technical Assistance

Remarks

KOIKA committed to carry out the feasibility study (as of Dec. 2017).

Expected Key Potential Impact and Mitigation Measures for Target Project

Project – Pong Taung-Pone Nyar Tunnel between Magway and Sagaing	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< Construction Phase > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Disruption and loss of productive top soil from agricultural fields due to creation of borrow pits and development of detour section • Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills • Proper disposal of used bentonite slurry
< Operation Phase > • Noise and vibration due to the traffic	• Provision by speed limit
Natural Environment	
< Construction Phase > • Loss of flora due to felling of trees along the ROW	• Compensation for forest land and trees to be felled in forest area and private land • Mixed plantation consisting of flowering shrubs and evergreen ornamental trees
Social Environment	
<Construction Phase > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

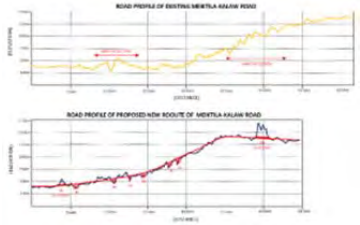
Project Profile

Sub-Sector	Road
Reference No.	LRP-12
Project Title	Fast Shan Plateau Access Road (Yin Mar Bin-Kalaw)
Executing Agency	Ministry of Construction
Relevant Ministry	

Outline of the Project

Objectives

1. Strengthen logistics corridor between Meiktila and Shan State
2. Promote rural development by fast and safe access to a large consumption market
3. Poverty reduction in Shan State providing domestic market access for agricultural products



(Conceptual Road Profile)

Location

Rationale	Project Plan (outline)
1. Fragile mountainous road 2. Less accessibility to marketplace 3. Limited capacity of cargo transport to/from the border	Construction of 52km length new alignment including 2 road tunnels (1.6km+3.0km)

Input	Estimated Cost (US$ million)
- Construction of 52km length new alignment - 4.6km (1.6km+3.0km) long road tunnel	365.0
Total Estimated Cost	365.0

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2019	2020
3. Funding Arrangement	2021	2022
4. Execution	2023	2028
5. Commissioning	2029	

Expected Output		Action Plan
Strengthen rural productivities in Shan State		- Feasibility study shall be conducted.

Necessity of Technical Assistance
O/M capacity building for road tunnel
Remarks

Expected Key Potential Impact and Mitigation Measures for Target Project

Project – Fast Shan Plateau Access Road (Yin Mar Bin-Kalaw)	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< Construction Phase > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Disruption and loss of productive top soil from agricultural fields due to creation of borrow pits and development of detour section • Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills • Proper disposal of used bentonite slurry
< Operation Phase > • Noise and vibration due to the traffic	• Provision by speed limit
Natural Environment	
< Construction Phase > • Increased incidence and duration of floods due to obstruction of natural drainage courses by the embankment	• Provision of adequate drains along the route • Augmentation of capacity of existing drainage works • Provision of adequate drainage works for smooth passage of runoff to avoid flooding and formation of water pool
• Loss of flora due to felling of trees along the ROW	• Compensation for forest land and trees to be felled in forest area and private land • Mixed plantation consisting of flowering shrubs and evergreen ornamental trees
< Operation Phase > • Impact to local drainage due to formation of road embankment	• Provision of longitudinal drains of sufficient capacity on both sides of the car road to accommodate increased run-off.
Social Environment	
<Pre-Construction Phase > • Loss of livelihood and properties	• Compensation and assistance package will be planned in the Rehabilitation and Resettlement Plan, separately from the EIA.
<Construction Phase > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

Sub-Sector	Road
Reference No.	LRP-13
Project Title	Construction of Bridges on India-Myanmar-Thai Trilateral Highway (Tamu-Kyigone-Kalaywa Road)
Executing Agency	Ministry of Construction
Relevant Ministry	

Outline of the Project

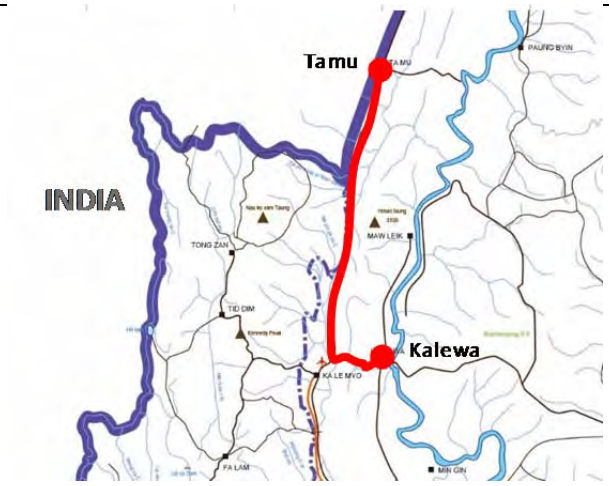
Objectives

1. Strengthen of the logistic corridor (Monywa-Tamu)

2. De-bottleneck of the logistic corridor

(Wooden slab bridge on AH 1)

Location



(Tamu-Kyigone-Kalewa Road: TKK Road)

Rationale

De-bottleneck of Asian Highway Route No.1 (AH 1) meeting the requirements of the Kuala Lumpur Transport Strategic Plan (2016-2025)

Project Plan (outline)

MOU was signed in August 2016 between India and Myanmar on the agreement of the construction of 69 bridges, including approach roads in the Tamu-Kyigone-Kalewa section of the Trilateral Highway, which will establish better connectivity between India and Myanmar.

Input	Estimated Cost (US$ million)
- Construction of 69 bridges on AH 1	54.0
Total Estimated Cost	54.0

Schedule

Calendar Year	Start	End
1. Preparation		
2. Feasibility Study		
3. Funding Arrangement		
4. Execution	2018	2021
5. Commissioning		

Result of Evaluation

Expected Output

Eliminate impassable bottlenecks for heavy trucks

Action Plan

Monitoring implementation of the project

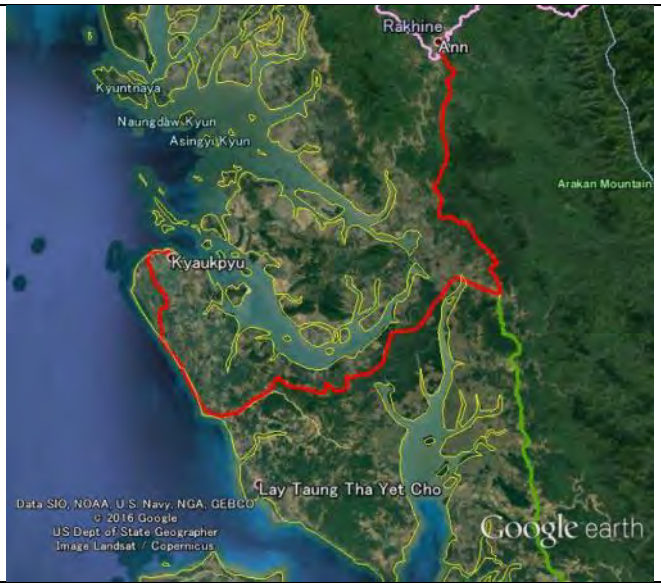
Necessity of Technical Assistance

Remarks

Expected Key Potential Impact and Mitigation Measures for Target Project

Project – Construction of Bridges on India-Myanmar-Thai Trilateral Highway (Tamu-Kyigone-Kalewa Road)	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< *Construction Phase* > • Deterioration of air quality due to particulate matter such as dust and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling within the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< *Operation Phase* > • Noise and vibration due to the traffic	• Provision of speed limit
Natural Environment	
< *Construction Phase* > • Increased incidence and duration of floods due to obstruction of natural drainage courses by the construction activities	• Provision of adequate drains along the route • Provision of adequate drainage works for smooth passage of runoff to avoid flooding and formation of water pool
Social Environment	
<*Construction Phase* > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

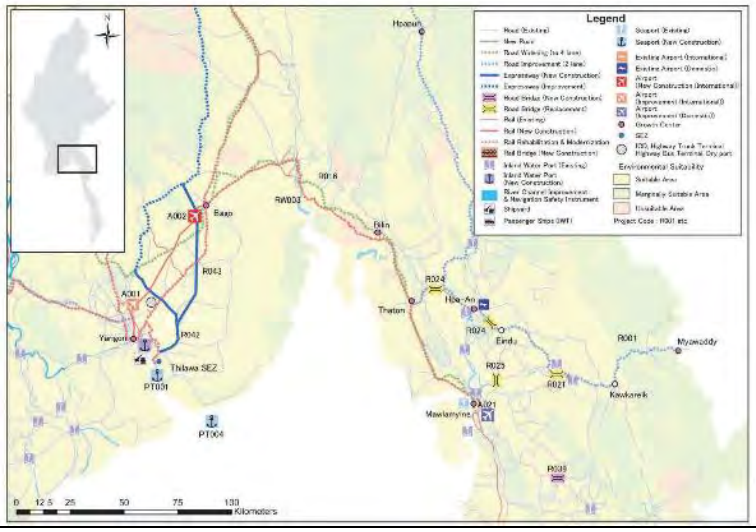
Project Profile

Sub-Sector	Road			
Reference No.	LRP-14			
Project Title	Ann-Kyaukpyu Road			
Executing Agency	Ministry of Construction			
Relevant Ministry				
Outline of the Project				
Objectives		Location		
Access to/from Kyaukpyu Port				
Rationale		Project Plan (outline)		
1. Limitation of heavy vehicle use		Road widening and improvement of the existing road between Ann and Kyaukpyu		
Input	Estimated Cost (US$ million)	Schedule		
- Road improvement of 180km existing road	460.0	Calendar Year	Start	End
		1. Preparation		
		2. Feasibility Study		
		3. Funding Arrangement		
		4. Execution		
		5. Commissioning		
Total Estimated Cost	460.0			
Result of Evaluation				
Expected Output		Action Plan		
- Reduce cargo transport time				
Necessity of Technical Assistance				
Remarks				

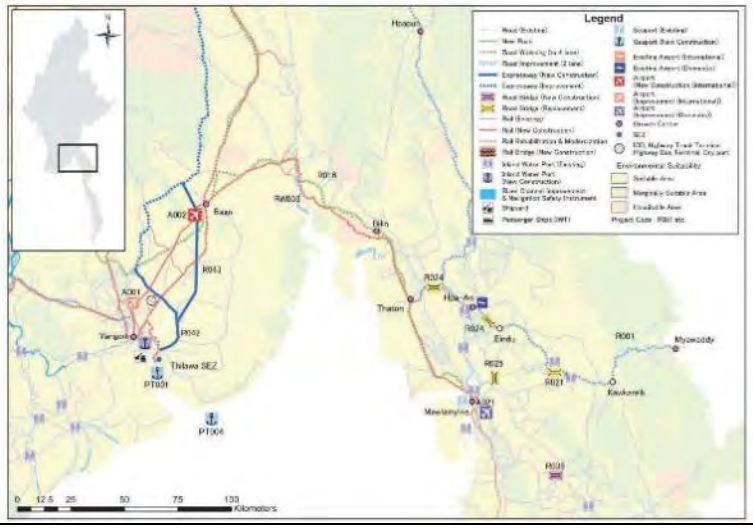
Expected Key Potential Impact and Mitigation Measures for Target Project

Project – Ann-Kyaukpyu Road	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< *Construction Phase* > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Disruption and loss of productive top soil from agricultural fields due to creation of borrow pits and development of detour section • Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills • Proper disposal of used bentonite slurry
< *Operation Phase* > • Noise and vibration due to the traffic	• Provision by speed limit
Natural Environment	
< *Construction Phase* > • Increased incidence and duration of floods due to obstruction of natural drainage courses by the embankment	• Provision of adequate drains along the route • Augmentation of capacity of existing drainage works • Provision of adequate drainage works for smooth passage of runoff to avoid flooding and formation of water pool
• Loss of flora due to felling of trees along the ROW	• Compensation for forest land and trees to be felled in forest area and private land • Mixed plantation consisting of flowering shrubs and evergreen ornamental trees
< *Operation Phase* > • Impact to local drainage due to formation of road embankment	• Provision of longitudinal drains of sufficient capacity on both sides of the car road to accommodate increased run-off.
Social Environment	
<*Pre-Construction Phase* > • Loss of livelihood and properties	• Compensation and assistance package will be planned in the Rehabilitation and Resettlement Plan, separately from the EIA.
<*Construction Phase* > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

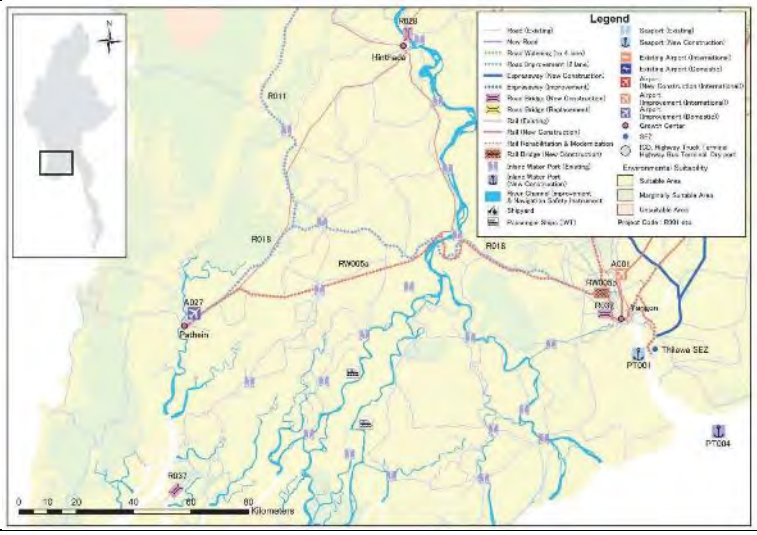
Project Profile

Sub-Sector	Road	
Reference No.	LRP-15	
Project Title	Thaton-Eindu-Kawkareik-Myawaddy Road	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
See R001 in RHS figure. (Source: NTMP) 198km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)		
Estimated Cost (US$ million)	140 (Source: NTMP)	Schedule: Short

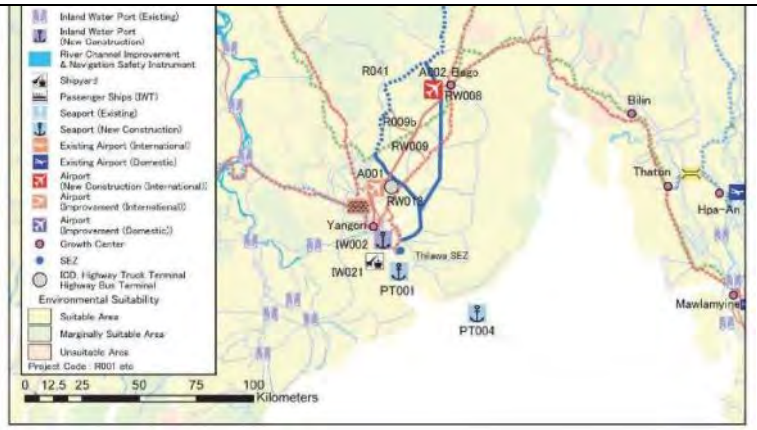
Project Profile

Sub-Sector	Road Sub-Sector	
Reference No.	LRP-16	
Project Title	Gyaing (Kawkareik) Bridge, Gyaing (Zathapyin) Bridge, Atran Bridge	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
See R021 (Gyaing (Kawkareik) Bridge, R025 (Gyaing (Zathapyin) Bridge, R026 (Atran Bridge) in RHS figure. (Source: NTMP) Gyaing (Kawkareik) Bridge L=810m (77 million $) Gyaing (Zathapyin) Bridge L=880m (103 million $) Atran Bridge L=780m (69 million $) (Source: MoC)		
Estimated Cost (US$ million)	249 (Source: MoC)	Schedule: Short

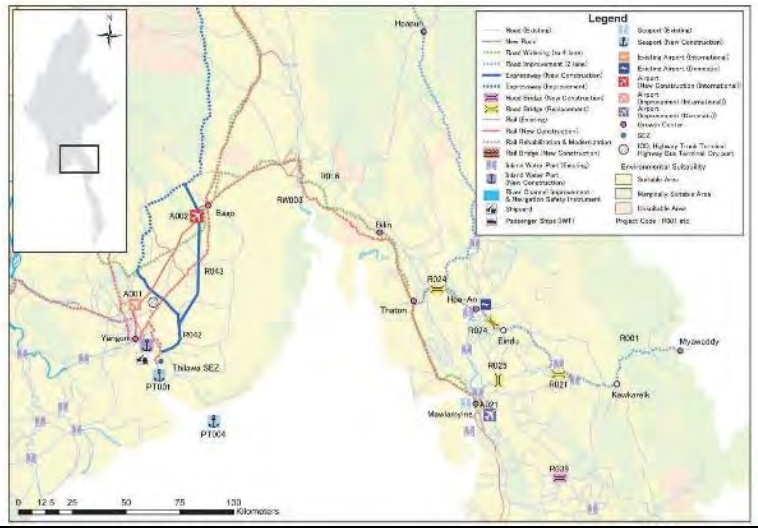
Project Profile

Sub-Sector	Road	
Reference No.	LRP-17	
Project Title	Yangon-Pathein Road	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
See R018 in RHS figure. (Source: NTMP) 128km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)		
Estimated Cost (US$ million)	91 (Source: NTMP)	Schedule: Short

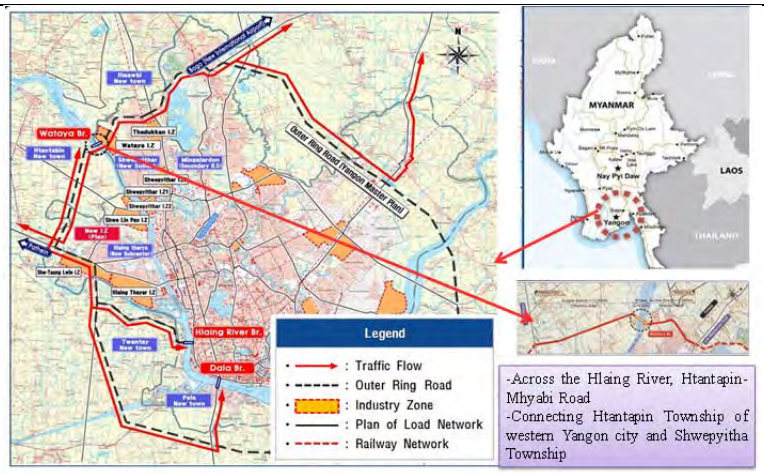
Project Profile

Sub-Sector	Road	
Reference No.	LRP-18	
Project Title	Yangon (from toll gate)-Bago Road	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
See R009b in RHS figure. (Source: NTMP) 50km, 4-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)		
Estimated Cost (US$ million)	84 (Source: MoC)	Schedule: Short

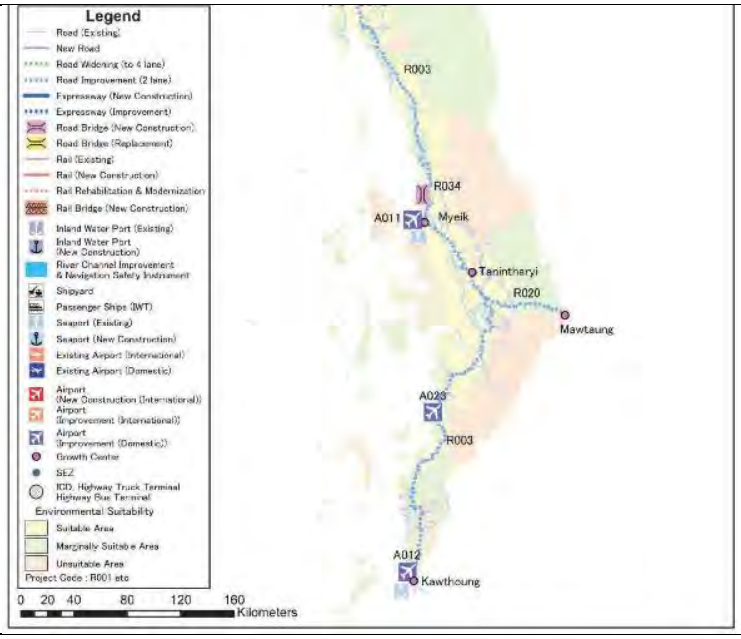
Project Profile

Sub-Sector	Road	
Reference No.	LRP-19	
Project Title	Payagyi-Mawlamyine-Thanbyuzayat Road	
Executing Agency	MoC	
Outline of the Project		
Outline		Location
See R016 in RHS figure. (Source: NTMP) 270km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)		
Estimated Cost (US$ million)	287 (Source: NTMP)	Schedule: Short

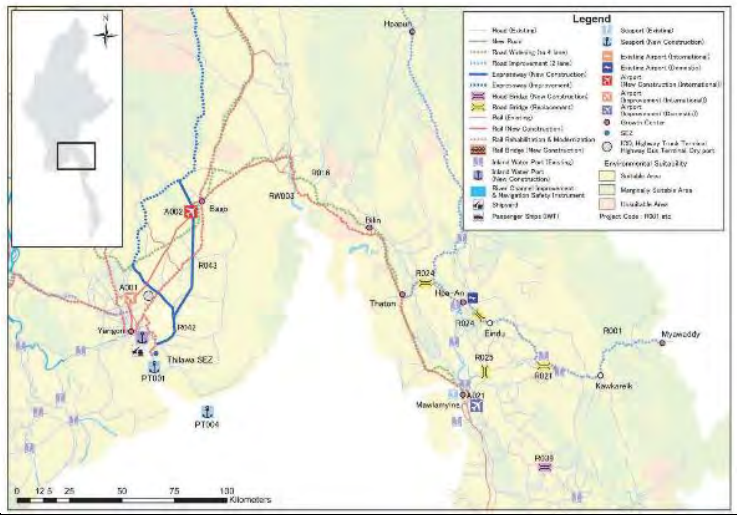
Project Profile

Sub-Sector	Road	
Reference No.	LRP-20	
Project Title	Watayar Bridge	
Executing Agency	MoC	
Outline of the Project		
Outline		Location
See RHS figure. (Source: MoC) Watayar Bridge located in Htantapin and Shwepyitha TS, Yangon Region L=825m (174 million $ including approach road) (Source: MoC)		
Estimated Cost (US$ million)	174 (Source: MoC)	Schedule: Short

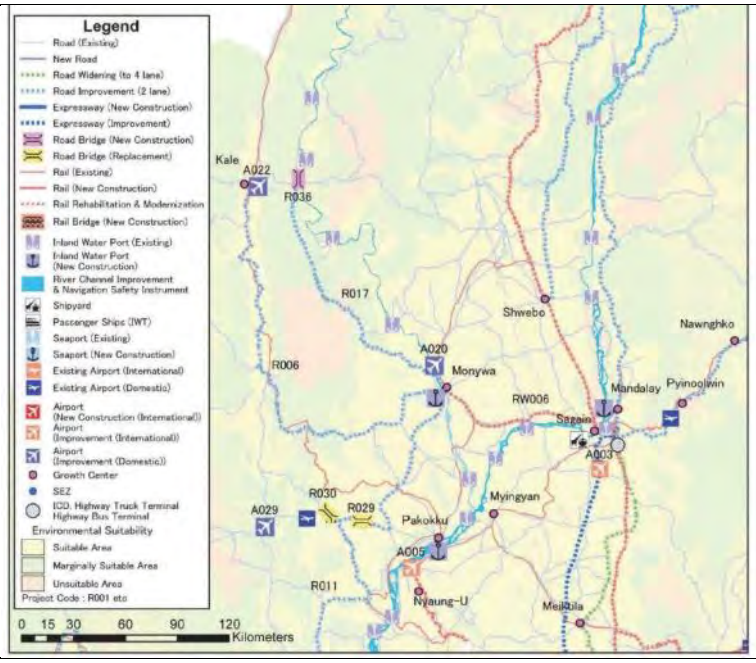
Project Profile

Sub-Sector	Road	
Reference No.	LRP-21	
Project Title	Tha Mouk Bridge	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
See R034 in RHS figure. (Source: NTMP) New bridge L=350m (Source: NTMP)		
Estimated Cost (US$ million)	10 (Source: NTMP)	Schedule: Short

Project Profile

Sub-Sector	Road	
Reference No.	LRP-22	
Project Title	Yangon City-Hanthawaddy-Existing Expressway	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
See R043 in RHS figure. (Source: NTMP) New expressway 80km (Source: NTMP)		
Estimated Cost (US$ million)	284 (Source: NTMP)	Schedule: Mid-long

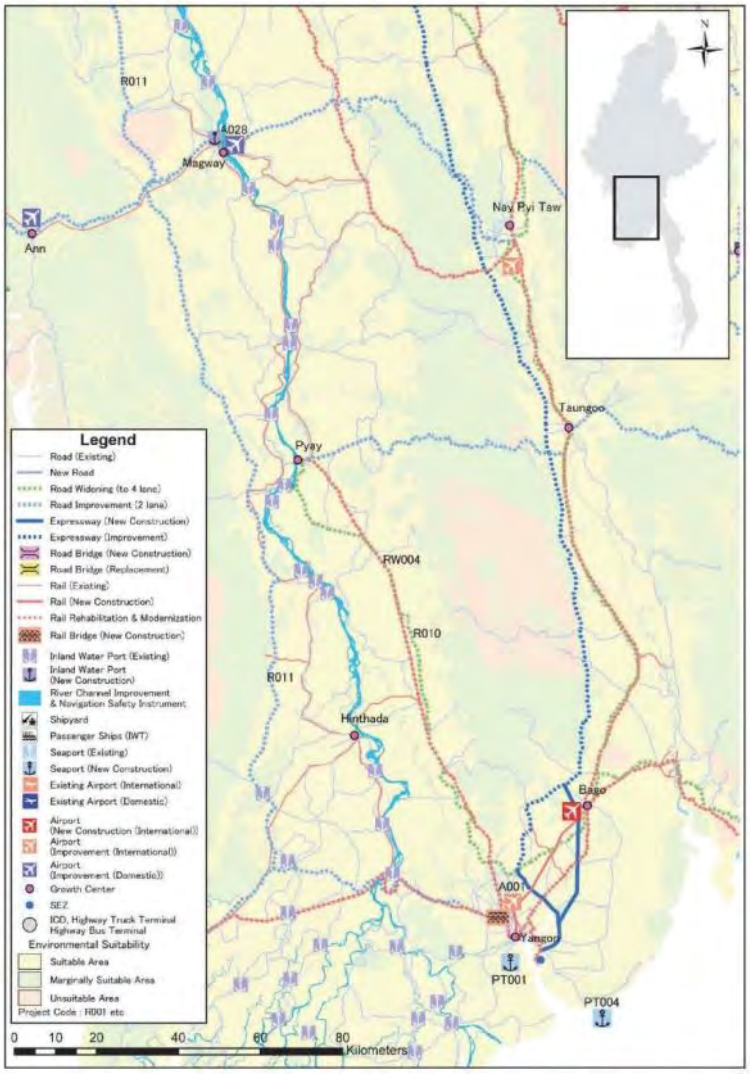
Project Profile

Sub-Sector	Road	
Reference No.	LRP-23	
Project Title	Yaw Chaung (Yepyar) Bridge	
Executing Agency	MoC	
Outline of the Project		
Outline		Location
See R029 in RHS figure. (Source: NTMP) Replacement L=1,000m (Source: NTMP)		
Estimated Cost (US$ million)	29 (Source: NTMP)	Schedule: Mid-long

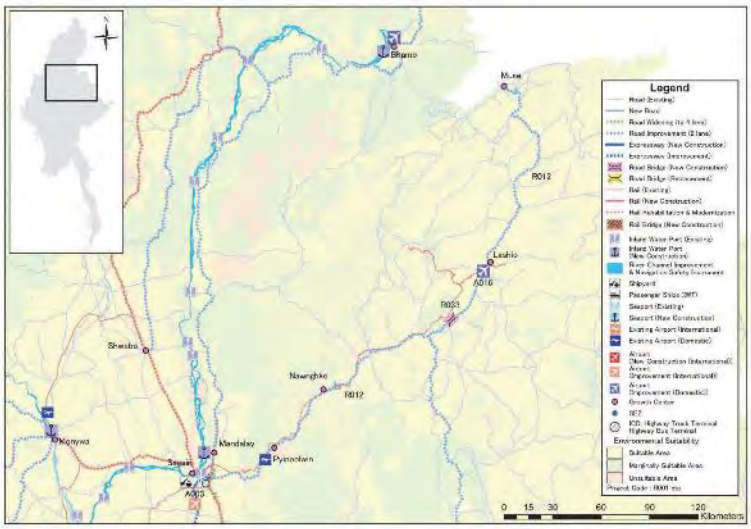
Project Profile

Sub-Sector	Road
Reference No.	LRP-24
Project Title	Yangon-Pyay-Mandalay Road
Executing Agency	MoC

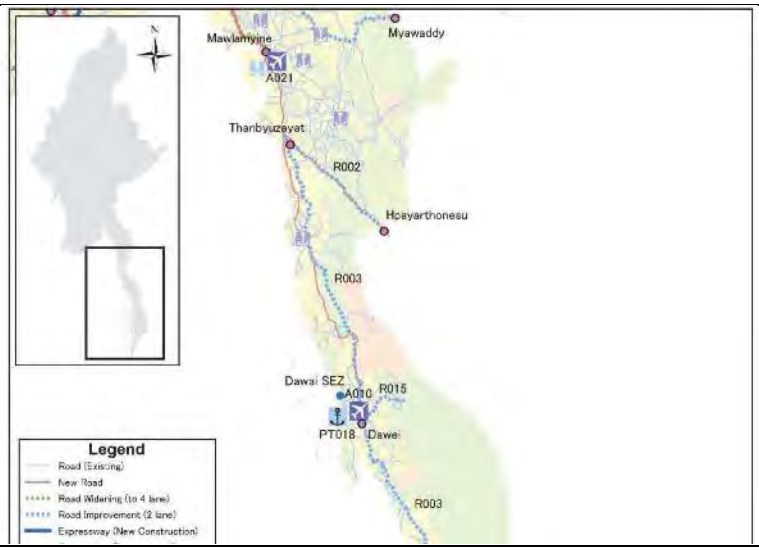
Outline of the Project

Outline	Location
See R010 in RHS figure. (Source: NTMP) 782km, 4-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)	
Estimated Cost (US$ million): 833 (Source: NTMP)	Schedule: Mid-long

Project Profile

Sub-Sector	Road	
Reference No.	LRP-25	
Project Title	Mandalay-Lashio-Muse Road	
Executing Agency	MoC	
Outline of the Project		
Outline		Location
See R012 in RHS figure. (Source: NTMP) 459km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)		
Estimated Cost (US$ million)	322 (Source: NTMP)	Schedule: Mid-long

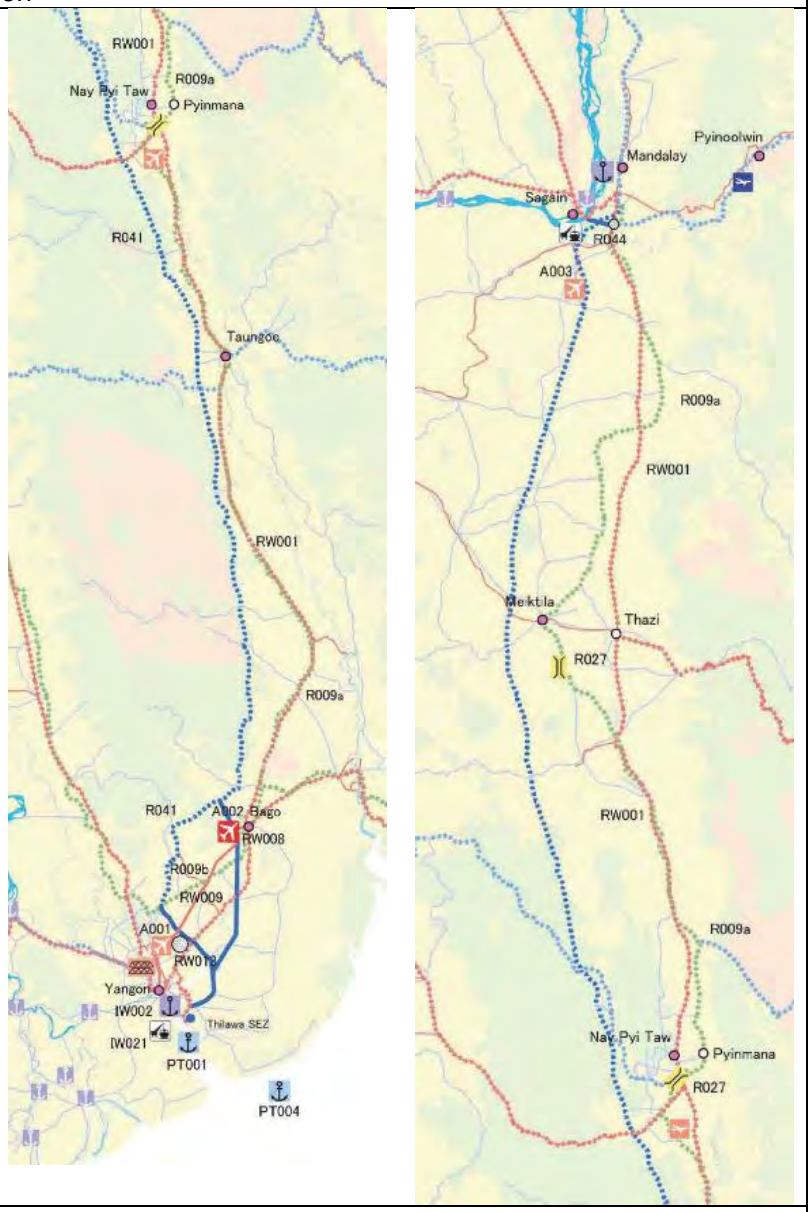
Project Profile

Sub-Sector	Road	
Reference No.	LRP-26	
Project Title	Dawei-Phunamron Road	
Executing Agency	MoC	
Outline of the Project		
Outline		Location
See R015 in RHS figure. (Source: NTMP) 132km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)		
Estimated Cost (US$ million)	824 (Source: JICA Study)	Schedule: Mid-long

Project Profile

Sub-Sector	Road
Reference No.	LRP-27
Project Title	Bago-Mandalay Road
Executing Agency	MoC

Outline of the Project

Outline	Location
See R009a in RHS figure. (Source: NTMP) 604km, 4-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)	

Estimated Cost (US$ million)	643 (Source: NTMP)	Schedule: Mid-long

Project Profile

Sub-Sector	Road
Reference No.	LRP-28
Project Title	New Goat Twin Viaduct
Executing Agency	MoC

Outline of the Project

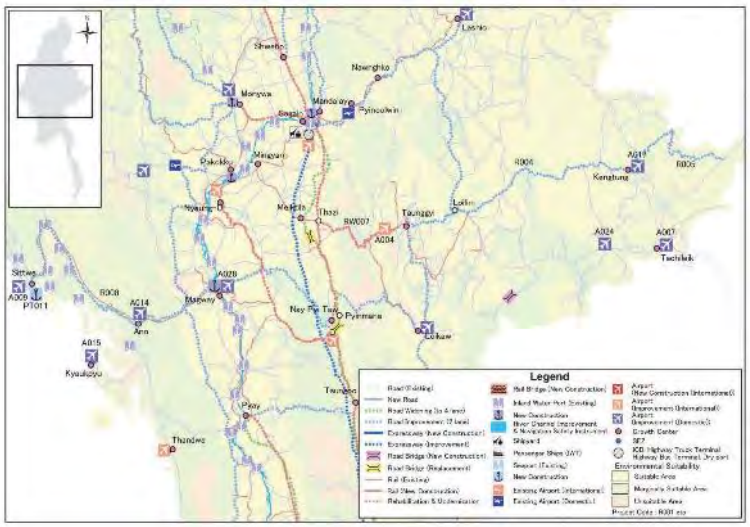
Outline	Location
See RHS figure. (Source: MoC) New bridge L=950m  3D Image (Source: MoC)	

Estimated Cost (US$ million)	95 (Source: MoC)	Schedule: Mid-long

Project Profile

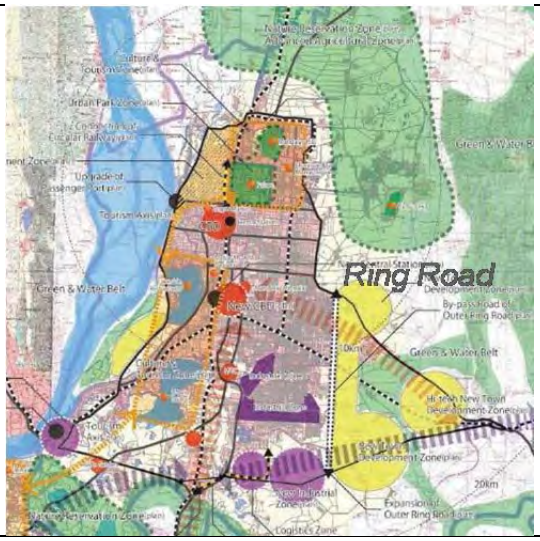
Sub-Sector	Road
Reference No.	LRP-29
Project Title	Minbu-Ann-Kyauktaw-Sittwe Road
Executing Agency	MoC

Outline of the Project

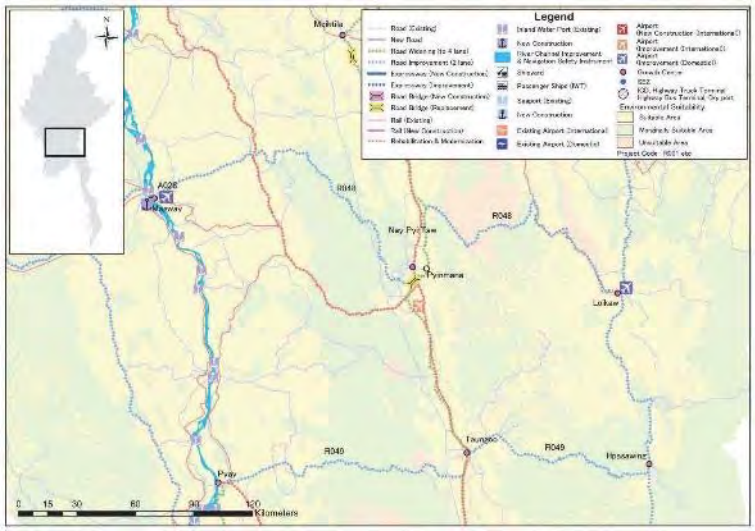
Outline	Location
See R008 in RHS figure. (Source: NTMP) 477km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)	

Estimated Cost (US$ million)	338 (Source: NTMP)	Schedule: Mid-long

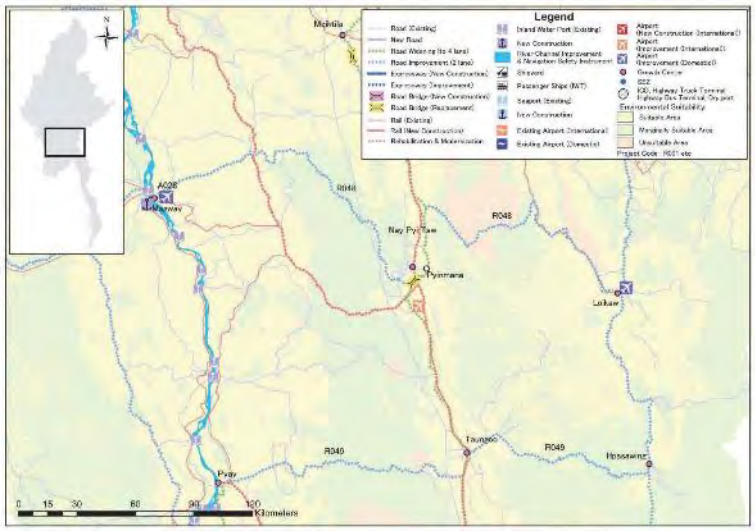
Project Profile

Sub-Sector	Road	
Reference No.	LRP-30	
Project Title	Mandalay Circular Expressway	
Executing Agency	MRG/MoC/MCDC	
Outline of the Project		
Outline		Location
See R044 in RHS figure. (Source: NTMP) New expressway 70km (Source: NTMP)		
Estimated Cost (US$ million)	240 (Source: NTMP)	Schedule: Mid-long

