

**REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS**

**PREPARATORY SURVEY
FOR
URGENT REHABILITATION OF
DAMAGED TRANS-CENTRAL ROADS
BY THE CONFLICT
IN MARAWI CITY**

FINAL REPORT

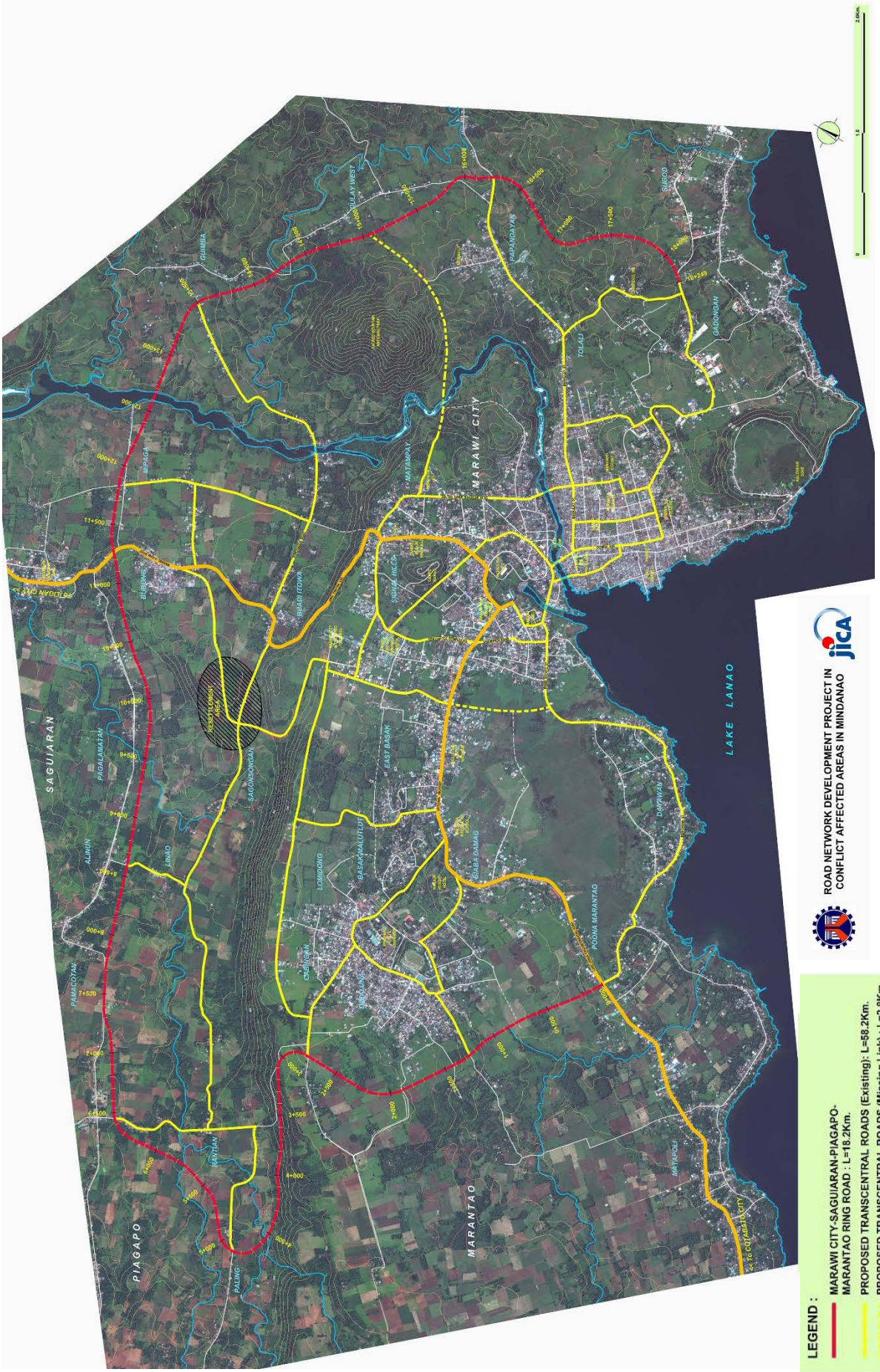
MAIN REPORT

JUNE 2018

JAPAN INTERNATIONAL COOPERATION AGENCY

**CTI ENGINEERING INTERNATIONAL CO., LTD.
ORIENTAL CONSULTANTS GLOBAL CO., LTD.
IC NET LIMITED**

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GR (5)
18-054 (1)



LEGEND :

- MARAWI CITY-SAGUIARAN-PIGAPO-MARANTAO RING ROAD : L=18.2km.
- PROPOSED TRANSCENTRAL ROADS (Existing) : L=59.2km.
- - - PROPOSED TRANSCENTRAL ROADS (Missing Link) : L=2.8km.
- OTHER ROADS



ROAD NETWORK DEVELOPMENT PROJECT IN
CONFLICT AFFECTED AREAS IN MINDANAO

**PREPARATORY SURVEY FOR URGENT REHABILITATION OF
DAMAGED TRANS-CENTRAL ROADS BY THE CONFLICT IN MARAWI CITY
Final Report**

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ACRONYMS AND ABBREVIATIONS

AC	:	Asphalt Concrete
ARMM	:	Autonomous Region in Muslim Mindanao
CCA	:	Climate Change Adaptation
CNC	:	Certificate of Non-Coverage
DAO	:	DENR Administrative Order
DENR	:	Department of Environment and Natural Resources
DPWH	:	Department of Public Works and Highways
DPWH-ESSD	:	Department of Public Works and Highways – ESSD
DRIMS	:	Dynamic Response Intelligent Monitoring System
DRR	:	Disaster Risk Reduction
ECA _s	:	Environmentally Critical Areas
ECC	:	Environmental Clearance Certificate
ECP _s	:	Environmentally Critical Projects
EIA	:	Environmental Impact Assessment
EIS	:	Environmental Impact Statement
EMB	:	Environmental Management Bureau
ICRC	:	the International Committee of the Red Cross
IDP	:	Internally Displaced Persons
IEE	:	Initial Environmental Examination
IRI	:	International Roughness Index
ISIS	:	Islamic State of Iraq and al-Sham
JICA	:	Japan International Cooperation Agency
JPT	:	JICA Project Team
JST	:	JICA Study Team
LGU	:	Local Government Units
MAA	:	Most Affected Area
PCC	:	Portland Pozzolana Cement
PD	:	Project Description
PEISS	:	Philippine Environmental Impact Statement System
PEPAMS	:	Project Environmental Monitoring and Audit Prioritization
PhP	:	Philippine Peso
RMC	:	Revenue Memorandum Circulars
ROW	:	Right of Way
TFBM	:	Task Force Bangon Marawi
UPMO	:	Unified Project Management Office

Chapter 1 Introduction

1.1 Background

The armed conflict between the Armed Forces of the Philippines and ISIS inspired terrorist group which started in May 2017 and ended in October 2017 had left much of the city's infrastructure in ruins. The magnitude of damage on the different infrastructure of the city however is still underappreciated due to the lack of comprehensive survey. For instance, although it is certain that some of the road network suffered severe damage, there's a lack of detailed data which could state exact length, location, type and severity of damage, and other necessary information to come up with the rehabilitation plan.

Hence this survey is an attempt to capture the magnitude of damage on the road infrastructure through three types of surveys: (i) Road inventory and road surface condition survey, (ii) Drainage inventory and condition survey, and (iii) Roughness survey using the DRIMS (Dynamic Response Intelligent Monitoring System).

The expected output of the surveys are as follows:

- a. Inventory of the major city roads (length, width, surface type, etc.)
- b. Existing condition (type of road damage) of the roads and its auxiliary facilities (e.g. drainage)
- c. Road surface condition and Road roughness condition (with video thru DRIMS)
- d. Width of Road Right-of-way for possible widening

The above information is necessary to come up with road rehabilitation program and its corresponding investment cost and implementation plan.

1.2 Position of the Project in the Overall Rehabilitation Plan for Marawi City

In general, the planning for reconstruction of Marawi City can be grouped into two: (i) inside the Most Affected Area (MAA) which is composed of the 24 barangays inside the ground zero and (ii) outside the MMA which is composed of the remaining 72 barangays of Marawi City and some barangays of the surrounding municipalities (Marantao, Piagao, Saguiaran) within the proposed Marawi City Ring Road.

a) Planning Inside the Most Affected Area (MMA) – 24 barangays

Inside the MAA, the Task Force Bangon Marawi (TFBM) is eyeing the private sector to develop the area through the Swiss challenge method where unsolicited proposals are to be evaluated by the TBFM . For this reason, the winning bidder in consultation with the affected communities will be tasked to come up with a plan and execute them.

b) Planning Outside the Most Affected Area (MAA) – 72 barangays

Outside the MAA, the most visible new structure established is the Sagonsongan Resettlement Area and its access roads. With the possibility of the resettlement becoming a permanent settlement of the displaced communities, there is a need to install essential support facilities. For this purpose, DPWH is planning to construct common facilities in three location such as school buildings, public markets, health centers and even religious facility (see **Figure 1.2-1**). Other plans in motion includes:

- Reconstruction of Marawi City Water Supply System – the International Committee of the Red Cross (ICRC) is currently undertaking a survey titled “Diagnosis and Modeling Marawi City Water Supply System” which is expected to be completed by June 2018. Output of this survey will be submitted to the TFBM to become one of the inputs of their plan.
- New Public Market and Public Transport Terminal – the city government of Marawi is currently developing a one (1) hectare area close to the intersection of Luksadatu St. and Buadi Sacayo St. close to the center of the city.
- Marawi City Ring Road – a JICA-assisted study aims to guide sound urbanization of Marawi City.

The Trans-central Roads Project will strengthen the link among these new planned facilities (e.g. resettlement area to new market) as well as improve the connection among the existing public facilities/institutions (e.g. community in the MMA to Mindanao State University) by providing better roads. This means that residents access to the different facilities/institutions would improve dramatically.

Likewise, by rehabilitating almost the entire network of the city, the traffic is expected to be distributed evenly since the roads in the past that are seldom used by motorists due to poor condition (e.g. surface condition is poor or pavement is earth) will provide equal level of service. Good distribution of traffic in the network will result to smooth flow of traffic due to avoidance of a single road carrying the large volume of traffic.

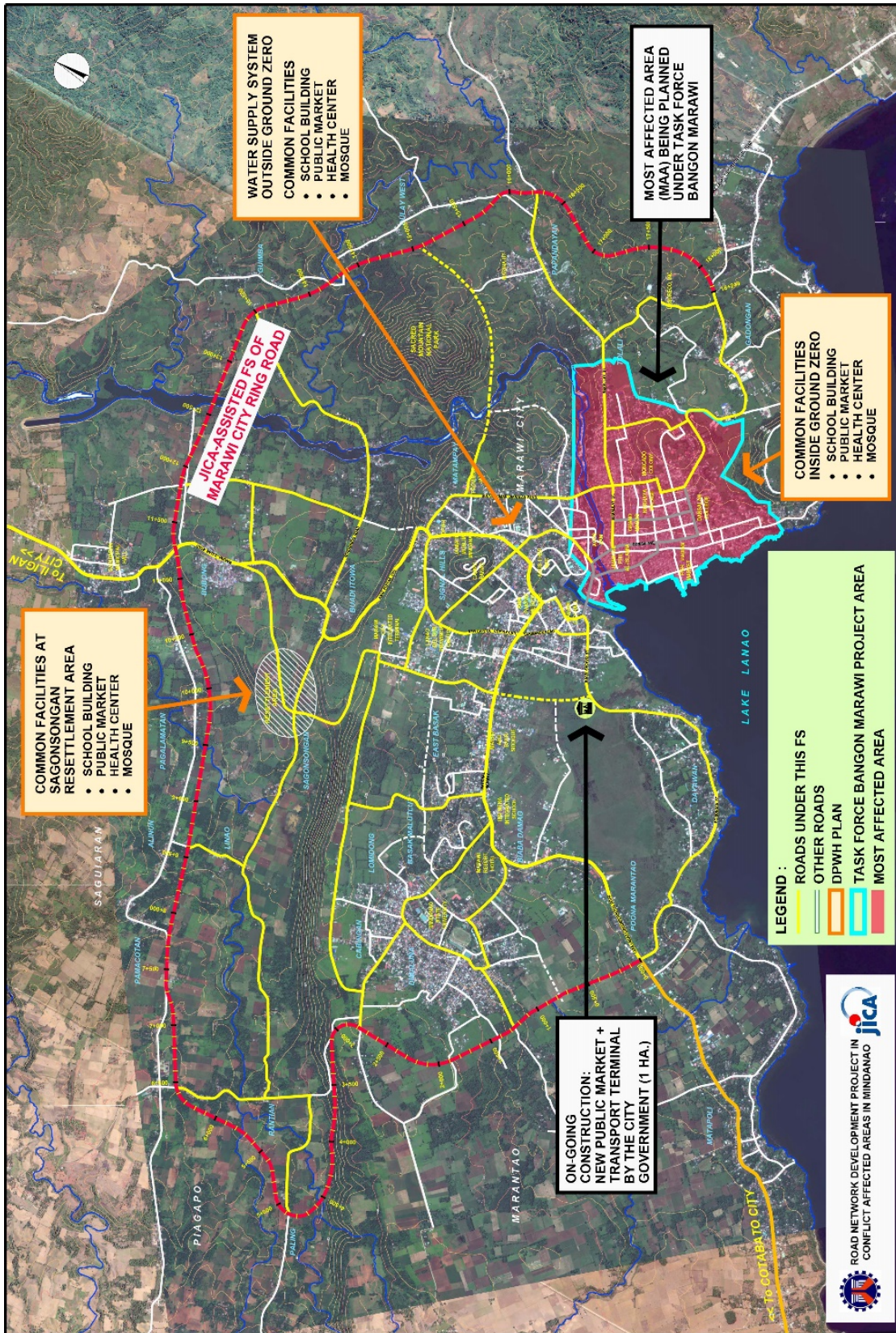


Figure 1.2-1 Position of the Project in the Overall Rehabilitation Plan

Source: JICA Study Team

1.3 Objectives of the Project

The objectives of the project are as follows:

- a) To support recovery and revitalization of socio-economic conditions of Marawi City which were devastated by the conflict
- b) To support smooth return of the IDPs
- c) To repair/rehabilitate road infrastructure damaged by the conflict

1.4 Objectives of the Study

Necessary data for the Project shall be prepared for the possible assistance by the Japanese Government.

1.5 Survey Area and Roads

The survey area shall be the area within the proposed Marawi Ring Road and important roads within the survey area shall be surveyed. Trans-central roads within the Marawi Ring Road will collect traffic and guide to the Ring Road or traffic in the Ring Road will be distributed through trans-central roads to destination inside the city.

Transcentral Roads were selected with due consultation with concerned LGUs based on the following criteria;

- National Roads which are the primary traffic collector/ distributor.
- City or Municipal Roads which are functioning major traffic collector distributor in the survey area.
- Roads within the major administrative center and commercial area.
- Roads which connect the resettlement area with administrative center and commercial center
- Roads within the academic area/ university area.

A total of 28 road sections with a total length of 60.4km are selected for the survey.

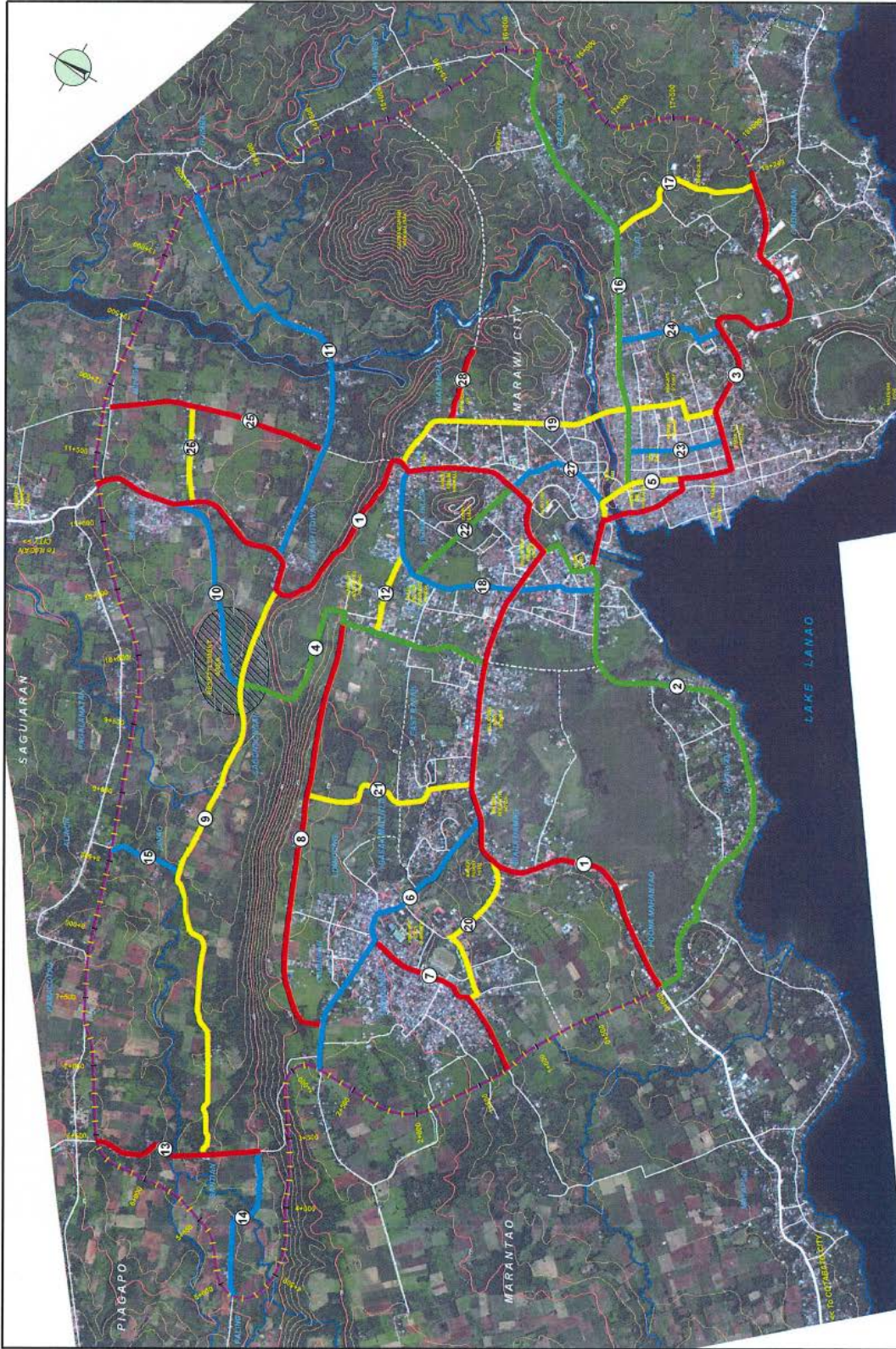


Figure 1.5-1 Survey Area and Roads

Source: JICA Study Team

1.6 Scope of the Work

To achieve the above objective, the Survey shall cover the following:

- (1) Selection of Roads to be studied under the study
- (2) Road Condition Survey
- (3) Criteria for Road Condition Evaluation
- (4) Selection of Road Sections for Rehabilitation/Improvement
- (5) Collection of Traffic Data
- (6) Preliminary Design
- (7) Cost Estimate
- (8) Environmental Survey
- (9) Implementation Plan

1.7 Schedule of the Study

The Study commenced in February 2018 and scheduled to be completed by the end of April 2018 as shown in **Table 1.7-1**.

Table 1.7-1 Schedule of the Study

	Month		
	1	2	3
a) Selection of Roads			
b) Road Condition Survey			
c) Criteria for Road Condition Evaluation			
d) Selection of Road Sections for Rehabilitation/Improvement			
e) Collection of Traffic Data			
f) Preliminary Design			
g) Cost Estimate			
h) Environmental Study			
i) Implementation Plan			

1.8 Organization of the Study Team

The JICA Survey Team organized by JICA in close collaboration with DPWH and other organizations concerned undertook the study.

JICA

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Yukiko SANO	Project Formulation Advisor, Mindanao Section, JICA Philippine Office

JICA Study Team:

The members of the JICA Study Team are as follows:

Mitsuo KIUCHI	Team Leader
Nashreen G. SINARIMBO	Deputy Team Leader
Tito T. ORIA, Sr.	Security Expert/Overall Coordinator
Seiji OZAWA	Road Design/DRIMS Expert
Medardo A. HABAL, Jr.	GIS Expert

Since the JICA Study Team are prohibited to visit Marawi City due to security issue, a survey team composed of ten (10) members of National experts were organized as follows;

National Experts (Cotabato City Based):

Domingo GUARIÑO, Jr.	Overall Team Leader (Road Inventory and Road Condition Survey)
Jareer JABER	Engineer 1 (Road Inventory and Road Condition Survey)
Morshida ABBAS	Engineer 2 (Road Inventory and Road Condition Survey)
Yasen MOHAMAD	Team Leader (DRIMS Survey)
Nabil MAMORIBID	Engineer 1 (DRIMS Survey)
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Marlon PEREZ	Team Leader (Drainage Condition Survey)
Normina PINGUIAMAN	Engineer 1 (Drainage Condition Survey)
Samsodin CALAMDADA	Engineer 2 (Drainage Condition Survey)
Junhora JUANDAY	Office Administrator, Cotabato City

Chapter 2 Road Surveys Undertaken

2.1 Road Surveys Undertaken

Following 3 types of road surveys were originally planned to be implemented for 60.4km of roads within Marawi City Ring Road;

- 1) Road Inventory and Condition Survey
- 2) IRI Survey by DRIMS
- 3) Road Drainage Survey

However, road surveys of some of road sections such as roads located inside the Most Affected Area (MAA) could not be undertaken due to the military's advice, thus length of surveyed roads was 57.2km.

2.2 Road Inventory and Condition Survey

2.2.1 Outline of the Survey

(1) Items Surveyed

Following items were recorded by a site survey;

- Station Number
- Pavement Type, Width and Condition by Observation
- Shoulder Width and Type
- Side Ditch
- Roadside Land Use
- Cross Section Type
- ROW Width (Building to building)

In addition to above, "pavement thickness" was measured when a pavement is exposed.

(2) Some Examples of Survey Forms Accomplished

Some examples of survey forms accomplished are presented in **Table 2.2.2-1** and **Table 2.2.2-2**.

(3) Visual Road Condition Evaluation Criteria

Visual road condition evaluation criteria is explained in **Section 2.2.3**.

(4) Establishment of Road Database

Survey results were compiled and pavement condition database was prepared.

2.2.2 Survey Formats

Following survey formats were prepared and recorded in the field.

- 1) Road Condition Survey Sheet----- **Table 2.2.2-1**
- 2) Field Survey Sheet for Photographs----- **Table 2.2.2-2**
- 3) Example of Summary of Road Inventory and Condition Survey ----- **Table 2.2.2-3**
- 4) Example of Field Survey Sheet for Photographs ----- **Table 2.2.2-4**

Table 2.2.2-3 Summary of Road Inventory and Condition Survey

SUMMARY OF ROAD INVENTORY AND CONDITION SURVEY

ROAD CONDITION SURVEY SHEET																	
Sheet Number : 1 ROAD NAME : MSU-GMA Terminal RD PROVINCE NAME : Lanao del Sur District Engineering Office : Total Length : 3.111 km																	
Road NO./ID : R8 MUNICIPALITY : Marawi City Admin. Road Class : Inspection Date : 2018.02.27																	
Sub Section No.	Station Beginning (kp)	Station Ending (kp)	Carriageway Pavement		Shoulder		Side Ditch				Land Use		Cross Section Type	ROW Bltg to Bltg (#2) (m)	Remarks		
			Type	Thickness (m)	Width (m)	Condition	Type	Width (m)	L	R	W x H (m)	u/w, oc, gd NONE (-)				W x H (m)	u/w, oc, gd NONE (-)
			C,C/O, A.G.E	(m)	(m)	C, A.G.E	L	R	(m)	u/w, oc, gd NONE (-)	W x H (m)	u/w, oc, gd NONE (-)	W x H (m)	A.F.W/R/C	R	F	
1	0 + 0	0 + 100	C	6.15	0.15	C	1.5	1.5	1.5	NONE	-	NONE	-	R/C	R/C	F	10.40
2	0 + 100	0 + 200	C	6.20	0.15	B	1.20	2.20	2.20	NONE	-	NONE	-	R/C	R/C	F	9.60
3	0 + 200	0 + 300	C	6.40	0.15	B	-	-	-	NONE	-	NONE	-	R/C	R/C	F	8.20
4	0 + 300	0 + 400	C	5.90	0.15	B	-	-	-	NONE	-	NONE	-	R/C	R/C	F	9.60
5	0 + 400	0 + 500	C	6.00	0.15	B	-	-	-	NONE	-	NONE	-	R/C	R/C	F	9.80
6	0 + 500	0 + 600	C	6.00	0.15	B	-	-	-	NONE	-	NONE	-	R/C	R/C	F	8.60
7	0 + 600	0 + 700	C	6.50	0.15	F	-	-	-	NONE	-	NONE	-	W	W	F	20.00
8	0 + 700	0 + 800	C	6.20	0.15	B	-	-	-	NONE	-	NONE	-	W	W	F	20.00
9	0 + 800	0 + 900	C	6.15	0.15	B	-	-	-	NONE	-	NONE	-	W	W	F	20.00
10	0 + 900	1 + 0	C	6.00	0.15	B	-	-	-	NONE	-	NONE	-	W	W	F	20.00
11	1 + 0	1 + 100	C	6.20	0.15	B	-	-	-	NONE	-	NONE	-	W	W	F	20.00
12	1 + 100	1 + 200	C	6.20	0.15	B	-	-	-	NONE	-	NONE	-	W	W	F	20.00
13	1 + 200	1 + 300	C	6.10	0.15	F	-	-	-	NONE	-	NONE	-	W	W	F	20.00
14	1 + 300	1 + 400	C	6.15	0.15	F	-	-	-	NONE	-	NONE	-	R/C	R/C	F	11.00
15	1 + 400	1 + 500	C	6.00	0.15	F	-	-	-	NONE	-	NONE	-	R/C	R/C	F	11.00
16	1 + 500	1 + 600	C	6.20	0.15	B	E	-	1.10	NONE	-	NONE	-	W	A	F	20.00
17	1 + 600	1 + 700	C	6.25	0.15	F	-	-	-	NONE	-	NONE	-	W	R/C	F	20.00
18	1 + 700	1 + 800	C	6.10	0.15	B	-	-	-	NONE	-	NONE	-	R/C	R/C	F	11.20
19	1 + 800	1 + 900	C	6.22	0.15	F	-	-	-	NONE	-	NONE	-	R/C	R/C	F	9.60
20	1 + 900	2 + 0	C	6.45	0.15	F	-	-	-	NONE	-	NONE	-	R/C	R/C	F	14.70
21	2 + 0	2 + 100	C	6.05	0.15	B	-	-	-	NONE	-	NONE	-	R/C	R/C	F	11.45
22	2 + 100	2 + 200	C	6.60	0.15	B	-	-	-	NONE	-	NONE	-	R/C	R/C	F	12.30
23	2 + 200	2 + 300	C	5.70	0.15	B	-	-	-	NONE	-	NONE	-	R/C	R/C	F	9.90
24	2 + 300	2 + 400	C	5.70	0.15	B	-	-	-	NONE	-	NONE	-	R/C	R/C	F	12.30
25	2 + 400	2 + 500	C	5.77	0.15	B	-	-	-	NONE	-	NONE	-	R/C	A	F	20.00
26	2 + 500	2 + 600	C	6.10	0.15	B	-	-	-	NONE	-	NONE	-	R/C	R/C	F	14.00

Source: JICA Study Team

Table 2.2.2-4 Road Field Survey Sheet-2 for Photo Graphs


Attachment - 2

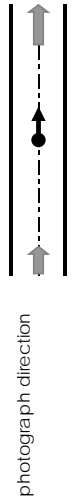
ROAD FIELD SURVEY SHEET-2
Photographs

Sheet No. of the day	(/)
Inspection Date	2018.02.13
Inspected by	
Checked by	

ROAD NAME : Lake Lanao Circm Road	Road NO./ID	R1
PROVINCE NAME : Lanao del Sur	MUNICIPALITY : Marantao	
District Engineering Office : 1st District LDS	<input type="checkbox"/> National Road	<input type="checkbox"/> Provincial Road

Road Link No. _____ Distance _____ km ~ _____ km

Photos		
SECTION	Section (0+000)	Section (0+100)



2.2.3 Visual Pavement Condition Assessment Criteria

Visual pavement condition assessment was made and conditions were classified into four (4) categories as “Good”, “Fair”, “Bad”, and “Very Bad”, and their assessment criteria is shown in **Table 2.2.3-1**.

Table 2.2.3-1 Road Condition Visual Assessment Criteria

ROAD CONDITION	Photo Index	Descriptions
Good		<p>No visible longitudinal or transverse cracks; concrete surface is still intact; no course aggregates are popping out; at least with a two-lane carriageway.</p>
Fair		<p>Appearance of occasional transverse cracks but no noticeable depression along these cracks; presence of few and small potholes from popped-out course aggregates; concrete surface is still generally intact; at least with a two-lane carriageway.</p>
Bad		<p>With longitudinal cracks; presence of numerous potholes caused by popped-out course aggregates; concrete surface starts to peel-off and gradually exposing course aggregates.</p>
Very Bad		<p>Presence of numerous longitudinal and transverse cracks; with noticeable depression along these cracks and/or between lane joints; with substantial presence of potholes; concrete surface has significantly peeled-off, thus, exposing course aggregates.</p>

2.3 IRI (Roughness) Survey by DRIMS

2.3.1 International Roughness Index (IRI)

Road surface roughness in terms of the International Roughness Index (IRI) is measured by DRIMS which is the equipment to measure road roughness. DRIMS is equipped to a vehicle and when a vehicle moves, roughness is automatically measured. When IRI of PCC Pavement exceeds 4.0, the pavement has damage and suggests some treatment is required (see **Figure 2.3.1-1**).

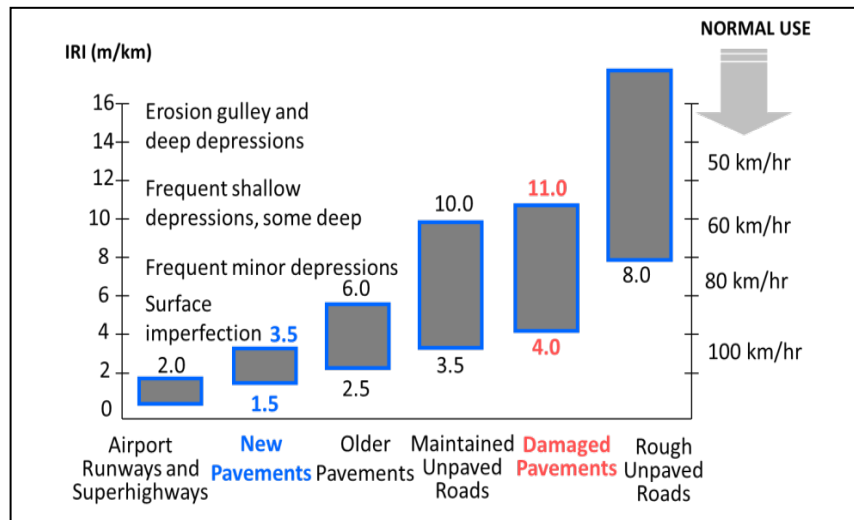






Figure 2.3.1-1 IRI Scale by World Bank

IRI ranges and corresponding pavement condition is shown in **Table 2.3.1-1**.

Table 2.3.1-1 IRI and Corresponding Pavement Condition

IRI RATING		Photo Index	Descriptions
Good	$0 \leq IRI < 3$		Nearly new condition. No depressions, potholes or corrugations are noticeable.
Fair	$3 \leq IRI < 5$		Occasional depressions, patches or potholes. Moderate corrugations or undulations.
Bad	$5 \leq IRI < 7$		Associated with defects, frequent moderate and uneven depressions or patches, or occasional potholes. Strong corrugations or undulations.
Very Bad	$7 \leq IRI$		Many deep depressions, potholes and severe disintegration.
No Assessment	No Assessment	Unmeasurable	


2.3.2 Survey Result Presentation

Table 2.3.2-1 and Table 2.3.2-2 show roughness survey result presentation.

Table 2.3.2-1 Roughness Survey Result Presentation (1/2)

Road Condition Inspection Result by DRIMS		Form-1																															
1. Road Inspection Information 1) Inspector : Nabil Jun Aqil 2) Inspection Sheet No. : No. 1 3) IRI Measuring Date : 2 / 19 / 2018 4) Road Code : RD01_Lane 1 5) Road Name : Bacung-iligan 6) Location : LDS 1st District 7) Length : 12,170m (Length in eATRIM) 8) Starting Point : Km. 0+000 9) Ending Point : Km. 12+170 10) Average IRI : 3.9 (Output of DRIMS)		2. Summary of Road Condition (by DPWH national rating) <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Road Condition</th> <th>IRI Scale</th> <th>Length</th> <th>Ratio</th> </tr> </thead> <tbody> <tr> <td>Good</td> <td>3>IRI>0</td> <td>1,770m</td> <td>15%</td> </tr> <tr> <td>Fair</td> <td>5>IRI>3</td> <td>8,710m</td> <td>72%</td> </tr> <tr> <td>Poor</td> <td>7>IRI>5</td> <td>1,390m</td> <td>11%</td> </tr> <tr> <td>Bad</td> <td>10>IRI>7</td> <td>300m</td> <td>2%</td> </tr> <tr> <td>No Valuation</td> <td>IRI>10</td> <td>0</td> <td>0%</td> </tr> <tr> <td colspan="2" style="text-align: center;">Total</td> <td>12,170m</td> <td>100%</td> </tr> </tbody> </table>				Road Condition	IRI Scale	Length	Ratio	Good	3>IRI>0	1,770m	15%	Fair	5>IRI>3	8,710m	72%	Poor	7>IRI>5	1,390m	11%	Bad	10>IRI>7	300m	2%	No Valuation	IRI>10	0	0%	Total		12,170m	100%
Road Condition	IRI Scale	Length	Ratio																														
Good	3>IRI>0	1,770m	15%																														
Fair	5>IRI>3	8,710m	72%																														
Poor	7>IRI>5	1,390m	11%																														
Bad	10>IRI>7	300m	2%																														
No Valuation	IRI>10	0	0%																														
Total		12,170m	100%																														
		1) Road Condition Ratio 																															
		2) Pavement Type 																															
		3. Road Repairment Cost ■ Repair type: ■ Repair cost:																															
		Average IRI (10m) 																															
		Road Condition Estimated by DRIMS (Distance in meter) 																															
		Comment from inspector on road condition during survey Ex. Many humps, on-going construction, traffic jam, security threat etc. 1) _____ 2) _____ 3) _____																															
		Comment from maintenance engineer Ex. Use Asphalt overlay with 50mm thickness for repair type 1. Reconstruction by PCC with 230mm 1) _____ 2) _____ 3) _____																															

Table 2.3.2-2 Roughness Survey Result Presentation (2/2)



Road Condition Inspection Result by DRIMS

Form-1

1. Road Inspection Information

Inspector : Nabil, Jum, Aqil

Inspection Sheet No. : No. 1

IRI Measuring Date : 2 / 19 / 2018

Road Code : RD01_Lane 1

Road Name : Bacung-Iligan

Location : LDS 1st District

Length : 12,170m (Length in e-ARMM)

Starting Point : Km. 0+000

Ending Point : Km. 12+170

Average IRI : 3.9 (Output of DRIMS)

2. Summary of Road Condition

(by DPWH-national rating)

Road Condition	IRI Scale	Length	Ratio
Good	3>IRI>0	1,770m	15%
Fair	5>IRI>3	8,710m	72%
Poor	7>IRI>5	1,390m	11%
Bad	10>IRI>7	300m	2%
No Valuation	IRI>10	0	0%
Total		12,170m	100%

Average IRI (10m)

Road Condition Estimated by DRIMS (Distance in meter)

Travel direction
Km. 0+000 (Starting Point) Km. 12+170 (Ending Point)

1. Road Condition Ratio

2) Pavement Type

3. Road Repairment Cost

Repairment type:

Repair cost:

Comment from inspector on road condition during survey

Ex. Many humps, on-going construction, traffic jam, security threat etc.