Project Profile

Sub-Sector	Road	
Reference No.	LRP-31	
Project Title	Loikaw-Magway Road	
Executing Agency	MoC	
Outline of the Project		
Outline		Location
See R048 in RHS figure. (Source: NTMP) 380km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)		
Estimated Cost (US$ million)	265 (Source: NTMP)	Schedule: Mid-long

Project Profile

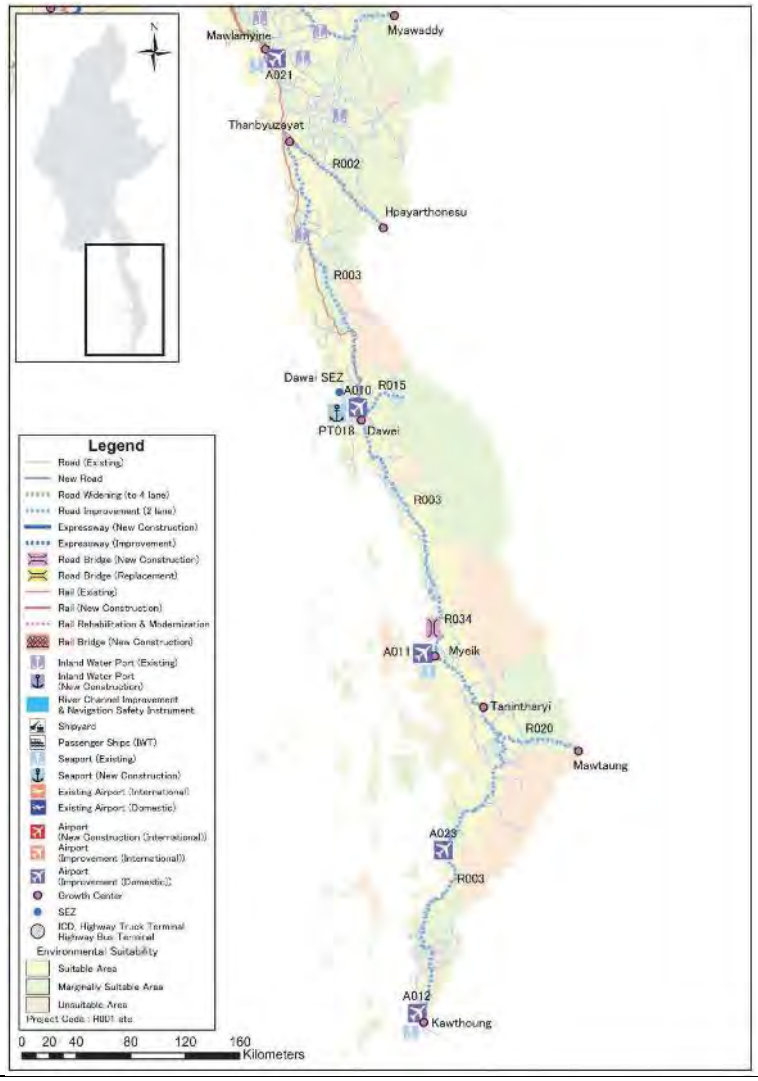
Sub-Sector	Road	
Reference No.	LRP-32	
Project Title	Hapasawong-Pyay Road	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
See R049 in RHS figure. (Source: NTMP) 300km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)		
Estimated Cost (US$ million)	207 (Source: NTMP)	Schedule: Mid-long

Project Profile

Sub-Sector	Road	
Reference No.	LRP-33	
Project Title	Tanintharyi-Mawtaung Road	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
See R020 in RHS figure. (Source: NTMP) 110km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)		
Estimated Cost (US$ million)	78 (Source: NTMP)	Schedule: Mid-long

Project Profile

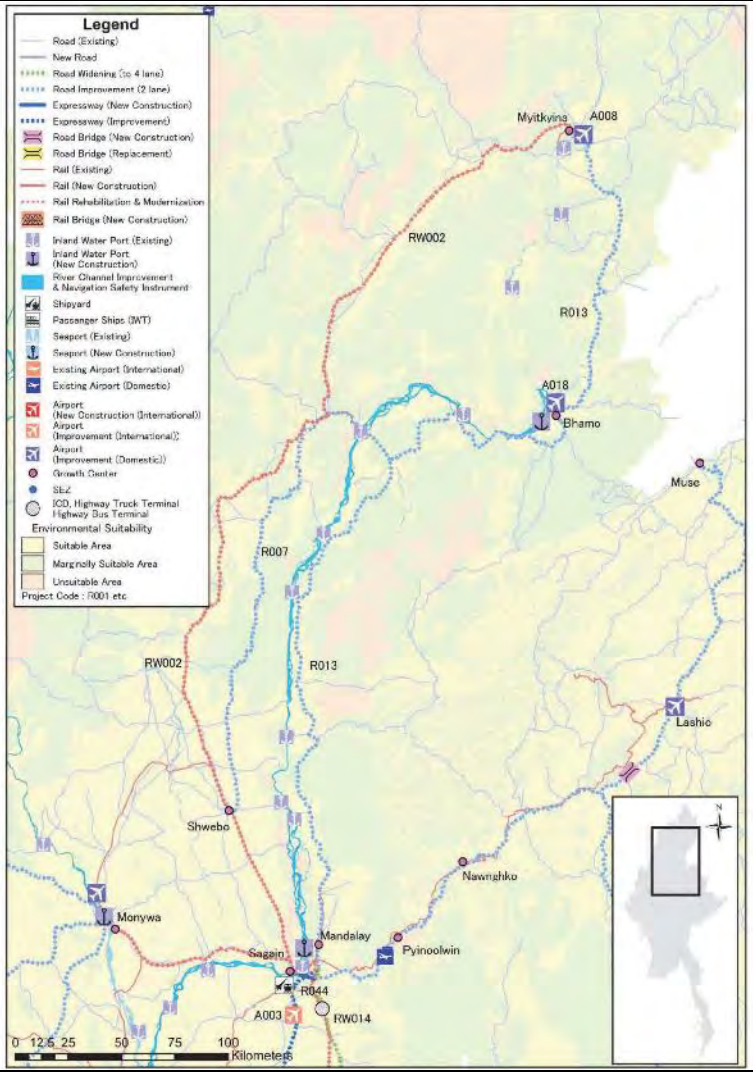
Sub-Sector	Road
Reference No.	LRP-34
Project Title	Thanbyuzayat-Dawei-Myeik-Kawthoung Road
Executing Agency	MoC

Outline of the Project	
Outline	Location
See R003 in RHS figure. (Source: NTMP) 934km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)	
Estimated Cost (US$ million): 663 (Source: NTMP)	Schedule: Mid-long

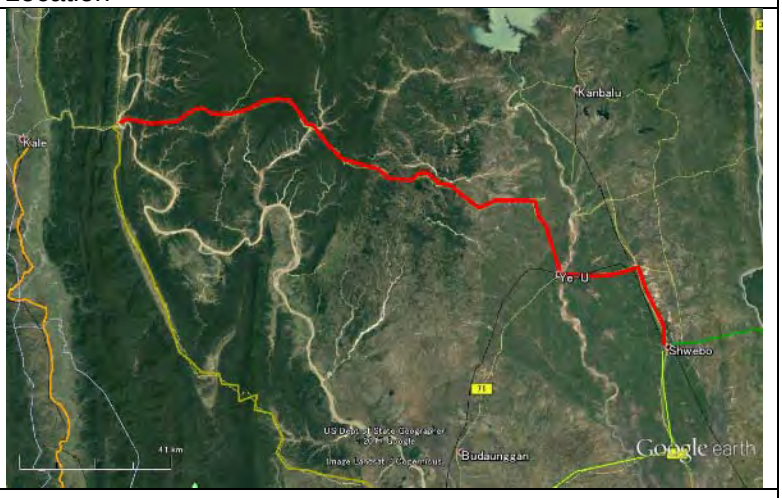
Project Profile

Sub-Sector	Road
Reference No.	LRP-35
Project Title	Shwebo-Myitkyina Road
Executing Agency	MoC

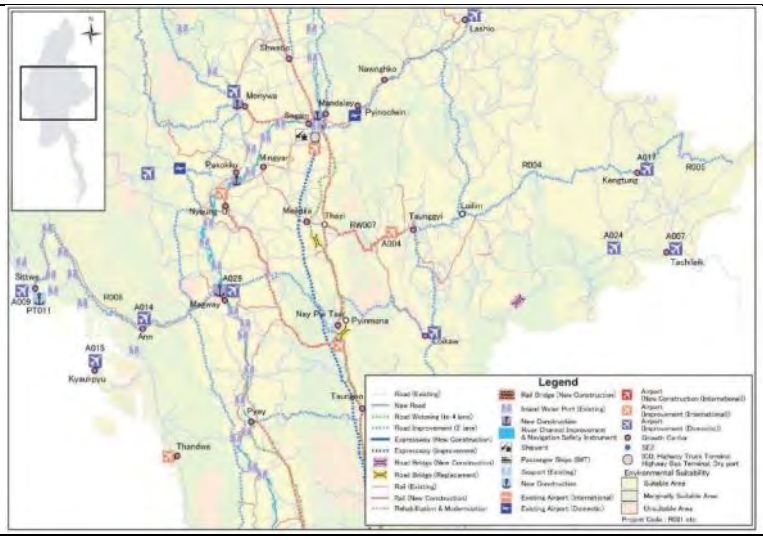
Outline of the Project

Outline	Location
See R007 in RHS figure. (Source: NTMP) 476km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)	
Estimated Cost (US$ million): 338 (Source: NTMP)	Schedule: Mid-long

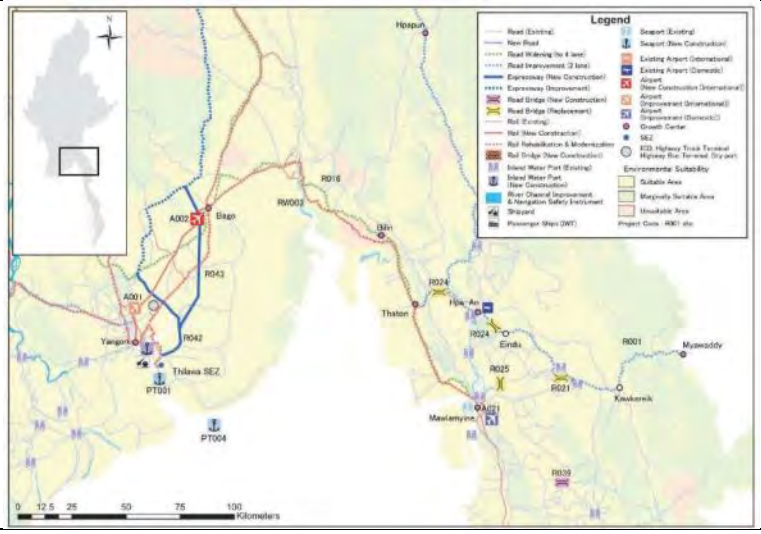
Project Profile

Sub-Sector	Road	
Reference No.	LRP-36	
Project Title	Shwebo-Ye U-Kalaywa Road	
Executing Agency	MoC	
Outline of the Project		
Outline		Location
200km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.)		
Estimated Cost (US$ million)	207 (Source: MoC)	Schedule: Mid-long

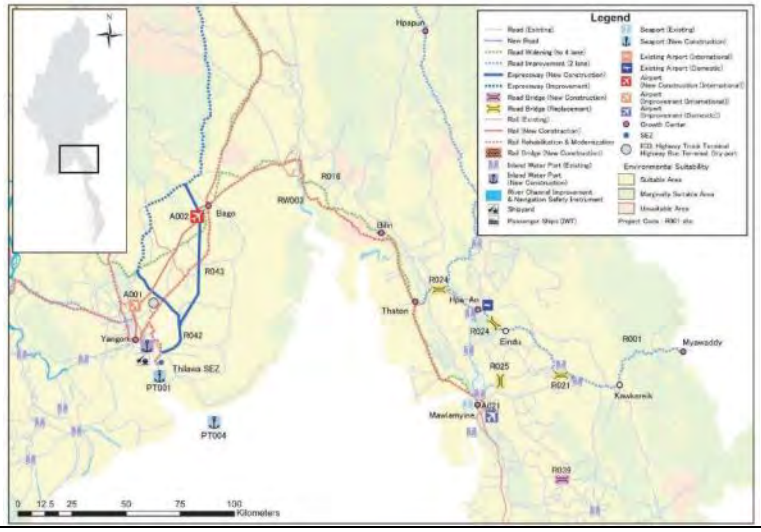
Project Profile

Sub-Sector	Road	
Reference No.	LRP-37	
Project Title	Taunggyi-Loilim-Kyaington Road	
Executing Agency	MoC	
Outline of the Project		
Outline		Location
See R004 in RHS figure. (Source: NTMP) 677km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)		
Estimated Cost (US$ million)	481 (Source: MoC)	Schedule: Mid-long

Project Profile

Sub-Sector	Road	
Reference No.	LRP-38	
Project Title	Don Tha Mi and Naung Lon Bridge	
Executing Agency	MoC	
Outline of the Project		
Outline		Location
See R024 in RHS figure. (Source: NTMP) Replacement L=200m+120m (Source: NTMP)		
Estimated Cost (US$ million)	12 (Source: MoC)	Schedule: Mid-long

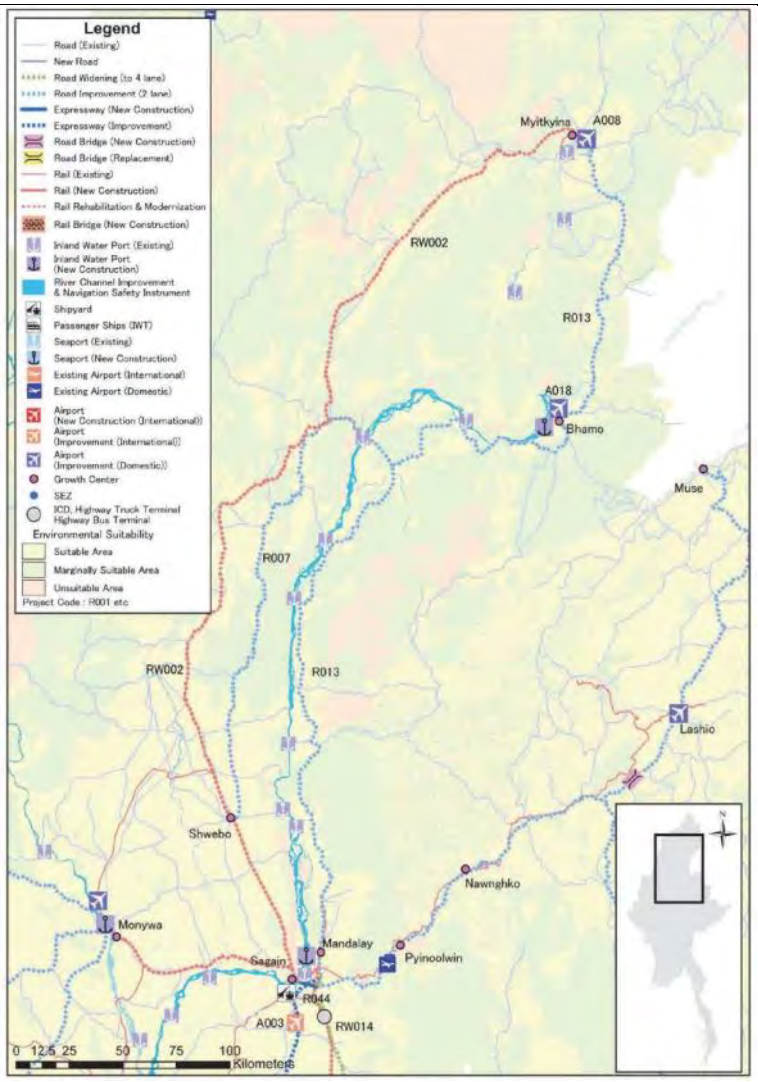
Project Profile

Sub-Sector	Road	
Reference No.	LRP-39	
Project Title	Chaungnitkwa Bridge	
Executing Agency	MoC	
Outline of the Project		
Outline		Location
See R039 in RHS figure. (Source: NTMP) New bridge L=360m (Source: NTMP)		
Estimated Cost (US$ million)	10 (Source: MoC)	Schedule: Mid-long

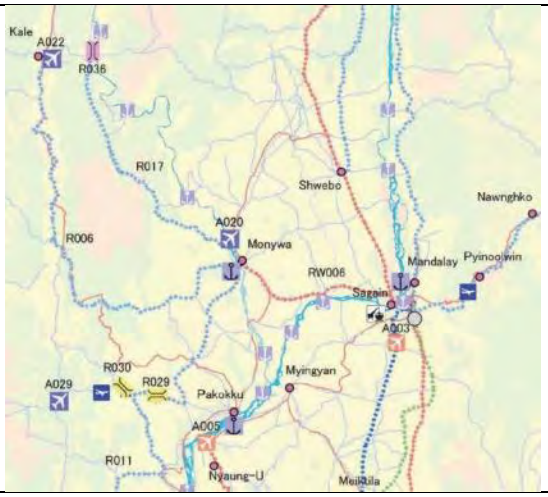
Project Profile

Sub-Sector	Road
Reference No.	LRP-40
Project Title	Mandalay-Thabeikkyin-Tagaung-Bhamo Road
Executing Agency	MoC

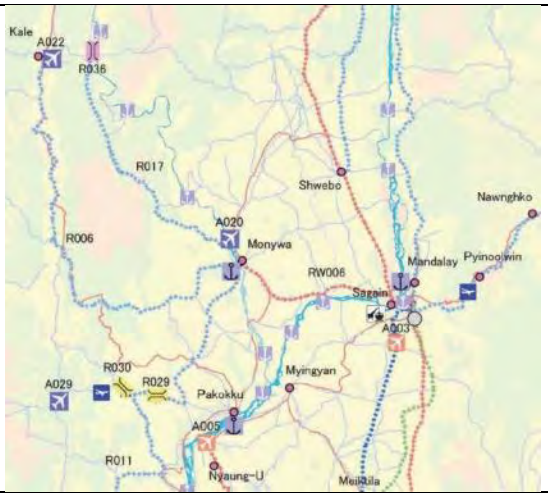
Outline of the Project

Outline	Location
See R013 in RHS figure. (Source: NTMP) 282km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)	
Estimated Cost (US$ million): 200 (Source: NTMP)	Schedule: Mid-long

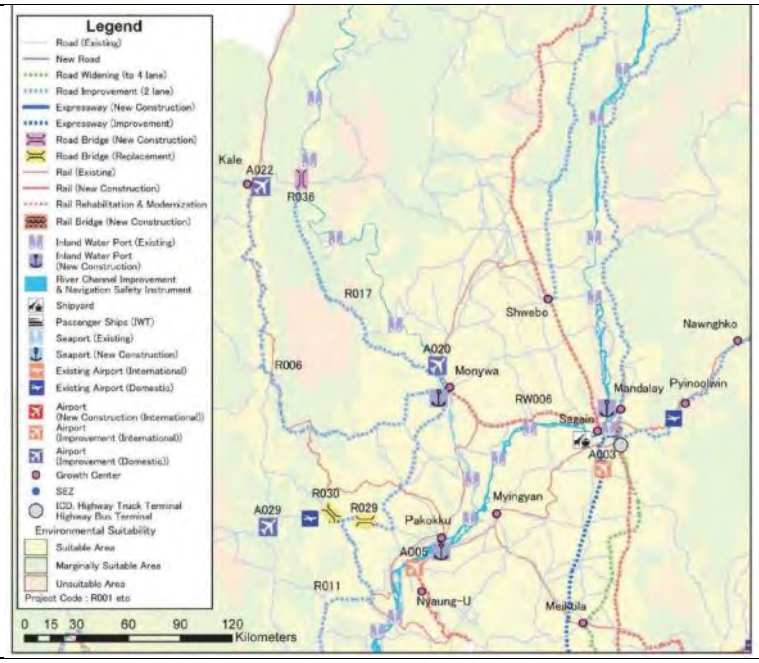
Project Profile

Sub-Sector	Road	
Reference No.	LRP-41	
Project Title	Monywa-Pale-Gangaw-Kalaymyo Road	
Executing Agency	MoC	
Outline of the Project		
Outline		Location
See R006 in RHS figure. (Source: NTMP) 311km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)		
Estimated Cost (US$ million)	221 (Source: MoC)	Schedule: Mid-long

Project Profile

Sub-Sector	Road	
Reference No.	LRP-42	
Project Title	Monywa-Yargyi-Kalewa Road	
Executing Agency	MoC	
Outline of the Project		
Outline		Location
See R017 in RHS figure. (Source: NTMP) 186km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)		
Estimated Cost (US$ million)	132 (Source: MoC)	Schedule: Mid-long

Project Profile

Sub-Sector	Road	
Reference No.	LRP-43	
Project Title	Yaw Chaung (Ohn Taw) Bridge	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
See R030 in RHS figure. (Source: NTMP) Replacement L=760m (Source: NTMP)		
Estimated Cost (US$ million)	21 (Source: NTMP)	Schedule: Mid-long

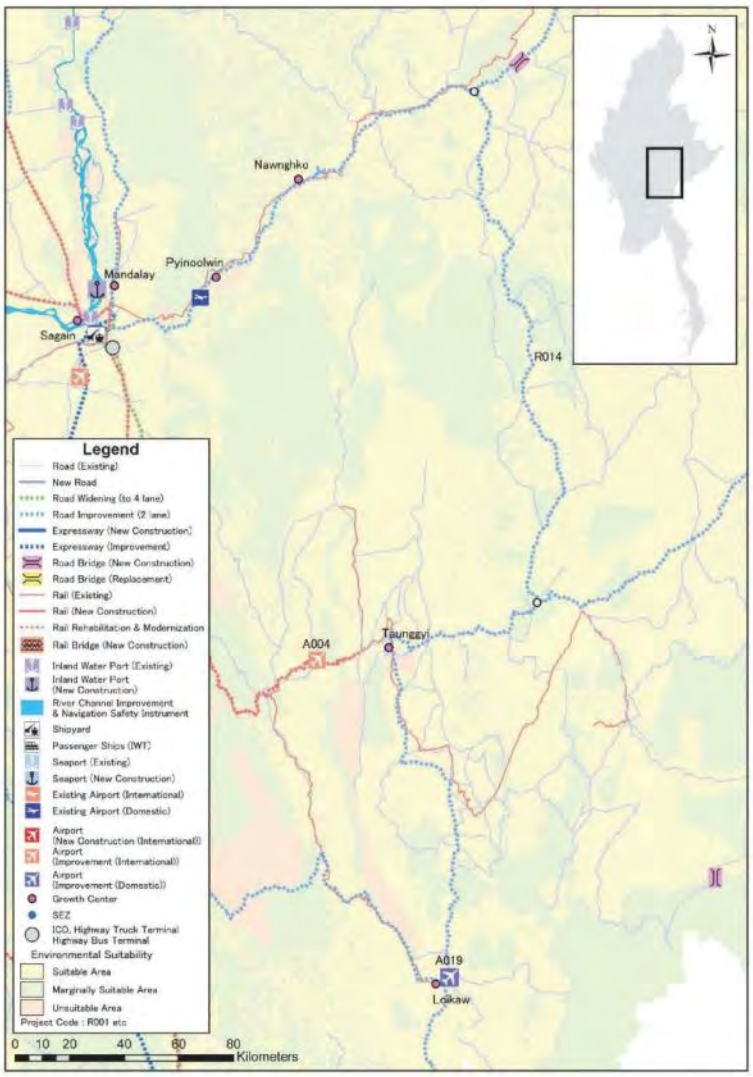
Project Profile

Sub-Sector	Road	
Reference No.	LRP-44	
Project Title	Thanlwin (Tarsotpha) Bridge	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
See R040 in RHS figure. (Source: NTMP) New bridge L=305m (Source: NTMP)		
Estimated Cost (US$ million)	9 (Source: NTMP)	Schedule: Mid-long

Project Profile

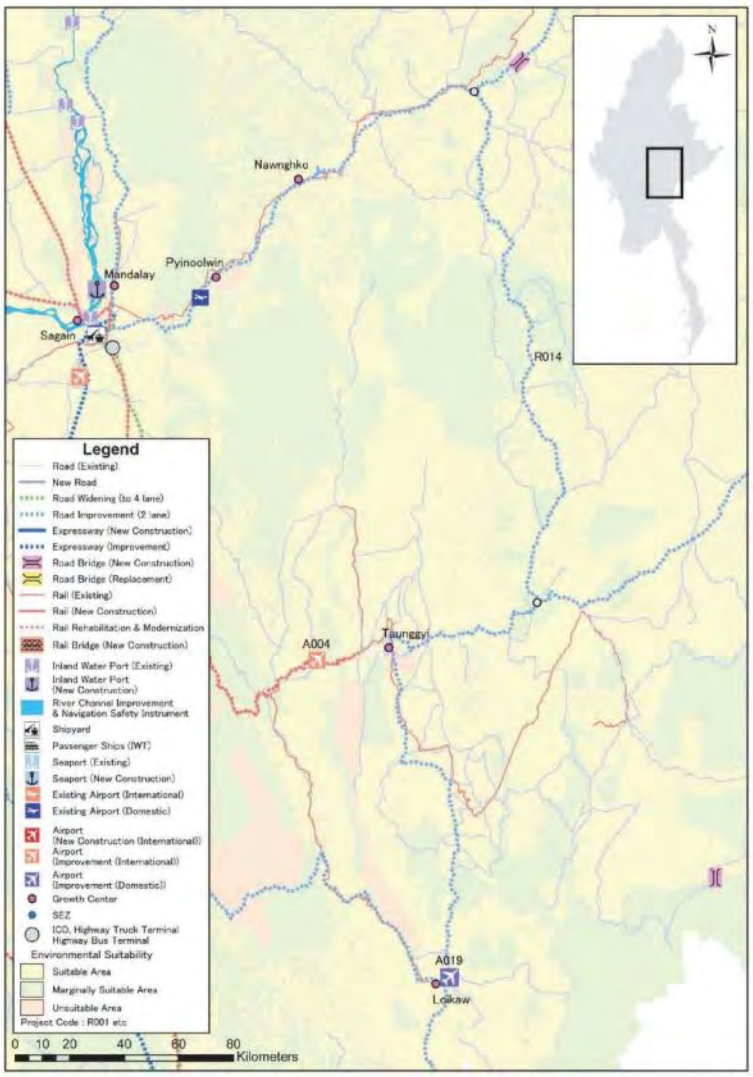
Sub-Sector	Road
Reference No.	LRP-45
Project Title	Thibaw-Loilem Road
Executing Agency	MoC

Outline of the Project

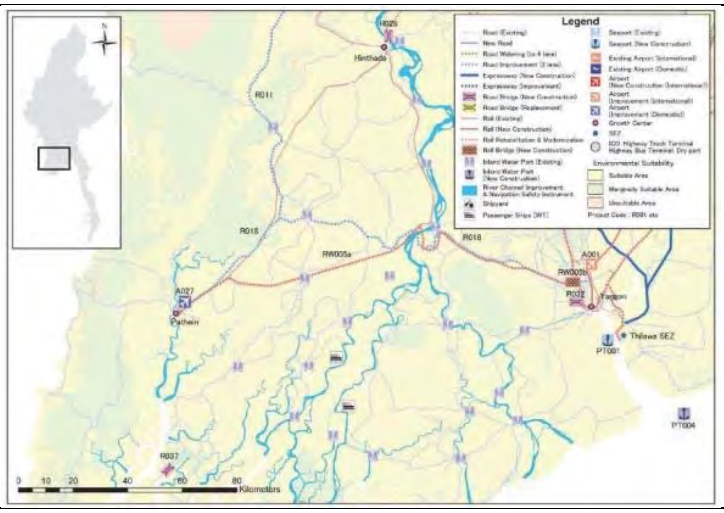
Outline	Location
See R014 in RHS figure. (Source: NTMP) 239km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)	
Estimated Cost (US$ million): 170 (Source: MoC)	Schedule: Mid-long

Project Profile

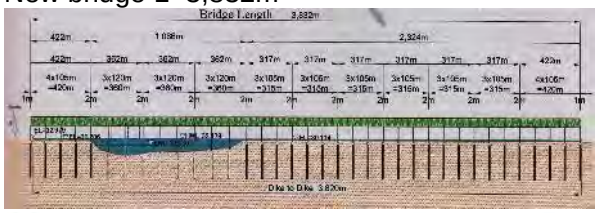
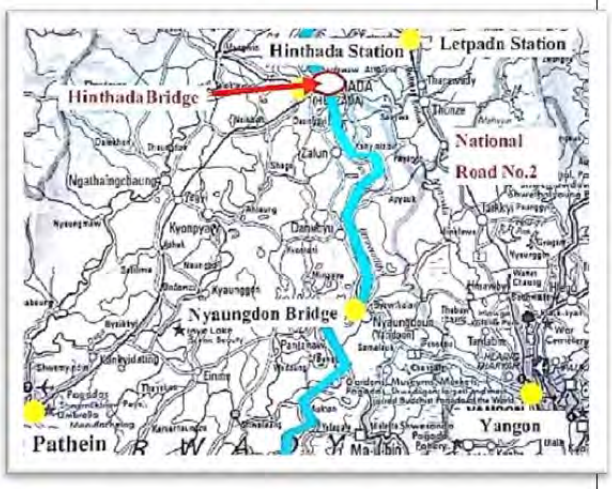
Sub-Sector	Road
Reference No.	LRP-46
Project Title	Taunggyi-Loikaw-Hpapun-Pha an Road
Executing Agency	MoC

Outline of the Project	
Outline	Location
See R019 in RHS figure. (Source: NTMP) 680km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)	
Estimated Cost (US$ million): 482 (Source: MoC)	Schedule: Mid-long

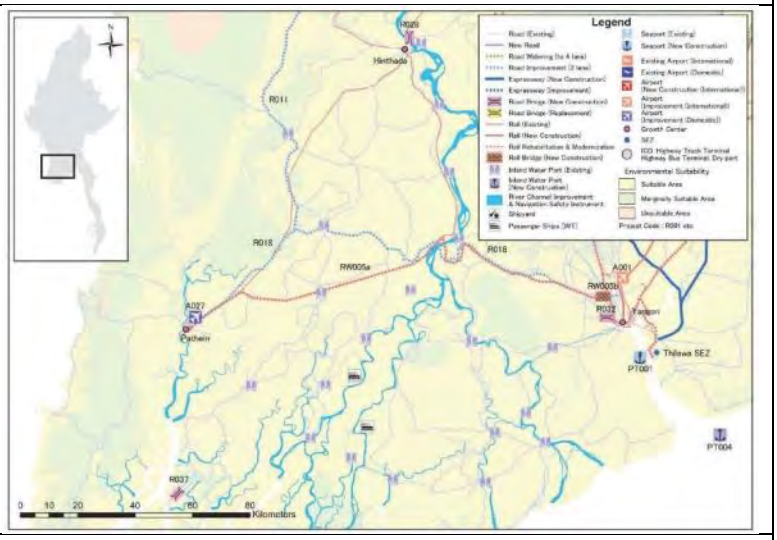
Project Profile

Sub-Sector	Road	
Reference No.	LRP-47	
Project Title	Hlaing River Bridge	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
See R032 in RHS figure. (Source: NTMP) New bridge L=1,200m (Source: NTMP)		
Estimated Cost (US$ million)	42 (Source: NTMP)	Schedule: Mid-long

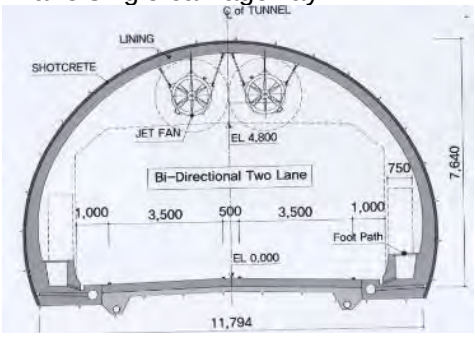
Project Profile

Sub-Sector	Road	
Reference No.	LRP-48	
Project Title	Hinthada Bridge	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
New bridge L=3,832m   (Source: MoC)		
Estimated Cost (US$ million)	202 (Source: NTMP)	Schedule: Mid-long

Project Profile

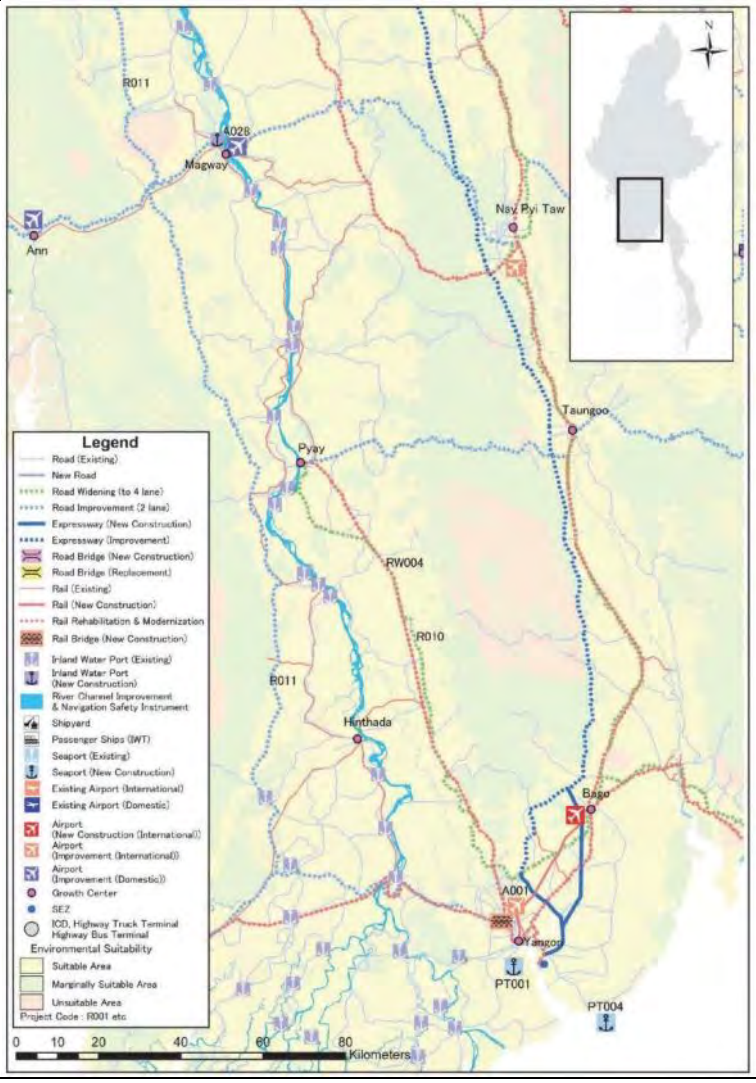
Sub-Sector	Road	
Reference No.	LRP-49	
Project Title	Thetkal Thoung Bridge	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
See R037 in RHS figure. (Source: NTMP) New bridge L=760m (Source: NTMP)		
Estimated Cost (US$ million)	21 (Source: NTMP)	Schedule: Mid-long

Project Profile

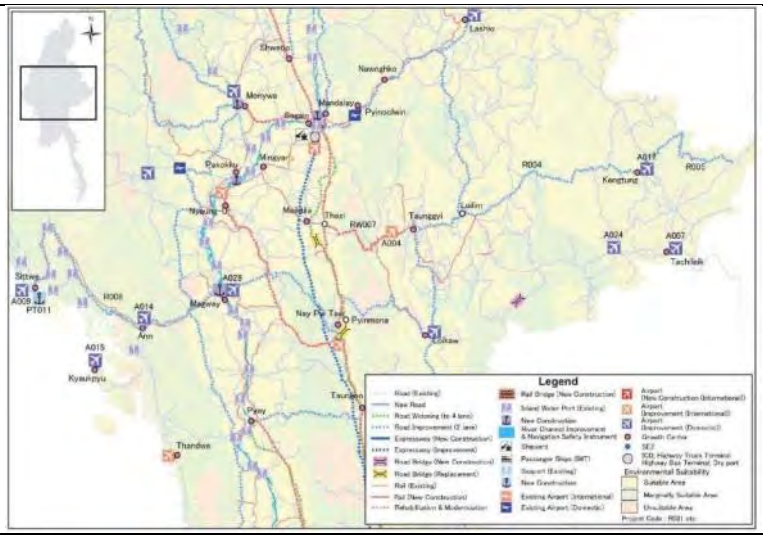
Sub-Sector	Road	
Reference No.	LRP-50	
Project Title	Watalone Tunnel	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
Tunnel length=2,400m 2-lane single carriageway  (Source: NTMP)		
Estimated Cost (US$ million)	97 (Source: MoC)	Schedule: Mid-long

Project Profile

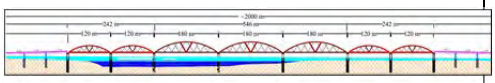
Sub-Sector	Road
Reference No.	LRP-51
Project Title	Monywa-Pathein Road
Executing Agency	MoC

Outline of the Project	
Outline	Location
See R011 in RHS figure. (Source: NTMP) 721km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)	
Estimated Cost (US$ million): 512 (Source: MoC)	Schedule: Mid-long

Project Profile

Sub-Sector	Road	
Reference No.	LRP-52	
Project Title	Kyaington-Mongla Road	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
See R005 in RHS figure. (Source: NTMP) 93km, 2-lane single carriageway Improvement (roughness, pavement, shoulder, et.) (Source: NTMP)		
Estimated Cost (US$ million)	66 (Source: MoC)	Schedule: Mid-long

Project Profile

Sub-Sector	Road	
Reference No.	LRP-53	
Project Title	Ayeyarwaddy (Thayat-Aunglan) Bridge	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
New bridge L=2,300m (Extradosed type)   (Source: MoC)		
Estimated Cost (US$ million)	115 (Source: MoC)	Schedule: Mid-long

Project Profile

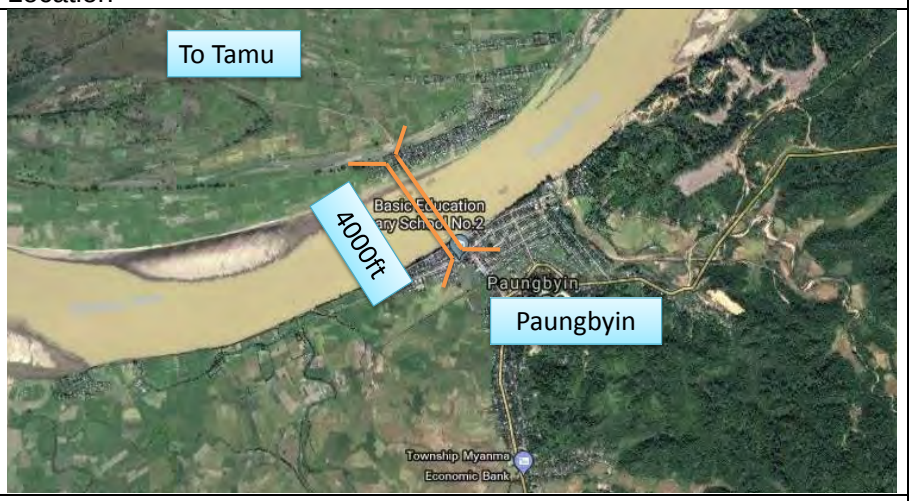
Sub-Sector	Road	
Reference No.	LRP-54	
Project Title	Thanlwin (Kunlone) Bridge	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
New bridge L=240m  (Source: MoC)		
Estimated Cost (US$ million)	15 (Source: MoC)	Schedule: Mid-long

Project Profile

Sub-Sector	Road	
Reference No.	LRP-55	
Project Title	Ayeyarwaddy (Kathar) Bridge	
Executing Agency	MoC	
Outline of the Project		
Outline	Location	
New bridge L=under planning (Source: MoC)		
Estimated Cost (US$ million)	93 (Source: MoC)	Schedule: Mid-long

Project Profile

<table>
<tr><td>Sub-Sector</td><td colspan="3">Road</td></tr>
<tr><td>Reference No.</td><td colspan="3">LRP-56</td></tr>
<tr><td>Project Title</td><td colspan="3">Chindwin (Phaungbyin) Bridge</td></tr>
<tr><td>Executing Agency</td><td colspan="3">MoC</td></tr>
<tr><td colspan="4">Outline of the Project</td></tr>
<tr><td colspan="2">Outline</td><td colspan="2">Location</td></tr>
<tr><td colspan="2">New bridge L=under planning

(Source: MoC)</td><td colspan="2"> 
</td></tr>
<tr><td>Estimated Cost (US$ million)</td><td>25 (Source : MoC)</td><td colspan="2">Schedule: Mid-long</td></tr>
</table>

Project Profile

Serial No.:

Sub-Sector	Railway
Reference No.	LFP-01
Project Title	Development of Freight Railway Station/ ICD at Yangon and Mandalay
Executing Agency	MR
Relevant Ministry	MOTC

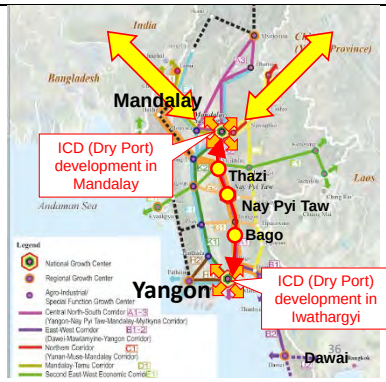
Outline of the Project

Objectives

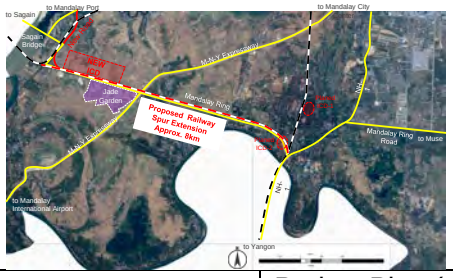
1. To start container freight transportation service by railway as a block train by preparation of railway logistic hub in the axis of Yangon – Mandalay main corridor ends i.e., Yangon and Mandalay.
2. To promote freight railway demand between Yangon and Mandalay.