1) _____

2) _____

3) _____

Comment from maintenance engineer

Ex. Use Asphalt overlay with 50mm thickness for repair type 1. Reconstruction by PCC with 230mm

1) _____

2) _____

3) _____

2.4 Road Drainage Survey

Road drainage is quite important to keep pavement in good condition and to defer deterioration. Field survey formats are shown in **Table 2.4-1** and **Table 2.4-2**.

Table 2.4-2 Road Drainage Field Survey Sheet-2 Photographs

ROAD DRAINAGE FIELD SURVEY SHEET-2
Photographs

Sheet No. of the day : (1 / 28)
 Inspection Date :
 Inspected by :
 Checked by :

ROAD NAME :
 Road NO./ID :
 PROVINCE NAME : LANAO DEL SUR
 MUNICIPALITY :
 District Engineering Office : National Road Provincial Road

Road Link No. _____ Distance _____ km ~ _____ km

Photos		
SECTION	Section (0+000 m)	Section (0+000 m)



Reference No. -

Chapter 3 Result of Road Surveys

3.1 Road Inventory and Condition Survey Results

The overall results of road inventory and road condition survey are shown in **Figure 3.1-1** and **Figure 3.1-2**.

Details of the survey results of each item are as follows.

(1) Carriageway Pavement Type and Width

Existing carriageway is mostly paved with PCC and there are short sections with AC overlay over PPC Pavement. Eighty seven percent (87%) of the road section of National Road have a carriageway pavement width of 6.0 m or more, and there is no unpaved section.

Forty five percent (45%) of the road section of the City road have a carriageway pavement width of less than 5.0 m and there is about 5km unpaved section.

Table 3.1-1 Summary of Carriageway Width

Road Type	Carriageway Width				Total
	~5.0m	5.0m~6.0m	6.0m~6.7m	6.7m~	
National Road	1.6km (6%)	2.2km (8%)	14.9km (52%)	10.0km (35%)	28.7km (100%)
City Road	13.9km (45%)	5.3km (17%)	6.1km (20%)	5.4km (18%)	30.7km (100%)
Total	15.5km (26%)	7.5km (13%)	21.0km (35%)	15.4km (26%)	59.4km (100%)

Source: JICA Study Team

(2) Right-of-Way (ROW)

Eighty eight percent (88%) of the National Road section has a ROW of 10.7 m or more (width necessary for Class 1).

Seventy percent (70%) of the City Road section has a ROW of 10.7 m or more. However, 13% of the road section has a ROW of less than 8.0 m (width necessary for Class 4).

Table 3.1-2 Summary of ROW

Road Type	ROW				Total
	~8.0m	8.0m~10.0m	10.0m~10.7m	10.7m~	
National Road	0.4km (1%)	1.8km (6%)	1.1km (4%)	25.2km (88%)	28.5km (100%)
City Road	4.0km (13%)	4.0km (13%)	1.3km (4%)	21.5km (70%)	30.8km (100%)
Total	4.4km (7%)	5.8km (10%)	2.4km (4%)	46.7km (79%)	59.3km (100%)

Source: JICA Study Team

(3) Road Surface Condition

Fifty one percent (51%) of the National Road sections were evaluated as “Very Bad” or “Bad”, while fifty seven percent (57%) of the City Road sections were evaluated as “Very Bad” and “Bad”.

Figure 3.1-2 shows the road surface condition for the 100m section.

Table 3.1-3 Summary of Road Surface Condition

Road Type	Road Surface Condition				Total
	Very Bad	Bad	Fair	Good	
National Road	2.0km (3%)	27.7km (48%)	24.7km (43%)	3.0km (5%)	57.4km (100%)
City Road	2.9km (5%)	32.0km (52%)	14.9km (24%)	11.8km (19%)	61.6km (100%)
Total	4.9km (4%)	59.7km (50%)	39.6km (33%)	14.8km (12%)	119.0km (100%)

Note: The length is the sum of each lane.

Source: JICA Study Team

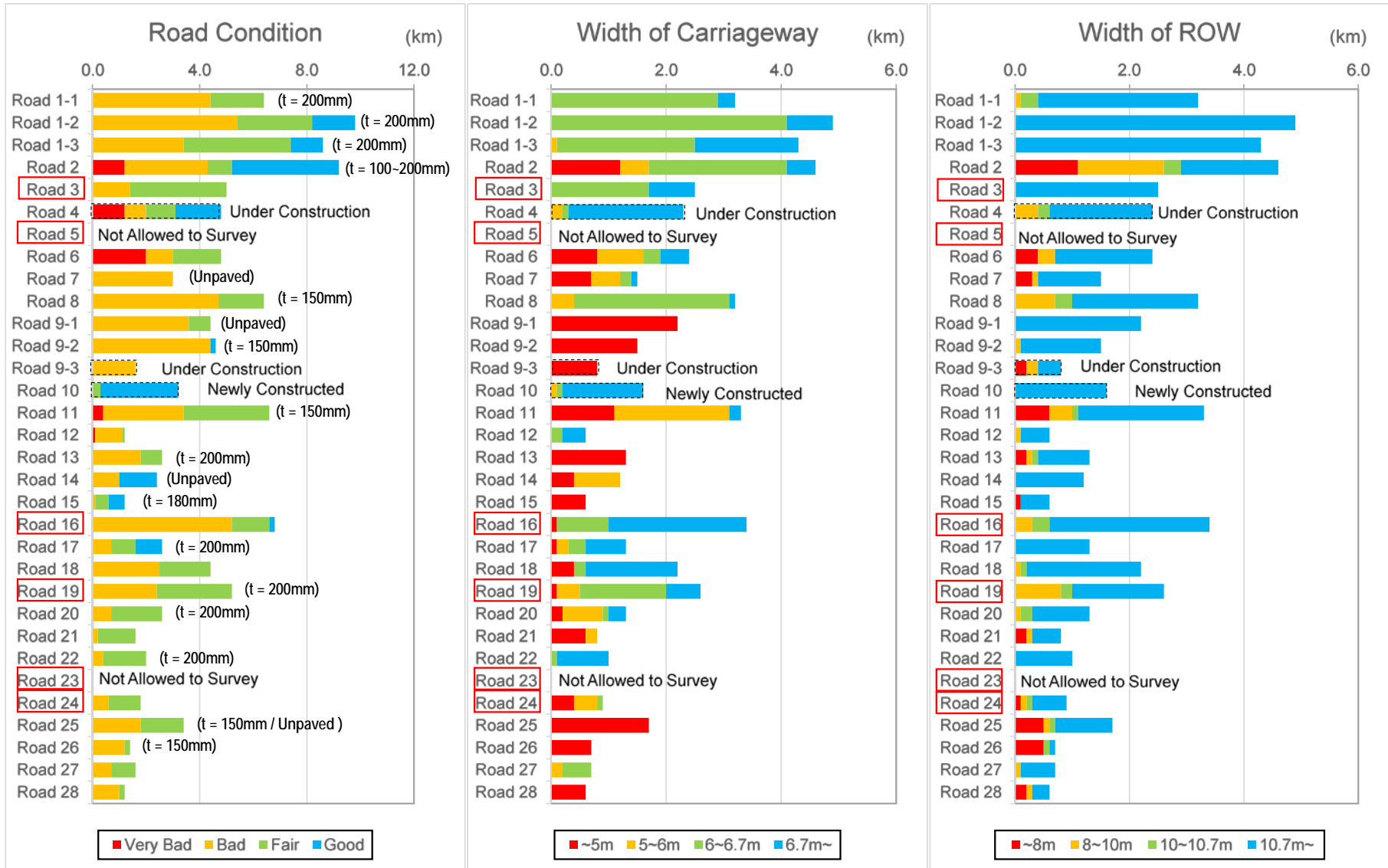
(4) Pavement Thickness

PCC pavement thickness is very thin and sub-standard compared with National requirement. DPWH specifies the minimum PCC pavement thickness shall be 28cm.

PCC pavement thickness of the Study area is as follows;

Existing PCC Pavement Thickness	
• National Road	: 20 cm
• City Road	: 15~18 cm

DPWH’s policy is to adopt the minimum thickness of 28cm for National Road, whenever pavement reconstruction is planned.



□ : Located inside the "Most Affected Area". () : Pavement Thickness of Existing Road (where pavement thickness could be surveyed)

Figure 3.1-1 Road Inventory and Road Condition Survey Result

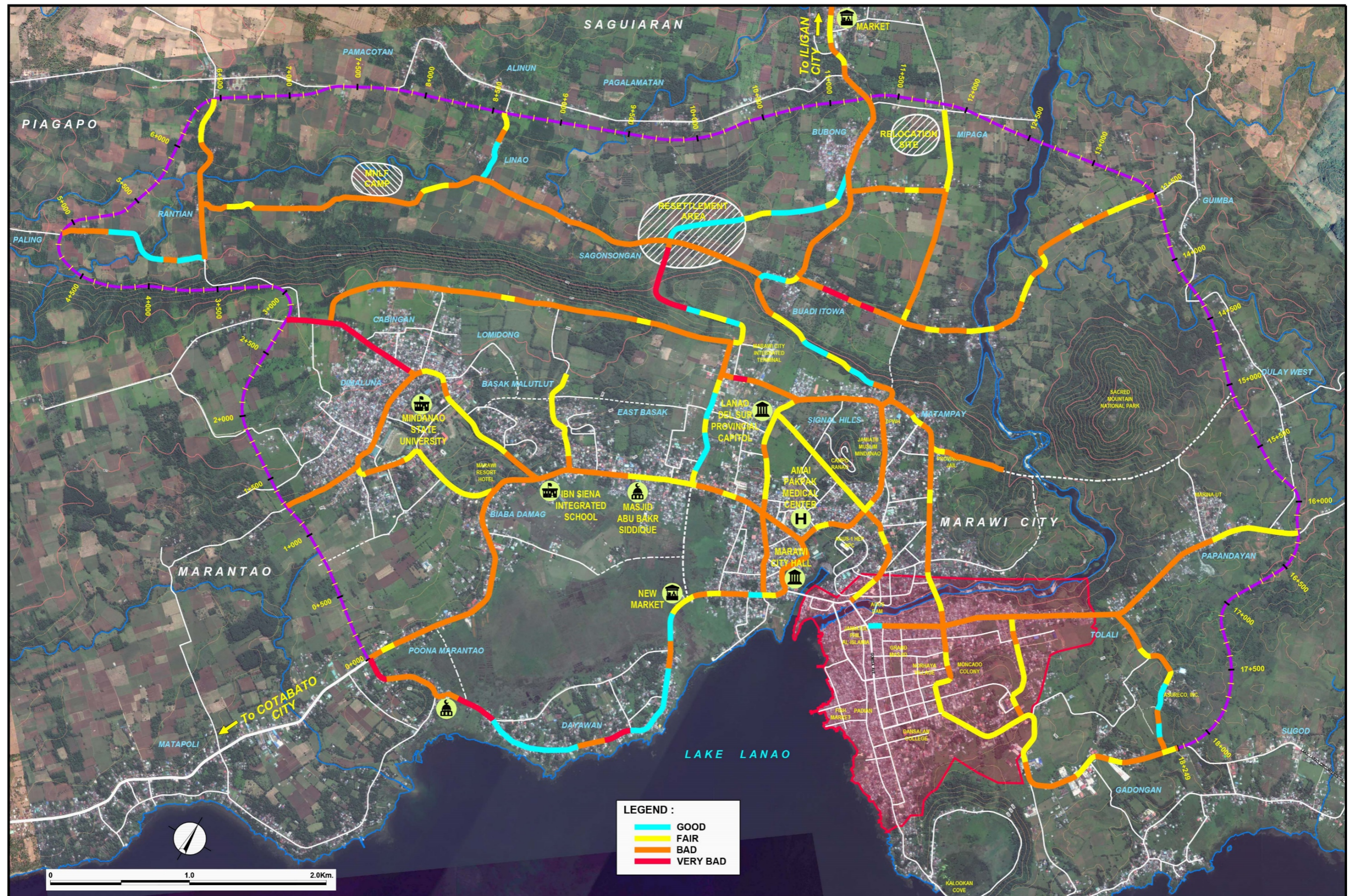


Figure 3.1-2 Pavement Surface Condition by Road Condition Survey

Table 3.1-4 Summary of Road Inventory and Road Condition Survey

Name of Road	Road Class	Length	Pavement Width (Km)					Right-of-Way (Km)					Road Condition on Lane 1 (Left Lane)										Road Condition of Lane 2 (Right Lane)														
			~5m	5~6m	6~6.7m	6.7m~	Total	~8m	8~10m	10~10.7m	10.7m~	Total	Paved (Km)					Un-Paved (Km)					Ground Total	Paved (Km)					Un-Paved (Km)					Ground Total			
													Very Bad	Bad	Fair	Good	Total	Very Bad	Bad	Fair	Good	Total		Very Bad	Bad	Fair	Good	Total	Very Bad	Bad	Fair	Good	Total				
Road 1	Bacong-Marawi-Iligan Road	National	12.34	0.00	0.10	9.40	2.84	12.34	0.00	0.10	0.30	11.94	12.34	0.00	6.80	4.30	1.24	12.34						0.00	12.34	0.00	6.40	4.50	1.44	12.34						0.00	12.34
Road 2	Bacong-Poona Marantao-Marawi Road		4.60	1.20	0.50	2.40	0.50	4.60	1.10	1.50	0.30	1.70	4.60	0.70	1.70	0.40	1.60	4.40		0.20				0.20	4.60	0.50	1.20	0.50	2.40	4.60						0.00	4.60
Road 3	Raya Madaya-Gumisa-Alawiya-Gadungan Road (Quezon Ave.)	National	2.42	0.00	0.00	1.70	0.72	2.42	0.00	0.00	0.00	2.42	2.42	0.00	0.50	1.92	0.00	2.42						0.00	2.42	0.00	0.90	1.52	0.00	2.42						0.00	2.42
Road 4	Sagongsong-Awar Road (New Marawi Dicsersion Road)		2.34	0.00	0.20	0.10	2.04	2.34	0.00	0.40	0.20	1.74	2.34	0.00	0.40	0.60	0.74	1.74	0.60					0.60	2.34	0.00	0.40	0.50	0.84	1.74	0.60					0.60	2.34
Road 5	Gumisa Ave.						0.00					0.00					0.00						0.00	0.00											0.00	0.00	
Road 6	Cabingan-MSU Campus-Amai Pakpak Road	National	2.30	0.80	0.80	0.30	0.40	2.30	0.40	0.30	0.00	1.60	2.30	1.00	0.40	0.90	0.00	2.30						0.00	2.30	1.00	0.60	0.70	0.00	2.30						0.00	2.30
Road 7	MSU Campus-Matampay Marantao Road		1.40	0.60	0.50	0.20	0.10	1.40	0.30	0.10	0.00	1.00	1.40	0.00	0.80	0.00	0.00	0.80		0.60				0.60	1.40	0.00	0.80	0.00	0.00	0.80		0.60			0.60	1.40	
Road 8	MSU-GMA Terminal Road		3.10	0.00	0.40	2.60	0.10	3.10	0.00	0.70	0.30	2.10	3.10	0.00	2.40	0.70	0.00	3.10						0.00	3.10	0.00	2.30	0.80	0.00	3.10						0.00	3.10
Road 9	Emie-Sagongsong-Linao-Rantian Road		4.35	4.35	0.00	0.00	0.00	4.35	0.20	0.30	0.00	3.85	4.35	0.00	1.65	0.40	0.00	2.05		2.30				2.30	4.35	0.00	1.45	0.40	0.20	2.05		2.30			2.30	4.35	
Road 10	New Marawi Diversion Road (Sagongsong Section)		1.49	0.00	0.10	0.10	1.29	1.49	0.00	0.00	0.00	1.49	1.49	0.00	0.00	0.20	1.29	1.49						0.00	1.49	0.00	0.00	0.10	1.39	1.49						0.00	1.49
Road 11	Bito-Rorogagus-Gumba Road		3.16	1.10	1.86	0.00	0.20	3.16	0.60	0.40	0.10	2.06	3.16	0.30	1.30	1.56	0.00	3.16						0.00	3.16	0.10	1.70	1.36	0.00	3.16						0.00	3.16
Road 12	GMA Terminal Access Road (Capitol-GMA Terminal Road)		0.58	0.00	0.00	0.20	0.38	0.58	0.00	0.10	0.00	0.48	0.58	0.00	0.48	0.10	0.00	0.58						0.00	0.58	0.10	0.48	0.00	0.00	0.58						0.00	0.58
Road 13	MSU-Bubo Road		1.24	1.24	0.00	0.00	0.00	1.24	0.20	0.10	0.10	0.84	1.24	0.00	0.84	0.40	0.00	1.24						0.00	1.24	0.00	0.84	0.40	0.00	1.24						0.00	1.24
Road 14	Rantian-Paling Road		1.14	0.40	0.74	0.00	0.00	1.14	0.00	0.00	0.00	1.14	1.14	0.00	0.10	0.00	0.64	0.74		0.40				0.40	1.14	0.00	0.10	0.00	0.64	0.74		0.40			0.40	1.14	
Road 15	Linao-Alinun Road		0.53	0.53	0.00	0.00	0.00	0.53	0.10	0.00	0.00	0.43	0.53	0.00	0.10	0.20	0.23	0.53						0.00	0.53	0.00	0.00	0.30	0.23	0.53						0.00	0.53
Road 16	Marawi-Kapai Road (Macalilay Road)	National	3.34	0.10	0.00	0.90	2.34	3.34	0.00	0.30	0.30	2.74	3.34	0.00	2.60	0.64	0.10	3.34						0.00	3.34	0.00	2.54	0.70	0.10	3.34						0.00	3.34
Road 17	Kilala-Tuali Road (Lasureco Road)		1.21	0.10	0.20	0.30	0.61	1.21	0.00	0.00	0.00	1.21	1.21	0.00	0.10	0.61	0.50	1.21						0.00	1.21	0.00	0.60	0.20	0.41	1.21						0.00	1.21
Road 18	Marawi-Cadre Road (New Capitol Road)	National	2.15	0.40	0.00	0.20	1.55	2.15	0.00	0.10	0.10	1.95	2.15	0.00	1.10	1.05	0.00	2.15						0.00	2.15	0.00	1.40	0.75	0.00	2.15						0.00	2.15
Road 19	Tampilong-Mapandi-Moncado Colony Road (Marcos Blvd)	National	2.53	0.10	0.40	1.50	0.53	2.53	0.00	0.80	0.20	1.53	2.53	0.00	1.00	1.53	0.00	2.53						0.00	2.53	0.00	1.33	1.20	0.00	2.53						0.00	2.53
Road 20	Rapas-an-Bayaba Road	National	1.22	0.20	0.62	0.10	0.30	1.22	0.00	0.10	0.20	0.92	1.22	0.00	0.40	0.82	0.00	1.22						0.00	1.22	0.00	0.30	0.92	0.00	1.22						0.00	1.22
Road 21	Lumindong-Amai Pakpak Road		0.78	0.58	0.20	0.00	0.00	0.78	0.20	0.10	0.00	0.48	0.78	0.00	0.10	0.68	0.00	0.78						0.00	0.78	0.00	0.10	0.68	0.00	0.78						0.00	0.78
Road 22	Marawi-Landing Road (Amai Pakpak-Capitol Road)	National	0.94	0.00	0.00	0.10	0.84	0.94	0.00	0.00	0.00	0.94	0.94	0.00	0.20	0.74	0.00	0.94						0.00	0.94	0.00	0.20	0.74	0.00	0.94						0.00	0.94
Road 23	Pangarungan Road (Roxas Ave.)						0.00					0.00					0.00						0.00	0.00											0.00	0.00	
Road 24	Disumangcop Road		0.79	0.35	0.34	0.10	0.00	0.79	0.10	0.10	0.10	0.49	0.79	0.00	0.30	0.49	0.00	0.79						0.00	0.79	0.00	0.30	0.49	0.00	0.79						0.00	0.79
Road 25	Rorogagus-Mipaga-Saguairan Road		1.60	1.60	0.00	0.00	0.00	1.60	0.50	0.10	0.10	0.90	1.60	0.00	0.00	0.70	0.00	0.70		0.90				0.90	1.60	0.00		0.70	0.00	0.70		0.90			0.90	1.60	
Road 26	Bito-Mipaga Marawi Road		0.69	0.69	0.00	0.00	0.00	0.69	0.49	0.00	0.10	0.10	0.69	0.00	0.59	0.10	0.00	0.69						0.00	0.69	0.00	0.59	0.10	0.00	0.69						0.00	0.69
Road 27	Idarus Road	National	0.80	0.00	0.20	0.60	0.00	0.80	0.00	0.10	0.00	0.70	0.80	0.00	0.40	0.40	0.00	0.80						0.00	0.80	0.00	0.50	0.30	0.00	0.80						0.00	0.80
Road 28	Tampilong Road		0.55	0.55	0.00	0.00	0.00	0.55	0.20	0.10	0.00	0.25	0.55	0.00	0.45	0.10	0.00	0.55						0.00	0.55	0.00	0.45	0.10	0.00	0.55						0.00	0.55
Total			57.59	14.89	7.16	20.80	14.74	57.59	4.39	5.80	2.40	45.00	57.59	2.00	24.71	19.54	6.34	52.59	0.60	4.40	0.00	0.00	5.00	57.59	1.70	25.48	17.96	7.65	52.79	0.60	4.20	0.00	0.00	4.80	57.59		

Source: JICA Study Team

3.2 IRI Survey Result

Eight percent (8%) of the National Road section has a low IRI of less than 3.0(m/km) or very smooth surface. The average of IRI is 5.76(m/km).

Two percent (2%) of the City Road section has a low IRI of less than 3.0(m/km). Fifty two percent (52%) of the road section has a high IRI of more than 7.0 (m/km) which include unpaved section. The average of IRI is 8.44(m/km).

Table 3.2-1 Summary of Road Surface Condition

Road Type	Ave. IRI	IRI (m / km)				Total
		0~3	3~5	5~7	7~	
National Road	5.76	4.6km (8%)	29.7km (53%)	13.1km (23%)	8.6km (15%)	56.0km (100%)
City Road	8.44	0.9km (2%)	9.2km (20%)	12.5km (26%)	24.7km (52%)	47.3km (100%)
Total		5.5km (5%)	38.9km (38%)	25.6km (25%)	33.3km (32%)	103.3km (100%)

Note: The length is the sum of each lane.

Source: JICA Study Team

In the urban area, IRI value is relatively low (about 5 or less). The roads with relatively high IRI are located outside the central urban area (some sections are unpaved roads) or located in the MAA where the pavement was damaged by the conflict.



Source: JICA Study Team

Figure 3.2-1 IRI Value of Lane 1

Table 3.2-2 Summary of IRI Survey

None of Road	Road Class	Length	ROAD CONDITIONS ON LANE 1 (LEFT LANE)											ROAD CONDITIONS ON LANE 2 (RIGHT LANE)																						
			Paved(Km)						Unpaved(Km)					Grand Total	Paved(Km)						Unpaved(Km)					Grand Total										
			Average	Good	Fair	Poor	Bad		Total	Good	Fair	Poor	Bad		Total	Average	Good	Fair	Poor	Bad		Total	Good	Fair	Poor		Bad	Total								
			IRI (m/km)	IRI<3	3<IRI<5	5<IRI<7	7<IRI<10	10<IRI	Total	IRI<7	7<IRI<11	11<IRI<16	16<IRI		Total	IRI (m/km)	IRI<3	3<IRI<5	5<IRI<7	7<IRI<10	10<IRI	Total	IRI<7	7<IRI<11	11<IRI<16		16<IRI	Total								
Road 1	Bacong-Marawi-Iligan Road	National	12.17	3.98	1.87	8.32	1.80	0.18					12.17						0.00	12.17	4.11	2.05	7.57	2.24	0.31					12.17					0.00	12.17
Road 2	Bacong-Poona Marantao-Marawi Road		4.47	7.47	0.11	1.44	1.51	1.12	0.29	4.47				0.00	4.47	5.49		1.05	1.93	0.48													0.00	3.46		
Road 3	Raya Madaya-Gumisa-Alawiya-Gadungan Road (Quezon Ave.)	National	2.49	4.56	0.08	1.78	0.56	0.06	0.01	2.49				0.00	2.49	4.86		1.50	0.84	0.14	0.01	2.49											0.00	2.49		
Road 4	Sagongsong-Awar Road (New Marawi Dicsersion Road)		2.55	6.30	0.23	0.90	0.59	0.21		1.93	0.01	0.07	0.54	0.62	2.55	4.70	0.18	1.07	0.40	0.28												0.00	1.93			
Road 5	Gumisa Ave.		-	0.00						0.00				0.00	0.00	0.00																0.00	0.00			
Road 6	Cabingan-MSU Campus-Amal Pakpak Road	National	2.38	8.30		0.15	0.76	0.71	0.76	2.38				0.00	2.38	7.84		0.12	0.67	1.37	0.22	2.38										0.00	2.38			
Road 7	MSU Campus-Matampay Marantao Road		1.67	11.85		0.29	0.05	0.09	0.42	0.85			0.82	0.82	1.67	8.70		0.08	0.26	0.23	0.28	0.85										0.00	0.85			
Road 8	MSU-GMA Terminal Road		3.10	7.16		0.49	1.06	1.19	0.36	3.10				0.00	3.10	7.13		0.16	1.42	1.51	0.01	3.10										0.00	3.10			
Road 9	Emie-Sagongsong-Linao-Rantian Road		2.67	11.06			0.11	0.82	0.54	1.47		0.17	1.03	1.20	2.67						0.00											0.00	0.00			
Road 10	New Marawi Diversion Road (Sagongsong Section)		1.46	3.52	0.10	1.28	0.08			1.46				0.00	1.46	3.32	0.30	1.16														0.00	1.46			
Road 11	Bito-Rorogagus-Gumba Road		3.38	8.10		0.42	0.71	1.87	0.38	3.38				0.00	3.38	8.02		0.09	1.28	1.70	0.31	3.38										0.00	3.38			
Road 12	GMA Terminal Access Road (Capitol-GMA Terminal Road)		0.57	5.08		0.31	0.18	0.08		0.57				0.00	0.57	6.78		0.24	0.11	0.03	0.19	0.57										0.00	0.57			
Road 13	MSU-Bubo Road		1.34	6.15			0.60	0.08	0.01	0.69				0.00	0.69	7.48		0.01	0.61	0.52	0.20	1.34										0.00	1.34			
Road 14	Rantian-Paling Road		1.21	11.95		0.18	0.09	0.10	0.39	0.76			0.45	0.45	1.21	9.95			0.07	0.32	0.37	0.76										0.00	0.76			
Road 15	Linao-Alinun Road		0.63	15.02				0.05	0.53	0.58			0.05	0.63							0.00											0.00	0.00			
Road 16	Marawi-Kapai Road (Macallay Road)	National	3.30	4.34	0.34	2.17	0.61	0.18		3.30				0.00	3.30	4.54	0.02	2.42	0.86													0.00	3.30			
Road 17	Kilala-Tuali Road (Lasureco Road)		1.20	8.11			0.27	0.82	0.11	1.20				0.00	1.20	7.84		0.05	0.48	0.49	0.18	1.20										0.00	1.20			
Road 18	Marawi-Cadre Road (New Capitol Road)	National	2.15	5.94		0.53	1.15	0.46	0.01	2.15				0.00	2.15	5.28		1.33	0.37	0.45		2.15										0.00	2.15			
Road 19	Tampilong-Mapandi-Moncado Colony Road (Marcos Blvd)	National	2.52	5.74	0.09	0.90	0.86	0.62	0.05	2.52				0.00	2.52	5.96	0.13	1.04	0.71	0.43	0.21	2.52										0.00	2.52			
Road 20	Rapas-an-Bayaba Road	National	1.36	8.26		0.05	0.42	0.52	0.37	1.36				0.00	1.36	8.51		0.02	0.25	0.75	0.34	1.36										0.00	1.36			
Road 21	Lumindong-Amal Pakpak Road		0.72	9.11			0.10	0.42	0.20	0.72				0.00	0.72	9.40			0.06	0.35	0.31	0.72										0.00	0.72			
Road 22	Marawi-Landing Road (Amal Pakpak-Capitol Road)	National	0.92	5.47		0.35	0.48	0.09		0.92				0.00	0.92	5.40		0.47	0.38	0.07		0.92										0.00	0.92			
Road 23	Pangarungan Road (Roxas Ave.)		-	0.00						0.00				0.00	0.00	0.00																0.00	0.00			
Road 24	Disumangcop Road		0.85	11.11				0.34	0.51	0.85				0.00	0.85	11.30				0.20	0.65	0.85										0.00	0.85			
Road 25	Rorogagus-Mipaga-Saguairan Road		1.58	11.45			0.31	0.11	0.31	0.73		0.25	0.60	0.85	1.58						0.00											0.00	0.00			
Road 26	Bito-Mipaga Marawi Road		0.69	7.96			0.18	0.49	0.02	0.69				0.00	0.69						0.00											0.00	0.00			
Road 27	Idarus Road	National	0.71	5.14	0.01	0.51	0.07		0.12	0.71				0.00	0.71	5.42		0.45	0.09	0.17		0.71										0.00	0.71			
Road 28	Tampilong Road		0.22	13.33					0.22	0.22				0.00	0.22						0.00											0.00	0.00			
Total			56.31	7.37	2.83	20.07	12.55	10.61	5.61	51.67	0.01	0.49	3.49	0.00	3.99	55.66	6.18	2.68	18.83	13.03	9.80	3.28	47.62								0.00	47.62				

Source: JICA Study Team

3.3 Road Drainage Survey Result

Thirty three percent (33%) of the National Road section has functional side ditches and seven percent (7%) of non-functional side ditches (totally cracked, damaged or broken). Sixty percent (60%) of the road sections do not have existing side ditches.

Sixteen percent (16%) of the City Road sections have functional side ditches and two percent (2%) non-functional side ditches. Eighty three percent (83%) of the road sections do not have existing side ditches.

Table 3.3-1 Summary of Road Side Drainage

Road Type	Existing Drainage		No Existing Drainage	Total
	Functional	Non-Functional		
National Road	18.6km (33%)	3.9km (7%)	34.1km (60%)	56.7km (100%)
City Road	9.4km (16%)	1.0km (2%)	49.4km (83%)	59.8km (100%)
Total	28.0km (24%)	4.9km (4%)	83.5km (72%)	116.4km (100%)

Note: The length is the sum of each lane side.