Conceptual Plan proposed by developers

Location



(Phase-2) New ICD development in Mitinge



Rationale	Project Plan (outline)
1. Handling facilities and freight stations is not designed for container transportation. Containers are used as wagon and it is not handled thus the container transportation service by railway has not commenced substantially. 2. Not only import/export cargo but also national cargo will be handled. Thus the ICD is functioned for national logistic hub as well. 3. The concession agreement will be signed soon between MR and developers. 4. Dry port development is planned in Ywathargyi (Yangon) and Mitinge (Mandalay) by MR. 5. Mitinge new ICD shall be developed after exceeding the demand 800,000 TEU/year	MR has a responsibility to prepare railway track therefore the plan shall be reviewed for actual operation.

Input	Estimated Cost
(Phase-1) Ywathargyi ICD	US$ 40 mil.
Mitinge ICD (Phase-1)	US$ 40 mil.
Mitinge New ICD	US$ 40 mil.
Spur Line Development 8km	US$ 120 mil.
Total Estimated Cost	(Phase-1) $ 80mil. (Phase-2) $160mil.

Schedule

Calendar Year	Start	End
1. Preparation	-	-
2. Feasibility Study	-	-
3. Funding Arrangement	2017	2017
4. Execution	2018	2019
5. Commissioning	2020	-

Expected Output	Container block train service is commenced
Necessity of Technical Assistance	
Remarks	
Up to 800,000 TEU/ year demanded, inside radius 50km from the Dry Port cannot be planned any other ICDs.	

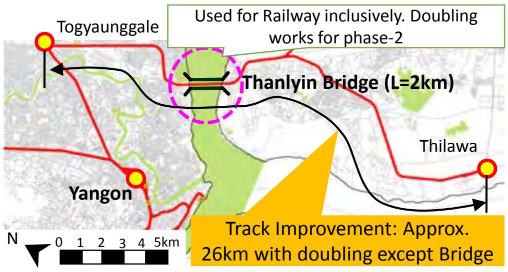
Project Profile

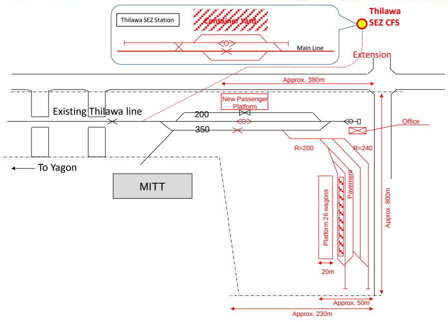
Serial No.:

Sub-Sector	Railway
Reference No.	LFP-02
Project Title	Freight Station Development Project at Thilawa Area with Thilawa Line Improvement Project
Executing Agency	MR
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location
1. To introduce containerized railway system 2. To utilize of Thilawa Area as an international freight center 3. To reduce traffic congestion by modal shifting to railway	





Rationale	Project Plan (outline)
1. The north south axis demand will be sharply increased and streams into Thilawa port. 2. Thilawa SEZ company residents are increased. 3. Thilawa access line will be the important line for freight and passenger transport due to the future development of Thilawa area as a main port, huge SEZ, and a one of sub-center in Yangon. 4. However, the current access railway line to Thilawa is single track and quite poor condition not enough to be the corridor between Yangon and Thilawa	**Phase-1:** New freight station will be constructed besides existing Thilawa Passenger station. The existing platform will be moved to opposite side and prepare container yard there. Whole Thilawa Line Improvement and Double Tracking (26.2km) excepting Thanlwin Br. (2km). **Phase-2:** The line will be extended to Thilawa SEZ area loop line and new station will be constructed in the port area and SEZ. Thanlyin Bridge double tracking works included.

Input	Estimated Cost
Freight sta. yard (Phase-1)	US$ 21mil.
Track improvement and double tracking (Phase-1)	US$ 1,035mil.
Double tracking for Thanlwin Bridge. (Phase-2)	US$ 450mil.
SEZ freight sta. yard (Phase-2)	US$ 11mil.
Total Estimated Cost	US$ 1,517 mil.

Schedule (Phase1/ Phase-2)

Calendar Year	Start	End
1. Preparation	2018/2020	2018/2020
2. Feasibility Study	2018/2020	2020/2022
3. Funding Arrangement	2021/2023	2021/2023
4. Execution	2022/2024	2024/2026
5.commissioning	2024/2027	-

Expected Output	Action Plan
Container Handling Capacity < TEU/year> (Phase-1) 350,000 (Phase-2) 1 million	Feasibility Study shall be started soon.

Necessity of Technical Assistance
Technical assistance is needed

Remarks
Land acquisition and resettlement should be completed prior to the commencement of the construction works. There are rooms to extend existing railway beyond Thilawa station to southern plots. The feasibility shall be confirmed in the further study.

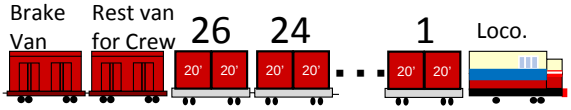
Project Profile

Serial No.:

Sub-Sector	Railway
Reference No.	LFP-03
Project Title	Procurement of Locomotives and Container Freight Wagons
Executing Agency	MR
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location
To enhance container block train service, procure necessary rolling stock.	Diesel Locomotive  Flat Bed Wagon 

Rationale	Project Plan (outline)
1. MR has started operation container freight transportation service. However, MR has many poorly maintained wagons and there is a shortage of fairly maintained wagons to operate freight railway service. 2. Although dry port development project is on-going by MR and developers, to commence fully block train transportation service, number of rolling stocks would be short.	✓ Four trains operation a day is assumed. 

Input	Estimated Cost	Schedule		
Procurement of Locomotives - 7 cars (6 trains sets will be used, 1 set is for backup)	US$ 30 mil.	Calendar Year	Start	End
		1. Preparation	2018	2018
		2. Feasibility Study	2018	2018
Procurement of wagons - 28 wagons x 7 sets (6 trains sets will be used, 1 set is for backup)	US$ 31 mil.	3. Funding Arrangement	2018	2019
		4. Execution	2019	2021
		5. Commissioning	2021	-
Total Estimated Cost	US$ 61 mil.			

Expected Output	Action Plan
Number of freight trains increased	Feasibility Study for rolling stock procurement shall be started soon.

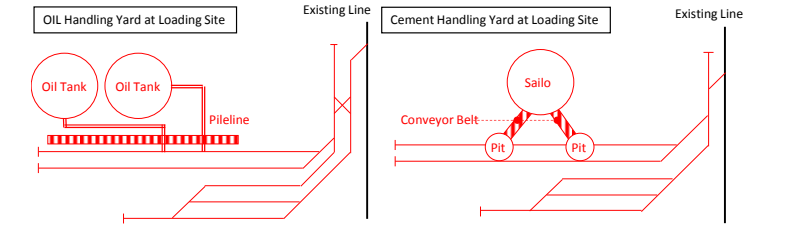
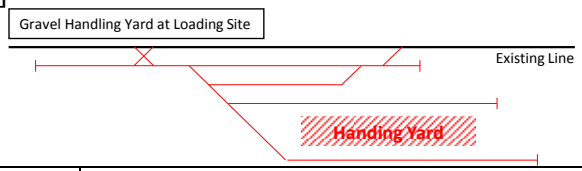
Necessity of Technical Assistance
Remarks
Container Transportation by Railway has started between Yangon and Paleik. The number of trains will be increased according to the demand Number of train set needed shall be studied in feasibility study with the period of procurement.

Project Profile

Serial No.:

Sub-Sector	Railway
Reference No.	LFP-04
Project Title	Bulk Cargo Freight Railway Improvement
Executing Agency	MR
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location
-To enhance the bulk cargo transport by railway.	=Sample layout of bulk yard by cargo= [Oil] [Cement/ fertilizer]  [Gravel] 

Rationale	Project Plan (outline)
- Major transport mode on bulk cargo is by truck. - Railway transport carries heavy cargo in one time. In view of traffic congestion, railway transportation shall be enhanced. - The commodity is assumed such as oil, cement and gravel	The project includes facilities of railway track and the yard only. Handling facility such as pipeline, pit and dump trucks is concessionaire in charge. The exact location of the yard shall be determined in feasibility study.

Input	Estimated Cost
Oil terminal (loading and unloading both sites)	US$ 16mil. (per one terminal set)
Cement Terminal (loading and unloading both sites)	US$ 12mil. (per one terminal set)
Gravel Terminal (loading and unloading both sites)	US$ 16mil. (per one terminal set)
Shunting yard preparation	US$ 4mil.
Total Estimated Cost	US$ 48mil.

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2019	2020
3. Funding Arrangement	2021	2021
4. Execution	2022	2023
5. Commissioning	2024	-

Expected Output	Action Plan
Bulk cargo transportation share by railway is increased.	Feasibility Study for rolling stock procurement shall be started soon.

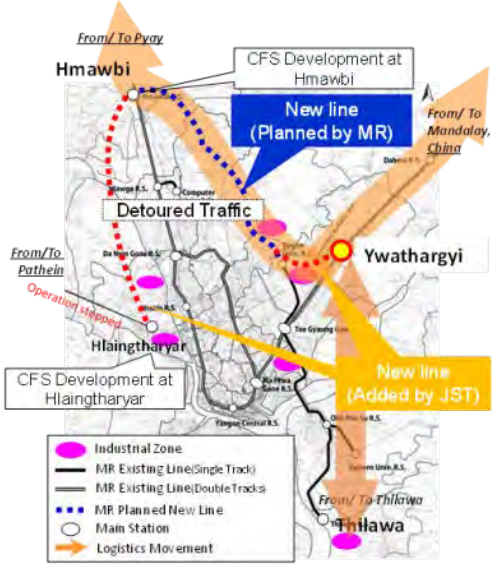
Necessity of Technical Assistance
Remarks
Project cost is variable based on the planned number of freight station.

Project Profile

Serial No.:

Sub-Sector	Railway
Reference No.	LFP-05
Project Title	Yangon Outer Ring Freight Railway Development Project
Executing Agency	MR
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location
1. To detour freight railway traffic in YGN center area 2. To suburbanize distribution center 3. To centralize the cargo from western side of Myanmar	

Alignment Image

Rationale	Project Plan (outline)
1. MR conducted the feasibility study between Dagon university and Hmawbi station 2. Dry port is planned at Ywathargyi and it will be the hub of logistics 3. Yangon city area is heavy congested	-New alignment planned between Dagon university and Hmawbi and the loop line to Ywathargyi (Phase-1) - Container Freight Station (CFS) also be constructed in North Okkalapa Industrial Zone - Western half will be developed in phase-2

Input	Estimated Cost
Eastern half new line const. (Ywathargyi ~ Hmawbi sta. 37km; Phase-1) with passenger stations	US$ 555mil.
2 container freight stations	US$ 16mil.
Ywathargyi Loop Line (6.5km)	US$ 47mil.
Western half new line const. (Hmawbi ~ Hlaingtharyar sta. 31km; Phase-2)	US$ 465mil.
1 container freight sta. and bridge	US$ 48mil.
Total Estimated Cost	App. US$ 1,130mil.

Schedule (Phase-1/Phase-2)

Calendar Year	Start	End
1. Preparation	2020/2022	2020/2022
2. Feasibility Study	2020/2022	2022/2024
3. Funding Arrangement	2022/2025	2023/2025
4. Execution	2023/2026	2025/2028
5. Commissioning	2026/2029	-

Expected Output	Action Plan
Railway traffic is detoured from Yangon CBD Area	-

Necessity of Technical Assistance
Technical assistance is needed.
Remarks
Alignment shall be studied.

Project Profile

Serial No.:

Sub-Sector	Railway
Reference No.	LFP-06
Project Title	ICDs Development proposed by UNESCAP
Executing Agency	MR
Relevant Ministry	MOTC

Outline of the Project

Objectives

To support logistics hub improvement in Myanmar

Image of Main ICD

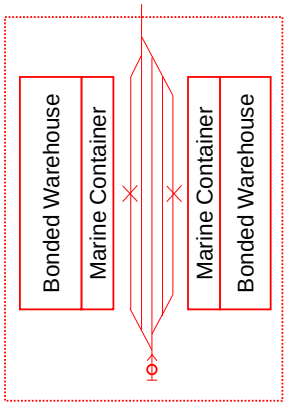
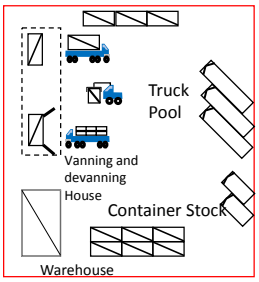
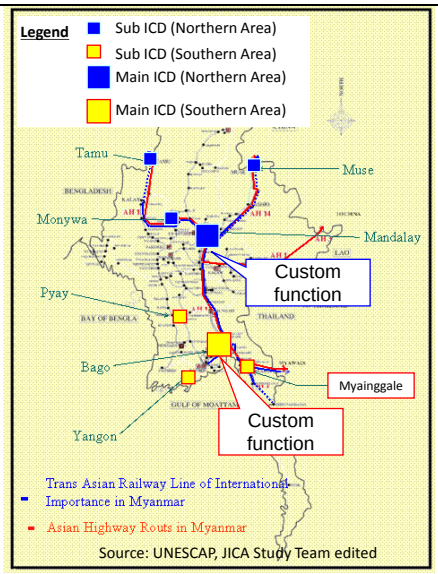


Image of Sub ICD



Location



Rationale

- Eight (8) ICDs are proposed to develop as intergovernmental agreement in 2013 by UNESCAP.
- Two (2) ICDs i.e., Ywathargyi in Yangon and Mitinge in Mandalay have been tendered and those are under progress of the development between MR and developers so far.
- The other six (6) ICDs i.e., Bago, Muse, Tamu, Monywa, Pyay and Mawlamyine ICD are not studied for future development.
- Myaingkalay is 40km northern away from Mawlamyine. It connected rail and the way to Myawaddy, the border to Thailand. The one is the candidate for ICD instead of Mawlamyine.
- The function shall be set according to the necessity. The Major ICD and Sub ICD functions are proposed. In detail shall be studied in the FS.

Project Plan (outline)

The feasibility study includes as follows;
-To Identify the location of freight station
-To analyze the cargo demanded by each location
-To study connectivity with access road
-To study the requirement functions on each location
-Train operation plan
-To estimate preliminary cost
-To prioritize the ICD development

Input	Estimated Cost
ICD development	US$ 20 mil. x 6 Locations
Total Estimated Cost	US$ 120mil.

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2019	2020
3. Funding Arrangement	2021	2021
4. Execution	2022	2023
5. Commissioning	2024	

Expected Output	Action Plan
The Freight Hub will be introduced in Myanmar	Feasibility Study shall be started soon.

Necessity of Technical Assistance

Technical assistance is needed.

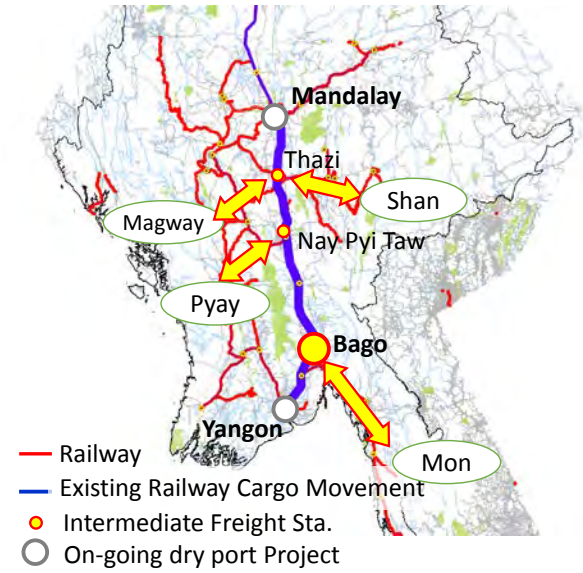
Remarks

Project Profile

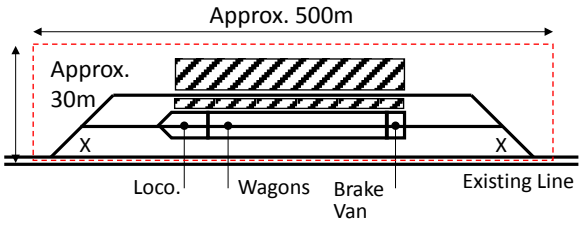
Serial No.:

Sub-Sector	Railway
Reference No.	LFP-07
Project Title	Intermediate Freight Station Improvement
Executing Agency	MR
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location
-To connect between axis of Yangon – Mandalay line and regional area	

=Image of Intermediate Station Layout=



Rationale	Project Plan (outline)
-Container freight railway service is planned between Yangon and Mandalay. -The cargo shall be collected not only Yangon and Mandalay, but also other regions. -The intermediate station functions as a deliver center to/from sub regions on Yangon-Mandalay axis.	The project includes as follows; -Container yard -Handling line x 2 *Bago station for Phase-1, Thazi and Nay Pyi Taw for Phase-2 development.

Input	Estimated Cost	Schedule (Phase-1/Phase-2)		
Container Freight station development	US$ 8mil. x 3 locations	Calendar Year	Start	End
		1. Preparation	2019/2023	2019/2023
		2. Feasibility Study	2019/2023	2019/2023
		3. Funding Arrangement	2020/2024	2020/2024
		4. Execution	2021/2025	2021/2025
		5. Commissioning	2022/2026	-
Total Estimated Cost	US$ 24mil.			

Expected Output	Action Plan
	Feasibility Study will be stated after commencement of Yangon and Mandalay ICD construction

Necessity of Technical Assistance
Remarks

Project Profile

Serial No.:

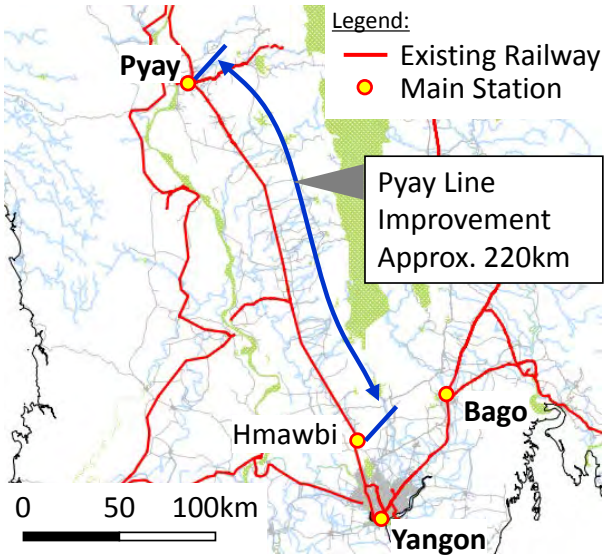
Sub-Sector	Railway
Reference No.	LFP-08
Project Title	Yangon - Pyay Line improvement (Pyay – Hmawbi)
Executing Agency	MR
Relevant Ministry	MOTC

Outline of the Project

Objectives

- To utilize Pyay Line for freight transportation

Location



Rationale

-

Project Plan (outline)

Input	Estimated Cost
Track improvement (220km)	US$ 308mil.
Freight station development in Pyay *Handling facilities are not included.	US$ 6mil.
Total Estimated Cost	US$ 314mil.

Schedule		
Calendar Year	Start	End
1. Preparation	2025	2025
2. Feasibility Study	2025	2026
3. Funding Arrangement	2027	2027
4. Execution	2028	2030
5. Commissioning	2031	2031

Expected Output

Pyay line functions not only for passenger but also freight use.

Action Plan

Necessity of Technical Assistance

Remarks

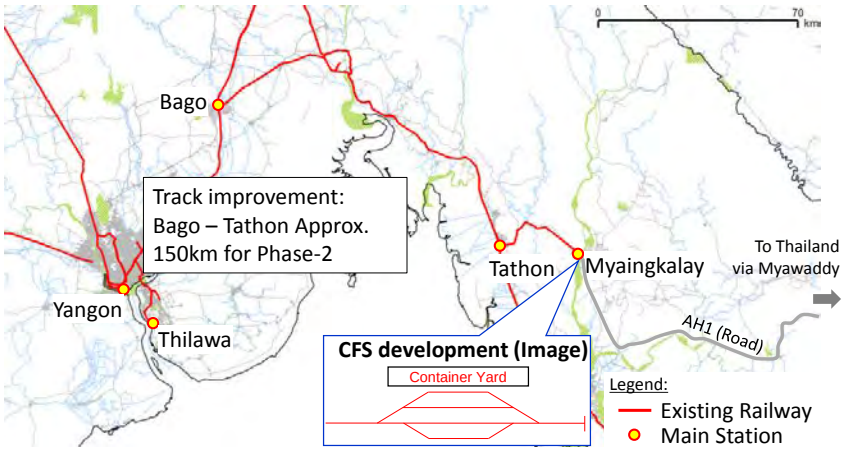
The project also planned by China fund.

Project Profile

Serial No.:

Sub-Sector	Railway
Reference No.	LFP-09
Project Title	Myaingkalay CFS Development Project
Executing Agency	MR
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location
- To enhance the transport improvement between Myanmar and Thailand via Myawaddy with railway	

Rationale	Project Plan (outline)
- 35 bogie wagons with haulage 1,100 tons in use as bulk transportation by railway - The cargo from Thailand by truck is demanded at Myaingkalay and it can be reloaded into railway as container transportation	The project includes; -Myaingkalay container freight station development

Input	Estimated Cost
Freight station development *Handling facilities are not included.	US$ 14mil.
Total Estimated Cost	US$ 14mil.

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2018	2018
3. Funding Arrangement	2019	2019
4. Execution	2020	2020
5. Commissioning	2021	-

Myaingkalay is used for intermodal hub between truck and railway from/to Myawaddy

Necessity of Technical Assistance

Remarks

Project Profile

Serial No.:

Sub-Sector	Railway
Reference No.	LFP-10
Project Title	Kyaikkhami Freight Terminal Development and Upgrading of Bridges
Executing Agency	MR
Relevant Ministry	MOTC

Outline of the Project

Objectives

-To utilize the proposed new grain terminal port as the intermodal hub.

Location

Rationale

- Kyaikami is the candidate for deep sea port in Myanmar.
- The area is not far from existing railway and it would be better to transport long distance by railway.

Project Plan (outline)

The project includes:
-Spur line between Kyaikami planned port and railway.
-Railway yard for bulk cargo development
- Long span bridge (L=2.3km) improvement works included

Input	Estimated Cost
New Spur line (17km)	US$ 255mil.
Freight Station Development (Oil, Cement and gravel terminal, shunting yard included)	US$ 25mil.
Railway Bridge Rehabilitation	US$ 135mil.
Total Estimated Cost	US$ 415 mil.

Schedule

Calendar Year	Start	End
1. Preparation	2021	2021
2. Feasibility Study	2021	2021
3. Funding Arrangement	2022	2022
4. Execution	2023	2024
5. Commissioning	2025	2025

Expected Output

Railway cargo is transported from Kyaikami port.

Action Plan

-

Necessity of Technical Assistance

Remarks

Kyaikami port development plan has not fixed yet and the plan shall be determined accordingly.

Project Profile

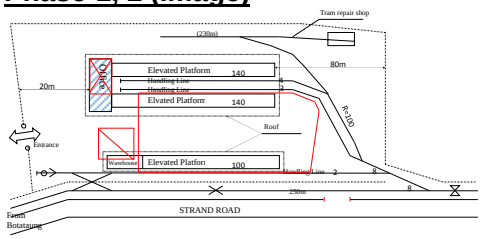
Serial No.:

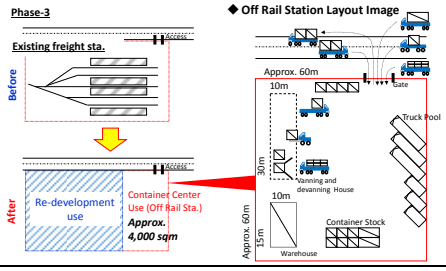
Sub-Sector	Railway
Reference No.	LFP-11
Project Title	Improvement of Yangon CBD Freight station
Executing Agency	MR
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location
1. To introduce containerized railway system 2. To utilize existing freight station 3. To increase non-railway revenue 4. To enhance urban development in Yangon CBD	**Phase-3** ✓ Container delivery service will operated by MR ✓ Saved Land Development

Phase-1, 2 (Image)





Rationale	Project Plan (outline)
1. Existing car loading service needs manual handling and takes longer deliver time of freight railway 2. Cargo is left at station yard until train departure or forwarder arrival and it worsen cargo condition. 3. Freight train operation causes traffic congestion in CBD area, it will be needed to close in long term	**Phase-1:** Container yard and handling facility preparation with car loading service continued in Yangon and Mandalay freight station (one station each) **Phase-2:** Container centralized freight station development in Yangon and Mandalay freight station (one station each) **Phase-3:** Stop freight railway service and shrink freight station function to container center operated in Yangon freight station. The saved area will be used for development purpose.

Input	Estimated Cost
Phase-1 Phase-2 Phase-3 *Handling facilities are not included.	US$ 4 mil. US$ 4 mil. US$ 2 mil. (per station)
Total Estimated Cost	US$ 10 mil.

Schedule (Phase-1/Phase-2/Phase-3)

Calendar Year	Start	End
1. Preparation	2017/2020/2024	2017/2020/2024
2. Feasibility Study	2017/------/2024	2017/------/2025
3. Funding Arrangement	2017/2020/2025	2018/2021/2025
4. Execution	2018/2021/2016	2018/2021/2026
5. Commissioning	2018/2021/2026	2018/2021/2026

Expected Output	Action Plan
Capacity of container handling <TEU/year> (Phase-1) 15,000 (Phase-2) 27,000	Feasibility Study shall be started soon.

Necessity of Technical Assistance
Operation know-haw from JRF
Remarks
Station selection shall be involved MR for phase-1 and phase-2. The timing shall be deeply discussed for freight railway service closure with MR in phase-3.

Project Profile

Serial No.:

Sub-Sector	Railway
Reference No.	LFP-12
Project Title	Thilawa Bago New Line Development
Executing Agency	MR
Relevant Ministry	MOTC

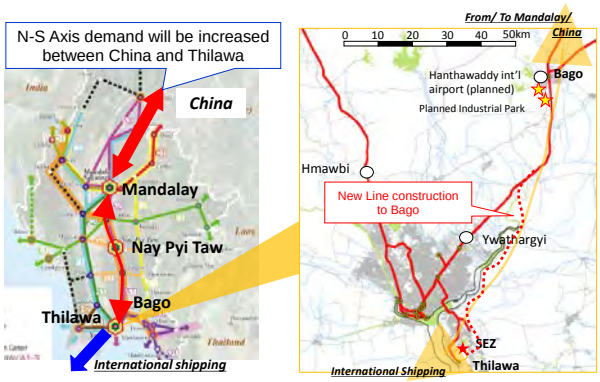
Outline of the Project

Objectives

1. To detour existing Thanlyin bridge
2. To improve track axle load

Location

Alienment Image



Rationale

1. The north south axis demand will be sharply increased and streams into Thilawa Area from China
2. Hanthawaddy international airport will be constructed and the industrial zone is planned

Project Plan (outline)

-New alignment will be planned crossing Bago river.
-The Length of route is approximately 60km.
-Possible to avoid resettlement
-The route mainly along road and river for less land acquisition

Input	Estimated Cost
-New track (57km)	US$ 855 mil.
-Bridge preparation	US$ 20 mil.
Total Estimated Cost	App. US$ 875 mil.

Schedule

Calendar Year	Start	End
1. Preparation	2025	2025
2. Feasibility Study	2025	2026
3. Funding Arrangement	2027	2027
4. Execution	2028	2030
5. Commissioning	2031	2031

Expected Output	
Carrying capacity	1.6 times (Axle load 12.5 tons to 20tons)

Action Plan

Necessity of Technical Assistance

Remarks

Expected Key Potential Impact and Mitigation Measures for Target Project

Project - Thilawa Bago New Line Development	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< Construction Phase > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Disruption and loss of productive top soil from agricultural fields due to creation of borrow pits and development of detour section • Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills • Proper disposal of used bentonite slurry
< Operation Phase > • Noise and vibration due to movement of trains and related facilities	• New technologies incorporated to lower noise and vibration generation with respect to structures and rolling stocks • Use of long welded rails • Appropriate maintenance of locomotives and tracks
• Wastewater generated from rail depot, train washing, heavy cleaning, workshops and maintenance activities	• Installation of wastewater treatment system • Reuse of treated water by removal of suspended solids, oil and grease, organic matter and neutralization of pH through waste water treatment plant
Natural Environment	
< Construction Phase > • Increased incidence and duration of floods due to obstruction of natural drainage courses by the embankment	• Provision of adequate drains along the track • Augmentation of capacity of existing drainage works • Provision of adequate drainage works for smooth passage of runoff to avoid flooding and formation of water pool
• Loss of flora due to felling of trees along the ROW	• Compensation for forest land and trees to be felled in forest area and private land • Mixed plantation consisting of flowering shrubs and evergreen ornamental trees
< Operation Phase > • Impact to local drainage due to formation of railway embankment	• Provision of longitudinal drains of sufficient capacity on both sides of the track to accommodate increased run-off.
• Effect on aquatic fauna in case of accidental oil spill and toxic chemical release into water bodies	• Contingent actions for speedy cleaning up of oil spills, fuel and toxic chemicals in the event of accidents
• Restriction of the movement of wildlife on either side of the track	• Provision of animal underpasses for wildlife near forest areas
• Collision of wildlife with train	• Provision of fencing, if feasible, along rail way in wildlife habitat concentration areas to avoid collision.
Social Environment	
<Pre-Construction Phase > • Loss of livelihood and properties	• Compensation and assistance package will be planned in the Rehabilitation and Resettlement Plan, separately from the EIA.
<Construction Phase > • Disturbance of vehicle traffic and pedestrian passage	• Provision of detour with adequate sign board and instruction
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

Serial No.:

Sub-Sector	Railway
Reference No.	LFP-13
Project Title	Mandalay – Muse New Railway Line Development (Implementation)
Executing Agency	MR
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location ; Muse-Lasho-Kyaukmae-Pyinoolwin-Mandalay (431.0) Km
● To meet with increasing cargo demand on the regional transportation network; ● To improve and expand the existing infrastructure; ● To upgrade the efficiency of operation of linkage between Muse the border city of Myanmar with China and Mandalay as a central hub of northern Myanmar: and ● To enhance railway cross-border cargo transport between Myanmar and China, and also to connect Trans Asian Railway (TAR) network.	
Rationale	Project Plan (outline)
● It is an important part of Myanmar-China international passageway that provide an access to the sea port for China; ● It is an important part of western Corridor for Trans-Asia Railway network. ● It enhances the economic and trade exchange in large volume through the logistics corridor by a rapid freight transport mean.	● To prepare a detailed and comprehensive Feasibility Study report.

Input	Estimated Cost (US$ollar)
Feasibility study on the development of a railway linking Muse and Mandalay with standard gauge and 20 ton axle load railway track. The estimated cost of the project is US$ 5.0 billion.	US$ 5 billion
Total Estimated Cost for F/S	US$ 5 billion

Schedule		
Calendar Year	Start	End
1. Preparation	2018	2019
2. Feasibility Study	2020	2022

Expected Output	Action Plan
● Lower the transport cost ● Shorter the lead time	Conduct feasibility study

Necessity of Technical Assistance
Technical and Financial Viability Study
Remarks

Project Profile

Serial No.:

Sub-Sector	Railway
Reference No.	LFP-14
Project Title	Mandalay – Tamu New Railway Line Development (Implementation)
Executing Agency	MR
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location ; Tamu-Kalay-Kalewa-Segyi-Monywa-Mandalay
● To meet with the increasing cargo demand on the regional transportation network; ● To improve and expand the existing infrastructure; ● To upgrade the efficiency of operation and connectivity between Tamu the border city of Myanmar with India and Mandalay as a central hub of northern Myanmar; and ● To enhance railway cross-border cargo transport between Myanmar and India; and ● To connect Trans Asian Railway (TAR) network.	

Rationale	Project Plan (outline)
● Since 1990, India continuously strives to strengthen diplomatic, trade and investment relation with Myanmar. ● Existing railway line linking Pakkokku – Gangaw - Kalay is an approach to the border with India does not meet with an international standard condition.	● To finalize the route alignment of missing rail link between India and Myanmar. ● To make a Feasibility Study report. ● The study will find a feasible railway route ● To meet updated demand Forecast.

Input	Estimated Cost (US$ollar)	Schedule		
Feasibility study on the development of a railway linking Tamu and Mandalay with standard gauge and 20 ton axle load railway track. The estimated cost of the project is US$ 5.8 billion.	US$ 3.0 mil.	Calendar Year	Start	End
		1. Preparation	2018	2019
		2. Feasibility Study	2020	2022
Total Estimated Cost for F/S	US$ 3.0 mil.			

Expected Output	Action Plan
Lower the transport cost Shorter the lead time	Proposed to the Government of India in line with the SASEC program to arrange the technical assistance to conduct the F/S

Necessity of Technical Assistance
Technical and Financial Viability Study
Remarks

Project Profile

Serial No.:

Sub-Sector	Railway
Reference No.	LFP-15
Project Title	High Speed Railway Linking Between Yangon and Hanthawaddy (Implementation)
Executing Agency	MR
Relevant Ministry	MOTC

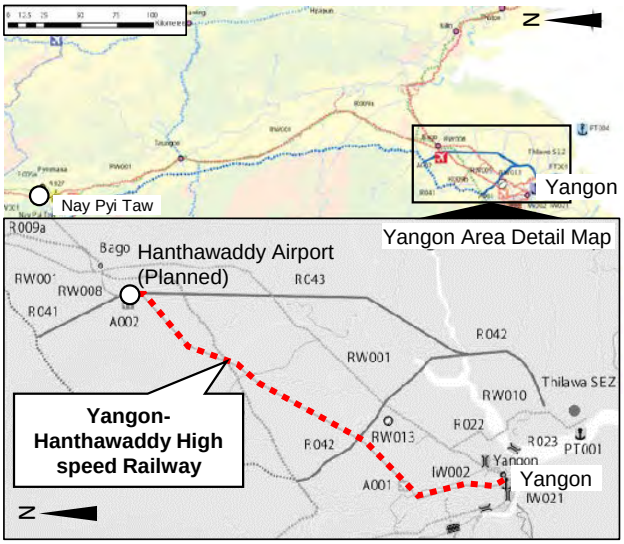
Outline of the Project

Objectives

- To develop a new railway link as a rapid access for the passenger movement between Yangon and newly built Hanthawaddy International Airport of which location is around 77 km away from Yangon.

Location

Alignment Image



Source: NTMP, JST Edited

Rationale

- A rapid passenger transport mean is needed to meet with the passenger demand for accessing between the newly built international airport and the capital city Yangon.

Project Plan (outline)

- New railway line will be prepared between Yangon and Hanthawaddy planned international airport

Input	Estimated Cost (US$ million)
Conduct feasibility study between Yangon and Hanthawaddy by High speed railway	US$ 1,466 mil.
Total Estimated Cost	US$ 1,466 mil.

Schedule

Calendar Year	Start	End
1. Preparation	2018	2019
2. Feasibility Study	2020	2022

Expected Output

A rapid access connecting between the Hanthawaddy International Airport and Yangon City

Action Plan

Conduct the feasibility study

Necessity of Technical Assistance

Feasibility study is needed.

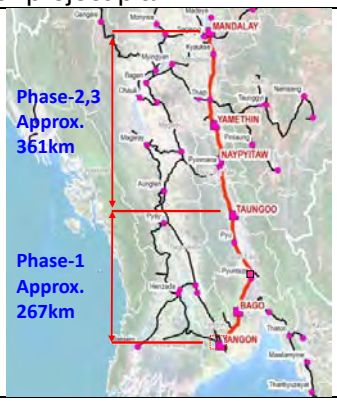
Remarks

The target year of completing the Hanthawaddy International Airport is 2023.

Project Profile

Sub-Sector	Railway
Reference No.	LFP-16
Project Title	Yangon-Mandalay Railway Track Improvement
Executing Agency	MR
Relevant ministries	MOTC

Outline of the Project

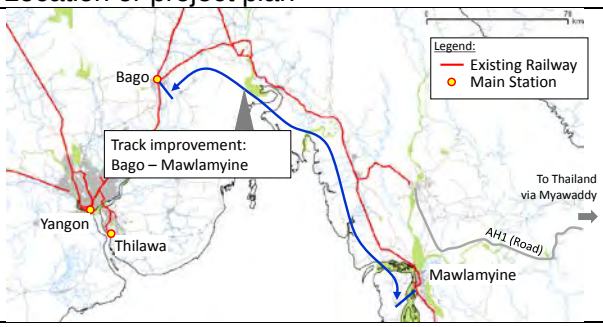
Objectives	Location or project plan
● Existing railway condition is quite poor due to unexperienced track maintenance and old-fashioned railway system. ● Yangon – Mandalay axis is selected as the priority corridor in NTMP. ● In this project, existing railway system between Yangon and Mandalay to be modernized in three phases.	