Source: JICA Study Team

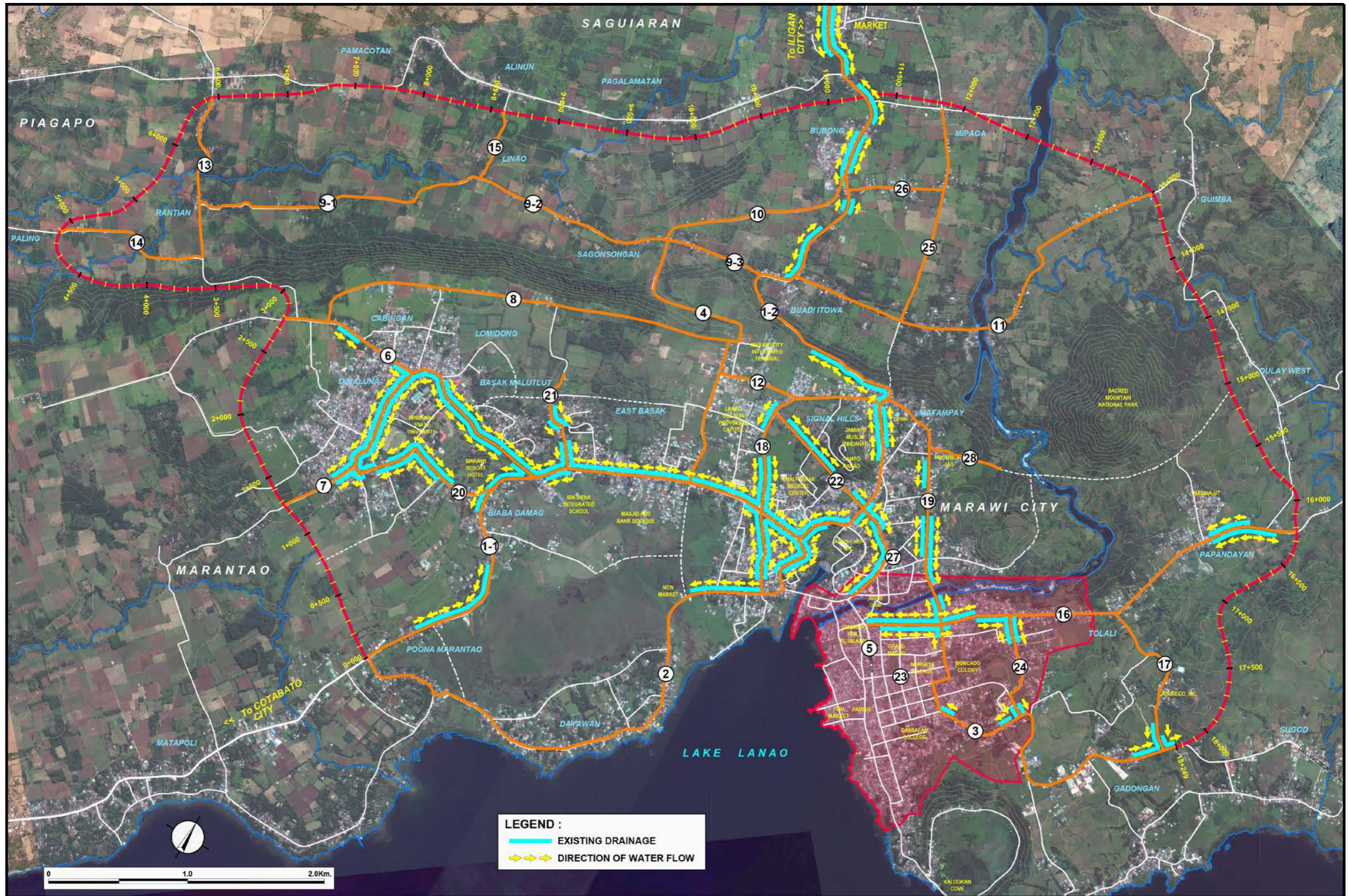


Figure 3.3-1 Road Drainage Survey Result

Table 3.3-2 Summary of Road Drainage Survey

Name of Road	Road Class	Length	Drainage Functional / Unfunctional								Drainage Type										
			Road Drainage on Left Side				Road Drainage on Right Side				Road Drainage on Left Side					Road Drainage on Right Side					
			Functional	Unfunctional	No Drainage	Total	Functional	Unfunctional	No Drainage	Total	U-Shaped with Cover	U-Shaped without Cover	Gutter Type Ditch	No Drainage	Total	U-Shaped with Cover	U-Shaped without Cover	Gutter Type Ditch	No Drainage	Total	
Road 1	Bacong-Marawi-Iligan Road	National	12.34	5.24	1.52	5.58	12.34	5.06	0.03	7.25	12.34	2.30	4.80	0.00	5.24	12.34	1.60	3.80	0.30	6.64	12.34
Road 2	Bacong-Poona Marantao-Marawi Road		4.60	0.89	0.00	3.71	4.60	0.38	0.00	4.22	4.60	0.90	0.00	0.00	3.70	4.60	0.40	0.00	0.00	4.20	4.60
Road 3	Raya Madaya-Gumisa-Alawiya-Gadungan Road (Quezon Ave.)	National	2.42	0.41	0.10	1.91	2.42	0.31	0.00	2.11	2.42	0.10	0.50	0.00	1.82	2.42	0.00	0.00	0.00	2.42	2.42
Road 4	Sagonsongan-Awar Road (New Marawi Dicsion Road)		2.34	1.68	0.00	0.66	2.34	1.64	0.00	0.70	2.34	0.30	1.20	0.00	0.84	2.34	0.10	1.40	0.20	0.64	2.34
Road 5	Gumisa Ave.		-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Road 6	Cabingan-MSU Campus-Amai Pakpak Road	National	2.30	1.00	0.00	1.30	2.30	1.10	0.20	1.00	2.30	0.00	1.30	0.00	1.00	2.30	0.00	1.30	0.00	1.00	2.30
Road 7	MSU Campus-Matampay Marantao Road		1.40	0.80	0.00	0.60	1.40	0.87	0.00	0.53	1.40	0.10	0.70	0.00	0.60	1.40	0.30	0.70	0.00	0.40	1.40
Road 8	MSU-GMA Terminal Road		3.10	0.00	0.00	3.10	3.10	0.00	0.00	3.10	3.10	0.00	0.00	0.00	3.10	3.10	0.00	0.00	0.00	3.10	3.10
Road 9	Emie-Sagonsongan-Linao-Rantian Road		4.35	0.08	0.00	4.27	4.35	0.12	0.00	4.23	4.35	0.00	0.10	0.00	4.25	4.35	0.00	0.20	0.00	4.15	4.35
Road 10	New Marawi Diversion Road (Sagonsongan Section)		1.49	1.11	0.28	0.10	1.49	1.10	0.30	0.09	1.49	0.00	1.29	0.00	0.20	1.49	0.00	1.29	0.00	0.20	1.49
Road 11	Bito-Rorogagus-Guimba Road		3.16	0.00	0.00	3.16	3.16	0.00	0.00	3.16	3.16	0.00	0.00	0.00	3.16	3.16	0.00	0.00	0.00	3.16	3.16
Road 12	GMA Terminal Access Road (Capitol-GMA Terminal Road)		0.58	0.00	0.00	0.58	0.58	0.00	0.00	0.58	0.58	0.00	0.00	0.00	0.58	0.58	0.00	0.00	0.00	0.58	0.58
Road 13	MSU-Bubo Road		1.24	0.00	0.00	1.24	1.24	0.00	0.00	1.24	1.24	0.00	0.00	0.00	1.24	1.24	0.00	0.00	0.00	1.24	1.24
Road 14	Rantian-Paling Road		1.14	0.00	0.00	1.14	1.14	0.00	0.00	1.14	1.14	0.00	0.00	0.00	1.14	1.14	0.00	0.00	0.00	1.14	1.14
Road 15	Linao-Alinun Road		0.53	0.00	0.00	0.53	0.53	0.00	0.00	0.53	0.53	0.00	0.00	0.00	0.53	0.53	0.00	0.00	0.00	0.53	0.53
Road 16	Marawi-Kapai Road (Macalilay Road)	National	3.34	0.16	0.90	2.28	3.34	0.25	0.86	2.23	3.34	0.70	0.30	0.00	2.34	3.34	0.50	0.60	0.00	2.24	3.34
Road 17	Kilala-Tuali Road (Lasureco Road)		1.21	0.11	0.00	1.10	1.21	0.14	0.00	1.07	1.21	0.00	0.21	0.00	1.00	1.21	0.00	0.21	0.00	1.00	1.21
Road 18	Marawi-Cadre Road (New Capitol Road)	National	2.15	0.95	0.00	1.20	2.15	0.78	0.00	1.37	2.15	0.90	0.00	0.20	1.05	2.15	0.90	0.00	0.00	1.25	2.15
Road 19	Tampilong-Mapandi-Moncado Colony Road (Marcos Blvd)	National	2.53	0.53	0.00	2.00	2.53	0.60	0.03	1.90	2.53	0.70	0.00	0.00	1.83	2.53	0.30	0.50	0.00	1.73	2.53
Road 20	Rapasan-Bayaba Road	National	1.22	0.62	0.10	0.50	1.22	0.36	0.12	0.75	1.22	0.00	0.72	0.00	0.50	1.22	0.00	0.30	0.00	0.92	1.22
Road 21	Lumindong-Amai Pakpak Road		0.78	0.03	0.20	0.55	0.78	0.21	0.00	0.57	0.78	0.00	0.30	0.00	0.48	0.78	0.00	0.30	0.00	0.48	0.78
Road 22	Marawi-Landing Road (Amai Pakpak-Capitol Road)	National	0.94	0.48	0.01	0.45	0.94	0.00	0.00	0.94	0.94	0.00	0.70	0.00	0.24	0.94	0.00	0.00	0.00	0.94	0.94
Road 23	Pangarungan Road (Roxas Ave.)		-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Road 24	Disumangcop Road		0.79	0.10	0.10	0.59	0.79	0.10	0.10	0.59	0.79	0.00	0.30	0.00	0.49	0.79	0.00	0.20	0.00	0.59	0.79
Road 25	Rorogagus-Mipaga-Saguiran Road		1.60	0.00	0.00	1.60	1.60	0.00	0.00	1.60	1.60	0.00	0.00	0.00	1.60	1.60	0.00	0.00	0.00	1.60	1.60
Road 26	Bito-Mipaga Marawi Road		0.69	0.00	0.00	0.69	0.69	0.00	0.00	0.69	0.69	0.00	0.00	0.00	0.69	0.69	0.00	0.00	0.00	0.69	0.69
Road 27	Idarus Road	National	0.80	0.10	0.00	0.70	0.80	0.55	0.00	0.25	0.80	0.10	0.00	0.00	0.70	0.80	0.60	0.10	0.00	0.10	0.80
Road 28	Tampilong Road		0.55	0.00	0.00	0.55	0.55	0.00	0.00	0.55	0.55	0.00	0.00	0.00	0.55	0.55	0.00	0.00	0.00	0.55	0.55
Total			57.59	14.27	3.21	40.10	57.59	13.56	1.64	42.39	57.59	6.10	12.42	0.20	38.87	57.59	4.70	10.90	0.50	41.49	57.59

Source: JICA Study Team

Chapter 4 Judgment on Pavement Rehabilitation/ Improvement

4.1 Road Classes and their Typical Cross Section

Based on the road's function and width of existing road right-of-way, roads are classified into four (4) classes as shown in **Table 4.1-1**, and identified road classes of roads in the study area is shown in **Figure 4.1-1**.

Many of the roads of Marawi City have narrow width and roadsides are mostly developed, therefore further widening of existing ROW is difficult due to presence of structures on both sides especially in the town center. To facilitate quick reconstruction of pavement, the principle is to work within the existing road right-of-way. This means that no people will be displaced, no land will be taken, no structure will be damaged, and no crops/trees will be affected. For these purposes, four (4) road classes were developed to fit the existing ROW as shown in **Table 4.1-1**.

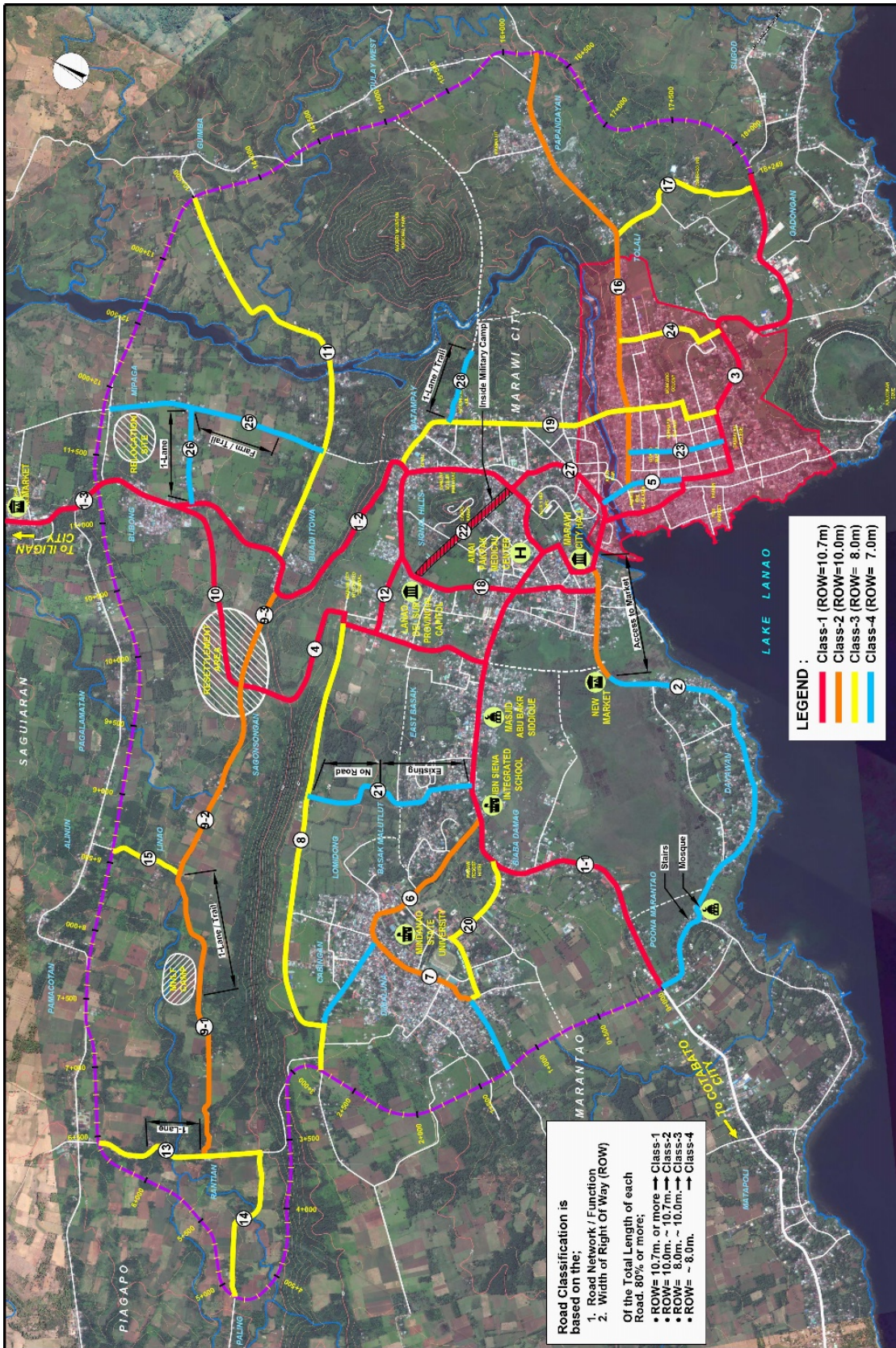
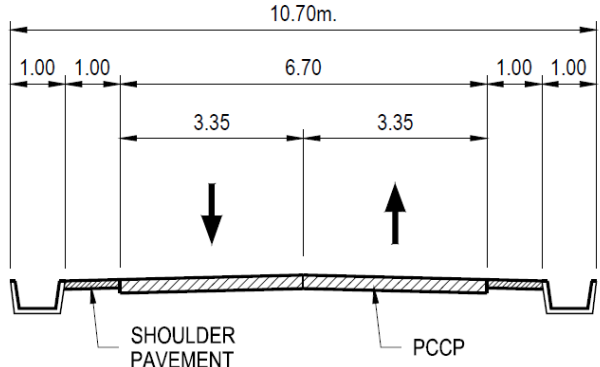
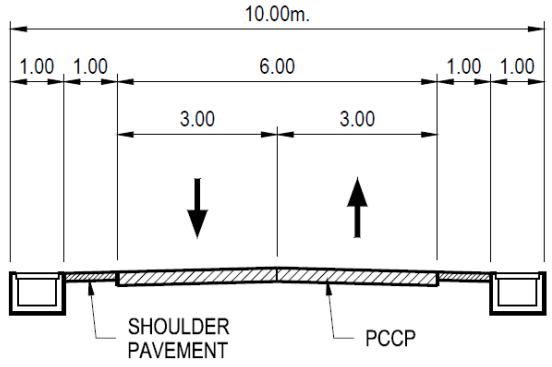
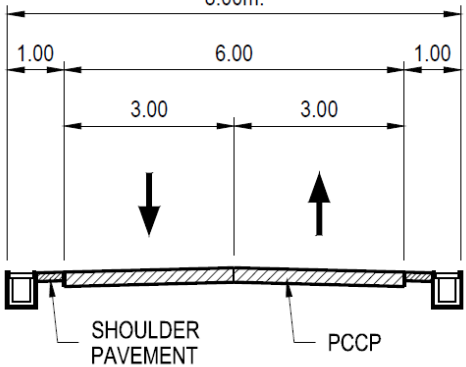
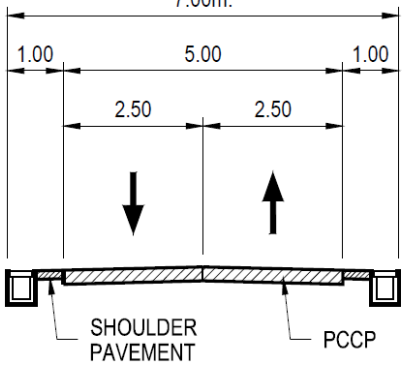


Figure 4.1-1 Road Classification

Source: JICA Study Team

Table 4.1-1 Road Classes and their Typical Cross Section

Road Classification	Criteria	Standard Road Section
Road Class-1	<ul style="list-style-type: none"> • Inter-regional Roads • Primary national roads 	 <p>The diagram shows a cross-section of a road with a total width of 10.70m. It features two lanes, each 3.35m wide, separated by a 0.30m gap. On either side of the lanes are shoulders, each 1.00m wide. The road surface is labeled as PCCP (Portland Cement Concrete Pavement), and the shoulders are labeled as SHOULDER PAVEMENT. Arrows indicate traffic flow in both directions.</p>
Road Class-2	<ul style="list-style-type: none"> • Inter-regional roads • Secondary national roads 	 <p>The diagram shows a cross-section of a road with a total width of 10.00m. It features two lanes, each 3.00m wide, separated by a 0.30m gap. On either side of the lanes are shoulders, each 1.00m wide. The road surface is labeled as PCCP, and the shoulders are labeled as SHOULDER PAVEMENT. Arrows indicate traffic flow in both directions.</p>
Road Class-3	<ul style="list-style-type: none"> • Major intra-city roads 	 <p>The diagram shows a cross-section of a road with a total width of 8.00m. It features two lanes, each 3.00m wide, separated by a 0.30m gap. On either side of the lanes are shoulders, each 1.00m wide. The road surface is labeled as PCCP, and the shoulders are labeled as SHOULDER PAVEMENT. Arrows indicate traffic flow in both directions.</p>
Road Class-4	<ul style="list-style-type: none"> • Feeder roads 	 <p>The diagram shows a cross-section of a road with a total width of 7.00m. It features two lanes, each 2.50m wide, separated by a 0.30m gap. On either side of the lanes are shoulders, each 1.00m wide. The road surface is labeled as PCCP, and the shoulders are labeled as SHOULDER PAVEMENT. Arrows indicate traffic flow in both directions.</p>

Source: JICA Study Team

4.2 Judgement on Pavement Rehabilitation/Improvement

Based on the existing pavement conditions, judgement is made whether the pavement is rehabilitated/improved or not.

In this study, “rehabilitation” or “improvement” is specified as follows;

“Rehabilitation”: the existing pavement is rehabilitated with the same thickness of the pavement as it is.

“Improvement”: the existing pavement is reconstructed with thicker pavement thickness than it is now.

Criteria for judgement on pavement rehabilitation/improvement is shown in **Table 4.2-1**.

Based on above criteria, existing road/pavement conditions were compared with criteria and shown in **Table 4.2-1**.

Table 4.2-1 Criteria for Judgement on Pavement Rehabilitation/Improvement

Item	Criteria		Judgement
Pavement Condition	Visual Assessment	Good	Do Nothing
		Fair	Maintenance
		Bad	Rehabilitation
		Very Bad	Improvement
	IRI	0-3	Do Nothing
		3-5	Maintenance
		5-7	Rehabilitation
		7 and above	Improvement
Pavement (carriageway) width	Wider than required		Do Nothing
	Same as required		Do Nothing
	Narrower than required		Widen to the required width
Pavement Thickness (Pavement type of all roads is PCC Pavement)	National Road (Classes I and II) (Minimum thickness = 28 cm)	Existing PCC Pavement Thickness is 28cm or more	Do Nothing
		Existing PCC Pavement Thickness is less than 28cm	Improvement
	City Road (Classes III and IV) (Minimum thickness = 23 cm)	Existing PCC Pavement Thickness is 23cm or more	Do Nothing
		Existing PCC Pavement Thickness is less than 23cm	Improvement

Source: JICA Study Team

Table 4.2-2 Comparison of Existing Condition with Requirement

			Survey Results	Judgement
Pavement Condition	Good		13.1 lane-km (11%)	Do nothing
	Fair		41.6 lane-km (35%)	Do nothing
	Bad		59.5 lane-km (50%)	Rehabilitation
	Very Bad		4.8 lane-km (4%)	Improvement
Pavement (Carriageway) Width	National Road	5.0 – 6.0m	0.3 km (1%)	Improvement
		6.0 – 6.7m	21.8 km (76%)	Improvement
		6.7m and above	6.6 km (23%)	Do nothing
	City Road	Less than 5.0m	10.2 km (33%)	Improvement
		5.0 – 6.0m	4.9 km (16%)	Improvement
		6.0 – 6.7m	7.7 km (25%)	Do nothing
		6.7m and above	8.3 km (27%)	Do nothing
PCC Pavement Thickness	National Road	200mm or less	28.7 km (100%)	Improvement
		200 – 280mm	0 km (0%)	-
		Above 280mm	0 km (0%)	-
	City Road	200mm or less	30.8 km (100%)	Improvement
		200 – 230mm	0 km (0%)	-
		230 – 280mm	0 km (0%)	-

Source: JICA Study Team

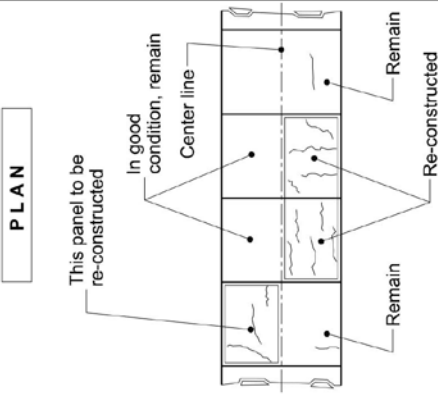
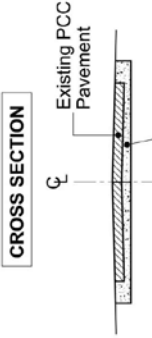
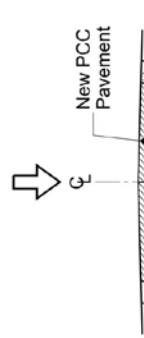
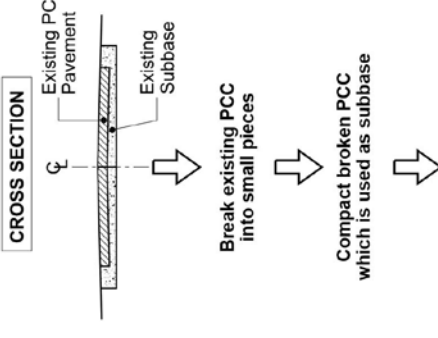

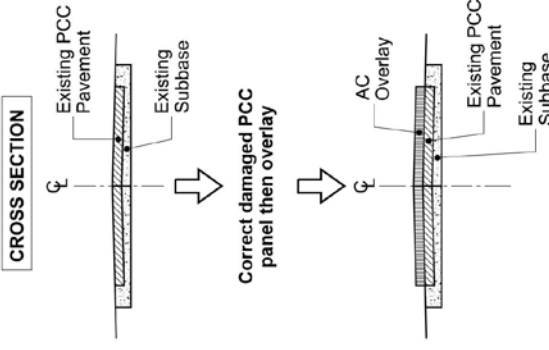
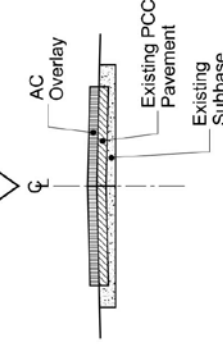
As the pavement thickness of all roads is very thin, **it is recommended that “pavement of all roads should be improved.”**

Chapter 5 Preliminary Design

5.1 Selection of Rehabilitation/Improvement Method

Most of the roads in Marawi City is surfaced with PCC pavement hence a comparison of rehabilitation method of PCC pavement was made to decide which method is suitable. There are several methods to replace existing pavement such as (i) Re-blocking method, (ii) Re-construction method, (iii) Break and Seat Method and (iv) Asphalt Overlay on the existing pavement. As seen in **Figure 5.1-1**, the recommended method is Re-construction. This method has the following advantages:

- New and stronger pavement than the existing can be constructed
- Pavement life can be drastically prolonged to about 20 years
- Existing road surface elevation can be maintained

METHOD	PCC PAVEMENT RE-BLOCKING METHOD	PCC PAVEMENT RE-CONSTRUCTION METHOD	PCC PAVEMENT BREAK AND SEAT METHOD	AC OVERLAY ON PCC PAVEMENT METHOD
<p>P L A N</p>  <p>✘ Only "Bad" and "Very Bad" PCC blocks to be reconstructed. "Fair" and "Good" blocks remain.</p> <ul style="list-style-type: none"> Only PCC pavement panels in "Bad" and "Very Bad" conditions are replaced, thus most economical way of rehabilitation. Existing road elevation can be maintained, thus no accessibility problem to abutting houses. 	<p>CROSS SECTION</p>  <p>Remove existing PCC pavement and subbase, then construct new subbase and PCC</p>  <p>New PCC Pavement New Subbase</p> <ul style="list-style-type: none"> New and stronger pavement than the existing can be constructed. Pavement life can be drastically prolonged to about 20 years. Existing road surface elevation can be maintained. 	<p>CROSS SECTION</p>  <p>Break existing PCC into small pieces</p> <p>Compact broken PCC which is used as subbase</p>  <p>New PCC Pavement Broken Subbase Existing Elevation New Elevation</p> <ul style="list-style-type: none"> Disposal of existing PCC pavement to another location is not required. Pavement life can be drastically prolonged to about 20 years. New pavement elevation is required to raise by about 28 cm, and accessibility to abutting areas may have problem. When the existing pavement width is narrower than the new one, longitudinal cracks will occur. 	<p>CROSS SECTION</p>  <p>Existing PCC Pavement Existing Subbase</p> <p>Correct damaged PCC panel then overlay</p>  <p>AC Overlay Existing PCC Pavement Existing Subbase</p> <ul style="list-style-type: none"> Soon after the overlay work, traffic can be opened, thus impact on traffic is small. Good driving smoothness is achieved. To prevent reflection cracks, overlay thickness needs to be 8 cm. or more. Pavement life will be about 10 years. Maintenance work is more difficult than PCC pavement. 	
<p>ADVANTAGES</p>	<p>RECOMMENDED</p>	<p>RECOMMENDED</p>	<p>RECOMMENDED</p>	
<p>DISADVANTAGES</p>	<p>RECOMMENDED</p>	<p>RECOMMENDED</p>	<p>RECOMMENDED</p>	

Source: JICA Study Team

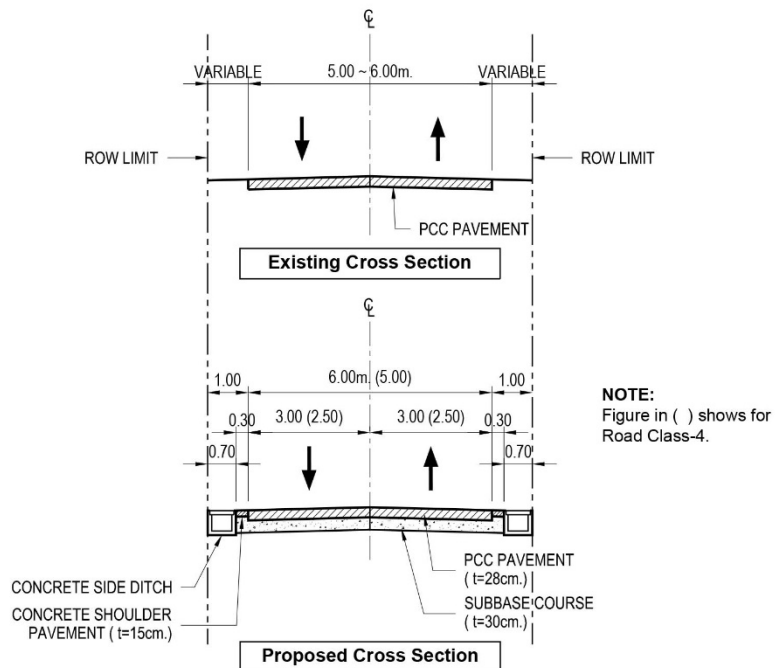
Figure 5.1-1 Comparison of Rehabilitation/Improvement Methods

5.2 Preliminary Design

Typical cross section for Road Classes I and II is shown in **Figure 5.1-1** and for Road Classes III and IV is shown in **Figure 5.2-2**. Based on the typical cross sections, preliminary design was undertaken and the plan as shown in **Figure 5.2-3** was prepared for all roads selected for improvement.

Source: JICA Study Team

Figure 5.2-1 Typical Section for Road Classes I and II



Source: JICA Study Team

Figure 5.2-2 Typical Section for Road Classes III and IV

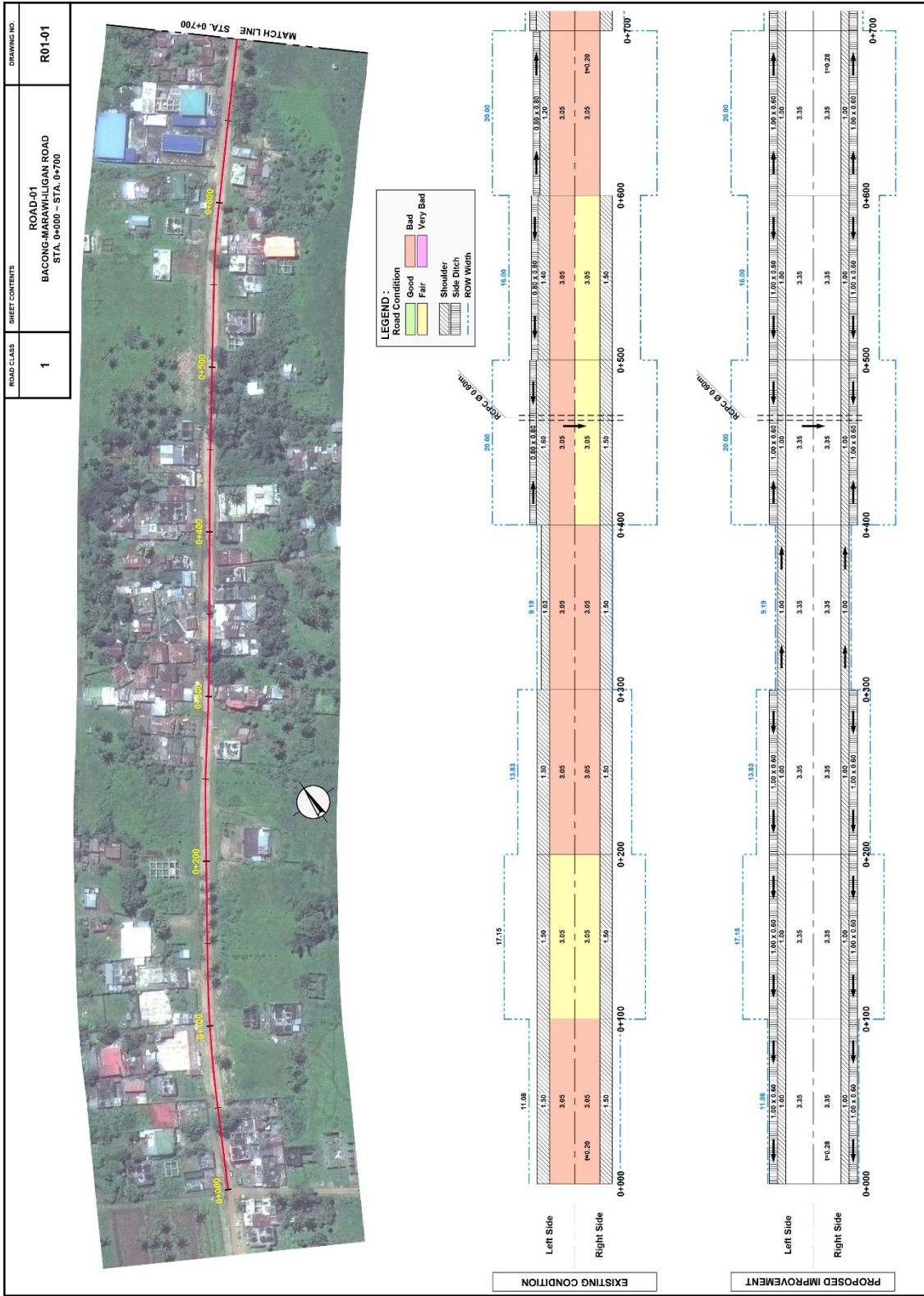


Figure 5.2-3 Preliminary Design Drawing

Source: JICA Study Team

Chapter 6 Project Cost Estimate and Implementation Plan

6.1 Basic Condition of Project Cost Estimate

(1) Exchange Rate

Monthly average exchange rate between Japanese Yen and United States Dollars was referred to the central rate information issued by the Bank of Japan. The one between Philippines Pesos and United States Dollars was referred to the International Monetary Fund (IMF) data issued originally from the Philippine Central Bank (Bangko Sentral ng Pilipinas). As a result, the average rates (1 Philippine Peso = 2.08 Japanese Yen, 1 United States Dollar = 108.0 Japanese Yen, hence, 1 United States Dollar = 51.8 Philippine Pesos) were applied in this project.

(2) Preliminary Construction Cost Estimate

The preliminary construction cost estimates were undertaken on each road in each phase to determine the construction cost of the reconstruction. The scope of works include the removal of the existing structures (concrete pavement, drainage structures) and the reconstruction of new pavement and drainage structures.

The construction cost estimate is composed of the following:

1. Direct Cost
 - a. Cost of Materials
 - b. Labor
 - c. Equipment

2. Indirect Cost : 29.5% of Direct Cost
 - a. Mark Up Cost
 - i. OCM (Overhead Expenses, Contingencies And Miscellaneous Expenses) ----- 8.0%
 - ii. Contractor's Profit ----- 8.0%
 - b. Value Added Tax (VAT) ----- 5.0%
 - c. Mobilization and Demobilization ----- 1.0%
 - d. Occupational Safety and Health ----- 0.5%
 - e. Preliminaries ----- 7.0%
 - Traffic Management
 - Environmental Compliance
 - Security
 - Project Billboard
 - Provision of Service Vehicle

Direct costs were determined based on the unit price analysis shown in Appendix 6-1. Unit prices of major construction items are shown in **Table 6.1-1**. Indirect cost was determined based on the rules determined by DPWH. Estimated construction cost by each road and each phasing is shown in **Table 6.1-2**.

Table 6.1-1 Estimated Unit Prices

Item No.	Description of Item	Unit	Unit Price (Php)
1	Removal of Existing PC Concrete Pavement (t=200~230mm)	m ²	568.30
2	Removal of Existing Concrete Side Ditches	m	373.06
3	Surplus Common Excavation	m ³	189.04
4	Subgrade Preparation (Common Material)	m ²	37.56
5	Aggregate Subbase Course	m ³	641.68
6	PC Concrete Pavement 280mm thk (Carriageway)	m ²	1,515.39
7	PC Concrete Pavement 230mm thk (Carriageway)	m ²	1,331.43
8	PC Concrete Pavement 150mm thk (Carriageway)	m ²	1,018.67
9	Reflectorized Thermoplastic Pavement Marking (White)	m ²	888.34
10	Concrete Side Ditches without cover (0.8W x 0.6H)	m	4,776.41
11	Concrete Side Ditches with cover (0.5W x 0.6H)	m	6,701.49
12	Pipe Culverts, 910mm diameter	m	4,827.81
13	Pipe Culverts, 610mm diameter	m	3,389.39
14	Pipe Culverts, 1070mm diameter	m	5,872.40
15	Pipe Culverts, 1210mm diameter	m	6,570.86
16	Dismantle and remove existing guardrail and transport to District Engineers Office	m	518.69
17	Guard Rail	m	2,159.53
18	Concrete Post for Guard Rail	m	1,105.44
19	Metal Beam End Piece	ea	1,470.38
20	Painting of Metal Guardrail	lm	287.14
21	Removal of Existing RC Pipe Culvert 610 mm diameter	m	601.34
22	Removal of Existing RC Pipe Culvert 910 mm diameter	m	902.02
23	Removal of Existing RC Pipe Culvert 1070 mm diameter	m	1,202.69
24	RC Box Culvert (new), 1-3.40 x 2.50mH	m	64,293.25
25	Pipe Culvert and Drain Excavation	m ³	338.71
26	Warning Signs	ea	9,165.85

Source: JICA Study Team

Table 6.1-2 Marawi Transcentral Road Estimated Construction Cost

Phase	Road No.	Road Name	Length (Km)	Estimated Construction Cost (1,000 PhP)	Road Class
Phase I	Road 1-2	Bacong-Marawi-Iligan Road (Center/North Section)	8.95	354,020	Class – 1
	Road 2-2	Bacong-Poona Marantao-Marawi Road (East Section)	1.30	55,409	Class – 2
	Road 12	GMA Terminal Access Road	0.58	25,457	Class – 1
	Road 18	Marawi-Cadre Road	1.65	55,720	Class – 1
	Road 19-1	Tampilong-Mapandi-Muncado Colony Road (North Section)	1.32	54,348	Class – 3
	Road 27-1	Idarus Road (North Section)	0.60	15,498	Class – 1
	Sub-Total			14.40	560,452
Phase II	Road 1-1	Bacong-Marawi-Iligan Road (South Section)	3.25	126,993	Class – 1
	Road 2-1	Bacong-Poona Marantao-Marawi Road (West Section)	3.30	80,572	Class – 4

Phase	Road No.	Road Name	Length (Km)	Estimated Construction Cost (1,000 PhP)	Road Class
	Road 6	Cabangan-MSU Campus-Amai Pakpak Road	2.29	95,355	Class – 2
	Road 7	MSU Campus-Matampa Marantao Road	1.40	56,224	Class - 2
	Road 8	MSU-GMA Terminal Road	3.10	121,301	Class – 3
	Road 9-2	Emie-Sagonsongan-Linao-Rantian Road (Center Section)	1.78	59,023	Class – 2
	Road 15	Linao-Alinun Road	0.53	20,687	Class – 3
	Road 20	Rapasan-Bayaba Road	1.22	58,601	Class – 3
	Road 21	Lumindong-Amai-Pakpak Road	0.80	14,449	Class – 4
	Sub-Total			17.67	633,206
Phase III	Road 9-1	Emia-Sagonsongan-Linao-Rantian Road (West Section)	2.15	79,618	Class – 2
	Road 11	Bito-Rorogagus-Guimba Road	3.16	121,533	Class – 3
	Road 13	MSU-Bubo Road	1.24	47,244	Class – 3
	Road 14	Rantian-Paling Road	1.14	42,924	Class – 3
	Road 25	Rorogagus-Mipaga-Saguiaran Road	1.60	54,493	Class – 4
	Road 26	Bito-Mipaga-Marawi Road	0.69	13,747	Class – 4
	Sub-Total			9.98	359,559

Source: JICA Study Team

Estimated construction cost by Phase is summarized in **Table 6.1-3**.