Input	Estimated Cost (US$ million)	Schedule (Phase-1/Phase-2,3)		
Railway improvement and modernization	1,283	Calendar year	Start	End
		1. Preparation	--	--
		2. Feasibility Study	----/ 2018	---- /2018
		3. Funding Arrangement	---- /2017	---- /2018
		4. Execution	2018/2019	2020/2024
		5. Commissioning	2021/2025	
Total	1,283			

Project Profile

Sub-Sector	Railway
Reference No.	LFP-17
Project Title	Bago-Mawlamyine Line Improvement
Executing Agency	MR
Relevant ministries	MOTC

Outline of the Project

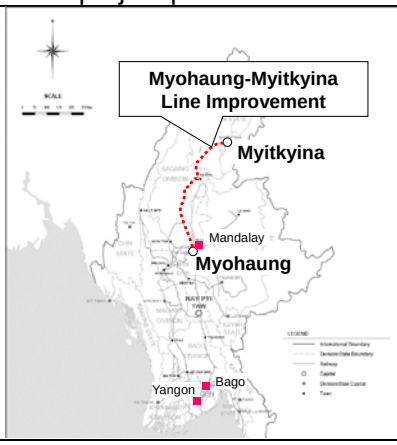
Objectives	Location or project plan
● To improve railway infrastructure and enhance railway transport services along the priority corridors (e.g. Yangon – Mandalay Section, Yangon - Hanthawaddy / Bago Section, **Bago - Mawlamyine Section**, Yangon-Pyay Section) on NTMP	

Input	Estimated Cost (US$ million)	Schedule		
Railway improvement and modernization	268	Calendar year	Start	End
		1. Preparation - Execution	2017	2026
		2. Commissioning	2027	
Total	268			

Project Profile

Sub-Sector	Railway
Reference No.	LFP-18
Project Title	Myohaung-Myitkyina Railway Improvement
Executing Agency	MR
Relevant ministries	MOTC

Outline of the Project

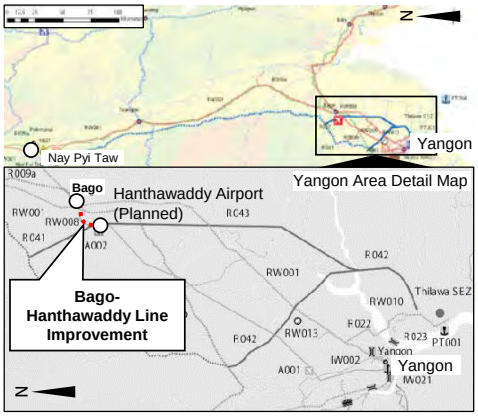
Objectives	Location or project plan
● There are several strategic railway lines that reach cities near international border areas, such as **Myitkyina**, Lashio, Kalay in the north, and Thanbyuzayat and Dawei in the south. ● To aim strategic development, development of international inter-modal facilities in these areas must be considered in coordination with international partners.	

Input	Estimated Cost (US$ million)	Schedule		
Railway improvement and modernization	667	Calendar year	Start	End
		1. Preparation - Execution	2016	2030
Total	667	2. Commissioning	2031	

Project Profile

Sub-Sector	Railway
Reference No.	LFP-19
Project Title	Bago-Hanthawaddy Line Improvement
Executing Agency	MR
Relevant ministries	MOTC

Outline of the Project

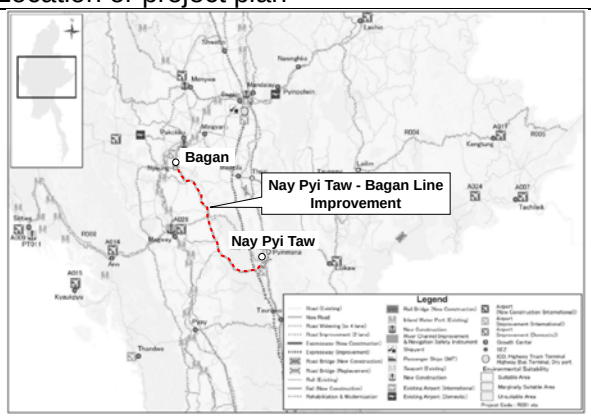
Objectives	Location or project plan
● To improve railway infrastructure and enhance railway transport services along the priority corridors (e.g. Yangon – Mandalay Section, Yangon - **Hanthawaddy / Bago Section**, Bago - Mawlamyine Section, Yangon-Pyay Section) on NTMP.	 Source: NTMP, JST Edited

Input	Estimated Cost (US$ million)	Schedule		
Spur line from Bago to Hanthawaddy Int'l Airport (single track)	21	Calendar year	Start	End
		1. Preparation - Execution	2020	2023
Total	21	2. Commissioning	2024	

Project Profile

Sub-Sector	Railway
Reference No.	LFP-20
Project Title	Nay Pyi Taw – Bagan Line Improvement
Executing Agency	MR
Relevant ministries	MOTC

Outline of the Project

Objectives	Location or project plan
● Special purpose trip such as tourism is aimed.	 Source: NTMP, JST Edited

Input	Estimated Cost (US$ million)	Schedule		
Railway improvement and modernization	406	Calendar year	Start	End
		1. Preparation - Execution	2024	2030
		2. Commissioning	2031	
Total	406			

Project Profile

Sub-Sector	Railway
Reference No.	LFP-21
Project Title	Yangon-Pathein Line Improvement
Executing Agency	MR
Relevant ministries	MOTC

Outline of the Project

Objectives	Location or project plan
● To provide a safe and reliable transport network and related services, as the primary corridor element on NTMP	 Source: NTMP, JST Edited

Input	Estimated Cost (US$ million)	Schedule		
Railway improvement and modernization	175	Calendar year	Start	End
		1. Preparation - Execution	2020	2026
Total	175	2. Commissioning	2027	

Project Profile

Sub-Sector	Railway
Reference No.	LFP-22
Project Title	Myohaung-Monywa Line Improvement
Executing Agency	MR
Relevant ministries	MOTC

Outline of the Project

Objectives	Location or project plan
● To improve the connectivity of Mandalay- Tamu corridor on NTMP	 Source: NTMP, JST Edited

Input	Estimated Cost (US$ million)	Schedule		
Railway improvement and modernization	94	Calendar year	Start	End
		1. Preparation - Execution	2024	2030
Total	94	2. Commissioning	2031	

Project Profile

Sub-Sector	Railway
Reference No.	LFP-23
Project Title	Pyawbwe-Shwenyaung Line Improvement
Executing Agency	MR
Relevant ministries	MOTC

Outline of the Project

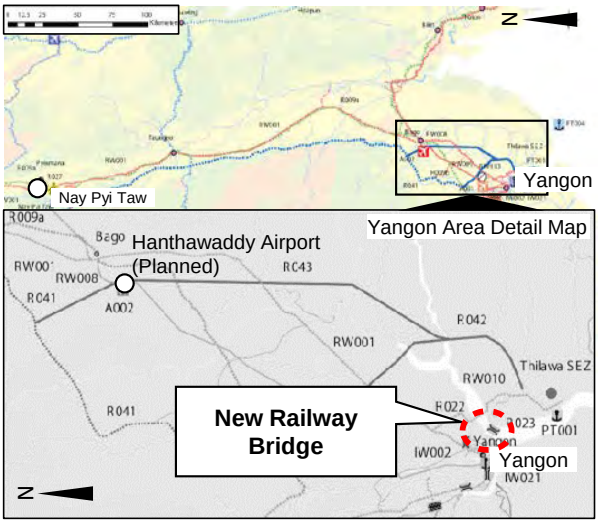
Objectives	Location or project plan
● To provide high-speed and high-capacity railway network and service, connecting major ports and airports.	 Source: NTMP, JST Edited

Input	Estimated Cost (US$ million)	Schedule		
Railway improvement and modernization	282	Calendar year	Start	End
		1. Preparation - Execution	2024	2030
Total	282	2. Commissioning	2031	

Project Profile

Sub-Sector	Railway
Reference No.	LFP-24
Project Title	New Railway Bridge Crossing the Hlaing River
Executing Agency	MR
Relevant ministries	MOTC

Outline of the Project

Objectives	Location or project plan
● To improve the connectivity between west side of Yangon e.g., Hlaingtharyar and center of the Yangon.	 Source: NTMP, JST Edited

Input	Estimated Cost (US$ million)	Schedule		
Railway Bridge Construction	21	Calendar year	Start	End
		1. Preparation - Execution	2020	2026
		2. Commissioning	2027	
Total	21			

Project Profile

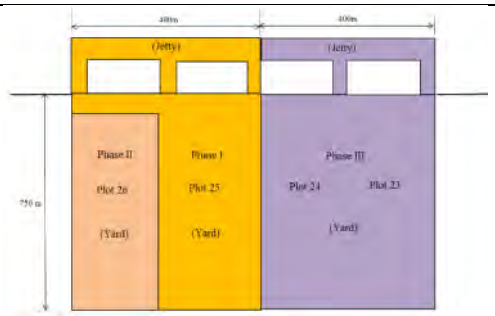
Sub-Sector	Waterborne Transport
Reference No.	LWP-01
Project Title	Yangon Port (Thilawa Terminal) Development
Executing Agency	Myanma Port Authority (MPA)
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. Provide necessary container handling capacity for the future demand of Myanmar after the completion of Thilawa Phase II project.

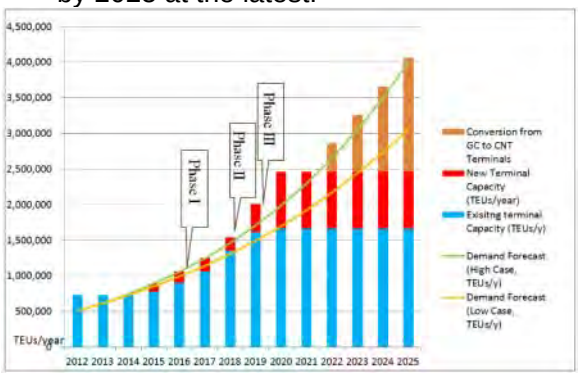
Location



Yangon Port – Thilawa Container Terminal Area

Rationale

1. It is estimated that the container handling capacity at Thilawa area will reach its limit by 2025 at the latest.



Project Plan (outline)

1. Implement the Phase III plan of Thilawa container terminal development project.

Input	Estimated Cost (US$ million)
1. Terminal (L:400 m, B:750 m) (4 berths) with container yard,	330
Total Estimated Cost	330

Schedule

Calendar Year	Start	End
1. Preparation	2019	2019
2. Feasibility Study	2020	2021
3. Funding Arrangement	2022	2022
4. Execution	2023	2026
5. Commissioning	2026	

Result of Evaluation

Expected Output

1. Meet the needs of container handling capacity requirement of Myanmar

Action Plan

1. Preparation of the feasibility study

Necessity of Technical Assistance

1. Conduct a feasibility study

Remarks

Expected Key Potential Impact and Mitigation Measures for Target Project

Project - Improvement of Yangon River Water Transport	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< Construction Phase > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< Operation Phase > • Noise and vibration due to embarkation and disembarkation of vessels as well as cargo and container handling services	• Provision on the schedules for embarkation and disembarkation of vessels • New technologies incorporated to lower noise and vibration generation with respect to the machine for cargo and container handling
Natural Environment	
< Construction Phase > • Effect on aquatic fauna due to the accidental oil spill into water bodies	• Contingent actions for speedy cleaning up of oil spills, fuel and toxic chemicals in the event of accidents
< Operation Phase > • Effect on aquatic fauna in case of accidental oil spill and toxic chemical release into water bodies	
Social Environment	
<Construction Phase > • Disturbance of vehicle traffic	• Provision of detour with adequate sign board and instruction
• Disturbance to water way users	• Prior announcement or notice of construction activities and schedule for water way
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

Sub-Sector	Waterborne Transport
Reference No.	LWP-02
Project Title	Yangon Port (Domestic Port) Improvement
Executing Agency	Myanma Port Authority (MPA)
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To redevelop the narrow Lamadaw Area and Kyeemyindan Area.
2. To utilize a part of the area adjacent to the waterfront for the urban development of Yangon.
3. To increase the cargo handling productivity of coastal shipping and inland water transport

Location

1. Lamadaw Area

2. Kyeemyindang Area

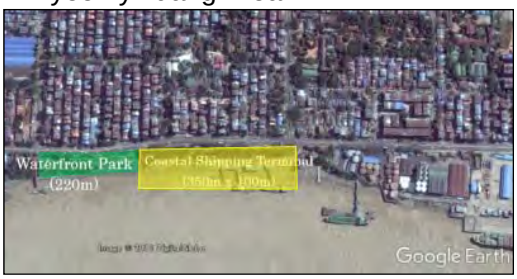
Rationale

1. Both the Lamadaw Area and Kyeemyindang Area are narrow and adjacent to the city area.
2. There is no space in the vicinity of Yangon city area suitable for the relocation of the existing port facilities.
3. There is a need to improve cargo handling productivity by the introduction of mechanical handling to cope with the increase in the cargo handling volume.
4. It is possible to utilize the Lamadaw area, which is close to the city area and faces the valuable water area for the future city development.

Project Plan (outline)

1. Lamadaw Area

2. Kyeemyindang Area



Input	Estimated Cost (US$ million)
Terminal; 1. Inland water transport (L: 500m, B:100m) (7berths) 2. Coastal shipping(L:850m, B:100m) (12 berths)	34.5 58.7
Total Estimated Cost	93.2

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2018	2019
3. Funding Arrangement	2019	2019
4. Execution	2020	2025
5. Commissioning	2026	

Result of Evaluation

Expected Output

1. To increase the cargo handling productivity
2. To improve the environment of Yangon

Action Plan

1. Conduct of a feasibility study

Necessity of Technical Assistance

1. Conduct of a feasibility study

Remarks

Expected Key Potential Impact and Mitigation Measures for Target Project

Project - Yangon Port (Domestic Port) Improvement	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< *Construction Phase* > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< *Operation Phase* > • Noise and vibration due to embarkation and disembarkation of vessels as well as cargo and container handling services	• Provision on the schedules for embarkation and disembarkation of vessels • New technologies incorporated to lower noise and vibration generation with respect to the machine for cargo and container handling
• Wastewater generated from vessel and office building	• Installation of domestic wastewater treatment system
Natural Environment	
< *Construction Phase* > • Effect on aquatic fauna due to the accidental oil spill into water bodies	• Contingent actions for speedy cleaning up of oil spills, fuel and toxic chemicals in the event of accidents
< *Operation Phase* > • Effect on aquatic fauna in case of accidental oil spill and toxic chemical release into water bodies	
Social Environment	
<*Construction Phase* > • Disturbance of vehicle traffic	• Provision of detour with adequate sign board and instruction
• Disturbance to water way users	• Prior announcement or notice of construction activities and schedule for water way
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

Sub-Sector	Waterborne Transport
Reference No.	LWP-03
Project Title	Sittwe Port Improvement
Executing Agency	Myanma Port Authority (MPA)
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To develop the port with the transit function of general cargo for the population of nearby villages where road network is still poor.
2. To establish an international multi-modal transport route connecting Myanmar with Bangladesh and India.
3. To develop the port as a core of border trade between Myanmar and Bangladesh and India.

Location

Rationale

1. Sittwe Port is located near the borders of Bangladesh and India and utilized as a part of a waterborne detour route of road transport at the east of those countries where road development is weak.
2. This port plays an important role as a distribution base to villages facing the coastal areas of Myanmar and the Kaladan River where roads are not well developed due to the existence of many tributaries.
3. Sittwe Port acts as a transit port of general cargo (and container cargo in future).

Project Plan (outline)

1. Development of a multi-purpose terminal (D;-10m, L; 400m, B; 100m) for container and general cargo ships.
2. Development of a piled pier with pontoon section (L; 210m) at Minga Creek.

Input	Estimated Cost (US$ million)
1. Reclamation (L;400m, B;200m)	6.0
2. Terminal	16.4
3. Piled pier (L;140m,B;30m)	10.1
4. Pontoon (L;70m,B;10m)	1.3
5. Access road (L;240m)	1.3
Total Estimated Cost	35.1

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2019	2020
3. Funding Arrangement	2021	2021
4. Execution	2022	2024
5. Commissioning	2025	

Result of Evaluation

Expected Output

1. Transit function for international multi-modal transport route

Action Plan

1. Conduct of a feasibility study

Necessity of Technical Assistance

1. Conduct of a feasibility study

Expected Key Potential Impact and Mitigation Measures for Target Project

Project – Kaladan Multi-Modal Transit Transport Project	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< Construction Phase > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< Operation Phase > • Noise and vibration due to embarkation and disembarkation of vessels as well as cargo and container handling services	• Provision on the schedules for embarkation and disembarkation of vessels • New technologies incorporated to lower noise and vibration generation with respect to the machine for cargo and container handling
Natural Environment	
< Construction Phase > • Effect on aquatic fauna due to the accidental oil spill into water bodies	• Contingent actions for speedy cleaning up of oil spills, fuel and toxic chemicals in the event of accidents
< Operation Phase > • Effect on aquatic fauna in case of accidental oil spill and toxic chemical release into water bodies	
Social Environment	
<Construction Phase > • Disturbance of vehicle traffic	• Provision of detour with adequate sign board and instruction
• Disturbance to water way users	• Prior announcement or notice of construction activities and schedule for water way
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

<table>
<tr><td>Sub-Sector</td><td colspan="3">Waterborne Transport</td></tr>
<tr><td>Reference No.</td><td colspan="3">LWP-04</td></tr>
<tr><td>Project Title</td><td colspan="3">Dawei Port Development (Implementation)</td></tr>
<tr><td>Executing Agency</td><td colspan="3">Myanma Port Authority (MPA)</td></tr>
<tr><td>3. Relevant Ministry</td><td colspan="3">MOTC</td></tr>
<tr><td colspan="4">Outline of the Project</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="2">Location</td></tr>
<tr><td colspan="2">4. To develop the area as a core of SEZ and industrial development (light industry, heavy and chemical industry and energy).
5. To develop the area as a logistic gate to the west (India, Africa and Middle East) from GMS and AEC zone.
6. To develop the area as a deep-sea gateway port at the southern part of Myanmar.</td><td colspan="2"> 
</td></tr>
<tr><td colspan="2">Rationale</td><td colspan="2">Project Plan (outline)</td></tr>
<tr><td colspan="2">5. A wide land area of 20,000 ha is secured and a part of road, reservoir, residential area and land filling is completed.
6. A deep-water area is available for the port development.
7. This area has the potential to be a core of Myanmar’s economic development.
8. This area is designated as the west side gate of the south coastal corridor of GMS.</td><td colspan="2">1. Initial Layout Plan
 
2. Further detailed study is needed for the formulation of a layout</td></tr>
<tr><td>Input</td><td>Estimated Cost (US$ million)</td><td colspan="2">Schedule</td></tr>
<tr><td rowspan="7">3. breakwater
4. pier
5. dredging
6. revetment
7. building and equipment</td><td rowspan="7"></td><td>Calendar Year</td><td>Start</td><td>End</td></tr>
<tr><td>1. Preparation</td><td></td><td></td></tr>
<tr><td>2. Feasibility Study</td><td>2021</td><td>2022</td></tr>
<tr><td>3. Funding Arrangement</td><td>2023</td><td>2024</td></tr>
<tr><td>4. Execution</td><td>2025</td><td>2030</td></tr>
<tr><td>5. Commissioning</td><td>2031</td><td></td></tr>
<tr><td>Total Estimated Cost</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Result of Evaluation</td><td colspan="2"></td></tr>
<tr><td colspan="2">Expected Output</td><td colspan="2">Action Plan</td></tr>
<tr><td colspan="2">2. Economic development and an efficiency increase in logistics in Myanmar and GMS</td><td colspan="2">1. Conduct of a feasibility study</td></tr>
<tr><td colspan="2">Necessity of Technical Assistance</td><td colspan="2"></td></tr>
<tr><td colspan="4">1. Conduct of a detailed design</td></tr>
<tr><td colspan="4">The Data Collection Survey for Development Planning in Tanintharyi Region and Dawei SEZ (DPTD)
is on-going.</td></tr>
</table>

Expected Key Potential Impact and Mitigation Measures for Target Project

Project - Dawei SEZ Port Development (Implementation)	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< *Construction Phase* > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< *Operation Phase* > • Noise and vibration due to embarkation and disembarkation of vessels as well as cargo and container handling services	• Provision on the schedules for embarkation and disembarkation of vessels • New technologies incorporated to lower noise and vibration generation with respect to the machine for cargo and container handling
• Wastewater generated from vessel and office building	• Installation of domestic wastewater treatment system
Natural Environment	
< *Construction Phase* > • Effect on aquatic fauna due to the accidental oil spill into water bodies	• Contingent actions for speedy cleaning up of oil spills, fuel and toxic chemicals in the event of accidents
< *Operation Phase* > • Effect on aquatic fauna in case of accidental oil spill and toxic chemical release into water bodies	
Social Environment	
<*Construction Phase* > • Disturbance of vehicle traffic	• Provision of detour with adequate sign board and instruction
• Disturbance to water way users	• Prior announcement or notice of construction activities and schedule for water way
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

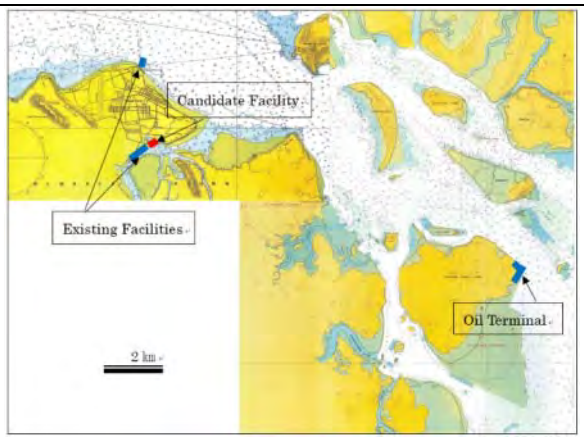
Sub-Sector	Waterborne Transport
Reference No.	LWP-05
Project Title	Kyaukpyu Port Improvement
Executing Agency	Myanma Port Authority (MPA)
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To develop the port as a component of the coastal shipping transport network.
2. To achieve transport efficiency of goods necessary for the population in the area.

Location



Rationale

1. The port is very important as an integral part of the coastal shipping network to transport necessities and other cargoes to surrounding areas.
2. There is no rationale for developing the port as a deep-sea port, which handles cargo for the hinterland such as Nay Pyi Taw due to the long distance (about 500km) from the port.
3. There is potential to develop a deep-sea port for petrochemical or gas related industrial development by utilizing the available water depth, which exceeds 20m.

Project Plan (outline)

1. To develop a piled pier with pontoon section (d;-5m, L;210m,B;30m) at the east side of the existing port area.

Input	Estimated Cost (US$ million)
1. Piled pier (L:140m, B:30m30m)	10.1
2. Pontoon (L:70m, B:10m)	1.3
3. Access road (L:350m)	9.0
Total Estimated Cost	20.4

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2019	2019
3. Funding Arrangement	2020	2020
4. Execution	2021	2023
5. Commissioning	2024	

Result of Evaluation

Expected Output

1. Increase of cargo handling productivity and capacity

Action Plan

1. Conduct of a feasibility study

Necessity of Technical Assistance

1. Conduct of a feasibility study

Expected Key Potential Impact and Mitigation Measures for Target Project

Project - Kyaukpyu Port Improvement	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< Construction Phase > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< Operation Phase > • Noise and vibration due to embarkation and disembarkation of vessels as well as cargo and container handling services	• Provision on the schedules for embarkation and disembarkation of vessels • New technologies incorporated to lower noise and vibration generation with respect to the machine for cargo and container handling
• Wastewater generated from vessel and office building	• Installation of domestic wastewater treatment system
Natural Environment	
< Construction Phase > • Effect on aquatic fauna due to the accidental oil spill into water bodies	• Contingent actions for speedy cleaning up of oil spills, fuel and toxic chemicals in the event of accidents
< Operation Phase > • Effect on aquatic fauna in case of accidental oil spill and toxic chemical release into water bodies	
Social Environment	
<Construction Phase > • Disturbance of vehicle traffic	• Provision of detour with adequate sign board and instruction
• Disturbance to water way users	• Prior announcement or notice of construction activities and schedule for water way
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

Sub-Sector	Waterborne Transport
Reference No.	LWP-06
Project Title	Thandwe Port Improvement
Executing Agency	Myanma Port Authority (MPA)
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location
1. Currently, there is no port facility for handling general cargo including the daily necessities required by the population of Thandwe. Consequently, the transport of general cargo depends on truck transport. In order to enhance transportation efficiency, it is recommended to develop this port as a domestic port to handle general cargo.	
Rationale	**Project Plan (outline)**
1. There is no general cargo berth 2. There is a calm sea area available 3. Cargo transport demand for the population of about fourteen thousand is substantial.	1. To develop a reclamation terminal (d;-5m, L; 60m, B; 15m) for coastal shipping vessels at a calm sea area located at the north side of the bay. A breakwater-cum-access bridge of about 250m, which connects the terminal and the land, will be constructed. 

Input	Estimated Cost (US$ million)
1. Breakwater-cum-access road (L:250m),	3.5
2. Reclamation (L:60m, B:15m)	1.5
3. Quay wall (L:60m, B:15m)	0.9
Total Estimated Cost	5.9

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Feasibility Study	2018	2018
3. Funding Arrangement	2019	2019
4. Execution	2020	2022
5. Commissioning	2023	

Expected Output	Action Plan
Realization of transport efficiency	1. Conduct of a feasibility study
1. Necessity of Technical Assistance	
Conduct of a feasibility study	
Remarks:	

Expected Key Potential Impact and Mitigation Measures for Target Project

Project - Thandwe Port Improvement	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< *Construction Phase* > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< *Operation Phase* > • Noise and vibration due to embarkation and disembarkation of vessels as well as cargo and container handling services	• Provision on the schedules for embarkation and disembarkation of vessels • New technologies incorporated to lower noise and vibration generation with respect to the machine for cargo and container handling
• Wastewater generated from vessel and office building	• Installation of domestic wastewater treatment system
Natural Environment	
< *Construction Phase* > • Effect on aquatic fauna due to the accidental oil spill into water bodies	• Contingent actions for speedy cleaning up of oil spills, fuel and toxic chemicals in the event of accidents
< *Operation Phase* > • Effect on aquatic fauna in case of accidental oil spill and toxic chemical release into water bodies	
Social Environment	
<*Construction Phase* > • Disturbance of vehicle traffic	• Provision of detour with adequate sign board and instruction
• Disturbance to water way users	• Prior announcement or notice of construction activities and schedule for water way
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

Sub-Sector	Waterborne Transport
Reference No.	LWP-07
Project Title	Pathein Port Improvement
Executing Agency	Myanma Port Authority (MPA)
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To maintain the function of coastal shipping and inland water port.
2. To increase cargo handling productivity and alleviate traffic congestion on roads around the port.
3. To secure the navigation safety and increase productivity.

Location

Rationale

1. To provide efficient transport means for the large volume and long haul transport needs of cargoes such as cement and rice.
2. The navigation safety and productivity increase can be expected.

Project Plan (outline)

1. To extend the existing piled pier by 140m to increase cargo-handling capacity.
2. To provide cargo handling area (810mx15m).

Input	Estimated Cost (US$ million)
1. Cargo handling yard (L:810m, B:15m)	31.6
2. Piled pier (L:140m, B:20m)	6.1
3. Access road (L:70m, B:10m)	1.9
4. Channel Dredging & Nav. aid	34.0
Total Estimated Cost	73.6

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2019	2019
3. Funding Arrangement	2020	2020
4. Execution	2021	2023
5. Commissioning	2024	

Result of Evaluation

Expected Output

1. Increase of cargo handling productivity and capacity
2. Alleviation of traffic congestion on roads near the port.

Action Plan

1. Conduct of a feasibility study

Necessity of Technical Assistance

1. Conduct of a feasibility study

Remarks:

Expected Key Potential Impact and Mitigation Measures for Target Project

Project - Pathein Port	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< *Construction Phase* > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< *Operation Phase* > • Noise and vibration due to embarkation and disembarkation of vessels as well as cargo and container handling services	• Provision on the schedules for embarkation and disembarkation of vessels • New technologies incorporated to lower noise and vibration generation with respect to the machine for cargo and container handling
Natural Environment	
< *Construction Phase* > • Effect on aquatic fauna due to the accidental oil spill into water bodies	• Contingent actions for speedy cleaning up of oil spills, fuel and toxic chemicals in the event of accidents
< *Operation Phase* > • Effect on aquatic fauna in case of accidental oil spill and toxic chemical release into water bodies	
Social Environment	
<*Construction Phase* > • Disturbance of vehicle traffic	• Provision of detour with adequate sign board and instruction
• Disturbance to water way users	• Prior announcement or notice of construction activities and schedule for water way
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

Sub-Sector	Waterborne Transport
Reference No.	LWP-08
Project Title	Mawlamyine Port Improvement
Executing Agency	Myanma Port Authority (MPA)
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To increase cargo handling productivity and capacity
2. To alleviate traffic congestion on roads around the port.

Location

Rationale

1. The existing jetties extend at the narrow space beside a coastal road. It results in poor cargo handling productivity and traffic congestion on the coastal road.
2. Future increasing cargo shall be handled at jetties, which are expected to be constructed at the opposite island.
3. Transport of daily necessities shall be handled at existing facilities, which is to be improved.

Project Plan (outline)

1. Construct the cargo handling yard (500mx15m)
2. Construct the piled pier (140mx30m) and pontoon jetty (70mx10m) which can employ mechanical handling

Input	Estimated Cost (US$ million)
1. Cargo handling yard (L:500m, B:15m)	19.5
2. Piled pier (L:140m, B:30m)	10.1
3. Pontoon(L:70m, B:10m)	1.3
4. Channel Dredging & Nav. Aid	34.0
Total Estimated Cost	64.9

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2019	2019
3. Funding Arrangement	2020	2020
4. Execution	2021	2023
5. Commissioning	2024	

Expected Output

1. Increase of cargo handling productivity and capacity
2. Alleviation of traffic congestion on roads around the port.

Action Plan

1. Conduct of a feasibility study

Necessity of Technical Assistance

1. Conduct of a feasibility study

Remarks

Expected Key Potential Impact and Mitigation Measures for Target Project

Project - Mawlamyine Port Improvement	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< *Construction Phase* > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< *Operation Phase* > • Noise and vibration due to embarkation and disembarkation of vessels as well as cargo and container handling services	• Provision on the schedules for embarkation and disembarkation of vessels • New technologies incorporated to lower noise and vibration generation with respect to the machine for cargo and container handling
• Wastewater generated from vessel and office building	• Installation of domestic wastewater treatment system
Natural Environment	
< *Construction Phase* > • Effect on aquatic fauna due to the accidental oil spill into water bodies	• Contingent actions for speedy cleaning up of oil spills, fuel and toxic chemicals in the event of accidents
< *Operation Phase* > • Effect on aquatic fauna in case of accidental oil spill and toxic chemical release into water bodies	
Social Environment	
<*Construction Phase* > • Disturbance of vehicle traffic	• Provision of detour with adequate sign board and instruction
• Disturbance to water way users	• Prior announcement or notice of construction activities and schedule for water way
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

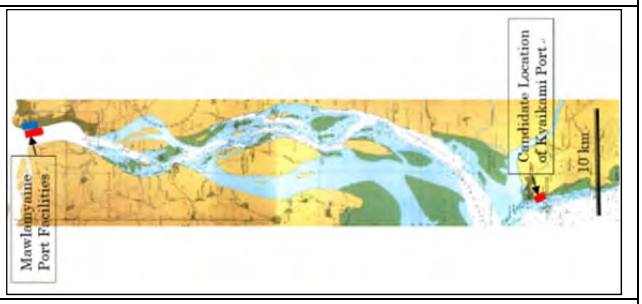
Sub-Sector	Waterborne Transport
Reference No.	LWP-09
Project Title	Kyaikami International Grain Terminal / Port Development
Executing Agency	Myanma Port Authority (MPA)
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To enhance and support export cargoes of rice and bean.
2. To function as a substitute for Yangon Port.
3. To develop as a west side gateway to the East-West Economic Corridor of GMS.
4. To handle regional cargoes of the Bago, Mon and Kayin States.

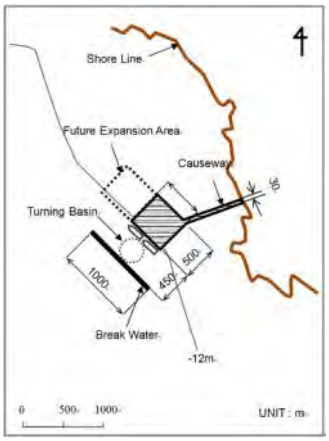
Location



Rationale

1. This area is the nearest deep-water area section from Yangon and a production area of rice and beans.
2. This area has a geographical advantage in terms of its distance from Yangon and the available water depth.
3. This port can substitute for Yangon Port.

Project Plan (outline)



Input	Estimated Cost (US$ million)
Breakwater, Reclamation, Quay wall, Access road, Utility, Building, Equipment	363
Total Estimated Cost	363

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Feasibility Study	2018	2018
3. Funding Arrangement	2019	2019
4. Execution	2020	2023
5. Commissioning	2024	

Expected Output

1. Cover the shortage of cargo handling capacity at Yangon Port including alleviation of the draught limit

Action Plan

1. Prepare for conducting a feasibility study

2. Necessity of Technical Assistance

1. Conduct of a feasibility study

Remarks

Expected Key Potential Impact and Mitigation Measures for Target Project

Project - Kyaikami Port Improvement	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< *Construction Phase* > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< *Operation Phase* > • Noise and vibration due to embarkation and disembarkation of vessels as well as cargo and container handling services	• Provision on the schedules for embarkation and disembarkation of vessels • New technologies incorporated to lower noise and vibration generation with respect to the machine for cargo and container handling
• Wastewater generated from vessel and office building	• Installation of domestic wastewater treatment system
Natural Environment	
< *Construction Phase* > • Effect on aquatic fauna due to the accidental oil spill into water bodies	• Contingent actions for speedy cleaning up of oil spills, fuel and toxic chemicals in the event of accidents
< *Operation Phase* > • Effect on aquatic fauna in case of accidental oil spill and toxic chemical release into water bodies	
Social Environment	
<*Construction Phase* > • Disturbance of vehicle traffic	• Provision of detour with adequate sign board and instruction
• Disturbance to water way users	• Prior announcement or notice of construction activities and schedule for water way
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

Sub-Sector	Waterborne Transport
Reference No.	LWP-10
Project Title	Dawei Local Port Improvement
Executing Agency	Myanma Port Authority (MPA)
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To increase cargo handling productivity by constructing facilities which allow the use of cargo handling equipment
2. To Increase cargo handling productivity by constructing cargo handling yards.
3. To secure the navigation safety and increase productivity.

Location

Rationale

1. It is necessary to widen the narrow cargo-handling yard to increase handling productivity.
2. It is necessary to alleviate traffic congestion on roads around the port.

Project Plan (outline)

1. Construct cargo-handling yard (430mx15m).
2. Construct the piled pier (140mx30m) and Pontoon Jetty (70mx10m) to employ cargo-handling equipment.

Input	Estimated Cost (US$ million)
1. Cargo handling yard (L;430m, B;15m)	16.8
2. Piled pier (L;140m, B;30m),	10.1
3. Pontoon (L;70m, B;10m),	1.3
4. Channel Dredging & Nav. aid	34.0
Total Estimated Cost	62.2

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2019	2019
3. Funding	2020	2020
4. Execution	2021	2023
5. Commissioning	2024	

Result of Evaluation

Expected Output

1. Increase of cargo handling productivity and capacity.
2. Alleviation of traffic congestion on roads around the port.

Action Plan

1. Conduct of a feasibility study

Necessity of Technical Assistance

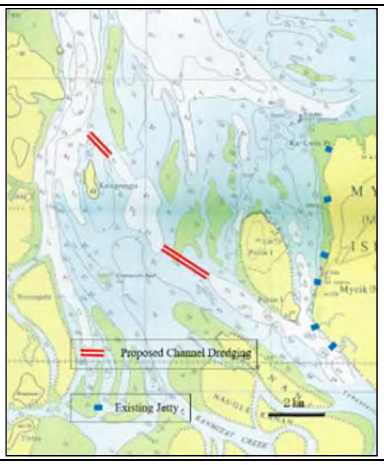
1. Conduct of a feasibility study

Remarks:

Project Profile

Sub-Sector	Waterborne Transport
Reference No.	LWP-11
Project Title	Myeik Port Improvement
Executing Agency	Myanma Port Authority (MPA)
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location
1. To develop new access channels which will contribute to secure navigation safety and to increase the cargo handling capacity of the port?	
Rationale	**Project Plan (outline)**
1. Myeik Port is a domestic port, which is indispensable for handling fish and fish products as well as for the commuting of peoples from surrounding islands. 2. This port plays an important role for international trade between Myanmar and Thailand. 3. This situation is likely to continue in future and additional private jetties are expected to be constructed; it will not be necessary to develop new large-scale port facilities. 4. The most important issue for this port is to secure deep channels so that ships can access the port anytime without waiting for high tide.	1. To develop an access channel (total length of about 3km and depth of 5m) and conduct the maintenance dredging

Input	Estimated Cost (US$ million)	Schedule		
1. Channel dredging (L; about 3km, d;5m) & Nav. aid	20.2	Calendar Year	Start	End
		1. Preparation	2018	2018
		2. Feasibility Study	2019	2019
		3. Funding Arrangement	2020	2020
		4. Execution	2021	2022
		5. Commissioning	2023	
Total Estimated Cost	20.2			

Result of Evaluation	
Expected Output	Action Plan
1. Increase of cargo handling capacity	1. Conduct of a feasibility study
Necessity of Technical Assistance	
1. Conduct of a feasibility study	
Remarks:	

Expected Key Potential Impact and Mitigation Measures for Target Project

Project - Myeik Port Improvement	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< *Construction Phase* > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< *Operation Phase* > • Noise and vibration due to embarkation and disembarkation of vessels as well as cargo and container handling services	• Provision on the schedules for embarkation and disembarkation of vessels • New technologies incorporated to lower noise and vibration generation with respect to the machine for cargo and container handling
• Wastewater generated from vessel and office building	• Installation of domestic wastewater treatment system
Natural Environment	
< *Construction Phase* > • Effect on aquatic fauna due to the accidental oil spill into water bodies	• Contingent actions for speedy cleaning up of oil spills, fuel and toxic chemicals in the event of accidents
< *Operation Phase* > • Effect on aquatic fauna in case of accidental oil spill and toxic chemical release into water bodies	
Social Environment	
<*Construction Phase* > • Disturbance of vehicle traffic	• Provision of detour with adequate sign board and instruction
• Disturbance to water way users	• Prior announcement or notice of construction activities and schedule for water way
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

Sub-Sector	Waterborne Transport
Reference No.	LWP-12
Project Title	Kawthaung Port Improvement
Executing Agency	Myanma Port Authority (MPA)
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To strengthen the function of the port as a transit port for handling international trade cargo between Myanmar and Thailand.

Location

Rationale

1. To contribute to the enhancement of international trade between Myanmar and Thailand.

Project Plan (outline)

1. To extend the existing piled pier by 140m with a width of 20m.

Input	Estimated Cost (US$ million)
1. Piled pier (L:140m, B:10m)	6.1
2. Access Bridge (L:160m)	3.4
Total Estimated Cost	9.5

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2019	2019
3. Funding Arrangement	2020	2020
4. Execution	2021	2022
5. Commissioning	2023	

Result of Evaluation

1. Strengthening of the transit function of the port

1. Conduct of a feasibility study

Necessity of Technical Assistance

1. Conduct of a feasibility study

Remarks

Expected Key Potential Impact and Mitigation Measures for Target Project

Project - Kawthoung Port Improvement	
Key Potential Impacts	**Mitigation Measures**
Pollution Control	
< *Construction Phase* > • Deterioration of air quality due to particulate matter such as dust, especially during dry season, and gaseous emissions from construction equipment and vehicular traffic	• Coverage of truck carrying soil, sand and stone to avoid spilling • Adequate dust suppression measures such as regular water sprinkling on unpaved haul roads and vulnerable areas of the construction sites • Use of low emission construction equipment, vehicles and generator sets
• Noise and vibration due to movement of vehicles, and operation of light and heavy construction machineries	• Use of low noise construction equipment • Construction activities carried out near residential area preferably in daytime • Provision of protective gears such as ear plugs etc. to construction personnel exposed to high noise levels
• Wastewater from construction activities with suspended impurities • Wastewater disposal from the workers camp and sludge generated from construction sites	• Provision of silt fencing near water bodies • Control of quality of construction wastewater emanating from the construction site through suitable drainage system with sediment traps • Provision of proper sanitation facilities at the construction site to prevent hygiene problems due to water contamination
• Losing of top soil and vegetation cover due to excavation and back filling • Deterioration of soil quality	• Adequate measures like adequate drainage, embankment consolidation and slope stabilization • Conservation and restoration of top soils of the construction sites • Avoidance of accidental spills
< *Operation Phase* > • Noise and vibration due to embarkation and disembarkation of vessels as well as cargo and container handling services	• Provision on the schedules for embarkation and disembarkation of vessels • New technologies incorporated to lower noise and vibration generation with respect to the machine for cargo and container handling
• Wastewater generated from vessel and office building	• Installation of domestic wastewater treatment system
Natural Environment	
< *Construction Phase* > • Effect on aquatic fauna due to the accidental oil spill into water bodies	• Contingent actions for speedy cleaning up of oil spills, fuel and toxic chemicals in the event of accidents
< *Operation Phase* > • Effect on aquatic fauna in case of accidental oil spill and toxic chemical release into water bodies	
Social Environment	
<*Construction Phase* > • Disturbance of vehicle traffic	• Provision of detour with adequate sign board and instruction
• Disturbance to water way users	• Prior announcement or notice of construction activities and schedule for water way
• Possible to occur the accidents	• Installation of security and maintain safety prevention measures and devices, and providing of appropriate PPE

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-01
Project Title	Mandalay Port Development
Executing Agency	DWIR and IWT
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To handle cargos and containers safely and effectively
2. To improve existing inland waterway transport
3. To establish a standard inland container port
4. To transport domestic and international cargos and containers
5. To reduce emissions of greenhouse gases by the mode change from truck to ship
6. To reduce the logistic cost by the mode change from truck to ship and general cargo ship to container barge
7. To secure the redundancy of logistics

Location

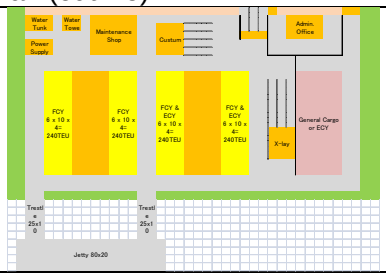
Location is one of the candidate areas only for reference.