Table 6.1-3 Summary of Construction Cost Estimate

	Length (Km)	Total Construction Cost (Million PhP)
Phase I	14.40	560.5
Phase II	17.67	633.2
Phase III	9.98	359.6
Total	42.05	1,553.3

Source: JICA Study Team

In summary, the total estimated construction cost of the project with the total length of **42.05 Km** is **PhP 1,553.3 Million**.

(3) Roads Excluded in the Construction Cost Estimate

The following roads were not included in the construction cost estimate because of the reasons shown in **Table 6.1-4**.

Table 6.1-4 Roads Not Included in the Construction Cost Estimate

Road No.	Remarks
Road 3	Inside Most-affected Area and could not be surveyed due to security problem.
Road 4	The section is completed recently, thus pavement is new.
Road 5	Inside Most-affected Area, and could not be surveyed due to security problem.
Road 10	Completed recently and pavement is new.
Road 22	Inside Military Camp
Road 23	Inside Most-affected Area. Not surveyed due to security problem.
Road 28	Existing road and Right-of-Way is very narrow.

(4) Roads inside the Most-affected Areas (MAA)

For the surveyed roads inside the Most-affected Area, the construction cost estimate was done except for Roads 5 and 23 and a portion of Road 3. **Table 6.1-5** presents the construction cost estimate of the roads inside the MAA.

Table 6.1-5 Estimated Construction Cost of Roads Inside MAA

Road No.	Length (Km)	Construction Cost Estimate (Million Php)
Road 3	2.42	102.5
Road 5	(No Survey Undertaken)	
Road 16	3.34	139.4
Road 17	1.21	48.8
Road 19-2	1.31	55.7
Road 23	(No Survey Undertaken)	
Road 24	0.79	30.7
Road 27-2	0.20	5.4
Sub-Total	9.27	382.5

Source: JICA Study Team

(5) Consultancy Services Cost

Consultancy services cost is estimated for Phase I and Phases II + III. Since Phase I needs to be urgently implemented, consultant firm for Phase I should be selected as soon as possible.

Consultancy services for Phases II and III should be combined and one group of consultant should be selected.

Table 6.1-6 Estimated Consultancy Services Cost

(Unit: 1,000PhP)

	Phase I	Phase II+III	Total
A. Detailed Design	23,295	34,666	57,961
B. Tender Assistance	11,838	13,049	24,887
C. Construction Supervision	72,353	88,593	160,946
Total	107,486	136,308	243,794

Source: JICA Study Team

(6) Right-of-Way Acquisition Cost

Since the road will be reconstructed in the existing ROW, the ROW acquisition cost is not required in this project.

(7) Administrative Cost

Administrative cost of the Project includes expenses to be incurred by the Project Management Office of the DPWH during the project period. This cost is estimated at 3.5% of the sum of the construction cost, the engineering service cost and the land acquisition cost.

(8) Physical Contingency

Physical contingency for construction cost and consultancy service cost was applied at 10.0% in this project.

(9) Price Escalation

Estimated construction cost is applied to local currency portion. Construction cost price escalation for the local currency was applied as 1.00% per annum.

(10) Value Added Tax (VAT)

VAT component at 12% was calculated separately.

6.2 Implementation Plan

(1) Priority Area of Pavement Improvement

The phasing of rehabilitation of the road network has to take into account the reconstruction plan of the Ground Zero (Most Affected Areas), return of the IDPs, synergy with the planned Ring Road, and intra-city movement of traffic in anticipation of return to normal of traffic once significant number of residents return to their original habitats. After discussion with the DPWH, the phasing of pavement improvement was decided taking into account the following (see **Figure 6.2-1**):

- Importance of the road to the reconstruction of the city
- Importance of the road to increase mobility of the residents to access social services
- Importance of the road to distribute traffic
- Roads which complement the function of the proposed Marawi Ring Road

Based on the above, the following three phases of pavement improvement is made as indicated in **Table 6.2-1**.

Table 6.2-1 Implementation Phasing

Phase	Priority Area	Objectives
Phase I (14.4 km)	<ul style="list-style-type: none"> • Main arterial road, inter-provincial linkages • Main road leading to rehabilitation of Ground Zero • Main connection between resettlement area and the central business district/ government institution area 	<ul style="list-style-type: none"> • To strengthen national roads which connects Marawi City to other major cities to ensure smooth movement of people and goods including construction materials needed for the rehabilitation of the affected area. • To strengthen city roads which connect the settlements (including Sagonsongan Resettlement Area) to markets, government institutions (provincial hall, city hall, schools, military camp, etc) and the Ground Zero. • To efficiently support returnees for them to re-build their normal daily lives. • To revive socio and economic activities which people enjoyed before the incident.

Phase	Priority Area	Objectives
Phase II (17.7 km)	<ul style="list-style-type: none"> • Main roads to academic center + urban expansion + lake side development + alternative route to Ground Zero 	<ul style="list-style-type: none"> • To improve these roads which will ensure good access of Marawi residents including those living in Sagonsongan Relocation Site to the primary academic center of the city which is the Mindanao State University. • To improve some roads which will provide dual functions like alternative road to Ground Zero and for the lake development. • To improve other roads which are critical for urban expansion and provide additional access to the resettlement area.
Phase III (10.0 km)	<ul style="list-style-type: none"> • Complement with Marawi Ring Road • Alternative roads to Ground Zero and agricultural development 	<ul style="list-style-type: none"> • To improve these roads which will enhance the function of the future Marawi Ring Road by distributing the traffic coming from the ring road straight to the settlements and linking it to the main arterial road (Marawi-Iligan Road). • To improve some of the roads which will serve agricultural lands of the city and connect to the road which serves as alternative route to the Ground Zero.

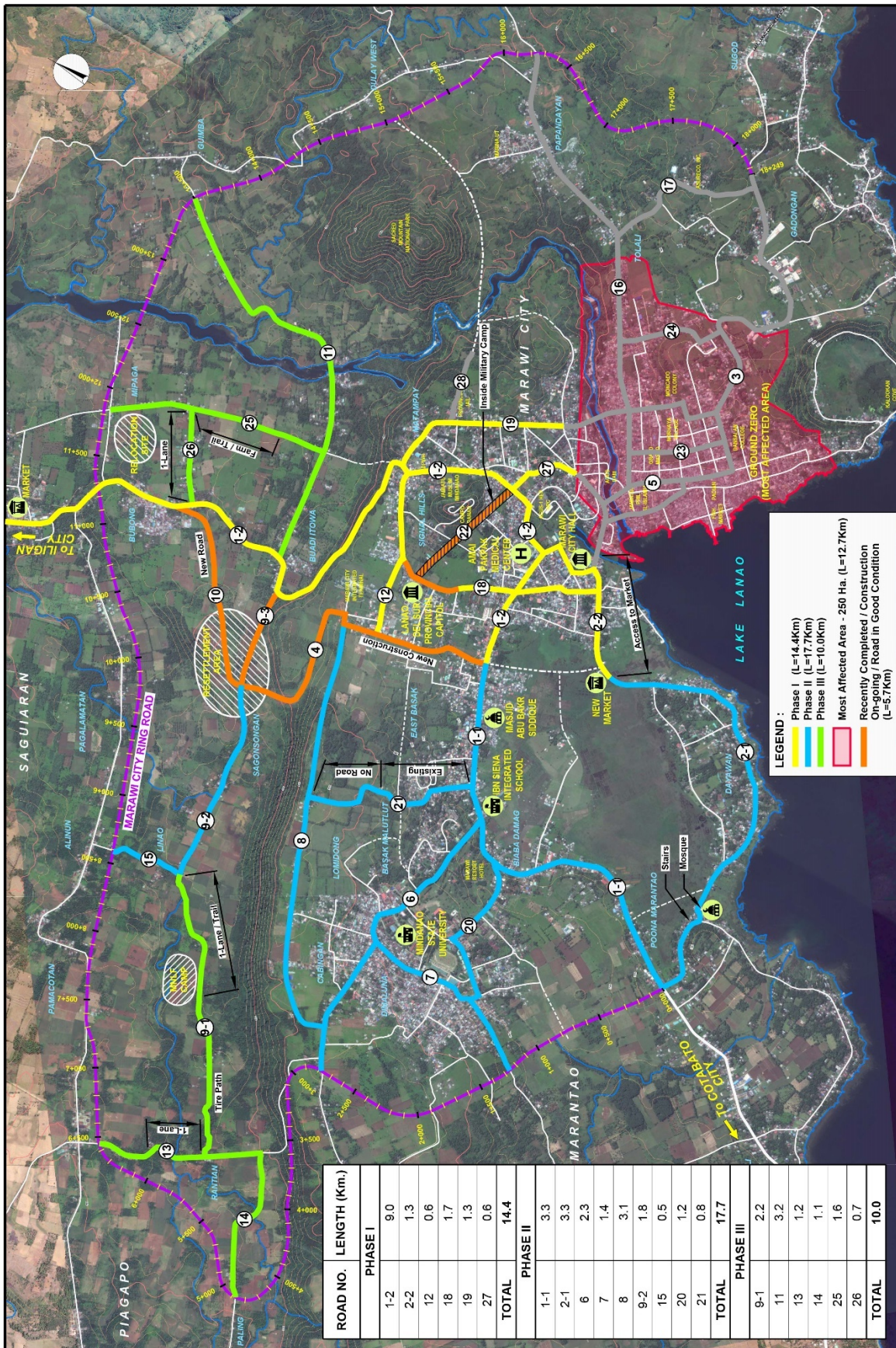


Figure 6.2-1 Phasing of Pavement Improvement Plan

Source: JICA Study Team

(2) Implementation Plan

The proposed Implementation Plan is illustrated in **Table 6.2-2**. The envisioned duration of implementation of the three (3) phases are as follows:

- Phase I – 14.4 km (18 months)
- Phase II – 17.7 km (24 months)
- Phase II – 10.0 km (18 months)

Table 6.2-2 Proposed Implementation Schedule

		2018	2019	2020	2021	2022
Phase I L = 14.4km	Selection of Consultant for D/D & C/S	(3 months)				
	Detailed Design & Tender Document Preparation	(4 months)				
	Procurement of Contractor	(4 months)				
	Construction			(18 months)		
Phase II L = 17.7km	Detailed Design & Tender Document Preparation		(6 months)			
	Procurement of Contractor		(4 months)			
	Construction				(24 months)	
Phase III L = 10.0km	Detailed Design & Tender Document Preparation		(6 months)			
	Procurement of Contractor		(4 months)			
	Construction				(18 months)	

Source: JICA Study Team

(3) Authority of DPWH-National to Implement Roads other than National Road

DPWH-National has been given authority by Regional Legislative Assembly of ARMM to improve roads other than national roads under this project, thus DPWH-National can improve pavement conditions of provincial, City and Municipal Roads.



Republic of the Philippines
Autonomous Region in Muslim Mindanao
REGIONAL LEGISLATIVE ASSEMBLY
Cotabato City



March 8, 2018

HON. EDUARDO D. DEL ROSARIO
Chairman HUDCC/Task Force Bangon Marawi
9th Floor BDO Plaza, 8737 Paseo De Roxas Street
Makati City

Sir:


I have the honor to forward the attached copy of Resolution No. 754, which was adopted by the Regional Legislative Assembly, Autonomous Region in Muslim Mindanao during its Regular Session held on March 6, 2018 entitled:

RESOLUTION ALLOWING THE IMPLEMENTATION BY NATIONAL GOVERNMENT AGENCIES OF PROGRAMS, PROJECTS AND ACTIVITIES (PPAs) IN THE BANGON MARAWI COMPREHENSIVE REHABILITATION AND RECOVERY PROGRAM (BMCRRP) UNDER THE TASK FORCE BANGON MARAWI.

for your information.

Thank you and more power.

Very truly yours,


ATTY. AISA L. PENDINATAR
Secretary - General



Republic of the Philippines
Autonomous Region in Muslim Mindanao
REGIONAL LEGISLATIVE ASSEMBLY
Cotabato City



NINTH LEGISLATIVE ASSEMBLY
(Second Regular Session)

RESOLUTION NO. 754

RESOLUTION ALLOWING THE IMPLEMENTATION BY NATIONAL GOVERNMENT AGENCIES OF PROGRAMS, PROJECTS AND ACTIVITIES (PPAs) IN THE BANGON MARAWI COMPREHENSIVE REHABILITATION AND RECOVERY PROGRAM (BMCRRP) UNDER THE TASK FORCE BANGON MARAWI.

WHEREAS, the Bangon Marawi Comprehensive Rehabilitation and Recovery Program (BMCRRP) is currently being crafted;

WHEREAS, it is envisioned that the implementation by national government agencies of programs, projects and activities (PPAs) in the BMCRRP is a shared responsibility of national government agencies, the ARMM regional government, and the local government units of Marawi City and Lanao del Sur;

WHEREAS, the Task Force Bangon Marawi is an inter-agency body created by virtue of Administrative Order No. 3, as amended by Administrative Order No. 9 issued by President Rodrigo R. Duterte, tasked to handle the emergency response, and the short-term, midterm, and long-term recovery and rehabilitation of Marawi City and other affected localities as a result of the Marawi siege;

WHEREAS, Section 20, Article VI of Republic Act No. 9054, otherwise known as An Act to Strengthen and Expand the Organic Act or the Autonomous Region in Muslim Mindanao, provides that:

“Unless approved by the Regional Assembly, no public works funds allocated by the central government or national government for the Regional Government or allocated by the Regional Government from its own revenues may be disbursed, realigned, or used in any manner.”

WHEREAS, Section 1 of Executive Order No. 125, as amended by Executive Order No. 125-A, provides:

“Devolution of Locally Funded Programs and Projects to ARMM. – Locally funded programs and projects being undertaken and programmed to be implemented within the ARMM are hereby devolved to and heretofore to be implemented by the ARG of the ARMM, except:

“(b) When in the judgement of the ARMM Regional Governor, the ARG does not have the capacity to implement the program and/or project, in which case he may request a national agency to implement the same.”

Page 2
RLA Resolution No. 754

WHEREAS, there is urgency in providing for the immediate needs of the internally displaced persons in Marawi City and other affected areas;

WHEREAS, the Regional Legislative Assembly supports any and all endeavors to rehabilitate Marawi City and bring the people back to normal and progressive life.

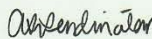
NOW, THEREFORE, be it

RESOLVED, as it is hereby resolved, To allow the implementation by national government agencies of programs, projects and activities (PPAS) in the Bangon Marawi Comprehensive Rehabilitation And Recovery Program (BMCRRP).


RESOLVED, further, to forward the foregoing Resolution to the Honorable Eduardo D. Del Rosario, HDUCC Chairperson and Head of the Task Force Bangon Marawi, for information and appropriate consideration.

ADOPTED, March 6, 2018.

Certified Correct:


ATTY. AISA L. PENDINATAR
Secretary-General

Attested:


DATU ROONIE Q. SINSUAT
Speaker

/pr148

6.3 Project Cost

The Government of Japan will be supporting the implementation of rehabilitation for Marawi Trans-central road as part of the Grant. There are two options being considered to implement the 3-Phase Projects. These are the following:

- a. Case 1 –Grant will fully cover the Phase I to Phase III including Consultancy Service Cost.
- b. Case 2 –Grant will cover the project cost of Phase I and consultancy service cost of Phase II and III (excluding Construction Cost of Phases II and III).

Phase		Case 1	Case 2
Phase I	Construction Cost	✓	✓
	Consultancy Service Cost	✓	✓
Phase II	Construction Cost	✓	-
	Consultancy Service Cost	✓	✓
Phase III	Construction Cost	✓	-
	Consultancy Service Cost	✓	✓

Note: “✓” indicates covering by Economic Support Grant

(1) Case 1

1) Project Cost

Under Case 1, all Phases are packaged into 1 project and implemented simultaneously. Under this arrangement, there will be 1 consultant team only to manage the project. The estimated project cost under Case 1 is about PhP 2,060 Million (Phase 1: PhP 763 Million, Phase II and III: PhP 1,298 Million) as shown in **Table 6.3-1**.