It will be discussed with stakeholders and decided in the Feasibility Study.

Rationale

1. Mandalay is the second largest city in Myanmar.
2. Mandalay is the center of upper Myanmar.
3. The Logistics route between Mandalay and Yangon is the backbone network in Myanmar.
4. Cargo transport volume is increasing between Mandalay and Yangon.

Project Plan (outline)



Input	Estimated Cost (US$ million)
- Civil structures (jetty, trestle, revetment, sand filling, yard, inner road and drainage, access road and utilities)	20.0
- Buildings (administration building, CFS and others)	6.0
- Cargo handling equipment	6.0
- Others	6.0
Total Estimated Cost	38.0

Schedule

Calendar Year	Start	End
1. Preparation	2016	2016
2. Feasibility Study	2017	2017
3. Funding Arrangement	2016	2016
4. Execution	2017	2020
5. Commissioning	2020	-

Expected Output

- General Cargo	100,000 ton/year
- Container Cargo	20,000 TEU/year

Action Plan

- Feasibility study started in February, 2017.

Necessity of Technical Assistance

- Operations and Maintenance of Port Facilities
- Selection of Concessionaire for Terminal Operations

Remarks

- Location shall be confirmed. Land expropriation may be needed. An Environmental Survey is needed.

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-02
Project Title	Yangon - Mandalay Navigation and Channel Improvement
Executing Agency	DWIR
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location
1. To strengthen integrated, climate resilient management 2. Development of the Ayeyarwaddy river basin and national water resources 3. To develop the institutions and tools needed to implement integrated river basin management 4. To deliver related livelihoods benefits from enhanced navigation, hydrometric warning and advisory services * Implementation of the Navigation System between Mandalay and Nyaung-U is in progress as Ayeyarwaddy Integrated River Basin Management (AIRBM) Project by WB	 Location of Mandalay and Nyaung-U
Rationale	Project Plan (outline)
1. Mandalay is second largest city in Myanmar. 2. Nyaung-U lies on the eastern bank of Ayeyarwaddy River and is just 4 km away from old Bagan, a popular tourist attraction. 3. Waterway transportation for passengers is also famous as tourist attraction (Mandalay - Nyaung-U). 4. In order to reduce poverty with good management in all the water related tasks like lowering the cost of electrical power production, water supply for agriculture, the quality of water, natural environment and nature-based transportation.	 Construction Situation (on-going)

Input	Estimated Cost (US$ million)
1. Capacity building of water resources institutions	32.0 (On-going)
2. Hydrometric observation and information systems modernization	30.2 (On-going)
3. Navigation enhancements Mandalay to Nyaung-U	37.9 (On-going)
4. Navigation enhancements Nyaung-U to Yangon	87.0 (Proposed)
Total Estimated Cost	187.0

Schedule		
Calendar Year	Start	End
Project Identification	Oct. 2013	Oct. 2013
Project Preparation	Jan. 2014	Feb. 2014
Project Pre-appraisal	May. 2014	May. 2014
Review on Project	Aug. 2014	Aug. 2014
DraftESMFconsult.	Sep. 2014	Sep. 2014
Appraisal, Negotiation	Sep. - Oct. 2014	
Financing Agreement	Apr. 2015	
Tender Invitation	May. 2015	
Project Implementation	Oct. 2015	Sep. 2020

Expected Output

- 24hours Channel Navigation from Mandalay to Nyaung-U.
- Vessels up to 2m draft can be operated from Mandalay to Nyaung-U.

Necessity of Technical Assistance	Action Plan
- Maintenance of the Navigation Aids - Dredging work - Procurement of container cranes for cargo handling	- Hydro Informatics Center will be constructed in Yangon. - Hydrology and Meteorology Stations will be upgraded. - Navigation charts will be prepared in March 2017. - Navigation aids will be installed in June/July 2017.

Remarks

- After 24hours navigation systems are installed, the tax will be higher.

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-03
Project Title	Yangon River Navigation Aid Improvement
Executing Agency	MPA
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. Ensure safe navigation of the Yangon River
2. Reinforce multimodal freight transport function at the Yangon Port amonb maritime transport, coastal shipping and inland waterway transport
3. Reinforce connectivity among three different waterborne transport modes (e.g. maritime transporta, coastal shipping, inland waterway transport)
4. To strengthen integrated, climate resilient management

Location

Yangon Port including Thilawa Container Terminal

Rationale

1. The port cargo of the Yangon Port inlculing Thilawa Terminal Area will create congestions at the port terminals,
2. The multimodal freight transportation among maritime, coastal shipping and inland waterway transport will increase the transport efficiency at the Yangon Port area

Project Plan (outline)

Condition of maintenance of buoy

Input	Estimated Cost (US$ million)	Schedule		
1. Provision of navigation aid along the Yangon River	15	Calendar Year	Start	End
		1. Preparation	2018	2019
		2. Feasibility Study	2019	2020
		3.Funding Arrangement	2020	2021
		4. Execution	2022	2025
		5. Commissioning	2025	-
Total Estimated Cost	15			

Expected Output

- 24hours Channel Navigation from Thilawa Terminal Area and the Yangon Port .

Necessity of Technical Assistance	Action Plan
- Maintenance of the Navigation Aids - Dredging work -	Prepareation of feasibility report

Remarks

- After 24hours navigation systems are installed, the levy for channel navigation will be set at higher rate.

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-04
Project Title	Replacement of Wooden vessels to FRP Vessels, with TA
Executing Agency	DMA and Regional Government
Relevant Ministry	MOTC

Outline of the Project

Objectives

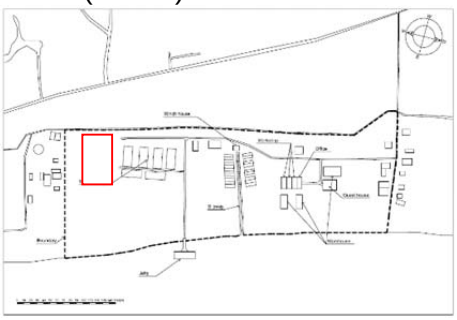
1. To build sturdy vessels (providing a long service life) compared to wooden vessels
2. To access difficulty areas in the rainy season by use of shallow draught vessels
3. To reduce maintenance costs by easy maintenance
4. To reduce wood consumption volumes
5. To reduce construction costs and period by using FRP vessels

Location

Rationale

1. There are many small wooden boats in Myanmar.
2. FRP vessels are familiar as small vessels across the World.
3. It is difficult to access villages in rural areas by road in the rainy season.

Project Plan (outline)



Only for reference (location is one of the candidate)

Input	Estimated Cost (US$ million)
- Renovation of facilities and equipment	2.0
- FRP construction facilities	4.0
- Technical Assistance	3.0
Total Estimated Cost	9.0

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Feasibility Study	2017	2018
3. Funding Arrangement	2018	2019
4. Execution	2019	2019
5. Commissioning	2019	-

Result of Evaluation

Expected Output

- Building capacity of FRP vessels	2 lane of vessel building

Action Plan

- Feasibility study shall start soon.

Necessity of Technical Assistance

- FRP shipbuilding (design, construction and maintenance)
- Operations and Maintenance of dockyard facilities and equipment

Remarks

- Approval from IWT is needed for the improvement of dockyard.

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-05
Project Title	Replacement of IWT Barge and Tugs
Executing Agency	IWT
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To provide a stable water transport mode for cargo in all seasons.
2. To provide safe and reliable transport service of barges and tug boats due to their age.

Rationale

1. Current situation of IWT involves transport by old vessels having low speed.
2. IWT has many aged vessels operating across Myanmar.
3. The aging vessels shall be replaced to improve public service for better safety and reliability.
4. The engine speed and fuel efficiency of ships shall be updated for improvement of faster and more economical transport services.
5. The statistical system shall be provided which can maintain barges and tugs in a shorter time with lower cost.
6. IWT is looking for a partner for J.V or investment to replace old barges and tugs.
7. IWT has introduced containerization for cargo transport.

Location & Project Plan (outline)

Source: JICA Study Team

Figure: Barge and Tug Boats with Aging

Input	Estimated Cost (US$ million)
- Updating the old and obsolete fleet composition of IWT	120.0
Total Estimated Cost	120.0

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Feasibility Study	2018	2018
3. Funding Arrangement	2019	2019
4. Execution	2020	2022
5. Commissioning	2023	-

Expected Output

- Replacing the old barges and tugs owned by IWT with modernized new vessels and barges
- Reducing the operating cost of IWT's aged vessels for better safety and reliability passenger and better cargo transport services

Action Plan

- Feasibility study is needed for the replacement.
- Finding JV partner or investors.

Necessity of Technical Assistance

- Operations and marketing of replaced barges and tugs
- Maintenance of replaced barges and tugs

Remarks

- The existing IWT shipyards shall be modernized for the construction of updated barges and tugs for replacement.

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-06
Project Title	Improvement of Yangon River Water Transportation
Executing Agency	YRTA (for passenger usage), IWT (for freight usage)
Relevant Ministry	Yangon Region Government, MOTC

Outline of the Project

Objectives

1. To reduce the road traffic jams in Yangon City
2. To reduce the CO_2 from road traffic jams

Rationale

1. There are heavy traffic jams in Yangon City.
2. Some rivers flow around Yangon City
3. Many industrial zones are located along rivers.
4. Cargo volume is increasing rapidly.
5. Well-balanced multi-modal transport is important for the urban development of Yangon.
6. Currently, the introduction of Water Taxi Project for commuters is under consideration by the YRTA (Yangon Region Government).

Location & Project Plan (outline)

Input	Estimated Cost (US$ million)
- Port facilities (jetties, passenger terminals, container yards)	40.0
- Vessels (container barges and tug boats)	10.0
- Vessels (passenger)	10.0
- Others	8.0
Total Estimated Cost	68.0

Schedule

Calendar Year	Start	End
1. Preparation	2016	2016
2. Feasibility Study	2016	2017
3. Funding Arrangement	2017	2017
4. Execution	2017	2018
5. Commissioning	2017	-

Result of Evaluation

Expected Output	
- Capacity of container barges	100 TEU/vessel
- Capacity of passenger vessels	200 passengers/vessel

Action Plan

- Feasibility study shall start soon.

Necessity of Technical Assistance

- Operations and marketing of container barges
- Operations of passenger vessels

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-07
Project Title	Dala Shipyard Modernization with TA
Executing Agency	IWT
Relevant Ministry	MOTC

Outline of the Project

Objectives

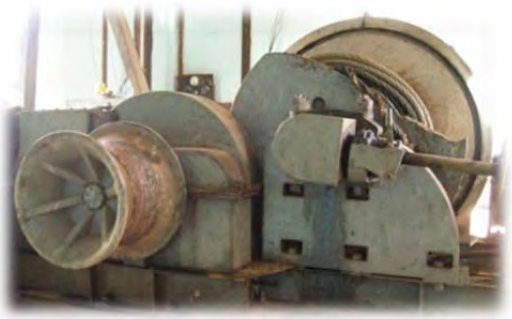
1. To upgrade and modernize the shipyard system and facilities for improvement of shipyard capacity
2. To improve the efficiency and enhancement of the quality of maintenance for both shipbuilding and repair
3. To improve the expertise and knowledge of the officers, engineers and technicians regarding ship building
4. To provide modern technology methods and knowledge for the officers, engineers and technicians of IWT

Rationale

1. Docking systems, machinery, workshops, equipment and slipways are very old and shall be modernized.
2. Technology for repair, shipbuilding and shipyard management shall be upgraded.
3. Training for shipbuilding and ship repair shall be provided to gain the essential skills and knowledge required.
4. Shipyard operation systems shall be enhanced.
5. IWT offered Japanese Grant Aid documentation to MLIT Japan.

Location & Project Plan (outline)

Source: Google Earth
Location of Dale Dockyard



Source: IWT
Old Machine of Dala Dockyard

Input	Estimated Cost (US$ million)
- Upgrading of machine shops, slipways and docking facilities	16.0
- Replenishing modern machineries and machine tools for replacing and construction	2.0
- Enhancing shipyard management capacity and technology for repair and construction	3.0
Total Estimated Cost	21.0

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Basic Design	2018	2018
3. Execution	2019	2020
4. Commissioning	2020	-

Expected Output

- Improvement of shipyard capacity and facilities
- Increased productivity of ships (maintenance, new-building and repair)

Action Plan

1. Basic Design is needed
2. Upgrading Master Plan of some shipyards owned by IWT is needed.

Necessity of Technical Assistance

- Operations and marketing of container barges and passenger vessels
- Training of shipyard personal

Remarks

- IWT need to request to MOTC the high priority of the Japanese Grant Aid.
-

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-08
Project Title	Kaladan Multi-Modal Transit Transport Project (Vessels, Channel, Navigation)
Executing Agency	MPA, IWT, DWIR
Relevant Ministry	MOTC, India Government and Myanmar Government

Outline of the Project

Objectives	Location & Project Plan (outline)
1. To open trade routes between India and Myanmar 2. To create multi-modal transport for shipment of cargo from eastern ports of India to Myanmar	
Rationale	
1. Construction of integrated port & IWT terminal at Sittwe including dredging. 2. Development of navigational channel along river Kaladan from Sittwe to Paletwa. 3. Construction of IWT-Highway transshipment terminal at Paletwa. 4. Construction of 6 IWT barges for cargo transport between Sittwe and Paletwa. 5. Construction of a highway from Paletwa to India-Myanmar border.	

Input	Estimated Cost (US$ million)	Schedule		
- Development of Sittwe Port and Kaladan waterway(Waterways, Terminals, Vessels) - Highway between Kalewa/Paletwa and Indian border	68.24 49.14	Calendar Year	Start	End
		1. Preliminary Survey Study	1999	2002/ 2003
		2. Framework Agreement	2008	-
		3. Redevelopment of Sittwe Port (Phase 1)	2009	2014
		4. Construction of IWT terminal at Paletwa	2013	-
		5. Dredging of Kaladan River (Phase 2)	2009	2014
		6. Construction of Highway (Phase 3)	2011	-
Total Estimated Cost	117.38			
Result of Evaluation				

Expected Output	Action Plan
Sea Vessels (6,000 DWT) IWT Vessels (260 tons) Sittwe IWT Terminal and Sitpitpyin (Kaletwa) IWT Terminal	1. Construction of IWT jetty at Sittwe and Paletwa is almost completed. 2. Construction of the highway between Kaletwa/Paletwa to Indo-Myanmar border schedule to start from 2011-2012 has now been delayed to 2 years or 3 years later. 3. The entire project is planned to be completed in 2015. 4. IWT ships (6 No.) are currently constructed for the Kaladan Multi-Modal Transport project.

Remarks
- Approval from IWT is needed for the improvement of dockyard.

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-09
Project Title	Yangon Port (Including Connectivity)
Executing Agency	MPA, IWT, Custom Department
Relevant Ministry	MOTC

Outline of the Project

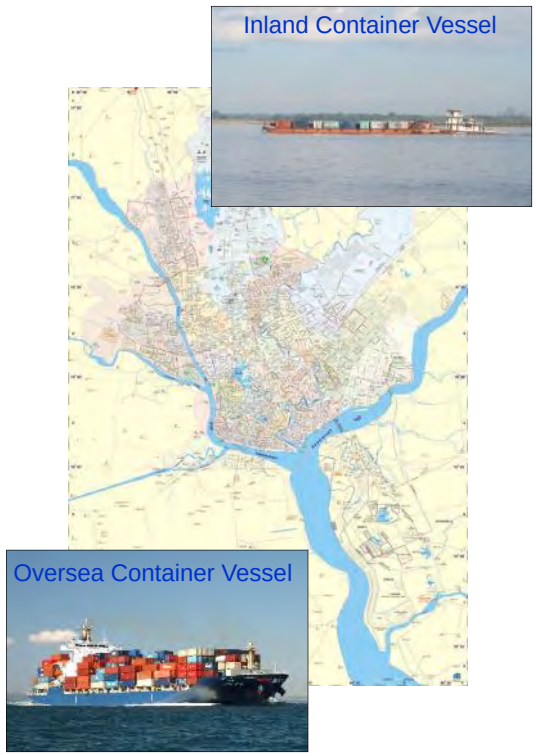
Objectives

1. To handle cargos and containers safely and effectively
2. To find the best way to coordinate the logistics system to save time and cost
3. To transit cargos and containers from one transport mode to another, safely and conveniently
4. To transship cargos and containers from inland to coastal transport and from and coastal to inland transport smoothly and conveniently
5. To upgrade existing channels and port facilities.

Rationale

1. Yangon is the former capital of Myanmar and is the capital of Yangon Region.
2. Yangon is the main domestic and international hub for air, rail, and ground transport in Myanmar.
3. Most transport routes often require the use of several different modes of transport.
4. The transit of cargos and containers from one transport mode to another causes some traffic and safety problems.
5. For waterways transport, the main passenger jetties of Yangon which are located on or near the downtown waterfront, mainly serve local ferries across the river to Dala and Thanlyin, and regional ferries to the Irrawaddy delta.

Location and Project Plan (Outline)



Source: JICA Study Team

Figure: Map Yangon Area

Input	Estimated Cost (US$ million)
- Upgrading Civil structures (jetties, trestles, yards, drainage, access roads and utilities)	4.0
- Buildings (administration buildings, CFS and others)	4.0
- Cargo handling equipment	4.0
- Others	2.0
Total Estimated Cost	14.0

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Feasibility Study	2018	2018
3. Funding Arrangement	2019	2019
4. Execution	2020	2021
5. Commissioning	2021	-

Result of Evaluation

Expected Output	Action Plan
- Easier and more convenient transit of cargo from one mode of transport to another - Reduce transport time and cost	- Feasibility study shall start soon.

Necessity of Technical Assistance

- Feasibility Study
- Operations and Maintenance of Port Facilities

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-10
Project Title	Monywa Port
Executing Agency	DWIR, IWT
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To transport cargoes and passengers safely and effectively
2. To establish standard inland port
3. To reduce the logistics cost by a mode change from trucks to ships
4. To separate cargoes and passenger transport for safety

Location & Project Plan

Monywa is a city located in Sagaing Region, Myanmar, 136 km (84.5 ml) northwest of Mandalay on Chindwin River's eastern bank.

Rationale

1. Monywa is the capital of the Sagaing Region and is also a busy port town.
2. Even though there are many cargo and passenger vessels at the bank of the Chindwin River, there are no facilities for port and cargo handling.
3. There are also many private and IWT vessels serving passenger and cargo transport.

<u>Existing Regular & Express Services for Inland Water Transport</u>
Monywa → Kalaywa → Hommalin → Khanty

Existing Situation

Photo: Many Vessels at Chindwin River Bank in Monywa

Input	Estimated Cost (US$ million)
- Construction of new jetties and improvement of existing jetties, cargo handling equipment and yards	5.0
- Miscellaneous	2.0
Total Estimated Cost	7.0

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Feasibility Study	2018	2018
3. Funding Arrangement	2019	2019
4. Execution	2020	2021
5. Commissioning	2021	-

Result of Evaluation

Expected Output

- General Cargo	50,000 ton/year

Action Plan

- Feasibility study shall start soon.

Necessity of Technical Assistance

- Operation and Maintenance of Port Facilities

Remarks

-

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-11
Project Title	Magway, Pakokku Inland Waterway Hub Port Development
Executing Agency	IWT, DWIR
Relevant Ministry	MOTC

Outline of the Project

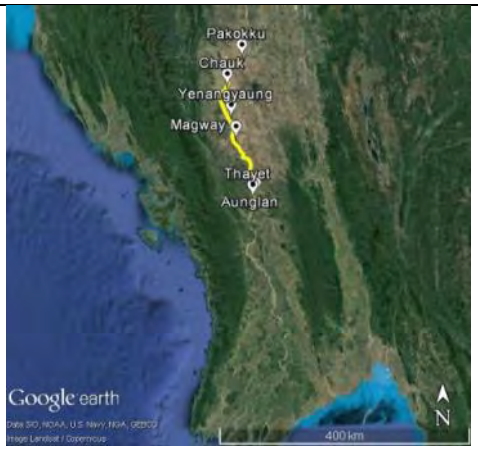
Objectives

1. To establish an effective cargo transport hub port.
2. To reduce logistics cost by a mode change from trucks to ships.

Rationale

1. Magway and Pakokku are envisaged as an Agro-industrial center in JICA's Urban Development Plan 2040 and is located on the East West Bridging Corridor and Western North-South Corridor.
2. It is expected that the cargo handling volume will increase in future.
3. There is no facility for port and cargo handling.

Location



Magway is the second largest division of Myanmar and bordered by Sagaing, Mandalay, Bago, Rakhine and Chin State, and located at the west bank of Ayeyarwaddy River.

Current Situation of Magway Port

Input	Estimated Cost (US$ million)
- Civil structures (Jetties, revetments, access roads and utilities)	5.0
- Cargo handling equipment and yards	3.0
- Other	2.0
Total Estimated Cost	10.0

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Feasibility Study	2018	2018
3. Funding Arrangement	2019	2019
4. Execution	2020	2021
5. Commissioning	2021	

Result of Evaluation

Expected Output

Action Plan

- Conduct of a feasibility study

Necessity of Technical Assistance

- Operation and Maintenance of Port Facilities

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-12
Project Title	Container Vessel (Vessel Modernization)
Executing Agency	IWT, Myanma Shipyard,
Relevant Ministry	MOTC and Communication

Outline of the Project

Objectives

1. To replace the aged container vessels with modernized new vessels.
2. To upgrade existing old dockyards and facilities for repairing container barge with modernized technology.
3. To increase container fleet size and port capacity in the future Myanmar Maritime Sector.

Rationale

1. The nation's waterway facilities will be upgraded to allow the vessels to play a larger role in carrying trade.
2. Containerization has been introduced for separate cargo transport to reduce transport costs and relieve congestion on the roads.
3. Pilot running of the container barge between Yangon to Mandalay has done twice.
4. The first container ship was built in Yangon with extensive use of Japanese technology.

Location & Project Plan (outline)

60m Container Barge Pilot Operation
(Source: IWT Presentation)

Input	Estimated Cost (US$ million)
- Upgrading old container barges and tugs with modernized ones	25.0
Total Estimated Cost	25.0

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Feasibility Study	2017	2018
3. Funding Arrangement	2018	2019
4. Execution	2019	2020
5. Commissioning	2020	-

Expected Output

- Development of Fleet composition
- Adequate jetty facilities for long trips of container vessels
- Business plan to build many container barges in each year

Action Plan

- The trial operation for container transport will be carried out from Thilawa to Shwepyitha.
- Finding JV partners or investors.

Necessity of Technical Assistance

- Operation and marketing of container barge

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-13
Project Title	Connectivity of Oversea, Coastal and Inland Water Transportation
Executing Agency	MPA, IWT, Custom Department
Relevant Ministry	MOTC, Ministry of Finance

Outline of the Project

Objectives

1. To handle cargos and containers safely and effectively.
2. To provide seamless and efficient movement of cargos between overseas, coastal and inland water transport.
3. To find the best way to coordinate the logistics system to save transport time and cost.

Rationale

1. Most transport routes often require the use of several different modes of transport.
2. Major coastal and inland ports should be developed as logistics hub to handle transshipment cargoes.
3. It takes time to inspect transshipment of cargoes at transit ports and the unit price of cargoes become higher.
4. Bonded transport should be introduced to reduce transport time and cost.

Location and Project Plan (Outline)

Source: JICA Study Team
Figure: Distribution of Industrial Estates

Input	Estimated Cost (US$ million)
- Upgrading/construction of civil structures (Jetties, access roads)	3.0
- Buildings (Transshipment station, Yard, Custom office)	3.0
- Others	2.0
Total Estimated Cost	8.0

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Feasibility Study	2018	2018
3. Funding Arrangement	2019	2019
4. Execution	2020	2021
5. Commissioning	2021	-

Expected Output

- Efficient cargo transport.
- Reduced transport time and cost.

Action Plan

-Feasibility study shall start soon.

Necessity of Technical Assistance

- Feasibility Study
- Operation and Maintenance of Port Facilities
- Custom clearance operations

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-14
Project Title	Chindwin Wa -Monywa Navigation and Channel Improvement
Executing Agency	IWT and DWIR
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To harmonize the inland river channel infrastructure development and fleet optimization for the efficient and safe transportation in Chindwin River
2. To provide the effective use of Chindwin river channel for inland transportation in all season
3. To ensure the safety of life and properties by establishing systematic transportation for passengers and cargo

Rationale

1. Ferry capsizing accidents happened in Chindwin river on October 2016, due to the over carrying of passenger as a result of high demand.
2. Most of the vessels used for passenger transportation are wooden vessels and not enough safety facilities and hardly meet with the standard of inland water transportation operation.
3. Although Chindwin River is one of the major rivers, it is only navigable efficiently during high water seasons.
4. Fire hazards also happened as dangerous cargos like oil drums were carried together with the passengers.
5. To contribute the economic and social development of the region by providing new passenger (cum cargo) ship in Chindwin river channel.

Location and Project Plan (Outline)

Source: IWT
Figure: IWT route on Chindwin river

Input	Estimated Cost
- Procurement of vessel	15 mil US$
- Channel dredging	15 mil US$
- Installation of Aids to navigation	5 mil US$
- Others (strengthening the safety rule and regulation)	2 mil US$
Total Estimated Cost	37 mil US$

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Channel Improvement Works	2018	2018
3. Procurement of vessels	2019	2019
4. Commissioning	2020	-

Expected Output

- Seamless flows of cargo and passenger for all season.
- To reduce the rate of accident in the channel.

Action Plan

- Feasibility study shall be started soon.

Necessity of Technical Assistance

-

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-15
Project Title	Navigation Safety and Maintenance Improvement and TA
Executing Agency	DWIR
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To develop safe navigable waterway throughout Myanmar.
2. To develop institutions and tools needed to implement channel maintenance works.

Rationale

1. Myanmar has an extensive river network with the total navigable length of 6,650 km.
2. Water transport is cheaper compared to land and air transport.
3. Draught limitation for each stretch of the channels are shallow and a channel improvement plan should be implemented in order to best utilize the long navigable water way.
4. Because of sedimentation and erosion in the rivers, navigation channels are not stable and need maintenance.

Location & Project Plan (Outline)

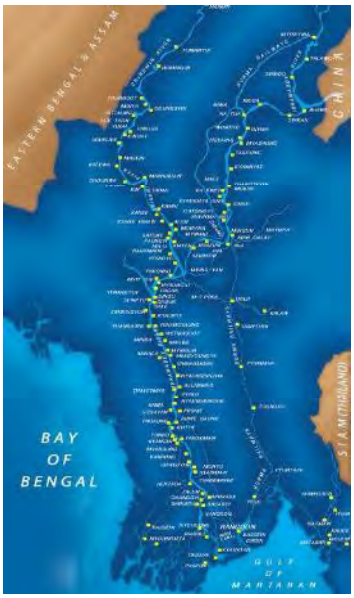


Fig: Navigable Waterways of Myanmar

Input	Estimated Cost (US$ million)
1. Safety rules and regulations	3.0
2. Aids to navigation	10.0
3. Inspection boats and survey equipment	5.0
4. Channel maintenance	5.0
5. Technical Assistance	5.0
Total Estimated Cost	28.0

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Feasibility Study	2018	2018
3. Funding Arrangement	2018	2018
4. Execution	2018	2020
5. Commissioning	2020	-

Result of Evaluation

Expected Output

-24hours Channel Navigation from Mandalay to Nyaung-U.

Action Plan

-Feasibility study shall start soon.

Necessity of Technical Assistance

-Maintenance of the navigation aids
-Dredging operations
-Sedimentation control
-Numerical simulation software (Delft 3D, etc...)

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-16
Project Title	Pathein Port
Executing Agency	IWT, MPA, DWIR
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To increase cargo handling volume and cargo productivity of Pathein.
2. To utilize the advantage in logistics hub of Pathein in maritime transport.
3. To maintain the function of coastal shipping and inland water ports.

Location

Rationale

1. Pathein is envisaged as a logistic hub for the region, a center of local agriculture and a tourist attraction in JICA's Urban Development Plan 2040.
2. Pathein is an important logistic hub for future coastal and inland water transport.
3. Most of the jetties are not suitable for cargo vessels and extend at the narrow space beside the strand road.
4. It has short access to the sea and has good potential to develop the deep-sea port for coastal shipping.

Project Plan (outline)

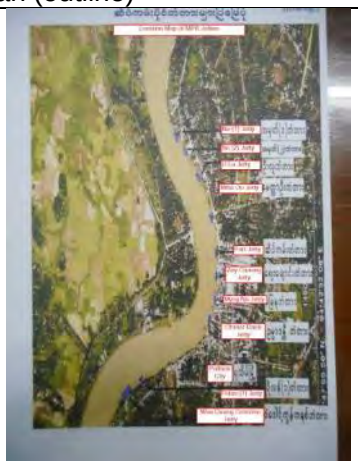


Figure: Location of Existing Port

Input	Estimated Cost (US$ million)
- Construction of new jetties and improvement of existing jetties, cargo handling equipment and yards	5.0
- Road expansion in hinter strand area	2.0
- Miscellaneous	1.0
Total Estimated Cost	8.0

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2019	2019
3. Funding Arrangement	2020	2020
4. Execution	2021	2023
5. Commissioning	2024	

Result of Evaluation	
Expected Output	Action Plan
	- Conduct of a feasibility study

Necessity of Technical Assistance

- Conduct of a feasibility study

Remarks

-

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-17
Project Title	Ayeyarwaddy Delta Channel and Navigation Improvement
Executing Agency	IWT and DWIR
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To develop the channel and to provide smooth and safe navigation in Ayeyarwaddy delta area
2. To enhance the connectivity of inland water transport and coastal transport network by channel improvement works in Ayeyarwaddy delta area
3. To provide the seamless and effective cargo flow in delta area so that the state economy will be improved

Rationale

1. Ayeyarwaddy delta region is densely populated and plays a dominant role in the rice production and also has short access to the international sea route.
2. Access channel in Pathein River is of important as Pathein port is the busiest port in Ayeyarwaddy region and is one of the hubs for inland and coastal transportation.
3. Pathein port will be developed as the logistic hub for rice exporting and access channel should also develop for international vessels.
4. Sedimentation is also important factor for channel and channel should be maintained by river training structures.

Location and Project Plan (Outline)

Source: IWT

Figure: Routes operated by IWT in Ayeyarwaddy Delta

Input	Estimated Cost
- Channel dredging	20 mil US$
- Construction of dykes (channel maintaining works)	10 mil US$
- Installation of Aids to Navigation	9 mil US$
Total Estimated Cost	39 mil US$

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Feasibility	2018	2018
3. Executing	2019	2019
4. Commission	2020	-

Expected Output	Action Plan
- Useful inland water transportation networks in delta region.	- Feasibility study shall be started soon.

Necessity of Technical Assistance

-

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-18
Project Title	Pyay Port
Executing Agency	DWIR, IWT
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To establish a standard inland port to handle the rice cargo in the region.
2. To provide a logistic hub for rice and effective flow of cargo and passenger.
3. To reduce the logistic cost by the mode change from road transportation to waterborne transportation.

Rationale

1. There are no jetties and facilities, just one mooring point used for general cargo and one used for passengers, close together. Vessels moor at the river bank and use gangways for loading and unloading.
2. The main crop in Pyay is rice.
3. The existing port area is located in the center of Pyay and can be accessed by only small size trucks.
4. During dry season, there is a restriction on the maximum amount of cargo due to the shallow draft of the river.

Location and Project Plan (Outline)

Source: http://www.maritime-database.com
Figure: Cargo unloading at Pyay Port

Input	Estimated Cost
- Construction of Port	6 mil US$
- Access road and hinterland area	3 mil US$
- Others	1 mil US$
Total Estimated Cost	10 mil US$

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Feasibility Study	2018	2018
3. Funding Arrangement	2019	2019
4. Execution	2020	2021
5. Commissioning	2021	-

Expected Output

- To handle rice cargo of delta region.
- To provide a port facility needed to support the transportation networks in the area.

Action Plan

- Feasibility study shall be started soon.

Necessity of Technical Assistance

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-19
Project Title	Hinthada Port
Executing Agency	DWIR, IWT
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To establish a standard inland port to handle the rice cargo in the region.
2. To reduce the waiting time of the vessels for loading and unloading operation.
3. To reduce the logistic cost by the mode change from road transportation to waterborne transportation.

Rationale

1. The trade of locally grown rice and grain goes through the Hinthada port.
2. There are no jetties and facilities, the vessels moor at the river bank and use gangways for loading and unloading.
3. There are many private cargo and passenger vessels, and the vessels have to wait for berthing and loading/unloading.

Location and Project Plan (Outline)

Source: Study Team
Figure: Cargo and passenger vessels at Hinthada

Input	Estimated Cost
- Construction of Port	15 mil US$
- Access road and hinterland area	5 mil US$
- Others	2 mil US$
Total Estimated Cost	22 mil US$

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Feasibility Study	2018	2018
3. Funding Arrangement	2019	2019
4. Execution	2020	2021
5. Commissioning	2021	-

Expected Output

- To reduce the waiting time of the vessels.
- To provide a port facility for rice cargo and others

Action Plan

- Feasibility study shall be started soon.

Necessity of Technical Assistance

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-20
Project Title	Kalewa Port
Executing Agency	DWIR, IWT
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To develop an inland port to strengthen the logistic corridor.
2. To provide the efficient handling and transportation of cargo from India border by inland water transportation.
3. To reduce the logistic cost by the mode change from road transportation to waterborne transportation.

Rationale

1. Kalewa is the terminal port in Chindwin river channel and important port for border trade with India.
2. There are no jetties and facilities for passenger and cargo vessels and loading and unloading is done with manual labor.
3. Kalewa port is relatively crowded with transport of construction materials and functions as a hub between Monywa, Kale, Tamu and Khanty.
4. During dry season, there is a restriction on the maximum amount of cargo due to shallow draft of river.

Location and Project Plan (Outline)

Source: http://www.maritime-database.com
Figure: Kalewa Port Overview

Source: http://www.maritime-database.com
Figure: Cargo Vessel berth at Kalewa

Input	Estimated Cost
- Construction of new port	4 mil US$
- Access road and hinterland area	1 mil US$
Total Estimated Cost	5 mil US$

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Feasibility Study	2018	2018
3. Funding Arrangement	2019	2019
4. Execution	2020	2021
5. Commissioning	2021	-

Expected Output

- To increase in trade between Myanmar and India.

Action Plan

- Feasibility study shall be started soon.

Necessity of Technical Assistance

-

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-21
Project Title	Thanlwin River Channel and Navigation Improvement
Executing Agency	IWT and DWIR
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To harmonize the inland river channel infrastructure development and fleet optimization for efficient cargo and passenger transportation in all season
2. To provide the economic transportation for quarry and construction material from Mon state.

Rationale

1. Thanlwin River is one of the major rivers of Myanmar but its navigable length is only 53 km in low water season.
2. Mon state is the one of the sources of quarry in Myanmar.
3. Transportation of quarry by water way is most economical way as water borne transportation can transport heavy and big amount of cargo at one time.
4. Imported cargoes such as cements from Thailand via border trade are also distributed from Mon state.
5. Road accessibility is undeveloped for some township in the Mon state and inland water transportation is only accessible for those areas.

Location and Project Plan (Outline)

Source: IWT
Figure: IWT route in the Thanlyin River

Input	Estimated Cost
- Channel dredging	40 mil US$
- River training structures	30 mil US$
- Installation of Aids to navigation	20 mil US$
- Others	10 mil US$
Total Estimated Cost	100 mil US$

Schedule

Calendar Year	Start	End
1. Preparation	2017	2017
2. Feasibility	2018	2018
3. Executing	2019	2020
4. Commission	2020	-

Expected Output

- Economic transportation of quarry and construction material.
- Seamless transportation of cargo and passenger throughout the year.

Action Plan

- Feasibility study shall be started soon.

Necessity of Technical Assistance

-

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-22
Project Title	Rakhine Coastal Vessels
Executing Agency	IWT
Relevant Ministry	Japan International Cooperation System (JICS), MOTC

Outline of the Project

Objectives

1. To improve the ability of coastal transport in Myanmar
2. To contribute to the economic and social development of Myanmar by providing Myanmar inland water transportation with passenger ships for coastal transport in Rakhine State
3. To serve passenger and cargo separately for more safe and effective transport

Rationale

1. Two used vessels and one new vessel for passenger transport are provided with Japanese Grant Aid for displaced person/refugees in Rakhine State.
2. The two aluminum vessels from Japan have arrived in Myanmar for Rakhine coastal area and the handover ceremony will be held on 29th March, 2017.
3. One new vessel from Japan is now at the tender stage for shipbuilding and will arrive in Myanmar in 2018 or 2019.

Location and Project Plan (Outline)

Source: Google
Figure: Map of Rakhine State

Source: IWT website
Figure: Passenger Ship donated by JICS

Input	Estimated Cost (US$ million)
- Procurement of three coastal vessels for passenger transport	15.0
Total Estimated Cost	15.0

Schedule

Calendar Year	Start	End
1.Preparation	2016	2017
2.Procurement of two used vessels	2017	2017
3.Procurement of a new vessel	2018	2019
4.Commissioning	2020	-

Expected Output

- Effective passenger and cargo transport in the Rakhine Coastal region

Action Plan

-

Necessity of Technical Assistance

- Safety Facilities

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-23
Project Title	Bhamo Port
Executing Agency	DWIR, IWT
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To establish a standard inland port to handle the rice cargo in the region.
2. To reduce the waiting time of the vessels for loading and unloading operation.
3. To reduce the logistic cost by the mode change from road transportation to waterborne transportation.

Rationale

1. The trade of locally grown rice and grain goes through the Bhamo port.
2. There are no jetties and facilities, the vessels moor at the river bank and use gangways for loading and unloading.
3. There are many private cargo and passenger vessels, and the vessels have to wait for berthing and loading/unloading.

Location and Project Plan (Outline)

Input	Estimated Cost
- Construction of Port	6,0 mil US$
- Access road and hinterland area	2.0 mil US$
- River training structure	2.0 mil US$
Total Estimated Cost	10 mil US$

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2019	2019
3. Funding Arrangement	2020	2020
4. Execution	2021	2023
5. Commissioning	2023	-

Expected Output

- To reduce the waiting time of the vessels.
- To provide a port facility for rice cargo and others

Action Plan

- Feasibility study shall be started soon.

Necessity of Technical Assistance

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-24
Project Title	Mwalik – Hommalin Channel and Navigation Improvement
Executing Agency	IWT, DWIR
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To transport cargoes and passengers safely and effectively
2. To enable river navigation throughout a year
3. To reduce the logistics cost by a modal shift from trucks to ships

Location & Project Plan

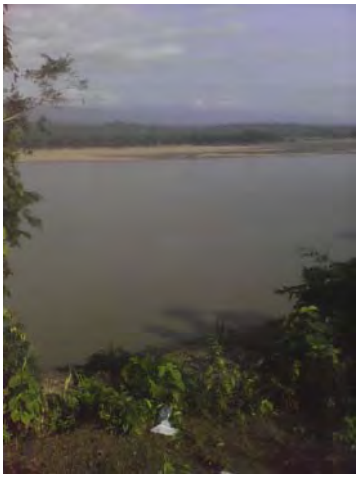
The distance between Monywa and Hommalin is around 300 km. The river channel of the Chindwin River from Monywa (capital of Sagaing) to Hommalin is to be improved as a safe navigation channel for freight and passenger transport.

Rationale

1. Monywa is the capital of the Sagaing Region (Population: 380,000) and is also a busy port town.
2. Even though there are many cargo and passenger vessels at the bank of the Chindwin River, there are no facilities for port and cargo handling.
3. There are also many private and IWT vessels serving passenger and cargo transport.
4. River navigation in the upstream of Monywa needs improved channel

<u>Existing Regular & Express Services for Inland Water Transport</u>
Monywa → Kalaywa → Hommalin → Khanty

Existing Situation



Input	Estimated Cost (US$ million)
- Navigation channel improvement	2.0
- Provision of navigation aid	2.0
Total Estimated Cost	4.0

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2019	2019
3. Funding Arrangement	2020	2020
4. Execution	2021	2025
5. Commissioning	2025	-

Expected Output

- General Cargo: 50,000 ton/year

Action Plan

- Feasibility study shall start soon.

Necessity of Technical Assistance

- Operation and Maintenance of Port Facilities

Remarks:
Ferry boat was capsized due to overriding of passengers and a lack of navigation aid.

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-25
Project Title	Monywa Upstream Channel and Navigation Improvement
Executing Agency	IWT, DWIR
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To transport cargoes and passengers safely and effectively
2. To enable river navigation throughout a year
3. To reduce the logistics cost by a modal shift from trucks to ships

Location & Project Plan

Monywa is a city located in Sagaing Region, Myanmar, 136 km (84.5 ml) northwest of Mandalay on Chindwin River's eastern bank.

Rationale

1. Monywa is the capital of the Sagaing Region and is also a busy port town.
2. Even though there are many cargo and passenger vessels at the bank of the Chindwin River, there are no facilities for port and cargo handling.
3. There are also many private and IWT vessels serving passenger and cargo transport.
4. River navigation in the upstream of Monywa needs improved channel

<u>Existing Regular & Express Services for Inland Water Transport</u>
Monywa → Kalaywa → Hommalin → Khanty

Existing Situation

Photo: Many Vessels at Chindwin River Bank in Monywa

Input	Estimated Cost (US$ million)
- Navigation channel improvement	20.0
- Provision of navigation aid	6.0
Total Estimated Cost	26.0

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2019	2019
3. Funding Arrangement	2020	2020
4. Execution	2021	2025
5. Commissioning	2025	-

Expected Output	
- General Cargo	50,000 ton/year

Action Plan

- Feasibility study shall start soon.

Necessity of Technical Assistance

- Operation and Maintenance of Port Facilities

Remarks:
Ferry boat was capsized due to overriding of passengers and lack of navigation aid.

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-26
Project Title	Mandalay – Bhamo Channel and Navigation Improvement
Executing Agency	IWT, DWIR
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To transport cargoes and passengers safely and effectively
2. To enable safe river navigation along the Ayeyarwaddy River throughout a year
3. To reduce the logistics cost by a modal shift from trucks to ships

Location & Project Plan

Distance between Mandalay and Bhamo is around 350 km

Rationale

1. Mandalay is the capital of the Mandalay Region and is the second largest city of Myanmar and the core of economy in the northern part of Myanmar.
2. Bhamo is a city of Kachin State (population: 50,000) in the northernmost part of Myanmar, located 186 km south from the capital city of the state of Kachin, Myitkyina.
3. The inland water transport is the major mode linking the two important cities in Kachin State however the navigation along this part of the Ayeyarwaddy River is need an improvement for safe navigation.

Existing Situation

Input	Estimated Cost (US$ million)
- Navigation channel improvement	30.0
- Provision of navigation aid	25.0
Total Estimated Cost	55.0

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Feasibility Study	2019	2019
3. Funding Arrangement	2020	2020
4. Execution	2021	2025
5. Commissioning	2025	-

Expected Output

- General Cargo: 50,000 ton/year

Action Plan

- Feasibility study shall start soon.

Necessity of Technical Assistance

- Operation and Maintenance of Port Facilities

Remarks:

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-27
Project Title	Chindwin River Vessels
Executing Agency	IWT
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To improve the safety and ability of inland water transport in Myanmar.
2. To provide the transportation services in all season throughout the years.
3. To contribute the economic and social development of Myanmar by providing Myanmar Inland water transportation with passenger ships for inland water transport in Chindwin River.
4. To serve passenger and cargo separately for more safe and effective transport.

Rationale

1. Ferry sinking accident occurred in Chindwin river in October 2016 and the cause is the overloading and safety issues.
2. Chindwin river is not navigable for all season and water depth is shallow at the dry season.
3. Shallow draft vessels are suited for the navigation in the Chindwin river channel.

Location and Project Plan (Outline)

Source: IWT
Fig: IWT vessels in Chindwin River

Input	Estimated Cost
- Procurement of vessels for passenger and cargo transport	4.0 mil US$
Total Estimated Cost	4.0 mil US$

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Procurement of used vessels	2019	2019
3. Procurement of used vessels	2020	2020
4. Commissioning	2020	-

Expected Output

- Effective passenger and cargo transport in Chindwin area.

Action Plan

-

Necessity of Technical Assistance

- Safety facilities

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-28
Project Title	Thanlwin River Vessels
Executing Agency	IWT
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location and Project Plan (Outline)
1. To improve the safety and ability of inland water transport in Myanmar. 2. To provide the transportation services in all season throughout the years. 3. To contribute the economic and social development of Myanmar by providing Myanmar Inland water transportation with passenger ships for inland water transport in Thanlwin River. 4. To serve passenger and cargo separately for more safe and effective transport.	 Source: IWT Fig: Thamainbayran Vessel of IWT in Thanlwin River.
Rationale	
1. Many accidents occurred in the inland waterways. 2. Thanlwin river is not navigable for all season and water depth is shallow at the dry season. 3. Shallow draft vessels are suited for the navigation.	

Input	Estimated Cost
- Procurement of vessels for passenger transport	4.0 mil US$
Total Estimated Cost	4.0 mil US$

Schedule

Calendar Year	Start	End
1. Preparation	2019	2019
2. Procurement of used vessels	2020	2020
3. Procurement of used vessels	2021	2021
4. Commissioning	2021	-

Expected Output	Action Plan
- Effective passenger and cargo transport in Thanlwin River.	-

Necessity of Technical Assistance
- Safety facilities
Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-29
Project Title	Ayeyarwady Delta Vessels
Executing Agency	IWT
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location and Project Plan (Outline)
1. To improve the safety and ability of inland water transport in Myanmar 2. To contribute the economic and social development of Myanmar by providing Myanmar Inland water transportation with passenger ships for inland water transport in Ayeyarwady River. 3. To serve passenger and cargo separately for more safe and effective transport.	 Source: DVB Fig: Search and Rescue activity of collision (April 2017)
Rationale	
1. River transportation is important mode of transport in delta region for its ease of accessibility of river networks. 2. Many accidents happened in the river due to dense traffic of local people for daily commuting and weak enforcement in safety regulation. 3. Delta region is agricultural region and transportation of rice and other product transportation in inland water way is also important.	

Input	Estimated Cost	Schedule		
- Procurement of vessels for passenger and cargo transport	15.0 mil US$	Calendar Year	Start	End
		1. Preparation	2019	2019
		2. Procurement of used vessels	2020	2020
		3. Procurement of used vessels	2021	2021
		4. Commissioning	2021	-
Total Estimated Cost	15.0 mil US$			

Expected Output	Action Plan
- Effective passenger and cargo transport in Delta area.	-

Necessity of Technical Assistance
- Safety facilities
Remarks

Project Profile

<table>
<tr><td>Sub-Sector</td><td colspan="4">Inland Water Transport</td></tr>
<tr><td>Reference No.</td><td colspan="4">LIP-30</td></tr>
<tr><td>Project Title</td><td colspan="4">Improvement of Sittaung River and Bank Projection Project</td></tr>
<tr><td>Executing Agency</td><td colspan="4">DWIR</td></tr>
<tr><td>Relevant Ministry</td><td colspan="4">MOTC</td></tr>
<tr><td colspan="5">Outline of the Project</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">Location and Project Plan (Outline)</td></tr>
<tr><td colspan="2">1. To prevent flooding and protect river banks erosion.
2. To improve and stabilize the navigation channel.
3. To secure the existence of farmlands and villages habited on the bank of the Sittaung river.</td><td colspan="3" rowspan="2"> 
Source: ElevenMyanmar.com
Fig: The levee along the Sittaung River.</td></tr>
<tr><td colspan="2">Rationale</td></tr>
<tr><td colspan="2">1. Sittaung river has notorious tidal bore at its mouth which preclude small craft navigating in the river.
2. Strong current makes the river less valuable for inland water transportation.
3. Bank erosion occurs due to the strong current and tidal bore.
4. Sittaung river level often exceed the danger level during raining season and river bank has been eroded over years.</td><td colspan="3"></td></tr>
<tr><td>Input</td><td>Estimated Cost</td><td colspan="3">Schedule</td></tr>
<tr><td rowspan="2">- Feasibility Survey
- River Training Structure (revetments, groynes, dikes)
- Miscellaneous</td><td rowspan="2">1.0 mil US$
18.0 mil US$
3.0 mil US$</td><td>Calendar Year</td><td>Start</td><td>End</td></tr>
<tr><td>1. Preparation
2. Feasibility Study
3. Funding Arrangement
4. Execution
5. Commissioning</td><td>2018
2019
2020
2021
2025</td><td>2018
2019
2020
2025
-</td></tr>
<tr><td>Total Estimated Cost</td><td>22.0 mil US$</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Expected Output</td><td colspan="3">Action Plan</td></tr>
<tr><td colspan="2">- Navigable through the year.</td><td colspan="3">- Feasibility study shall be start soon</td></tr>
<tr><td colspan="5">Necessity of Technical Assistance</td></tr>
<tr><td colspan="5">- Operation and maintenance of river training works.</td></tr>
<tr><td colspan="5">Remarks</td></tr>
<tr><td colspan="5"></td></tr>
</table>

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-31
Project Title	Mandalay Upstream Vessels (Passenger Cargo)
Executing Agency	IWT
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To improve the ability of inland water transport in Myanmar.
2. To contribute the economic and social development of Myanmar by providing Myanmar Inland water transportation with passenger ships for inland water transport in Ayeyarwady River.
3. To serve passenger and cargo separately for more safe and effective transport.

Rationale

1. Rehabilitation of river navigation is under construction from Mandalay to Nyaung U.

Location and Project Plan (Outline)

Source: The Irrawady & IWT
Fig: Passenger and Container Vessel in Mandalay

Input	Estimated Cost
- Procurement of vessels for passenger and Cargo transport	9.0 mil US$
Total Estimated Cost	9.0 mil US$

Schedule

Calendar Year	Start	End
1. Preparation	2019	2019
2. Procurement of used vessels	2020	2020
3. Procurement of used vessels	2021	2021
4. Commissioning	2021	-

Expected Output

- Effective passenger and cargo transport in Mandalay upstream.

Action Plan

-

Necessity of Technical Assistance

-

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-32
Project Title	Mandalay Shipyard Modernization
Executing Agency	IWT
Relevant Ministry	MOTC

Outline of the Project

Objectives

1. To upgrade and modernize the shipyard system and facilities for improvement of shipyard capacity.
2. To improve the efficiency and enhancement of the quality of maintenance for both shipbuilding and repair.
3. To improve the expertise and knowledge of the officers, engineers and technicians regarding ship building
4. To provide modern technology methods and knowledge for the officers, engineers and technicians of IWT.

Rationale

1. Docking systems, machinery, workshops, equipment and slipways are very old and shall be modernized.
2. Technology for repair, shipbuilding and shipyard management shall be upgraded.
3. Training for shipbuilding and ship repair shall be provided to gain the essential skills and knowledge required.
4. Shipyard operation systems shall be enhanced.

Location and Project Plan (Outline)

Source: Study Team
Fig: Shipyards in Mandalay

Input	Estimated Cost
- Upgrading of machine ships, slipways and docking facilities	14.0 mil US$
- Replenishing modern machineries and machine tools for repairing and construction	2.0 mil US$
- Enhancing shipyard management capacity and technology for repair and construction.	3.0 mil US$
Total Estimated Cost	19.0 mil US$

Schedule

Calendar Year	Start	End
1. Preparation	2018	2018
2. Basis Design	2019	2019
3. Execution	2020	2021
4. Commissioning	2021	-

Expected Output

- Improvement of shipyard capacity and facilities
- Increased productivity of ships (maintenance, new-building and repair)

Action Plan

- Basic Design is needed.

Necessity of Technical Assistance

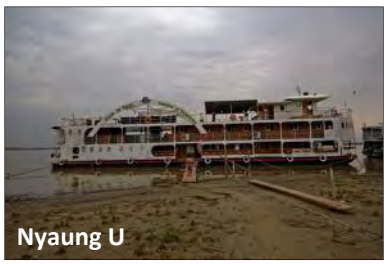
- Operations and marketing of container barges and passenger vessels
- Training of shipyard personal

Remarks

Project Profile

Sub-Sector	Inland Water Transport
Reference No.	LIP-33
Project Title	Other 10 Small Ports Construction
Executing Agency	DWIR, IWT
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location and Project Plan (Outline)
1. To transport cargoes and passengers safely and effectively. 2. To establish standard inland port 3. To reduce the logistic cost by a mode change from trucks to ships 4. To separate cargoes and passenger transport for safety.	  Source: Study Team Fig: Current situation of Inland port in Myanmar
Rationale	
1. Even through there is huge volume of cargo flow and passengers in inland water way, there are no port facilities for cargo and passenger. 2. Road access is not reachable for some area and inland water transport is the only one mode of transportation and most economical way. 3. There are many private and IWT vessels serving passenger and cargo transport.	

Input	Estimated Cost
- Construction of new jetties and improvement of existing jetties.	50.0 mil US$
- Cargo handling equipment and yards.	50.0 mil US$
- Miscellaneous	5.0 mil US$
Total Estimated Cost	105.0 mil US$

Schedule	Start	End
Calendar Year		
1. Preparation	2018	2018
2. Feasibility Study	2019	2019
3. Funding Arrangement	2020	2020
4. Execution	2021	2025
5. Commissioning	2025	-

Expected Output	Action Plan
-	- Feasibility study shall be start soon

Necessity of Technical Assistance

- Operation and maintenance of Port Facilities.

Remarks

Project Profile

<table>
<tr><td>Sub-Sector</td><td colspan="4">Aviation</td></tr>
<tr><td>Reference No.</td><td colspan="4">LAP-01</td></tr>
<tr><td>Project Title</td><td colspan="4">Yangon International Airport (Air Cargo Handling Facilities)</td></tr>
<tr><td>Executing Agency</td><td colspan="4">DCA</td></tr>
<tr><td>Relevant Ministry</td><td colspan="4">MOTC</td></tr>
<tr><td colspan="5">Outline of the Project</td></tr>
<tr><td colspan="3">Objectives</td><td colspan="2">Location</td></tr>
<tr><td colspan="3">1) To operate 24 hrs a day
2) To accommodate increased passengers and cargos demand
3) To extend smooth expansion of apron and airport capacity</td><td colspan="2">Yangon
Approximately 18 km northwest of downtown Yangon
  </td></tr>
<tr><td colspan="3">Rationale</td><td colspan="2">Project plan</td></tr>
<tr><td colspan="3">1. The development of cargo terminal has been recently improved and it is now partially operating. The linkage between cargo terminal and warehouse is to be firmly established for minimum transshipment time and cost.</td><td colspan="2">To handle increased demand of air cargo</td></tr>
<tr><td>Input</td><td>Estimated Cost (US$ million)</td><td colspan="3">Schedule</td></tr>
<tr><td rowspan="6">1. Aprons
2. Cargo Terminal and Facilities
3. Others</td><td rowspan="6">100</td><td>Calendar Year</td><td>Start</td><td>End</td></tr>
<tr><td>1. Preparation</td><td>2017</td><td>2018</td></tr>
<tr><td>2. Feasibility Study</td><td>2018</td><td>2019</td></tr>
<tr><td>3. Funding Arrangement</td><td>2019</td><td>2020</td></tr>
<tr><td>4. Execution</td><td>2020</td><td>2021</td></tr>
<tr><td>5. Commissioning</td><td>2021</td><td>2022</td></tr>
<tr><td>Total Estimated Cost</td><td>100</td><td></td><td></td><td></td></tr>
<tr><td colspan="3">Expected Output</td><td colspan="2">Action Plan</td></tr>
<tr><td colspan="3">1) Increase in passenger and cargo volume
2) Smoother logistics
3) Increase in safety assurance</td><td colspan="2">- To conduct feasibility and detailed study.
- Construction</td></tr>
<tr><td colspan="5">Necessity of Technical Assistance</td></tr>
<tr><td colspan="5">Technical assistance is needed</td></tr>
<tr><td colspan="5">Remarks:
Present Yangon International Airport will be used as the domestic air traffic for both passenger and air cargo transportation in 2023 when the Hanthawaddy Internaitonal Airport will commence its airport operation. The existing cargo terminal has been operating since 2016.</td></tr>
</table>

Project Profile

Sub-Sector	Aviation
Reference No.	LAP-02
Project Title	Mandalay International Airport (Air Cargo Handling Facilities)
Executing Agency	DCA
Relevant Ministry	MOTC

Outline of the Project

Objectives

1) To operate 24 hrs a day
2) To accommodate increased passengers and cargos demand
3) To extend international air network
4) Trade Facilitation

Location & Project Plan

Approximately 30km southwest of the second largest city, Mandalay

Rationale

The development of cargo facility has been recently improved.
As a middle city of Myanmar, the linkage between cargo terminal and warehouse would be at shortest time and lowest cost.
It is second gateway to Myanmar.

Construction CARGO Terminal
(Phasing of cargo handling capacity)
Phase 1 - 4000 tons/year in 2019
Phase 2 - 8000 tons/year
Phase 3 - 12000 tons/year

Project plan

Source: Internet,
Existing Passenger Terminal of Mandalay International Airport

Input	Estimated Cost (US$ million)
Cargo Terminal and Facilities	20
Others	
Total Estimated Cost	20

Schedule

Calendar Year	Start	End
1. Preparation	2015	2016
2. Feasibility Study	2016	2017
3. Funding Arrangement	2017	2018
4. Execution	2018	2019
5. Commissioning	2019	2020

Expected Output

1) Increase in passenger and cargo volume
2) Smoother logistics
3) Keeping profitability

Action Plan

To conduct detailed study
To develop and construct cargo handling capacity

Necessity of Technical Assistance

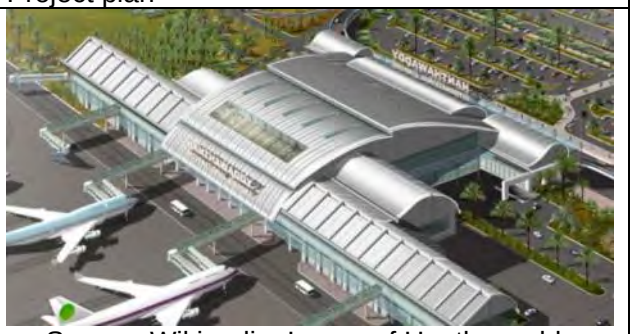
Technical assistance is needed

Remarks:

Project Profile

Sub-Sector	Aviation
Reference No.	LAP-03
Project Title	Hanthawaddy International Airport (Air Cargo Handling Facilities)
Executing Agency	DCA
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location & Project Plan
1) Major gate way and regional hub airport of Myanmar. 2) Rapid demand increase and provide the airport users high quality services of the world class airport. 3) To contribute sustainable development including the employment promotion of Myanmar. 4) Export enhancement	Hanthawady  Source: DCA
Rationale	**Project plan**
1) The development of cargo terminal will be implemented and expected full operation by 2024. 2) The linkage between cargo terminal and warehouse is to be firmly established for minimum transhipment time and cost and maximum transport impacts of investment. 3) To develop cargo handling facilities on Phase I is annual 63,000 tons for International air cargo is planned and needed.	 Source: Wikipedia, Image of Hanthawaddy International Airport Passenger Terminal

Input	Estimated Cost (US$ million)
1. Runways 2. Taxiways, Aprons 3. Cargo Terminal and Facilities 4. Others	1,000
Total Estimated Cost	1,000

Schedule

Calendar Year	Start	End
1. Preparation	2015	2016
2. Feasibility Study	2016	2017
3. Funding Arrangement	2019	2020
4. Execution	2021	2023
5. Commissioning	2023	2024

Expected Output	Action Plan
7000 tons Cargo terminal and 8 cargo aprons (Code D) in Phase I project	To conduct detailed study and Construction

Necessity of Technical Assistance

Technical and financial viability analysis

Remarks:
The Hanthawady International Airport development project is totally vested to the consorcium formed and led by JGC of Japan under PPP agreement with DCA. The project is expected to be completed by the end of 2024.

Project Profile

<table>
<tr><td>Sub-Sector</td><td colspan="4">Aviation</td></tr>
<tr><td>Reference No.</td><td colspan="4">LAP-04</td></tr>
<tr><td>Project Title</td><td colspan="4">Pakokku / Nyaung U Airport Development</td></tr>
<tr><td>Executing Agency</td><td colspan="4">DCA</td></tr>
<tr><td>Relevant Ministry</td><td colspan="4">MOTC</td></tr>
<tr><td colspan="5">Outline of the Project</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">Location & Project Plan</td></tr>
<tr><td colspan="2">1) To enhance the airport safety and security facility
2) To improve airport basic facilities
3) To introduce cargo facilities</td><td colspan="3">Pakokku in Magwe Region
21° 24' 19.47686" N
95° 06' 40.60451" E
16 km from Bagan
  </td></tr>
<tr><td colspan="2">Rationale</td><td colspan="3">Project plan</td></tr>
<tr><td colspan="2">1. Existing domestic airports are poor andinadequate for international standards of safety and security for aircraft operation
2. Basic airport facilities such as runways, taxiways, aprons and related facilities are urgently needed to be improved.
3. Air cargo facilities at domestic airports need to be developed for future potential of perishable and high value goods</td><td colspan="3">- To develop cargo handling facilities.</td></tr>
<tr><td>Input</td><td>Estimated Cost (US$ million)</td><td colspan="3">Schedule</td></tr>
<tr><td rowspan="6">- Civil works
- Runway,Taxiways, Aprons
- Air Cargo Facilities
- Others</td><td rowspan="6">31</td><td>Calendar Year</td><td>Start</td><td>End</td></tr>
<tr><td>1. Preparation</td><td>2017</td><td>2018</td></tr>
<tr><td>2. Feasibility Study</td><td>2018</td><td>2019</td></tr>
<tr><td>3. Funding Arrangement</td><td>2019</td><td>2020</td></tr>
<tr><td>4. Execution</td><td>2021</td><td>2023</td></tr>
<tr><td>5. Commissioning</td><td>2023</td><td>2024</td></tr>
<tr><td>Total Estimated Cost</td><td>31</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Expected Output</td><td colspan="3">Action Plan</td></tr>
<tr><td colspan="2">- To enhance the airport safety and security
- To improve the air cargo facilities for logistical activities</td><td colspan="3">- To conduct detailed study
- Construction</td></tr>
<tr><td colspan="5">Necessity of Technical Assistance</td></tr>
<tr><td colspan="5">Technical assistance is needed.</td></tr>
<tr><td colspan="5">Remarks:
The airport expansion project is planned in the area of potential world cultural heritage. The acceptance of UNESCO is to be sought. As an alternative area for the airport aiming at enahancement of tourism at this area Pakokku can be nominated.</td></tr>
</table>

Project Profile

Sub-Sector	Aviation
Reference No.	LAP-05
Project Title	Heho Airport Development
Executing Agency	DCA
Relevant Ministry	MOTC

Outline of the Project

Objectives

1) To enhance the airport safety and security facility
2) To improve airport basic facilities
3) To introduce cargo facilities

Location

- Approximately 4 km to the northwest of Heho Town and approximately
- 20 km to the northwest of Inle Lake

View of Present Passenger Terminal

Rationale

1. Meeting with increasing international and domestic passenger demand
2. Enhancement and supporting the promotion of tourism and local industries

Input	Estimated Cost (US$ million)
1.Existing domestic airports are poor and inadequate for international standards of safety and security for aircraft operation 2.Basic airport facilities such as runways, taxiways, aprons and related facilities are urgently needed to be improved. 3.Air cargo facilities at domestic airports need to be developed for future potential of perishable and high value goods	38
Total Estimated Cost	38

Schedule

Calendar Year	Start	End
1. Preparation	2017	2018
2. Feasibility Study	2018	2019
3. Funding Arrangement	2019	2020
4. Execution	2021	2022
5. Commissioning	2022	2023

Expected Output

- To enhance the airport safety and security
- To improve the air cargo facilities for logistical activities

Action Plan

Conduct of feasibility study

Necessity of Technical Assistance

Technical assistance is needed.

Increased passenger and air cargo handling volume

Remarks: Master plan study conducted in 2017. Heho airport is located at one of major tourism destination of Myanmar. The demand of international tourism has been growing quickly at present. The location where this airport exists is mountainous area or Shan Plateau where horticultural activity is significant. In the future the export of horticulture products such as flower is expected to start and to grow rapidly.

Project Profile

Sub-Sector	Aviation
Reference No.	LAP-06
Project Title	Dawei Airport Development
Executing Agency	DCA
Relevant Ministry	MOTC

Outline of the Project

Objectives

1) To enhance the airport safety and security facility
2) To improve airport basic facilities
3) To introduce cargo facilities

Location

Dawei Town in Tanintharyi Region, Southern Myanmar.

View of Dawei Airport

Rationale

1. Existing domestic airports are poor and inadequate for international standards of safety and security for aircraft operation
2. Basic airport facilities such as runways,taxiways, aprons and related facilities are urgently needed to be improved.
3. Air cargo facilities at domestic airports need to be developed for future potential of perishable and high value goods

Source: Wikipedia

Input	Estimated Cost (US$ million)
- Civil works - Runway,Taxiways, Aprons - Air Cargo Facilities - Others	32
Total Estimated Cost	32

Schedule

Calendar Year	Start	End
1. Preparation	2017	2018
2. Feasibility Study	2018	2019
3. Funding Arrangement	2019	2020
4. Execution	2021	2023
5. Commissioning	2023	2024

Expected Output

1. To enhance the airport safety and security
2. To improve the air cargo facilities for logistical activities

Action Plan

Conduct of feasibility study

Necessity of Technical Assistance

Technical assistance is needed.

Remarks: Master plan study conducted in 2017. Dawei city is a core city in the location being developed as the Dawei SEZ. The improvement of exisiting Dawei domestic airport is necessary for the promotion of the development of Dawei SEZ and promotion of tourism in and aound this area along the sea coast.

Project Profile

Sub-Sector	Aviation
Reference No.	LAP-07
Project Title	Kyaukphyu Airport Development
Executing Agency	DCA
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location & Project Plan
1) To enhance the airport safety and security facility 2) To improve airport basic facilities 3) To introduce cargo facilities	Present location of Kyaukpyu Airport Kyaukphyu in Rakhine State 19 º 25’ 21.35” N 93 º 32’ 04.87” E 
Rationale	View of Existing Passenger Terminal
1. Existing domestic airports are poor and inadequate for international standards of safety and security for aircraft operation 2. Basic airport facilities such as runways, taxiways, aprons and related facilities are urgently needed to be improved. 2. Air cargo facilities at domestic airports need to be developed for future potential of perishable and high value goods	 Source: Wikipedia

Input	Estimated Cost (US$ million)
- Civil works - Runway,Taxiways, Aprons - Air Cargo Facilities - Others	15
Total Estimated Cost	15

Schedule

Calendar Year	Start	End
1. Preparation	2017	2018
2. Feasibility Study	2018	2019
3. Funding Arrangement	2019	2020
4. Execution	2021	2023
5. Commissioning	2023	2024

Expected Output	Action Plan
To enhance the airport safety and security To improve the air cargo facilities for logistical activities	Conduct of feasibility study

Necessity of Technical Assistance

Technical assistance is needed.

Remarks:
Kyaukphyu city is a core city in the location being developed as the Kyaukphyu SEZ that is the gateway of Trans-Myanmar Oil Pipeline as well as Trans-Myanmar Logistics Corridor as planned. The improvement of exisiting Kyaukphyu domestic airport is necessary for the promotion of the development of Kyaukphyu SEZ and promotion of local industries including fishery.

Project Profile

Sub-Sector	Aviation
Reference No.	LAP-08
Project Title	Tachilek Airport Development
Executing Agency	DCA
Relevant Ministry	MOTC

Outline of the Project

Objectives

1) To enhance the airport safety and security facility
2) To improve airport basic facilities
3) To introduce cargo facilities

Location & Project Plan

Present location of Tachilek Airport

Source: World Airport Finder

Rationale

1. Existing domestic airports are poor and inadequate for international standards of safety and security for aircraft operation
2. Basic airport facilities such as runways, taxiways, aprons and related facilities are urgently needed to be improved.
3. Air cargo facilities at domestic airports need to be developed for future potential of perishable and high value goods.

Input	Estimated Cost (US$ million)
- Civil works - Runway,Taxiways, Aprons - Air Cargo Facilities - Others	29
Total Estimated Cost	29

Schedule

Calendar Year	Start	End
1. Preparation	2017	2018
2. Feasibility Study	2018	2019
3. Funding Arrangement	2019	2020
4. Execution	2021	2023
5. Commissioning	2023	2024

Expected Output

- To enhance the airport safety and security
- To improve the air cargo facilities for logistical activities

Action Plan

Conduct of feasibility study

Necessity of Technical Assistance

Technical assistance is needed.

Remarks: Master plan study conducted in 2017. Tahcileik city is city located at the border with the northern Thailand and closed to the gateway of the Trans-Myanmar Logistics Corridor at the border with China. The improvement of exisiting Tachileik domestic airport is necessary for the promotion of the development of border region with Thailand and China.

Project Profile

Sub-Sector	Aviation
Reference No.	LAP-09
Project Title	Myeik Airport Development
Executing Agency	DCA
Relevant Ministry	MOTC

Outline of the Project

Objectives

1) To enhance the airport safety and security facility
2) To improve airport basic facilities
3) To introduce cargo facilities

Location & Project Plan

- Myeik in Tanintharyi Region, Southernmost part of Myanmar.

Rationale

1. Existing domestic airports are poor and inadequate for international standards of safety and security for aircraft operation
2. Basic airport facilities such as runways, taxiways, aprons and related facilities are urgently needed to be improved.
3. Air cargo facilities at domestic airports need to be developed for future potential of perishable and high value goods

View of Present Passenger Terminal

Source: Logistics Capacity Assessment, dica

Input	Estimated Cost (US$ million)
- Civil works - Runway,Taxiways, Aprons - Air Cargo Facilities - Others	13
Total Estimated Cost	13

Schedule

Calendar Year	Start	End
1. Preparation	2017	2018
2. Feasibility Study	2018	2019
3. Funding Arrangement	2019	2020
4. Execution	2021	2023
5. Commissioning	2023	2024

Expected Output

- To enhance the airport safety and security
- To improve the air cargo facilities for logistical activities

Action Plan

Conduct of feasibility study

Necessity of Technical Assistance

Technical assistance is needed.

Remarks: Master plan study conducted in 2017. Myeik city is a core city along the coast of the South Eastern part of Myanmar where a rich natural marine resouces is endowed. The expected tourism products in and around Myeik will be a sort of marine resort and its potential is quite high once the access will become easier either from Yangon or Bangkok.

Project Profile

Sub-Sector	Aviation
Reference No.	LAP-10
Project Title	Sittwe Airport Development
Executing Agency	DCA
Relevant Ministry	MOTC

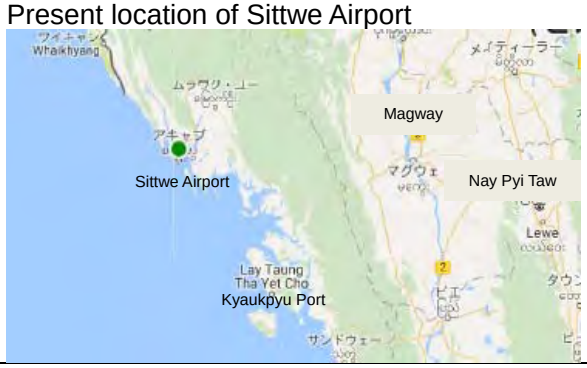
Outline of the Project

Objectives

1) To enhance the airport safety and security facility
2) To improve airport basic facilities
3) To introduce cargo facilities

Location & Project Plan

Present location of Sittwe Airport



Rationale

1. Existing domestic airports are poor and inadequate for international standards of safety and security for aircraft operation
2. Basic airport facilities such as runways, taxiways, aprons and related facilities are urgently needed to be improved.
3. Air cargo facilities at domestic airports need to be developed for future potential of perishable and high value goods

View of Existing Facilities

Input	Estimated Cost (US$ million)
- Civil works - Runway,Taxiways, Aprons - Air Cargo Facilities - Others	18
Total Estimated Cost	18

Schedule

Calendar Year	Start	End
1. Preparation	2017	2018
2. Feasibility Study	2018	2019
3. Funding Arrangement	2019	2020
4. Execution	2021	2023
5. Commissioning	2023	2024

Expected Output

- To enhance the airport safety and security
- To improve the air cargo facilities for logistical activities

Action Plan

Conduct of feasibility study

Necessity of Technical Assistance

Technical assistance is needed.

Remarks: Master plan study conducted in 2017. Sittwe city is a core city and located at the gatway of the Kaladan Multimodal Transport Project connecting with the Eastern Coast Indian cities with the North East Indian region with the shortest possible freight transport means (e.g. maritime transport, inland waterway transport, road or railway). The promotion of trade and the operation of the above mentioned Kaladan Multimodal Transport System the expansion and modernization of existing Sittwe Domestic Airport is needed.

Project Profile

<table>
<tr><td>Sub-Sector</td><td colspan="4">Aviation</td></tr>
<tr><td>Reference No.</td><td colspan="4">LAP-11</td></tr>
<tr><td>Project Title</td><td colspan="4">Myitkyina Airport Development</td></tr>
<tr><td>Executing Agency</td><td colspan="4">DCA</td></tr>
<tr><td>Relevant Ministry</td><td colspan="4">MOTC</td></tr>
<tr><td colspan="5">Outline of the Project</td></tr>
<tr><td colspan="2">Objectives</td><td colspan="3">Location & Project Plan</td></tr>
<tr><td colspan="2">1) To enhance the airport safety and security facility
2) To improve airport basic facilities
3) To introduce cargo facilities</td><td colspan="3">Approximately 4 km to the west of Myitkyina in Kachin State.
  </td></tr>
<tr><td colspan="2">Rationale</td><td colspan="3">View of Existing Facilities</td></tr>
<tr><td colspan="2">1. Meeting with increasing domestic and international passenger demand;
2. Enhancement and supporting the promotion of local industries; and
3. Support rural development at the northern most city of Myanmar</td><td colspan="3"> 
- Project plan is to develop cargo handling facilities.</td></tr>
<tr><td>Input</td><td>Estimated Cost (US$ million)</td><td colspan="3">Schedule</td></tr>
<tr><td rowspan="6">1. Existing domestic airports are poor and inadequate for international standards of safety and security for aircraft operation.
2. Basic airport facilities such as runway, taxiways, aprons and related facilities are urgently needed to be improved.
3. Air cargo facilities at domestic airports need to be developed for future potential of perishable and high value goods</td><td rowspan="6">10</td><td>Calendar Year</td><td>Start</td><td>End</td></tr>
<tr><td>1. Preparation</td><td>2017</td><td>2018</td></tr>
<tr><td>2. Feasibility Study</td><td>2018</td><td>2019</td></tr>
<tr><td>3. Funding Arrangement</td><td>2019</td><td>2020</td></tr>
<tr><td>4. Execution</td><td>2021</td><td>2023</td></tr>
<tr><td>5. Commissioning</td><td>2023</td><td>2024</td></tr>
<tr><td>Total Estimated Cost</td><td>10</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Expected Output</td><td colspan="3">Action Plan</td></tr>
<tr><td colspan="2">- To enhance the airport safety and security
- To improve the air cargo facilities for logistical activities</td><td colspan="3">- To conduct detailed study.
- Construction</td></tr>
<tr><td colspan="5">Necessity of Technical Assistance</td></tr>
<tr><td colspan="5">Technical assistance is needed.</td></tr>
<tr><td colspan="5">Remarks: Master plan study conducted in 2017. Myitkyina city is the city located at the northenmost part of Myanmar along the Ayeyarwaddy River.</td></tr>
</table>

Project Profile

Sub-Sector	Aviation
Reference No.	LAP-12
Project Title	Kengtung Airport Development
Executing Agency	DCA
Relevant Ministry	MOTC

Outline of the Project

Objectives

1) To enhance the airport safety and security facility
2) To improve airport basic facilities
   To introduce cargo facilities

Location & Project Plan

- Approximately 3 km to the east of Kengtung Town, Shan State in eastern partof Myanmar.

Rationale

1. Existing domestic airports are poor and inadequate for international standards of safety and security for aircraft operation
2. Basic airport facilities such as runways, taxiways, aprons and related facilities are urgently needed to be improved.
3. Air cargo facilities at domestic airports need to be developed for future potential of perishable and high value goods

Project plan

To develop cargo handling facilities.

Input	Estimated Cost (US$ million)
- Civil works - Runway,Taxiways, Aprons - Air Cargo Facilities - Others	3
Total Estimated Cost	3

Schedule

Calendar Year	Start	End
1. Preparation	2017	2018
2. Feasibility Study	2018	2019
3. Funding Arrangement	2019	2020
4. Execution	2021	2023
5. Commissioning	2023	2024

Expected Output	Action Plan
- To enhance the airport safety and security - To improve the air cargo facilities for logistical activities	- To conduct detailed study. - Construction

Necessity of Technical Assistance

Technical assistance is needed.

Remarks:

Project Profile

Sub-Sector	Aviation
Reference No.	LAP-13
Project Title	Lashio Airport Development
Executing Agency	DCA
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location & Project Plan
1) To enhance the airport safety and security facility 2) To improve airport basic facilities To introduce cargo facilities	Lashio in Northern Shan State. 22° 58' 39.49434" N 97° 45' 08.68302" E 
Rationale	Project plan
1. Existing domestic airports are poor and inadequate for international standards of safety and security for aircraft operation. 2. Basic airport facilities such as runways, taxiways, aprons and related facilities are urgently needed to be improved. 3. Air cargo facilities at domestic airports need to be developed for future potential of perishable and high value goods	- To develop cargo handling facilities.

Input	Estimated Cost (US$ million)
- Civil works - Runway,Taxiways, Aprons - Air Cargo Facilities - Others	20
Total Estimated Cost	20

Schedule

Calendar Year	Start	End
1. Preparation	2017	2018
2. Feasibility Study	2018	2019
3. Funding Arrangement	2019	2020
4. Execution	2021	2023
5. Commissioning	2023	2024

Expected Output	Action Plan
- To enhance the airport safety and security - To improve the air cargo facilities for logistical activities	- To conduct detailed study. - Construction

Necessity of Technical Assistance

Necessity of Technical Assistance

Remarks:
Master plan study conducted in 2017.

Project Profile

Sub-Sector	Aviation
Reference No.	LAP-14
Project Title	Kawthaung Airport Development
Executing Agency	DCA
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location & Project Plan
1) To enhance the airport safety and security facility 2) To improve airport basic facilities To introduce cargo facilities	Approximately 6 km to the northwest of Kawthoung, Tanintharyi Region. 
Rationale	Project plan
1. Existing domestic airports are poor and inadequate for international standards of safety and security for aircraft operation. 2. Basic airport facilities such as runways, taxiways, aprons and related facilities are urgently needed to be improved. 3. Air cargo facilities at domestic airports need to be developed for future potential of perishable and high value goods.	

Input	Estimated Cost (US$ million)
- Civil works - Runway,Taxiways, Aprons - Air Cargo Facilities - Others	8
Total Estimated Cost	8

Schedule

Calendar Year	Start	End
1. Preparation	2017	2018
2. Feasibility Study	2018	2019
3. Funding Arrangement	2019	2020
4. Execution	2021	2023
5. Commissioning	2023	2024

Expected Output	Action Plan
- To enhance the airport safety and security - To improve the air cargo facilities for logistical activities	Conduct of feasibility study

Necessity of Technical Assistance

Necessity of Technical Assistance

Remarks:
Master plan study conducted in 2017

Project Profile

Sub-Sector	Aviation
Reference No.	LAP-15
Project Title	Mawlamyine Airport Improvement
Executing Agency	DCA
Relevant Ministry	MOTC

Outline of the Project

Objectives	Location & Project Plan
1) To enhance the airport safety and security facility 2) To improve airport basic facilities To introduce cargo facilities	Mawlamyine in Mon State 16° 26' 41.39361"N 97° 39' 39.01383"E 
Rationale	**Project plan**
1. Existing domestic airports are poor and inadequate for international standards of safety and security for aircraft operation 2. Basic airport facilities such as runways, taxiways, aprons and related facilities are urgently needed to be improved. 3. Air cargo facilities at domestic airports need to be developed for future potential of perishable and high value goods	- To develop cargo handling facilities.

Input	Estimated Cost (US$ million)
- Civil works - Runway, Taxiways, aprons - Air Cargo Facilities - Others	2
Total Estimated Cost	2

Schedule

Calendar Year	Start	End
1. Preparation	2017	2018
2. Feasibility Study	2018	2019
3. Funding Arrangement	2019	2020
4. Execution	2021	2023
5. Commissioning	2023	2024

Expected Output	Action Plan
- To enhance the airport safety and security - To improve the air cargo facilities for logistical activities	- To conduct detailed study. - Construction

Necessity of Technical Assistance

Necessity of Technical Assistance

Remarks:

Project Profile

Sub-Sector	Aviation	
Reference No.	LAP-16	
Project Title	Magway Airport Development	
Executing Agency	DCA	
Outline of the Project		
Objective and Outline of the Project		Location
1) To enhance the airport safety and security facility 2) To improve airport basic facilities To introduce cargo facilities Outline of the Project Provison of cargo handling facility		Magway in Magway Region 20°09' 12.90535"N 94° 58' 06.90650"E 
Estimated Cost (US$ million)	2 (Source: DCA	Schedule: Mid-long

Project Profile

Sub-Sector	Aviation	
Reference No.	LAP-17	
Project Title	Kalay Airport Development	
Executing Agency	DCA	
Outline of the Project		
Objective and Outline of the Project		Location
1) To enhance the airport safety and security facility 2) To improve airport basic facilities 3) To introduce cargo facilities Outline of the Project Provison of cargo handling facility		Kalay in Sagaing Region 23° 11' 19.67" N 94° 03' 04.04" E 
Estimated Cost (US$ million)	3 (Source: DCA	Schedule: Mid-long

Project Profile

Sub-Sector	Aviation	
Reference No.	LAP-18	
Project Title	Homalin Airport Development	
Executing Agency	DCA	
Outline of the Project		
Objective and Outline of the Project		Location
1) To enhance the airport safety and security facility 2) To improve airport basic facilities 3) To introduce cargo facilities Outline of the Project Provison of cargo handling facility		Homalin in Sagaing Region 24° 53' 55.88294" N 94° 54' 51.29456" E 
Estimated Cost (US$ million)	3 (Source: DCA)	Schedule: Short

Project Profile

Sub-Sector	Aviation	
Reference No.	LAP-19	
Project Title	Loikaw Airport Development	
Executing Agency	DCA	
Outline of the Project		
Objective and Outline of the Project		Location
1) To enhance the airport safety and security facility 2) To improve airport basic facilities 3) To introduce cargo facilities Outline of the Project Provison of cargo handling facility		Loikaw in Kayah State 19° 41’ 30.31790” N 97° 12’ 53.58136” E 
Estimated Cost (US$ million)	3 (Source: MoC)	Schedule: Mid-long

Project Profile

Sub-Sector	Aviation	
Reference No.	LAP-20	
Project Title	Bhamo Airport Development	
Executing Agency	DCA	
Outline of the Project		
Objective and Outline of the Project		Location
1) To enhance the airport safety and security facility 2) To improve airport basic facilities 3) To introduce cargo facilities Outline of the Project Provison of cargo handling facility		Bhamo in Kachin State 24° 16' 14.99101" N 97° 14' 50.20100" E 
Estimated Cost (US$ million)	3 (Source: DCA	Schedule: Mid-long

Project Profile

Sub-Sector	Aviation	
Reference No.	LAP-21	
Project Title	Ann Airport Development	
Executing Agency	DCA	
Outline of the Project		
Objective and Outline of the Project		Location
1) To enhance the airport safety and security facility 2) To improve airport basic facilitie 3) To introduce cargo facilities Outline of the Project Provison of cargo handling facility		Ann in Rakhine State 19 º 46’ 09.37109” N 94 º 01’ 34.41298” E 
Estimated Cost (US$ million)	3 (Source: DCA	Schedule: Mid-long

Project Profile

Sub-Sector	Aviation	
Reference No.	LAP-22	
Project Title	Kamti Airport Development	
Executing Agency	DCA	
Outline of the Project		
Objective and Outline of the Project		Location
1) To enhance the airport safety and security facility 2) To improve airport basic facilities 3) To introduce cargo facilities Outline of the Project Provison of cargo handling facility		Kamti in Sagaing Region 25° 59' 19.49415" N 95° 40' 28.88440" E 
Estimated Cost (US$ million)	3 (Source: DCA	Schedule: Mid-long

Project Profile

Sub-Sector	Aviation	
Reference No.	LAP-23	
Project Title	Mong Hsat Airport Development	
Executing Agency	DCA	
Outline of the Project		
Objective and Outline of the Project		Location
1) To enhance the airport safety and security facility 2) To improve airport basic facilities 3) To introduce cargo facilities Outline of the Project Provison of cargo handling facility		Mong-Hsat in Shan State 20° 31’ 05.12993" N 99° 15’ 30.19961" E 
Estimated Cost (US$ million)	3 (Source: DCA	Schedule: Mid-long

Project Profile

Sub-Sector	Aviation	
Reference No.	LAP-24	
Project Title	Bokpyinn Airport Development	
Executing Agency	DCA	
Outline of the Project		
Objective and Outline of the Project		Location
1) To enhance the airport safety and security facility 2) To improve airport basic facilities 3) To introduce cargo facilities Outline of the Project Provison of cargo handling facility		Bokpyinn in Tanintharyi Region 11° 08’ 57.55751" N 98° 44’ 10.37070" E 
Estimated Cost (US$ million)	3 (Source: DCA	Schedule: Mid-long

Project Profile

Sub-Sector	Aviation	
Reference No.	LAP-25	
Project Title	Monywa Airport Development	
Executing Agency	DCA	
Outline of the Project		
Objective and Outline of the Project		Location
1) To enhance the airport safety and security facility 2) To improve airport basic facilities 3) To introduce cargo facilities Outline of the Project Provison of cargo handling facility		Monywa in Sagaing Region 22° 13' 27.77" N 95° 05' 36.41" E 
Estimated Cost (US$ million)	3 (Source: DCA	Schedule: Mid-long

Project Profile

<table>
<tr><td colspan="2">Sub-Sector</td><td>Aviation</td></tr>
<tr><td colspan="2">Reference No.</td><td>LAP-26</td></tr>
<tr><td colspan="2">Project Title</td><td>Pathein Airport Development</td></tr>
<tr><td colspan="2">Executing Agency</td><td>DCA</td></tr>
<tr><td colspan="3">Outline of the Project</td></tr>
<tr><td colspan="2">Objective and Outline of the Project</td><td>Location</td></tr>
<tr><td colspan="2">1) To enhance the airport safety and security facility
2) To improve airport basic facilities
3) To introduce cargo facilities

Outline of the Project

Provison of cargo handling facility</td><td>Pathein in Ayeyarwaddy Region
16°48' 43.57" N
94°46' 25.90" E
  </td></tr>
<tr><td>Estimated Cost (US$ million)</td><td>3
(Source: DCA)</td><td>Schedule: Mid-long</td></tr>
</table>

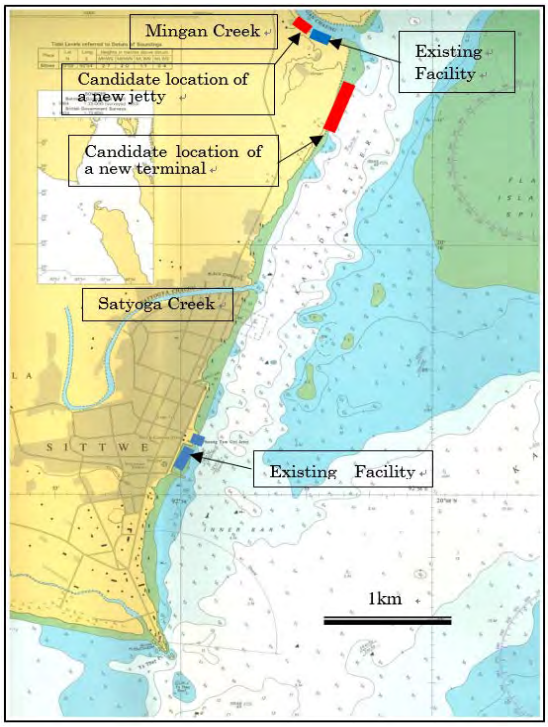
Appendix 2

Supplementary Material for Port Development Plan

1. Local Port Development Plans

(1) Sittwe Port

Sittwe Port is located about 1,000 km away from Yangon by road. However, this port is located at the closest location with Bangladesh and India. The Government of India has been assisting the development of this port as a gateway port to assess with Assam Province of India where the access from main economic areas of India through Indian Territory is quite difficult. When the transport corridor composed of the Sittwe port, inland waterway and arterial road connecting with Imphal of Manupul and Nagaland provinces is completed a considerable volume of freight will be transported. The existing and proposed port facilities are shown in a sea chart of **Figure-1**.



Source: Study Team

Figure-1 Sittwe Port and Future Development Scheme

Mooring facilities of Sittwe Port are separately located at three locations: facing the Kaladan River near the city center, at the right bank of the Satoga Creek about 2.4 km north of the former facility and at the right bank of the Mingan Creek about 4.6 km further north. Among those facilities, a MPA jetty (Phanung Taw Gyi Jetty) located near the city center is a reinforced concrete structure (74 m in length and 5 m in depth) and accommodates 500 GRT class coastal shipping vessels.

The jetty at the Satyoga Creek is a small wooden structure (240 m in length and 1.5 m in depth) while jetty at the Minga Creek is a reinforced concrete structure (80 m in length and 5 m in depth, built in 1990 and under renovation due to aging). However, due to soil discharge from the creek, the water depth is getting shallower. This facility is used by ships navigating between Yangon and Sittwe. In order to complement the shortage of mooring facilities for large ships, two anchorage areas (7 m and 5.9 m in depth respectively) are provided where cargo can be carried by barges to/from anchored large ships. Since Phanung Taw Gyi Jetty located at the estuary of the Kaladan River faces to the east, it seems difficult for ships to moor during monsoon seasons due to strong winds. In order to avoid this situation, there is a conceptual idea to construct jetties opposite to the existing Sittwe Port facilities, which would serve for the waterborne cargo distribution function to nearby villages.

A reinforced concrete piled pier (length of 270 m, maximum depth of 8 m) and warehouses are under construction at the south of the Phanung Taw Gyi Jetty on the Kaladan River as a grant aid project of the Indian Government. This project, called the "Kaladan Multi-Modal Transit Project," is based on an agreement signed between the Myanmar Government and Indian Government in May 2008. Implementation of the project began in 2011 and it is 95% completed. The project components are; pier and warehouses, cargo handling equipment, barges, channel dredging (length of 14 km, depth of 8 m, dredging volume of 120 million m7.), navigational aid and road. The project cost is estimated at about US$ 214 million.

This project aims at establishing a multi modal transport means including sea transport from Kolkata of India to Sittwe, inland water transport in Myanmar and land transport to India by road. This will enable Indian cargo to Mizoram State (east India) to be transported by water and road as the road transport network is still weak. A road (two-lanes, length of 110 km) to India from Palewa upstream of the Kaladan River (port facilities are to be constructed at this location) is scheduled to be constructed over a four-year period from 2016. All facilities to be constructed by this project will be transferred to Myanmar and subsequently managed by Myanmar. There are some technical problems related to the dredging of the Kaladan River channel. Namely, the sand sedimentation and rock layer at the river bottom make the dredging difficult. In addition, the project could be delayed due to financial constraints of the Indian government.

The scheme of the multi modal transport project is as follows; first, cargoes from Kolkata and other ports on the east coast of India are transported to Sittwe Port over a distance of about 540 km by 20,000 DWT class ships (temporally, 6,000 DWT class ships) and unloaded to the pier, which is under construction. Then, the unloaded cargoes are loaded again through a small pier next to the large pier under construction to 7.00-ton class barges (6 in number) which are to be provided by the project and transported to Palawa over a distance of about 160 km. Finally, the cargoes are transported to the east side of India by trucks via a new road (about 110 km) to be constructed by the project.

The above discussions can be summarized as described below.

- **Direction of the Development**

Since Sittwe Port is located near the borders of Bangladesh and India, this port is utilized as a part of a waterborne detour route of road transport at the east of those countries where road development is weak. This port plays an important role as a distribution base to villages facing the coastal areas of Myanmar and the Kaladan River where roads are not well developed due to the existence of many tributaries. Therefore, Sittwe Port shall be developed as a transit port of general cargo and container cargo in future.

- **Concept of the Development**

A multi-purpose terminal (8m in depth, 400m in length) will be developed is shown in **Figure-2** to accommodate the increasing number of container ships which call among ports in the Bay of Bengal and coastal ships. A suitable candidate location of the multi-purpose terminal is the mouth of Minga Creek where the connectivity to inland water transport can be secured and waves are expected to be small even during monsoon seasons. The initial two-berth construction (200m in length) will be the minimum requirement to prevent waiting for berths.

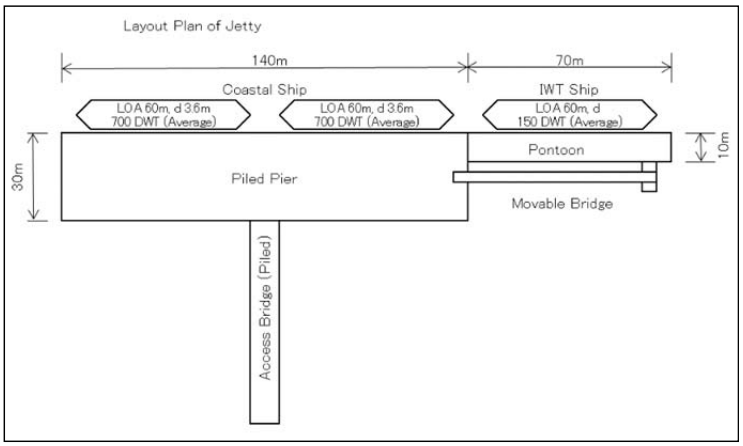
The construction of the hybrid jetty composed of a reinforced concrete pier (5m in depth) and a pontoon jetty for small freeboard ships will be required to meet the future cargo demand at Minga Creek where a calm water area can be secured even during monsoon seasons are illustrated in **Figures-3** and **Figure-4**. In order to increase handling productivity, mechanical cargo handling shall be conducted on the concrete pier

Source : Study Team (Google Earth)

Figure-2 Layout Plan of Multi-purpose Terminal (at right bank of Kaladan river)

Source : Study Team (Google Earth)

Figure-3 Layout Plan of Hybrid Jetty including Concrete Pier and Pontoon (Minga Creek area)



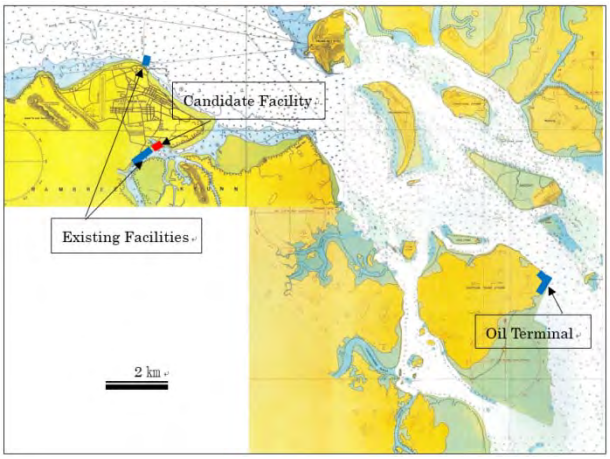
Source: Study Team

Figure-4 Standard Layout Plan of Hybrid Jetty including Concrete Pier and Pontoon

(2) Kyaukpyu Port

Kyaukpyu Port is a domestic port, which mainly functions as a fishery port; it is located about 640 km by road from Yangon. The port has the following jetties which are mainly used for general cargo handling; one pontoon jetty (-5m) owned by MPA, one pontoon jetty (-7.m) owned by the city and one reinforced concrete jetty owned by the state. In addition, a privately owned reinforced concrete jetty (-7 m) used for off shore natural gas exploitation, a reinforced concrete jetty adjacent to the former for public use and other jetties for fishing boats are also found. Cement from Thailand, which arrives via Kawthaung Port, by taking 72 hours of sailing time, is the major cargo handled here while daily necessities for the people of Kyaukpyu are also handled here to some extent.

There are several islands at the inner part of the bay of Kyaukpyu where deep-sea is available as shown in **Figure-5**. At Made Island, oil handling facilities which can accommodate 7.00,000 DWT tankers and a tank yard have been developed by a Chinese company by making use of its deep-sea area. Unfortunately, no large oil tanker has called this facility except for a 300,000 DWT tanker, which called on the opening day of the facility in January 2015. There is no bridge connection with the main land available. However, this is an important area because of the deep and calm water area (more than 20 m) available. This area is ideal for the construction of a deep-sea port for gas and oil related industrial development in future.



Source: Study Team

Figure-5 Kyaukpyu Port and Future Development Scheme

Due to the long distance (about 500 km) from Kyaukpyu to Nye Phitow and other hinterland and lack of road development, this area could not be used for the development of a deep-sea port to serve the needs of the hinterland in the near future. However, the expansion of the existing port facilities is necessary for handling port cargo of the Kyaukpyu area, which is expected to increase. Taking into account the availability of water and land area, a candidate area is indicated in **Figure-5.** Since a mangrove forest exists in this area, it is necessary to choose a structure, which will not adversely impact the environment.

The above discussions can be summarized as follows;

- **Direction of the Development**

This port shall be developed as an integral part of the coastal shipping network which in order to transport necessities and other cargo to surrounding areas. There is no rationale for developing the port as a deep-sea port, which handles cargo for the hinterland such as Nay Pyi Taw due to the long distance (about 500km) from the port. However, there is potential to develop a deep-sea port for petrochemical or gas related industrial development by utilizing the available water depth, which exceeds 20m.

- **Concept of the Development**

A jetty of 5 m in depth will be developed as a coastal shipping port at the east water front line of the existing facilities. The structure is recommended to be a hybrid jetty including concrete pier and pontoon that is able to support mechanical cargo handling are shown in **Figure-6.**

Source : Study Team (Google Earth)

Figure-6 Layout Plan of Kyaukpyu Port

(3) Thandwe Port

Thandwe Port is located about 500 km away from Yangon by road. A pontoon jetty (water depth of 6 m) owned by MPA is located at Thanbyugyaing about 7.0 km south from the downtown area of Thandwe in the bay of Andrew. **Figure-7** shows the location of existing Thandwe Port. Tankers carry fuel oil to this jetty from Yangon once a month. Then fuel oil is stored at tanks on land and supplied to fishing boats working in the nearby sea. Fuel oil is also transported to the downtown area by oil tank lorries. Fish taken and packed with ice on fishing boats are unloaded at this pontoon jetty and transported to the downtown by trucks three times a month. In addition, at a privately-owned reinforced concrete piled pier about 100 m away from the pontoon jetty (water depth of 3.5 m), fuel oil and water are supplied to fishing boats. However, general cargo is not handled through those port facilities.

Source: Study Team

Figure-7 Thandwe Port and Future Development Scheme

A small-scale reinforced concrete jetty (water depth of 2 m) is located at Gyeiktaw about 16 km north of the downtown area and the north part of the bay. Fishing boats and passenger boats are using this jetty. But no general cargo ship handles cargo at this jetty. The port facilities located at the south of the bay are used as a fuel oil handling facility by making use of the relatively deep water compared to the north. Therefore, the port facility at the south is suitable for fuel handling but for general cargo handling due to a long distance from the downtown area.

On the other hand, although jetties at the north are small in size they are conveniently located close to the downtown area. It is recommended to utilize this area for constructing facilities to transport daily necessities for the Thandwe population of approx. 140,000. Therefore, jetties should be constructed at calm water areas at Thandwe Port. Future development scheme of Thandwe Port is shown in **Figure-7.**

The above discussions can be summarized as follows;

- **Direction of the Development**

Currently, there is no port facility for handling general cargo including the daily necessities required by the population of Thandwe. Consequently, the general cargo transport depends on truck transportation. In order to enhance the transportation efficiency, it is recommended to develop this port as a domestic port, which handles general cargo.

- **Concept of the Development**

To construct a breakwater at the north area of the bay which is currently used by fishing boats and passenger boats to secure calm water areas. And to construct jetties of 5 m in depth and a cargo handling yard which can accommodate coastal shipping vessels at the calm water area created by the breakwater construction as shown in **Figure-8.**

Source : Study Team (Google Earth)

Figure-8 Layout Plan of Thandwe Port

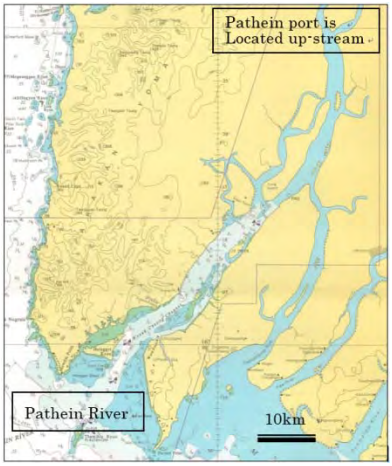
(4) Pathein Port

Pathein Port, which is a river port facing the Pathein River (one of the tributaries of the Ayeyarwaddy River) approximately 190 km west of Yangon, is a strategic point in the inland water transport network (see **Figure-9**, **Figure-10**). Daily inland water transport service is provided between Yangon and Pathein. The draft of entering ships is limited due to the shallow water depth of about 6 m and at the outer bar in the river mouth and 4.5 m at the inner bar in the river. The tidal range is about 1.7 m. Due to the narrow channel/river depth and lack of navigation aids for night navigation, navigation conditions are unsafe, particularly at night. Accordingly, it is very difficult to increase the transport capacity under the current situation (see **Figure-11**. In the past, inland water transport was used heavily at the Ayeyarwaddy area where many rivers flow and consequently roads were not sufficiently developed. However, due to the recent development of the road network at this area, road transport has become the dominant transport mode.

Small-scale port facilities such as pontoons (MPA owns nine pontoons which range in depth from 18 ft. to 45 ft.) and a reinforced concrete jetty with a depth of 6 m for coastal shipping vessels are scattered along a 3 Km stretch on the left riverbank of the Pathein River as shown in **Figure-9**. The cargo handling area in the port is very narrow because a city road is situated close behind the jetties. Maintenance work for port facilities such as pontoons is conducted only once every four years due to budgetary constraints and consequently aging of facilities is significant. The reinforced concrete jetty used for handling cement transported from Thailand via Kawthaung Port should be extended since ships are forced to wait for berthing during the dry season.

Source : Study Team (Google Earth)

Figure-9 Location of Pathein Port



Source: Chart

Figure-10 Situation of the Pathein River

Source : Study Team (Google Map)

Figure-11 Pathein Port and Future Development Scheme

The above discussions can be summarized as follows;

Due to the rapid development of the road transport network from Yangon, a significant increase in waterborne transport between the hinterland and the port is not expected. In order to cope with the demand for long haul transport of large cargo volumes, the maintenance and improvement of the port function for the coastal and inland water shipping is required.

- **Concept of the Development**

The coastal shipping pier will be extended to increase capacity (see **Figure-12**) and the narrow cargo handling yard will be widened toward the river side to increase the cargo handling productivity (see **Figures-13** and **Figure-14**).

Source : Study Team (Google Earth)

Figure-12 Extension Plan of Concrete Jetty for Coastal ships

Source : Study Team (Google Earth)

Figure-13 Yard Expansion Plan of Pathein Port (1)

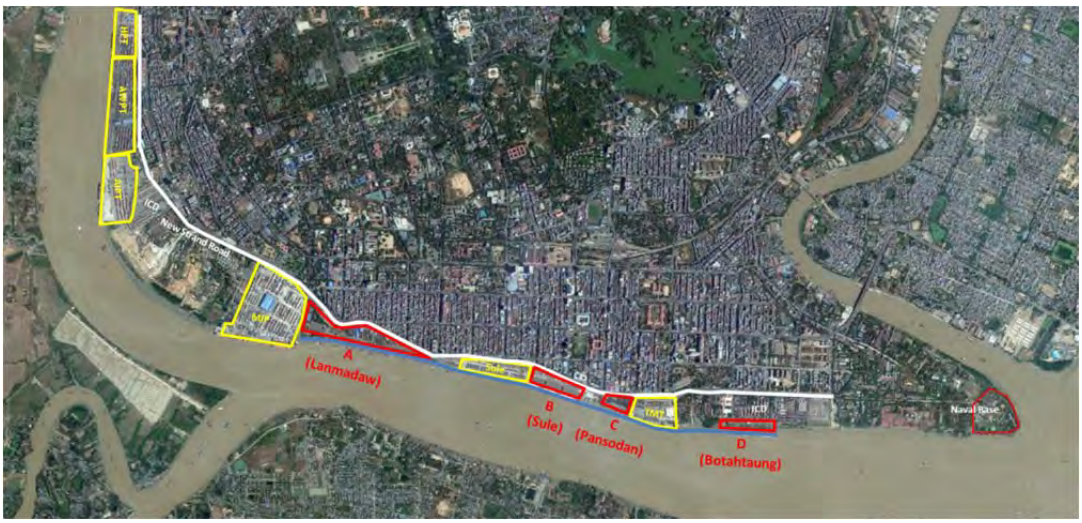
Source : Study Team (Google Earth)

Figure-14 Yard Expansion Plan of Pathein Port (2)

(5) Yangon Port

The major port facilities of Yangon Port are separately located in Yangon Inner harbor area and Thilawa Terminal Area. Yangon Port (Inner Harbour Area) is located about 32 km from the mouth of the Yangon River and extends about 9 km on the left bank of the river upstream. Yangon Port (including Thilawa Terminal Area) is located about 16 km downstream and extends on the left bank of Yangon River.

The area of Yangon Port is very narrow because of the existence of the city area immediately behind the port. Six container terminals (multipurpose terminals), (Htedan Port Terminal (HPT), Asia World Port Terminal (AWPT), Ahlone International Port Terminal (AIPT), Myanmar Industrial Port (MIP) Terminal, Myanmar Sule Port Limited (Sule) Terminal and TMT Ports Terminal are located in this narrow port area. In addition, the container depot is located far apart from the container terminals as shown in **Figure-15.**



Source: Myanmar Port Authority

Figure-15 Layout of Major Port Facilities at Yangon Main Port

According to the JICA report titled "The Preparatory Survey for the Project for Expansion of Yangon Port in Thilawa Terminal Area" (2014.6), the basic development policy of Yangon Port is set as below;

1) No additional large terminal development at Yangon Main Port should be conducted but the existing and planned port facilities for international trade cargo should be utilized as extensively as possible.
2) Increase cargo-handling productivity.
3) Enhance navigation security.
4) Prudent environmental consideration is needed for the future development of Yangon Port.
5) The remaining water front areas should be used for facilities, which directly benefit the lives of citizens such as passenger terminals, domestic transport terminals, promenades, shopping centers and office buildings.
6) Port facilities, which will handle future increasing international trade cargo, should be constructed in Yangon Port (Thilawa Terminal Area).
7) Promotion of a new road network development connecting Thilawa Terminal Area and the city and other areas should be contemplated in order to improve the existing poor road network.
8) The north part of Thilawa Terminal area should be utilized for facility development needed after the completion of the whole planned facilities at Thilawa Terminal area.
9) The development of a deep-water port near Yangon in the future shall be examined as a long-term issue.

In line with the above mentioned basic development policy, it is realistic to handle the international cargo such as the containerized cargo at the above mentioned four container terminals before concentrating the container handling operation at a new deep water port in Yangon. It is necessary to conduct a study on the development of a new container terminal at the northern part of Thilawa Terminal Area in order to relieve the expected shortage of container handling capacity at Yangon Port even after the completion of the MPA Thilawa Container Terminal (ODA Loan Project) and the full operation of MITT Terminal on a middle or long-term basis.

The coastal cargo volume handled mainly at the Lamadaw Area since 2009 has remained at one million tons per annum level figure. On the other hand, the inland water cargo volume shows a declining trend since 2004, registering 600 thousand tons per annum in 2015. The demand for those cargoes is expected to increase due the economic development of the country however the annual increase rate of cargo demand is estimated at 7.8% in the report entitled "The Preparatory Survey for the Project for Expansion of Yangon Port in Thilawa Terminal area (2014.6)". According to this estimate, the annual demand of coastal shipping cargo and inland water transport cargo in 2030 can be estimated at 1.75 million tons and 1.05 million tons respectively.

The cargo handling productivity of coastal ships which employ mechanical handling and inland water transport ships which employ manual handling is estimated at about 500 tons per day and 120 tons per day respectively according to the Team's observations. Assuming that berth utilization rate is 80%, annual cargo handling capacity of coastal ships is estimated at about 146 thousand tons. Consequently, 12 coastal shipping berths will be required to handle the annual cargo demand of 1.75 million tons. In case of the manual handling operation, 30 inland water transport berths would be required. If the manual handling is converted to mechanical handling, however, the annual cargo handling capacity per one inland water ship berth becomes 105 thousand tons which is 3.0 times the manual handling capacity. Thus, the required number of the inland water transport berths becomes 10.

The standard size of coastal shipping vessels is shown in **Table-1.**

Table-1 Dimensions of Typical Coastal Ship

Ship Type		Length		Width		Draft	
		feet	meter	feet	meter	feet	meter
Large Size	Steel	200	60	32	9.6	16	4.8
	Wooden	200	60	32	9.6	18	5.4
Small Size	Wooden/ Steel	99	30	20	6.0	12	3.6

Source: Myanmar Coastal Cargo Shipping Association

(6) Port Facility Development Plan

The coastal and inland water transport of cargo and passengers are handled at such areas as Lamadaw, Pansodan and Botathaung. Pansodan and Botathaung where passenger transport is the major operation are situated very close to the city area. MPA has a plan to convert these areas into urban development areas including shopping centers, office buildings and passenger terminals by making use of the amenity-rich waterfront nature of these areas. Lanmadaw area (total length of about 1,500 m as shown in **Figure-16**) where the cargo handling area is quiet narrow (maximum width is 150 m and minimum width is 20 m) handles almost all-domestic cargo. In order to improve the cargo handling productivity, it is necessary to redevelop this area. Since this area is adjacent to the city area, it is recommended to use this area as an amenity-rich waterfront urban development space including shopping centers and office buildings. In addition to Lamadaw area, the port area at Kyeemyindang (see **Figure-17),** which exclusively handles bananas, is recommended to be redeveloped similar to Lamadaw area redevelopment.

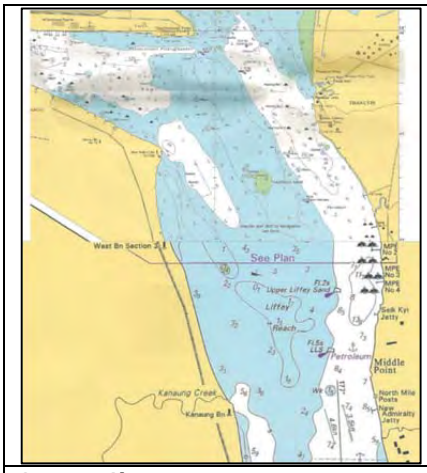
Source : Study Team (Google Earth)

Figure-16 Location of Port Facilities at Lamadaw Area

Source : Study Team (Google Earth)

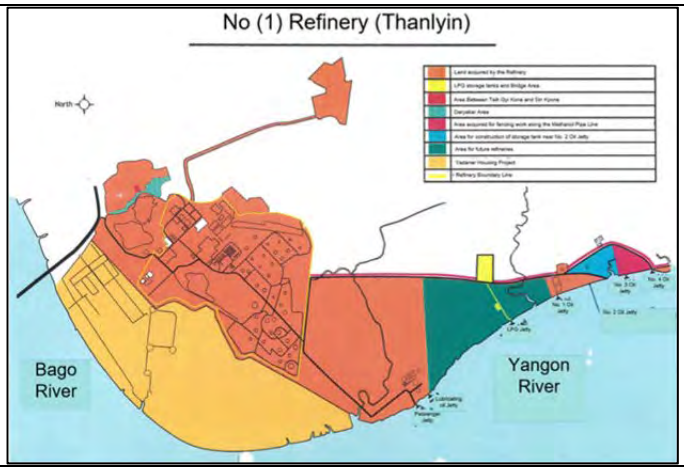
Figure-17 Location of Port Facilities at Kyeemyindang Area

If the port facilities at Lamadaw and Kyeemyindang area were to be relocated, candidate areas for the relocation would have to have a sufficient water depth and be as close as possible to Yangon (large market). From this viewpoint, the eastern area of Thanlyin where sufficiently deep-water area and land area are available was once evaluated as a candidate site (see Figure 8.6.4.23). However, the Myanma Petrochemical Enterprise (MPE) of the Ministry of Electricity and Energy owns the area shaded in orange in **Figure-18** and operates the refinery (production capacity is 20 thousand barrels per day). The refinery expansion project is expected at this area to increase production capacity to 100 thousand barrels per day by the year 2020. In addition, a further expansion project is expected in future by utilizing the area shaded in green in **Figure-19**. Further south of this area, there is a sufficiently deep-water area for port development. However, this area cannot be used for the port development because it is owned and occupied by the navy. Therefore, it is not possible to relocate the port facilities at Lamadaw and Kyeemyindang area in the vicinity of Yangon. The redevelopment of Lamadaw and Kyeemyindang area at their present locations is only solution that satisfies the requirement of providing space for urban development including waterfront amenity while still maintaining port function.



Source : Chart

Figure-18 Chart around Thanlyin area



Source : MPE

Figure-19 Land use plan of MPE in Thanlyin area

The above discussions can be summarized as follows;

- **Direction of the Development**

  To redevelop Lamadaw and Kyeemyindang area at present location to meet with the requirement that this area shall provide the space for urban development with waterfront amenity while maintaining port function.

- **Concept of the Development**

  To redevelop Lamadaw and Kyeemyindang area at their present location as shown in **Figure-20** and **Figure-21.**

Source: Study Team（Google Earth）

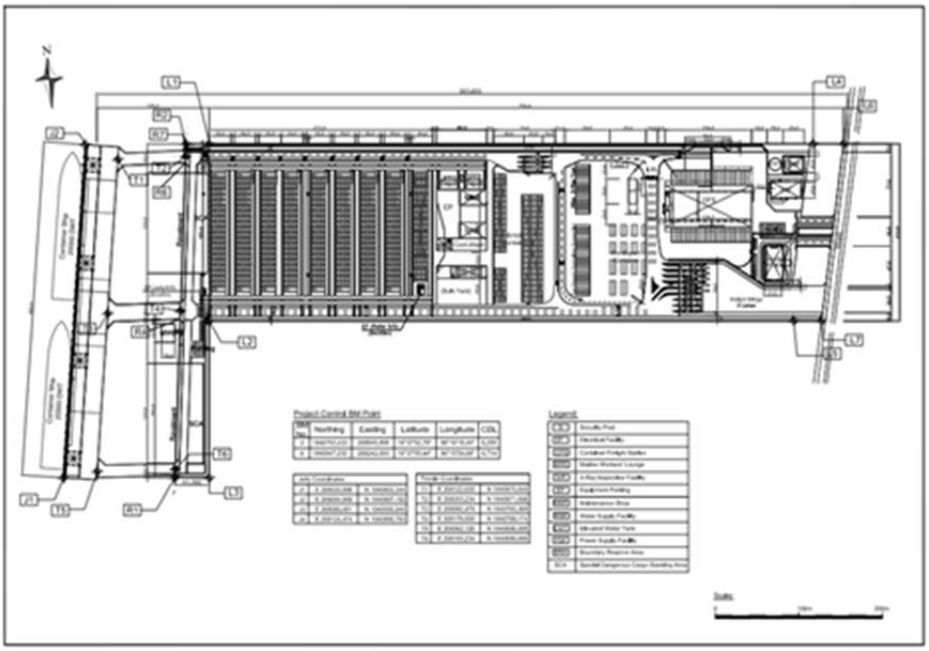
Figure-20 Layout Plan of Lamadaw Area Redevelopment

Source: Study Team（Google Earth）

Figure-21 Layout Plan of Kyeemyindang Area Redevelopment

(7) Yangon Port (Thilawa Terminal Area)

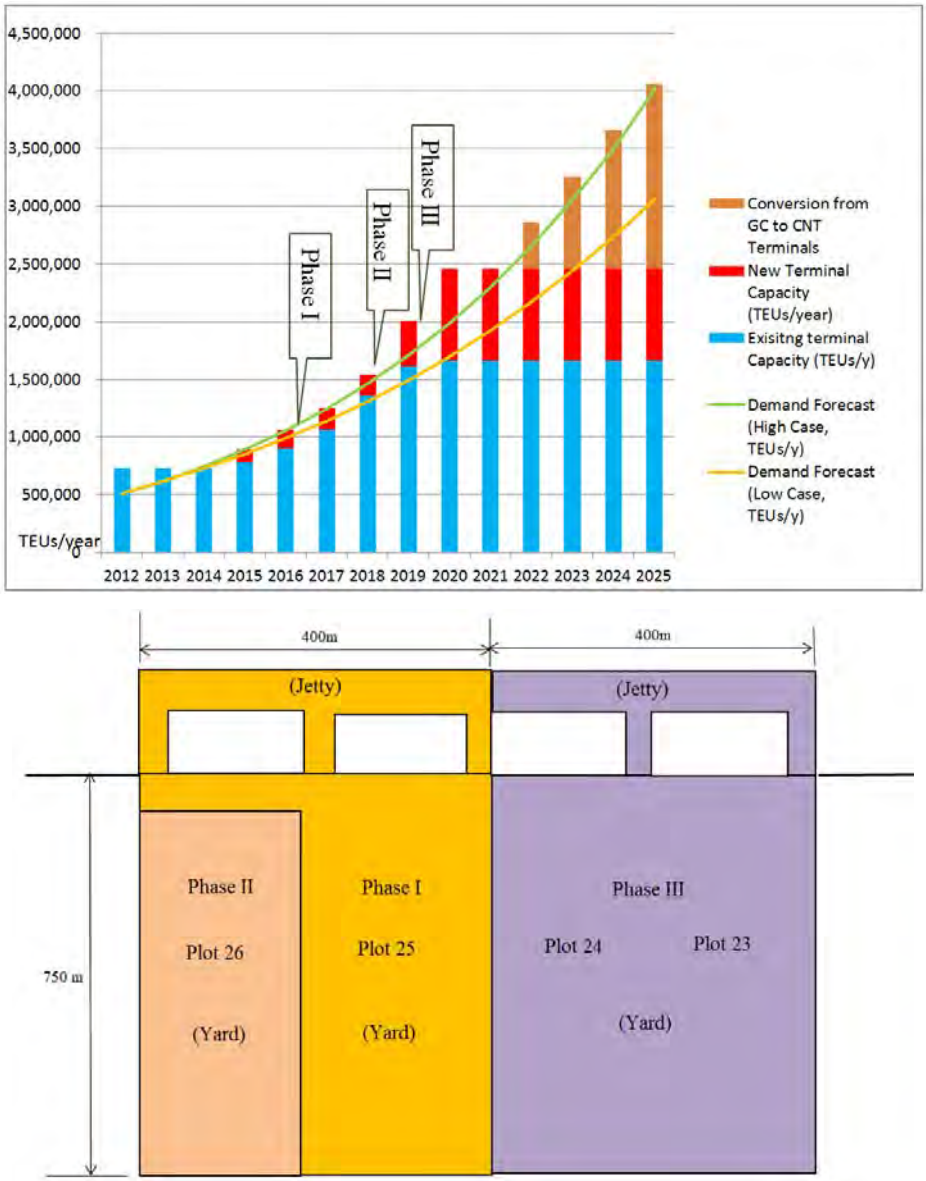
Almost all of the 37 Plots of Thilawa Terminal Area have been sold to private companies and the development and operation of some areas has been commenced. The MPA container terminal is under construction at Plots 25 and 26 by using Japanese ODA; the Phase I project is expected to be completed in 2018. The Phase I project is composed of a quay wall of 400 m in length and a container yard of 200 m in width as the minimum requirement for container terminal as shown in **Figure-22**. In order to fulfill the container terminal function, however, it is necessary to widen the container yard to 400 m corresponding to the length of the quay wall after the completion of the current construction project.



Source: "The Preparatory Survey for the Project for Expansion of Yangon Port in Thilawa Terminal Area" (2014.6)

Figure-22 Layout Plan of Thilawa Terminal Area's Container Terminal (Phase I)

The container handling volume at Yangon Port has steadily increased in accordance with the economic development of the country, reaching about 900,000 TEUs in 2015. This volume is slightly higher than the demand forecast of about 850 thousand TEUs estimated at the time of the original development plan study. Therefore, it will be necessary to complete the construction of the Phase II container yard (Plot 26, 200m in width) by 2018 as shown in **Figure-23** to meet the High Case Demand. Similarly, it will be necessary to complete the Phase III project (Plots 27. and 24, 400m in width) by 2019. Even in the case of Low Case estimates, the Phase I project should be completed by 2020 and the Phase III by 2027. The container handling demand after 2025 will exceed the capacity of the Thilawa Terminal Area even if the current project is successfully realized and some Plots are converted to container terminals. Therefore, it is necessary to develop new terminals at other areas.



Source : "The Preparatory Survey for the Project for Expansion of Yangon Port in Thilawa Terminal Area" (2014.6)

Figure-23 Stage-wise Development Plan of Thilawa Container Terminal

Candidate sites for the next stage container development project (Post Thilawa Project) will be needed beyond 2025 when Myanmar is expected to face a shortage of container handling capacity. The candidate project site shall be selected from various candidate sites including the Yangon River mouth area. Thanlyin area, which was considered a promising candidate area, will be

- **Direction of the Development**

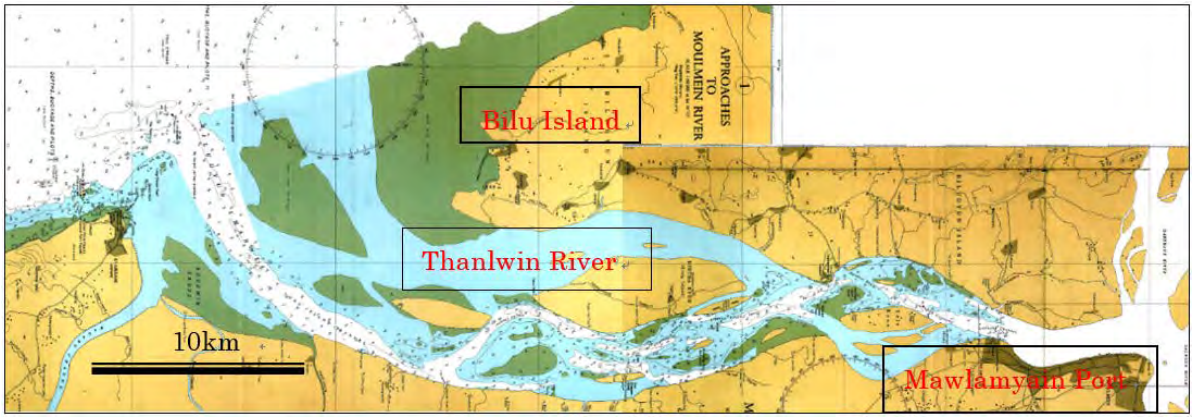
  To promote the formulation and implementation of terminal development to cope with the container handling demand in future.

- **Concept of the Development**

  To promote the project implementation of Thilawa Container Terminal Phase II and Phase III succeeding to the current Phase I project. To commence the formulation of a container terminal development plan at the area apart from Thilawa Terminal Area where no space is available for future development.

(8) Mawlamyine Port

Mawlamyine Port is a river port located at the confluence of the Thanlwin River and the Jyain River. The water depth is only 4.5 m. Even when utilizing the spring tide (4.2 m) or the neap tide (2.4 m), the maximum draft of ships, which can enter the port, is only 4.5 m. Cargo from deep draft ships, which anchor off Kyaikami area near the estuary of the Thanlwin River is carried by small boats to Mawlamyine Port. The estuary of Thanlwin River is shallowing due to the sedimentation of the river. Thus it is necessary to deepen and maintain the channel at the estuary (see **Figure-24**, the present water depth at the estuary is shallower than this chart which depicts old water depth measurement results).



Source: Chart

Figure-24 Situation of the Thanlwin River
(Present depth at the estuary is shallower than this chart)

There are eight pontoon type jetties and two reinforced concrete piers at the port as shown in **Figure-25**. Because the port is adjacent to the downtown area, roads are located just behind the port area and consequently the space for cargo handling is very narrow. Cargo is manually handled without using any handling equipment.

The port handles foods, edible oil products, daily goods, construction materials and auto-parts

which are shipped from domestic ports and diesel oil which is imported from Singapore.

Source: Study Team

Figure-25 Mawlamyine Port and Future Development Plan

Construction materials such as sand and gravel are transported to other parts of the country.
To cope with the expected increase in cargo transport demand, a new port shall be constructed at Kyaikami as proposed in section 4.2.2. The demand for daily goods can be met by improving the existing facilities. In order to increase cargo handling productivity and alleviate traffic congestion, the port area shall be expanded toward the river by providing space in front of the existing riverbank either by the construction of a piled platform or reclamation.

The above discussions can be summarized as follows;

- **Direction of the Development**

The increasing demand will be handled at new jetties to be constructed on the island of Bilu located opposite of Mawlamyine and a connecting bridge construction is being conducted. Other daily use general cargo shall be handled at the existing jetties with some improvement, which is located near the cargo demand area of the city. It is necessary to maintain the channel depth in the Thanlwin River.

➢ **Concept of the Development**

The existing jetties extend at the narrow space beside a coastal road. Therefore, it causes poor cargo handling productivity and traffic congestion on the coastal road. An expansion of a port area in front of the coastal road either by a reclamation method or the construction of a piled structure can be proposed as shown in **Figure-26.**

In addition to the above, it is recommended to construct a hybrid type jetty, which is composed of a concrete jetty and a pontoon jetty for small freeboard ships as shown in **Figure-26.** Mechanical cargo handling equipment can be employed on this jetty and thus the cargo handling productivity will increase. The dredging of the river mouth is needed to maintain the water depth of the channel.

Source : Study Team (Google Earth)

Figure-26 Layout Plan of Mawlamyine Port

(9) Dawei Local Port

Dawei Port is situated about 270 km south of Mawlamyine and is expected to serve as a terminal on the western edge of the GMS South Coastal Corridor. However, the road between the Thailand border and Dawei has not been developed. Dawei Port is a river port located on the left bank of Dawei River at a distance of about 45 km from the Dawei River mouth and about 65 km upstream from the open sea. There are total of nine jetties (concrete structure type, wooden structure type and pontoon type) over the distance of about 2 km owned by both MPA and private companies (see **Figure-27** and **Figure-28**). The size of ships calling to the port is reduced due to the accumulation of sediment in the entrance channel. In order to know the situation of the channel, it is necessary to conduct a sounding survey on the channel at first. Subsequently, necessary channel improvement program shall be established. Cement is imported from Thailand and fuel oil is imported from Malaysia and goods such as fishery products, sugar and palm are handled at Dawei port. Daily consumption goods for Dawei (a

major city of Tanintharyi Region with a population of about 140 thousand) are mainly transported via the road network since waterborne transport is in underdeveloped state. The cargo handling productivity at this port is very low because mechanical handling cannot be applied at the narrow yard, which is located just behind the city road.

Source: Chart

Figure-27 Situation of the Dawei River

Source : Study Team (Google Earth)

Figure-28 Layout of Dawei Port

The above discussions can be summarized as follows;

- **Direction of the Development**

This port will continue to handle the daily necessities, construction materials and fuel oil transport for the Dawei area population. It is necessary to maintain the channel depth

- **Concept of the Development**

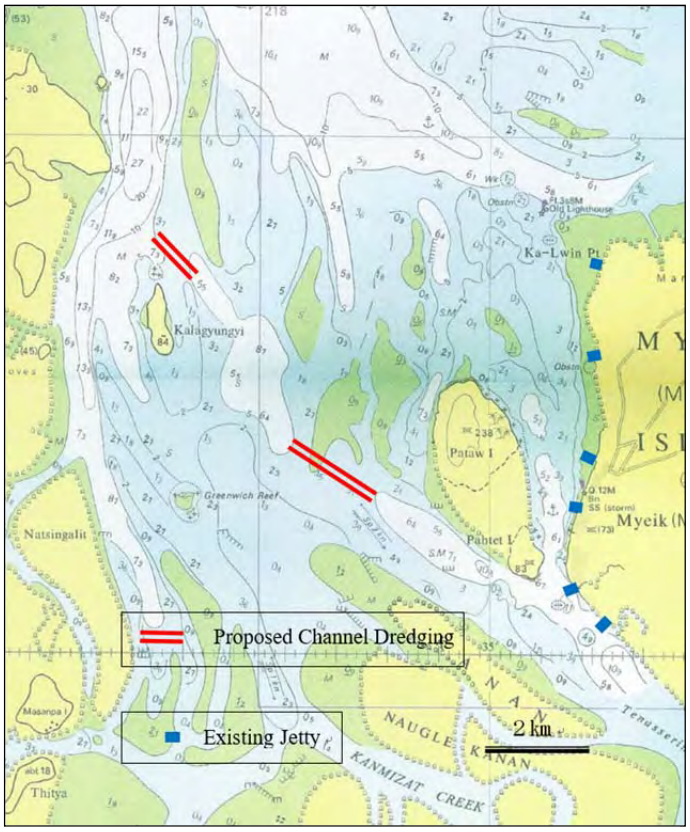
The narrow handling yard will be extended and a hybrid jetty with reinforced concrete pier and pontoon jetty will be constructed for small freeboard ships in order to make mechanical handling possible (see **Figure-29**). The dredging of the shallow channel is needed.

Source : Study Team (Google Earth)

Figure-29 Layout Plan of Dawei Port

(10) Myeik Port

Myeik Port is located about 800 km away from Yangon by road. Since many islands surround this area, the water area near Myeik Port is calm even during the monsoon season. There are four MPA jetties as well as many jetties owned by private companies and a national petroleum company found at the port. In addition to commuting passengers, the jetties are used for the handling of fish, fish paste, frozen fish, rubber, lumber, cement, oil and the supply of ice to fishing boats. Although the water depth at the MPA jetties is 4 m and it is 6 m at privately-owned jetties, calling ships have to wait for high tide (tidal range is about 5m) due to the shallowness of the channel entrance (2m).



Source: Study Team

Figure-30 Myeik Port and Future Development Scheme

Figure-30 illustrates the location of existing jetties.

Despite its multipurpose usage, Myeik Port actually seems to be a fishing port judging from the many fishing boats (approx.700), which generally station here for operations etc. Most of the import cargo is diesel oil and edible oil from Malaysia and Thailand. Some general cargo is transported by container ships of about 1,500 GRT (LOA of 70 m and draft of 5 m), which are capable of carrying about 40 TEUs twice or three times per month. Imported container cargoes are consumed in this area though some are transferred to Yangon, Dawei and Kawthaung by coastal shipping vessels of about 500 GRT. On the other hand, most export cargoes are fish paste and frozen fish bound for Japan via Penang, Malaysia.

The Myeik Economic Zone is under construction by a private company on a 260 ha parcel of land facing the inner channel of Myeik Port. This project will be implemented over a 10-year period from 2014 to 2024. The purpose-wise land use plan of this project is as follows; industrial zone (7%), commercial zone (19%), residential zone (7.7%), sports zone (9%), road (15%) and port zone (18%). Since the water depth in front of the port zone is about 7 m, it is possible to construct piers for larger size ships.

As noted above, a major problem facing Myeik Port is the shallowness of the entrance channel, which adversely affects the operating rate of jetties. In order to resolve this problem, off shore cargo handling by barges is conducted by utilizing the deep and calm sea area at this port. Should the problem of shallow water channel be resolved, deep berths could be constructed at the Myeik Economic Zone, which would lead to an increase in the overall cargo handling capacity. The increase of cargo handling capacity at Myeik Port can be achieved by the dredging and the use of channels (total length of about 7. km and the depth of 5 m).

The above discussions can be summarized as follows;

- **Direction of the Development**

Myeik Port is a domestic port, which is indispensable for handling fish and fish products as well as for the commuting of peoples of surrounding islands. In addition, this port plays an important role for the international trade between Myanmar and Thai. Since this situation is likely to continue in future and additional private jetties are expected to be constructed, it will not be necessary to develop new large-scale port facilities. Therefore, the most important issue for this port is to secure deep channels so that ships can access the port anytime without waiting for high tide.

- **Concept of the Development**

To dredge channels to 5 m in depth and maintain the depth.

(11) Kawthaung Port

Kawthaung city is adjacent to Thailand which is located only about 4 km away over the Pachain River and it is a base of international trade with Thailand. Since there are no roads that connect to the Thai side near Kawthaung city, waterborne transport is vital for trade. Although there is a road to Dawei which is located about 67.0 km north of Kawthaung, bridges on this road are in poor condition. Cargo volume of daily necessities for Kawthaung city is not large as the population is only about 60,000. Approximately 80 % of the international cargo transported from Thailand is cement while the remainder consists of general cargo and fuel oil.

Cement from Thailand is loaded to coastal ships at Ranon Port. The manifests of ships are inspected for about one to two hours by customs at the anchoring area of Kawthaung Port. The ships are inspected again at their first calling ports in Myanmar. This double inspection is performed under cabotage system in which international shipping vessels are not allowed to transport cargo directly to several domestic ports from foreign ports.

Domestic cargoes of Kawthaung Port are exports of palm oil to Yangon, daily necessities of this area and general cargo bound for other ports in Myanmar. No significant increase in the volume of general cargo at this port is expected. However, even now, ships have to wait for a long time to berth due to a shortage of jetties of 5 m in depth at this port. Although cement imports are expected to increase in future, it will not be necessary to expand jetties provided that customs inspections will continue to be carried out at the anchorage areas. This is possible

due to the geographical features of Kawthaung area, which is surrounded by many islands, and consequently calm throughout the year. MPA owns a reinforced concrete pier (length of 110 m, width of 9 m and depth of 5 m) for ships of 1,500 to 2,000 GRT, which handle general cargoes, and two pontoon jetties for passenger boats, fishing boats and sight-seeing boats of 200 GRT class. At privately-owned jetties, petrol, fish, general cargo and passengers are handled (see **Figure-31)**.

Source: Study Team

Figure-31 Kawtaung Port and Future Development Plan

It is necessary to construct quay walls in order to eliminate long berth waiting times and the dangerous side-by-side berthing. Since water depth is shallow due to the sedimentation of discharged river sand, the location of new pier construction sites should be carefully examined.

The above discussions can be summarized as follows;

- **Direction of the Development**

To maintain and enhance the functions of Kawthaung Port as a transit port for international trade between Myanmar and Thailand

- **Concept of the Development**

To expand the pier near the existing MPA pier (depth of 5 m) where deep-sea is available as shown in **Figure-32.**

Source: Study Team (Google Earth)

Figure-32 Layout Plan of Kawthaung Port

2. Deep-sea Ports Development Plans

(1) Dawei SEZ Port

1) Development History

A mutual agreement on the development of the Dawei area, which is located at around 600 km south of Yangon, was signed by the Myanmar Government and Thai Government in May 2008. Based on this agreement, a Thai private developer of Italian-Thai Development (ITD) acquired a 75-year concession for the development and management of a deep-sea port and industrial park from the Myanmar Government. ITD intended to invest US$ 850 million for the first phase of the project. ITD planned to invited private investors from Japan, Korea and India to formulate a joint venture company and some companies expressed interest. However, due to the weak financial situation of ITD, the project has been suspended.

Under this situation, the Myanmar Government and Thai Government signed a Memorandum of Understanding to declare that the Dawei Development Project including the construction of a deep-sea port and the establishment of SEZ shall be implemented as a national project of both governments. In 2013, a Special Purpose Vehicle (SPV) was established with both governments investing an equal amount and the concession has been transferred to the SPV. Under this framework, individual project components are to be handled by each Special Purpose Company (SPC), which would be established under the initiative of the SPV.

A tripartite agreement of Myanmar, Thai and Japan regarding the cooperation on the development of Dawei SEZ project was signed on 4th July 2015 on the occasion of the 7th summit meeting of Japan and Mekong region countries. This agreement includes the following cooperation, which will be implemented step-by-step.

The Data Collection Survey for Development Planning in Tanintharyi Region and Dawei SEZ (DPTD) is on-going and the further implementation scheme will be determined among Myanmar, Thailand and Japan based on the result of the survey.

- ✓ Equal basis capital investment to the SPV
- ✓ Dispatch of JICA experts to the SPV for the development masterplan preparation
- ✓ Conduct of a pre-feasibility study to examine needs and method of a new trunk road linking with Bangkok and Dawei

2) Dawei SEZ Development Project

Myanmar Government through the Dawei Special Economic Zone Management Committee signed a contract on 5th August 2015 to commence the initial development project with a consortium composed of ITD, Rojana Industrial Park Co., Ltd (a joint venture of Nippon Steel & Sumikin Bussan Corporation and Vinichbutr's Group of Thai) and LNG Plus International Co., Ltd of Thai. The initial development project includes the construction of a small port, a small power plant, a two-lane road to Thai border, a residential estate and an industrial park where labor-intensive industries such as garment and food production are expected to be established.

3) Contents and Scale of Development

As shown in **Figure-33** the Dawei Development Project is expected to be developed over a large area extending along the coastal line situated about 20 km north from the downtown area of Dawei. This area is temporally connected with Thai border by a road of 132 km in length.

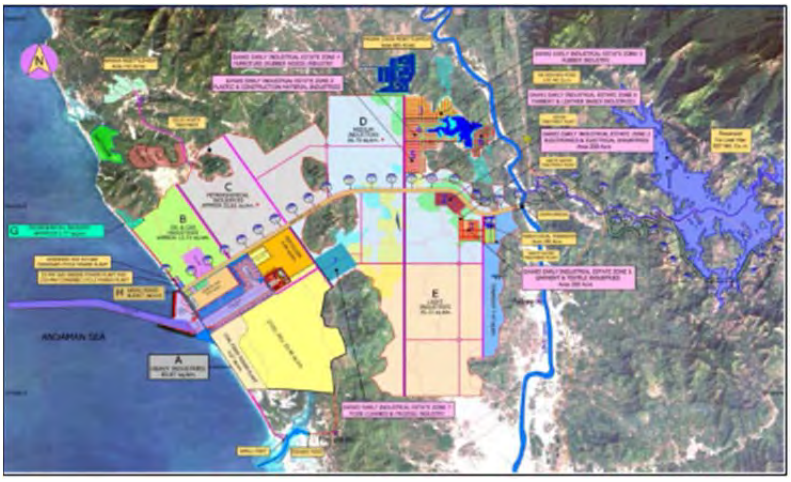
As shown in **Figure-34**, the original development plan of ITD was a large project, which included the development of an industrial park including facilities with the following functions. The industrial park was planned to be developed around a new excavation type port.

- ➢ Facilities to be developed in the original plan ;

steel mill, ship building, oil refinery, petrochemical industry, plastic product, fertilizer, cement, power plant, water resource, car assembly, tire, food processing, pharmacy, container logistics, general cargo logistics and residential area etc.

Source: ITD (Italian-Thai Development Public Company Ltd.)

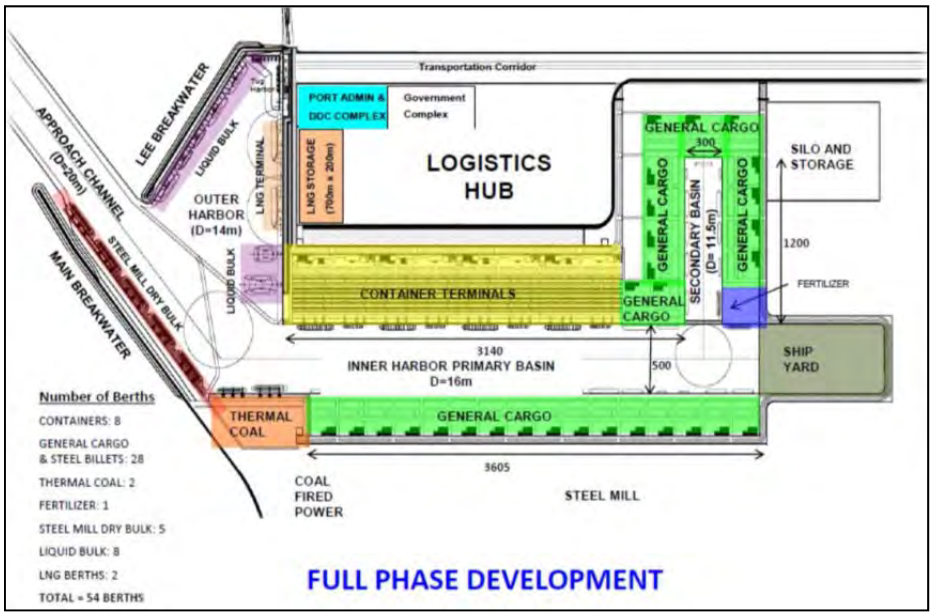
Figure-33 Location of Dawei SEZ Development Project



Source：ITD

Figure-34 Original Plan of Dawei Development Project

The original port layout plan was an excavation-type construction as shown in **Figure-35.** However, in accordance with the scale and deposit depth of rock layer believed to exist, it is possible that a reclamation-type port construction would be more economical than an excavation-type construction. Therefore, it is recommended to conduct a detailed soil investigation and subsequent port layout planning.



Source：ITD

Figure-35 Original Layout Plan of Dawei Development Project

The original development plan shall be reviewed and revised.

4) Development Scenario

The southern coastal area can provide a huge area suitable for the development of coastal industry by making use of gas produced off-shore of this area. Dawei area is suitable for the development of heavy industries by processing coal and ore those are to be imported by large size vessels through a possible new deep sea port which can be constructed at a nearby deep sea area. Cargo transport time from Laem Chabang Port in Thailand to the west may be reduced by 2 to 3 days if the Dawei deep-sea port can be used as a western gate of Thailand. However, the economic merit of this transport route cannot be realized if the land transport cost in Myanmar is still expensive. Even the economic and time merit is materialized the priority for transport route through Dawei for Thailand cargo will be still low unless the frequency of this shipping service increases.

The Dawei deep-sea port development cannot be realized unless the following situation is materialized;

- The shipping cargo demand increases in accordance with the development of industry including light industries at this area.

・The shipping service level reaches a certain level for instance an annual container transport demand exceeds 1.4 million TEUs/Year for the economic deployment of 3,800 TEU container vessels (50,000DWT, 13m draft).

Until the above situation is realized, the development of a small port for supporting the coastal industrial development (light industry is a core) will be a realistic solution.

The above discussions can be summarized as follows;

- **Direction of the Development**

To be developed as a core infrastructure of Myanmar as well as GMS by making use of the expected deep-sea port, the availability of a large area of about 20,000 ha, the easy access to Thailand and the expected development of the southern coastal economic corridor.

The function of this port as a logistic hub shall be realized when the base cargo increases to a certain level.

- **Concept of the Development**

To develop a new deep-sea port of -14 m in depth either by excavation or reclamation and a SEZ and industrial park and a logistic base by utilizing a large area extended behind the port.

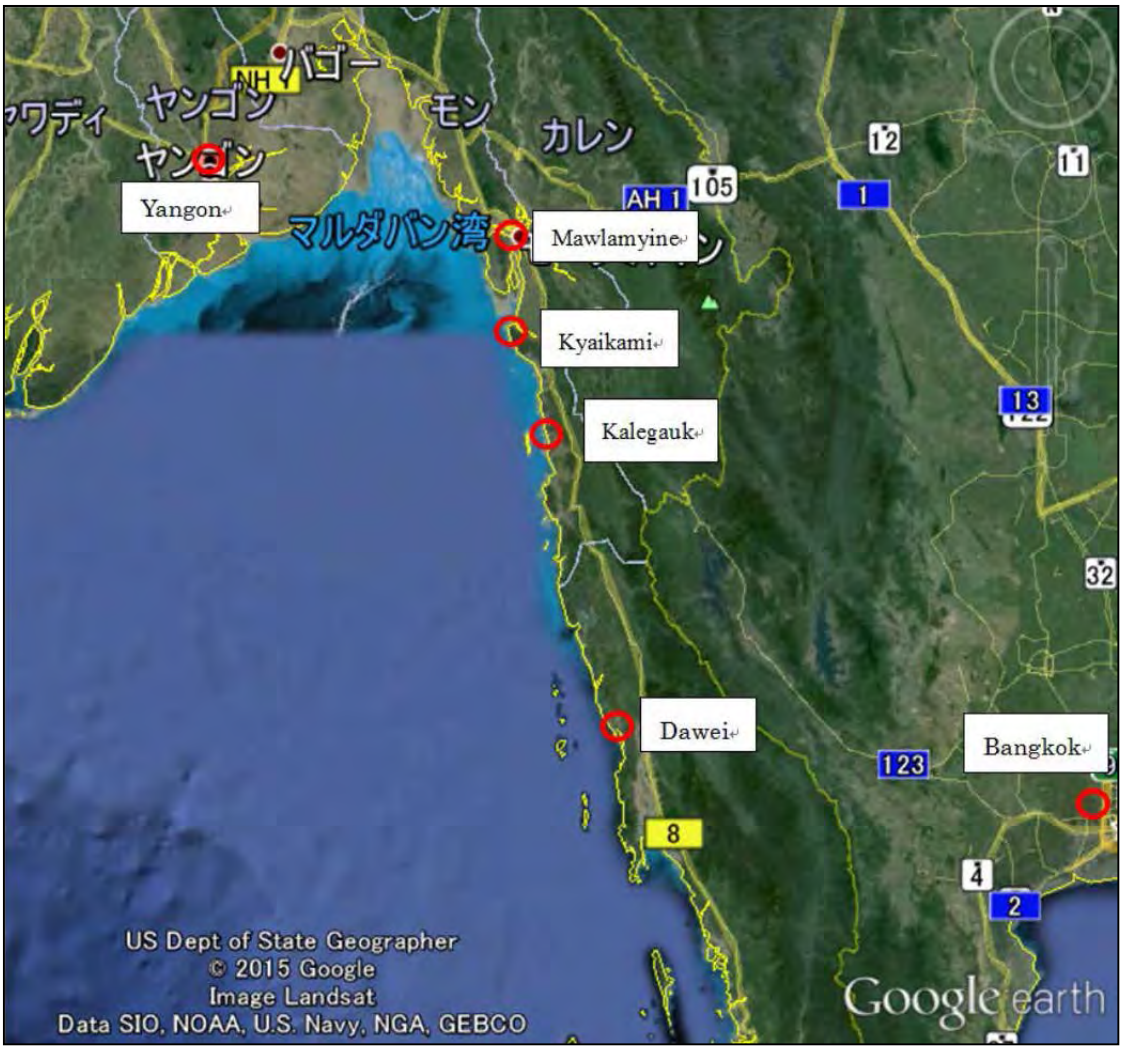
(2) Kyaikami Port (out port of Mawlamyine Port)

Along the southern coast of Myanmar, a water depth of -12m is only available at the south coast of the Kyaikami Temple situated at the estuary of the Thanlwin River. In this area, candidate areas for the development of a deep-sea port are the Kyaikami coast and the Kaleguk area situated along the southern coastline about 75 km from Kyaikami. The candidate sites are shown in **Figure-36** while an evaluation of the candidate sites is shown in **Table-2.**

Based on its close proximity to Yangon Port which is the most important factor in determining whether a port is suitable for serving as a substitute of Yangon Port, the Kyaikami area is judged to be the superior location compared to other areas. The distance by road from Yangon to Kyaikami is about 370 km but it is only 180 km by sea. Therefore, it is possible to transport cargo not only by trucks but also by coastal shipping vessels and barges. If waterborne transport by shallow draft barges becomes available, the cargo transport between the inland cargo demand areas and ports will become a convenient and effective transport means.

Figure-36 Location of Mawlamyine and Kyaikami Port

The export of rice and beans (the increase of this commodity is considered the national strategy) can be handled at this port instead of the Yangon Port, which has the draft limit of 9m. This port is relatively near the production areas of rice and beans and able to accommodate ships of 40,000DWT class (draft of about 11m) which can transport cargos as far as Middle-East and Africa. However, since the candidate area for the development of the new deep-sea port faces the Bay of Bengal, marine conditions during monsoon seasons are expected to be severe. Consequently, this port should have a breakwater. In addition, land reclamation to secure a water depth of -12 m will be necessary because no deep-sea area is available in the vicinity of the coastline. **Figure-37** shows the candidate locations of deep-sea ports.



Source: Study Report of Port Development Projects in the Southern Area of Myanmar (2015, MLIT)

Figure-37 Location and Candidate Places of Port Development in the Southern Area of Myanmar

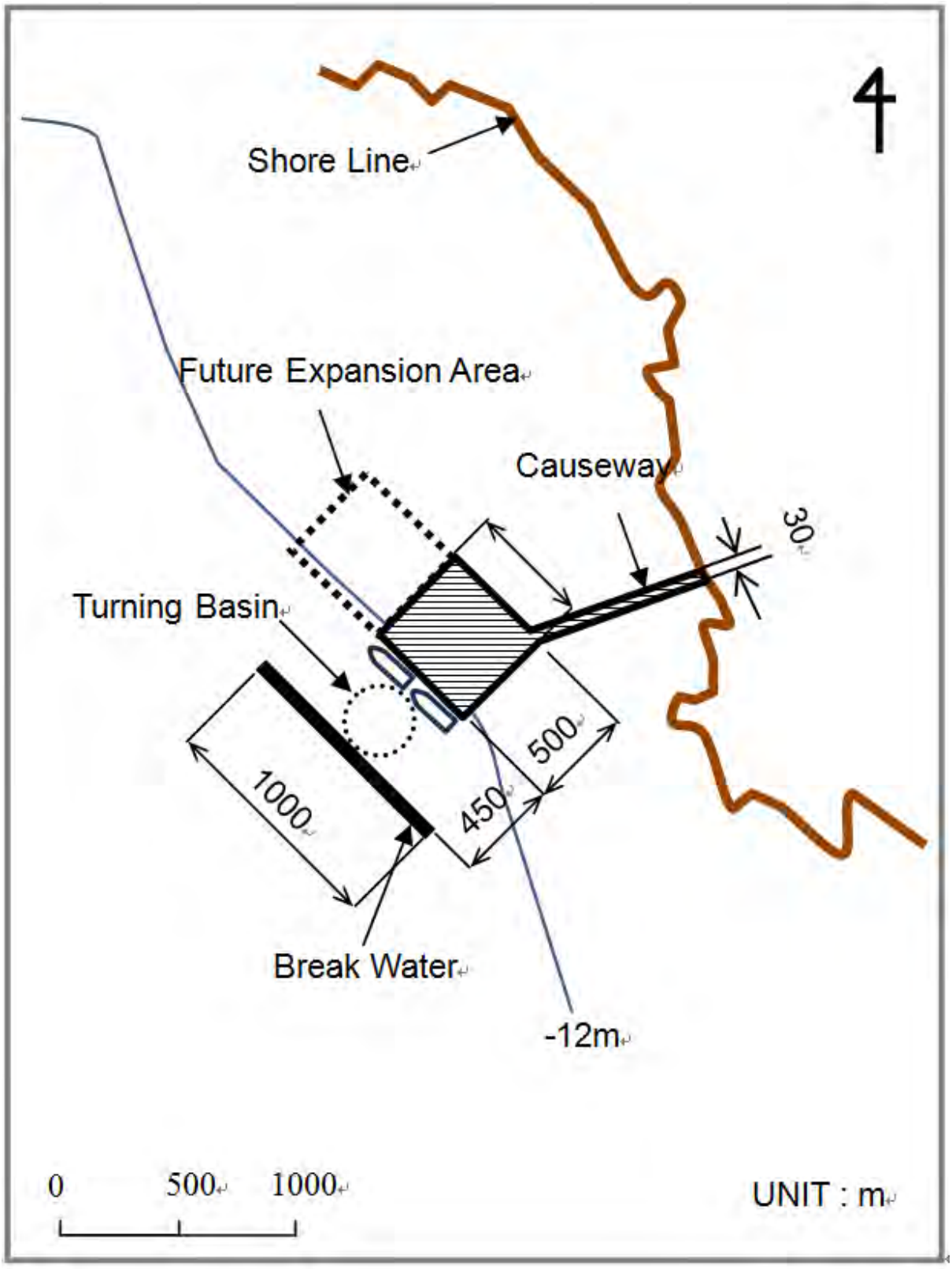
The above discussions can be summarized as follows;

- **Direction of the Development**

To be developed as a substitute port of Yangon Port due to its close proximity and availability of deep-sea.

- **Concept of the Development**

To develop a port with a water depth of -12 m and a breakwater for handling cargoes such as containers (see **Figure-38**)



Source : Study Report of Port Development Projects in the Southern Area of Myanmar (2015, MLIT)

Figure-38 Layout Plan of Kyaikami Ports

3. Direction and Concept of Port Development

The direction and concept of port development is as shown in **Table-2.**

Table-2 Direction and Concept of Port Development

Port	Direction of Port Development	Concept of Port Development
Yangon Main Port	Present port extends on a narrow space adjacent to the downtown. Major functions of Yangon Port shall be moved to other area for the improvement of cargo handling efficiency as well as proper land use of this area.	To redevelop the port area in conformity with Yangon City Development Plan. Major port functions shall be transferred to new areas such as Thanlyin area
Thilawa and Thanlyin Area Port	A part of the function of Yangon Main Port shall be integrated into Thilawa Terminal area and Thanlyin areas to strengthen the capacity of the port.	To promote Phase II and Phase III project of Thilawa Container Terminal. Re-arrange the land use plan of Thilawa Terminal area port. Utilize Thanlyin area for the expansion of Yangon Main Port and Thilawa Container Terminal.
Sittwe Port	Sittwe port is used as a part of detour waterborne transport route to Bangladesh and the east of India where road development is insufficient. This port plays an important role as a cargo distribution port to villages located at the coast and Kaladan river where road development is hampered because of the existence of many tributaries at this area. Develop this port as a cargo distribution port including container transport for neighboring countries and isolated villages from road connection.	To develop wharves of 8m in depth for container ships of coastal and the Bay of Bengal area shipping which connects ports of this area and is expected to increase calling frequency in the future. A candidate development area is the mouth of Minga Creek. The construct of a hybrid jetty composed of a reinforced concrete pier (5m in depth) and a pontoon jetty for small freeboard ships will be required to meet the future cargo demand at Minga Creek where a calm water area can be secured even during monsoon seasons.
Kyaukpyu Port	This port shall be developed as a port composing coastal shipping network, which aims at transporting cargo demand in the surrounding area of each port. There is no rationale for developing the port as a deep-sea port, which handles cargo for the hinterland such as Nay Pyi Taw due to the long distance (about 500km) from the port. However, there is potential to develop a deep-sea port for petrochemical or gas related industrial development by utilizing the available water depth, which exceeds 20m.	To develop a jetty of 5 m in depth as a coastal shipping port at the east water front line of the existing facilities. The structure is recommended to be a hybrid jetty including concrete pier and pontoon, which is able to apply mechanical cargo handling.
Thandwe Port	Transport of daily necessaries for Thandwe population of about 14 thousand depends solely on land traffic. Because Thandwe port has no facility to be used for general cargo handling but fish handling purpose. In order to supply daily necessaries to the population effectively by waterborne transport, Thandwe port needs general cargo handling facilities.	To contract a break water at north part of the bay where fishing boats and passenger boats are berthing to secure a calm water area and jetties of 5m in depth and cargo handling yard which are capable of receiving coastal shipping ships.

Pathein Port	Due to the development of the road transport network from Yangon, a significant increase of waterborne transport between the hinterland and the port is not expected. In order to cope with the demand of the large volume and long haul transportation, the maintenance and improvement of the port function for the coastal and inland water shipping is required.	To extend the coastal shipping pier which faces shortage of capacity in addition to the widening of the narrow cargo handling yard toward riverside to increase the cargo handling productivity.
Mawlamyine Port	The increasing demand will be handled at new jetties to be constructed on the island of Bilu located opposite of Mawlamyine and a connecting bridge construction is being conducted. Other daily use general cargo shall be handled at the existing jetties with some improvement, which is located near the cargo demand area of the city. It is necessary to maintain the channel depth in the Thanlwin River.	The existing jetties extend at the narrow space beside a coastal road resulting poor cargo handling productivity and traffic congestion on the coastal road. It is recommended to expand the port area in front of the riverside road either by a reclamation method or the construction of a piled structure. In addition to the above, it is recommended to construct a hybrid type jetty, which is composed of a concrete jetty and a pontoon jetty for small freeboard ships. Mechanical cargo handling equipment can be employed on this jetty and thus the cargo handling productivity will increase. The dredging of the river mouth is needed to maintain the water depth of the channel.
Dawei Port	This port will continue to handle the daily necessities, construction materials and fuel oil transport for the Dawei area population. It is necessary to maintain the channel depth	To extend the area of the narrow handling yard and construct a hybrid jetty with reinforced concrete pier and pontoon jetty for small freeboard ships in order to make the use of mechanical handling possible. The dredging of the shallow channel is needed.
Myeik Port	Myeik port is an indispensable port for handling fish and fish related cargo as well as for the commutation of people living in scattered islands. This port also plays an important role of cargo transit function in the trade between Thai and Myanmar. The roles of this port are expected to remain unchanged in future. Considering the expected increase in private jetty constructions, a new large-scale port development will not be needed. However, it will be necessary to maintain the depth of the access channel.	To conduct capital dredging of -5m in depth and subsequent maintenance dredging.
Kawthaung Port	Cargo transit function of this port in the trade between Thai and Myanmar shall be maintained and enhanced.	A jetty with 5m in depth shall be constructed in the vicinity of the existing MPA jetty where relatively deep water is available.

Source: Study Team