Table 6.3-1 Project Cost of Case 1 (Phase I to III)

Unit: Million PhP			
Breakdown of Cost	Phase I	Phase II and III	Total
Phase I	493	0	493
Phase II	0	557	557
Phase III	0	316	316
Civil Works Sub Total	493	874	1,367
Price Escalation	10	23	33
Physical Contingency	50	90	140
Consulting Services	107	137	244
Land Acquisition	0	0	0
Administration Cost	23	39	62
VAT	79	135	214
Import Tax	0	0	0
Interest during construction	0	0	0
Front End Fee	0	0	0
Total	763	1,298	2,060

2) Annual Expenditure Requirement

The annual expenditure requirement of Phase I and Phase II and III from 2018 to 2023 is shown in **Table 6.3-2**.

Table 6.3-2 Annual Expenditure Requirement Summary of Phase I to III

Unit: Million PhP

Breakdown of Cost	Phase I	Phase II and III	Total
2018	21	0	21
2019	189	47	237
2020	417	537	954
2021	120	633	753
2022	16	61	78
2023	0	19	19
Total	763	1,298	2,060

Detailed annual expenditure requirement by item of each case is shown in **Table 6.3-3** and **Table 6.3-4**.

Table 6.3-3 Detailed Annual Fund Requirement of Phase I

Item	Total			2018			2019			2020			2021			2022			2023		
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total
A. ELIGIBLE PORTION																					
I) Procurement / Construction	0	553	553	0	0	0	0	132	132	0	314	314	0	93	93	0	14	14	0	0	0
Phase I	0	493	493	0	0	0	0	119	119	0	279	279	0	82	82	0	12	12	0	0	0
Base cost	0	493	493	0	0	0	0	119	119	0	279	279	0	82	82	0	12	12	0	0	0
Price escalation	0	10	10	0	0	0	0	1	1	0	6	6	0	2	2	0	1	1	0	0	0
Physical contingency	0	50	50	0	0	0	0	12	12	0	29	29	0	8	8	0	1	1	0	0	0
II) Consulting services	0	107	107	0	18	18	0	31	31	0	47	47	0	11	11	0	0	0	0	0	0
Base cost	0	96	96	0	16	16	0	28	28	0	42	42	0	9	9	0	0	0	0	0	0
Price escalation	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Physical contingency	0	10	10	0	2	2	0	3	3	0	4	4	0	1	1	0	0	0	0	0	0
Total (I + II)	0	660	660	0	18	18	0	164	164	0	361	361	0	104	104	0	14	14	0	0	0
B. NON ELIGIBLE PORTION																					
a Procurement / Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b Land Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
c Administration cost	0	23	23	0	1	1	0	6	6	0	13	13	0	4	4	0	0	0	0	0	0
d VAT	0	79	79	0	2	2	0	20	20	0	43	43	0	12	12	0	2	2	0	0	0
e Import Tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (a+b+c+d+e)	0	102	102	0	3	3	0	25	25	0	56	56	0	16	16	0	2	2	0	0	0
TOTAL (A+B)	0	763	763	0	21	21	0	189	189	0	417	417	0	120	120	0	16	16	0	0	0
C. Interest during Construction																					
Interest during Construction(Const.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest during Construction (Consul.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D. Front End Fee																					
GRAND TOTAL (A+B+C+D)	0	763	763	0	21	21	0	189	189	0	417	417	0	120	120	0	16	16	0	0	0

Note:
Administration Cost : 3.5%
VAT : 12% of the expenditure in local currency of the eligible portion
Import Tax : 0%
Exchange Rate : PHP=JPY 2.08
Price Escalation : LC 1.00%
Physical Contingency : Construction 10%, Consultancy Service Cost 10%

Table 6.3-4 Detailed Annual Fund Requirement of Phase II and III

Item	Total			2018			2019			2020			2021			2022			2023			
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	
A. ELIGIBLE PORTION																						
I) Procurement / Construction	0	987	987	0	0	0	0	0	0	0	422	422	0	499	499	0	50	50	0	16	16	
Phase II	0	557	557	0	0	0	0	0	0	0	249	249	0	258	258	0	35	35	0	14	14	
Phase III	0	316	316	0	0	0	0	0	0	0	127	127	0	182	182	0	8	8	0	0	0	
Base cost	0	874	874	0	0	0	0	0	0	0	376	376	0	440	440	0	43	43	0	14	14	
Price escalation	0	23	23	0	0	0	0	0	0	0	8	8	0	13	13	0	2	2	0	1	1	
Physical contingency	0	90	90	0	0	0	0	0	0	0	38	38	0	45	45	0	5	5	0	1	1	
II) Consulting services	0	137	137	0	0	0	0	41	41	0	43	43	0	49	49	0	4	4	0	0	0	
Base cost	0	122	122	0	0	0	0	37	37	0	39	39	0	43	43	0	3	3	0	0	0	
Price escalation	0	3	3	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	
Physical contingency	0	12	12	0	0	0	0	4	4	0	4	4	0	4	4	0	0	0	0	0	0	
Total (I + II)	0	1,123	1,123	0	0	0	0	41	41	0	465	465	0	548	548	0	53	53	0	16	16	
B. NON ELIGIBLE PORTION																						
a Procurement / Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Base cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
b Land Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Base cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
c Administration cost	0	39	39	0	0	0	0	1	1	0	16	16	0	19	19	0	2	2	0	1	1	
d VAT	0	135	135	0	0	0	0	5	5	0	56	56	0	66	66	0	6	6	0	2	2	
e Import Tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total (a+b+c+d+e)	0	174	174	0	0	0	0	6	6	0	72	72	0	85	85	0	8	8	0	2	2	
TOTAL (A+B)	0	1,298	1,298	0	0	0	0	47	47	0	537	537	0	633	633	0	61	61	0	19	19	
C. Interest during Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Interest during Construction(Const.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Interest during Construction (Consul.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
D. Front End Fee	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
GRAND TOTAL (A+B+C+D)	0	1,298	1,298	0	0	0	0	47	47	0	537	537	0	633	633	0	61	61	0	19	19	

Note:
Administration Cost : 3.5%
VAT : 12% of the expenditure in local currency of the eligible portion
Import Tax : 0%
Exchange Rate : PHP=JPY 2.08
Price Escalation : LC 1.00%
Physical Contingency : Construction 10%, Consultancy Service Cost 10%

(2) Case 2

1) Project Cost

The estimated project cost under Case 2 is about PhP 921 Million (Phase I: PhP 763 Million, Phase II and III: PhP 158 Million) as shown in **Table 6.3-5**.

Table 6.3-5 Project Cost of Case 1 (Phase I to III)

Unit: Million PhP			
Breakdown of Cost	Phase I	Phase II and III	Total
Phase I	493	0	493
Phase II	0	0	0
Phase III	0	0	0
Civil Works Sub Total	493	0	493
Price Escalation	10	0	10
Physical Contingency	50	0	50
Consulting Services	107	137	244
Land Acquisition	0	0	0
Administration Cost	23	5	28
VAT	79	16	96
Import Tax	0	0	0
Interest during construction	0	0	0
Front End Fee	0	0	0
Total	763	158	921

2) Annual Expenditure Requirement

The annual expenditure requirement for Phase I and Phase II and III from 2018 to 2022 is shown in **Table 6.3-6**.

Table 6.3-6 Annual Fund Requirement Summary of Phase I to III

Breakdown of Cost	Phase I	Phase II and III	Total
2018	21	0	21
2019	189	47	237
2020	417	50	467
2021	120	56	176
2022	16	4	20
2023	0	0	0
Total	763	158	921

Detailed annual fund requirement by item of each Case is shown in **Table 6.3-7** and **Table 6.3-8**.

Table 6.3-7 Detailed Annual Fund Requirement of Phase I

Item	Total			2018			2019			2020			2021			2022			2023		
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total
A. ELIGIBLE PORTION																					
I) Procurement / Construction	0	553	553	0	0	0	0	132	132	0	314	314	0	93	93	0	14	14	0	0	0
Phase I	0	493	493	0	0	0	0	119	119	0	279	279	0	82	82	0	12	12	0	0	0
Base cost	0	493	493	0	0	0	0	119	119	0	279	279	0	82	82	0	12	12	0	0	0
Price escalation	0	10	10	0	0	0	0	1	1	0	6	6	0	2	2	0	1	1	0	0	0
Physical contingency	0	50	50	0	0	0	0	12	12	0	29	29	0	8	8	0	1	1	0	0	0
II) Consulting services	0	107	107	0	18	18	0	31	31	0	47	47	0	11	11	0	0	0	0	0	0
Base cost	0	96	96	0	16	16	0	28	28	0	42	42	0	9	9	0	0	0	0	0	0
Price escalation	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Physical contingency	0	10	10	0	2	2	0	3	3	0	4	4	0	1	1	0	0	0	0	0	0
Total (I + II)	0	660	660	0	18	18	0	164	164	0	361	361	0	104	104	0	14	14	0	0	0
B. NON ELIGIBLE PORTION																					
a Procurement / Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b Land Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
c Administration cost	0	23	23	0	1	1	0	6	6	0	13	13	0	4	4	0	0	0	0	0	0
d VAT	0	79	79	0	2	2	0	20	20	0	43	43	0	12	12	0	2	2	0	0	0
e Import Tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (a+b+c+d+e)	0	102	102	0	3	3	0	25	25	0	56	56	0	16	16	0	2	2	0	0	0
TOTAL (A+B)	0	763	763	0	21	21	0	189	189	0	417	417	0	120	120	0	16	16	0	0	0
C. Interest during Construction																					
Interest during Construction(Const.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest during Construction (Consul.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D. Front End Fee																					
GRAND TOTAL (A+B+C+D)	0	763	763	0	21	21	0	189	189	0	417	417	0	120	120	0	16	16	0	0	0

Note:

- Administration Cost : 3.5%
- VAT : 12% of the expenditure in local currency of the eligible portion
- Import Tax : 0%
- Exchange Rate : PHP=JPY 2.08
- Price Escalation : LC 1.00%
- Physical Contingency : Construction 10%, Consultancy Service Cost 10%

Table 6.3-8 Detailed Annual Fund Requirement of Phase II and III

Item	Total			2018			2019			2020			2021			2022			2023		
	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total	FC	LC	Total
A. ELIGIBLE PORTION																					
I) Procurement / Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phase II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phase III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
II) Consulting services	0	137	137	0	0	0	0	41	41	0	43	43	0	49	49	0	4	4	0	0	0
Base cost	0	122	122	0	0	0	0	37	37	0	39	39	0	43	43	0	3	3	0	0	0
Price escalation	0	3	3	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0
Physical contingency	0	12	12	0	0	0	0	4	4	0	4	4	0	4	4	0	0	0	0	0	0
Total (I + II)	0	137	137	0	0	0	0	41	41	0	43	43	0	49	49	0	4	4	0	0	0
B. NON ELIGIBLE PORTION																					
a Procurement / Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
b Land Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Base cost	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Price escalation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical contingency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
c Administration cost	0	5	5	0	0	0	0	1	1	0	2	2	0	2	2	0	0	0	0	0	0
d VAT	0	16	16	0	0	0	0	5	5	0	5	5	0	6	6	0	0	0	0	0	0
e Import Tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total (a+b+c+d+e)	0	21	21	0	0	0	0	6	6	0	7	7	0	8	8	0	1	1	0	0	0
TOTAL (A+B)	0	158	158	0	0	0	0	47	47	0	50	50	0	56	56	0	4	4	0	0	0
C. Interest during Construction																					
Interest during Construction(Const.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest during Construction (Consul.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D. Front End Fee																					
Front End Fee	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRAND TOTAL (A+B+C+D)	0	158	158	0	0	0	0	47	47	0	50	50	0	56	56	0	4	4	0	0	0

Note:
Administration Cost : 3.5%
VAT : 12% of the expenditure in local currency of the eligible portion
Import Tax : 0%
Exchange Rate : PHP=JPY 2.08
Price Escalation : LC 1.00%
Physical Contingency : Construction 10%, Consultancy Service Cost 10%

Chapter 7 Initial Environmental Examination (IEE)

7.1 Legal and Environmental Assessment Framework

7.1.1 Philippine Environmental Assessment System

Ensuring environmental protection and upholding the rights of the people to a balanced and healthy environment takes its root to the constitutional provisions and laws of the land. In the Philippines, the Environmental Impact Statement (EIS) System was formally introduced and legislated in 1978 by Presidential Decree No. 1586. It is a process of predicting the likely environmental consequences of implementing a project.

The value of EIA process is in the reduction and anticipation of adverse environmental impacts before the proposed project be allowed to operate or not. The process entails assessment of potential impacts and providing solutions or designing appropriate preventive mitigating and enhancement measures.

One key benefit of undergoing the EIA process is to increase the chance that the project will be accepted and eventually supported by the recipients or the host community. Moreover, it gives the opportunity to improve the project design with inputs solicited and gathered from the target beneficiaries. This also promotes accountability and transparency from the side of the proponent. Project proponents have to exercise responsibility to determine and disclose all the relevant information in assessing and determining the impacts of the project. In addition, undergoing the EIA informs the decision-making process and improves integration of projects into environmental and social settings and conditions.

7.1.2 Relevant Laws and Related Policies

Over the years the Philippine EIS System (PEISS) was subjected to several refinements to become more effective and responsive to current and emerging conditions and challenges. Innovations and improvements were introduced to process and requirements to respond to changing political and social realities which affects and shapes government policies and regulations.

Table 7.1.2-1 below are relevant laws and policies which supports and/or are consistent with the EIS system and process:

Table 7.1.2-1 Relevant Philippine Environmental Laws on EIA

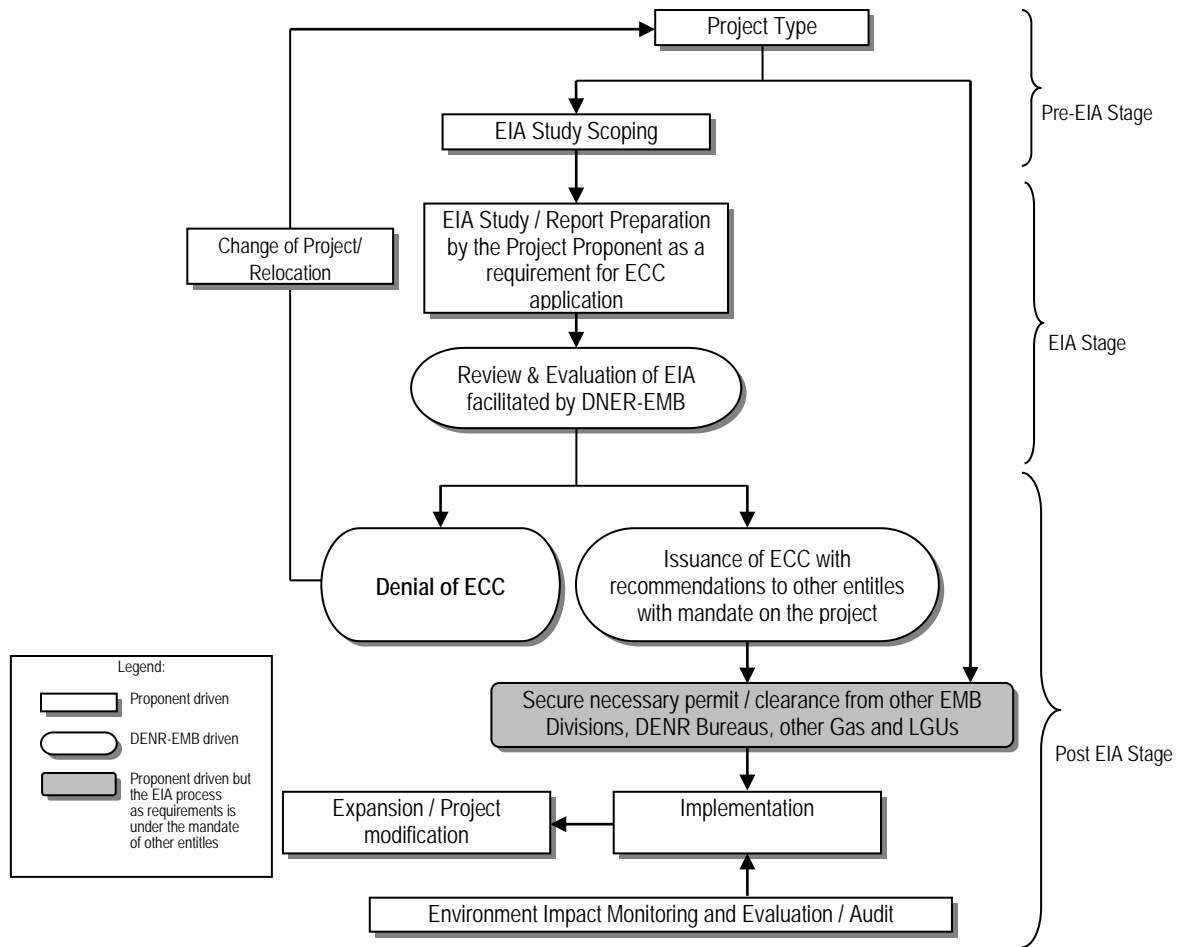
Name of Laws/Policies	Policy Directives/Contents
Presidential Decree No. 1151 (1977)	Philippine Environmental Policy: which requires proponents of projects affecting the quality of environmental to prepare environmental impacts statements
DENR Administrative Order (DAO) 03-30	Implementation of rules and regulations of PD No. 1586
Memorandum Circular 2010-14	Standardization of requirements and enhancement of public participation in the streamlined implementation of the Philippine EIS system
Memorandum Circular 2011-005	Incorporating Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) concerns in the Philippine EIS system
DENR Administrative Order (DAO) 96-37	Highlights the importance of public participation and social acceptability in the environmental review process
Procedural Manual for DENR Administrative Order No. 30 Series of 2003 (DAO 03-30)	Provides detailed guidance on EIA coverage; provides forms for specific themes/projects (e.i road and bridges)

7.2 EIA/IEE Coverage, Screening and Project's IEE Process

7.2.1 EIA/IEE Coverage

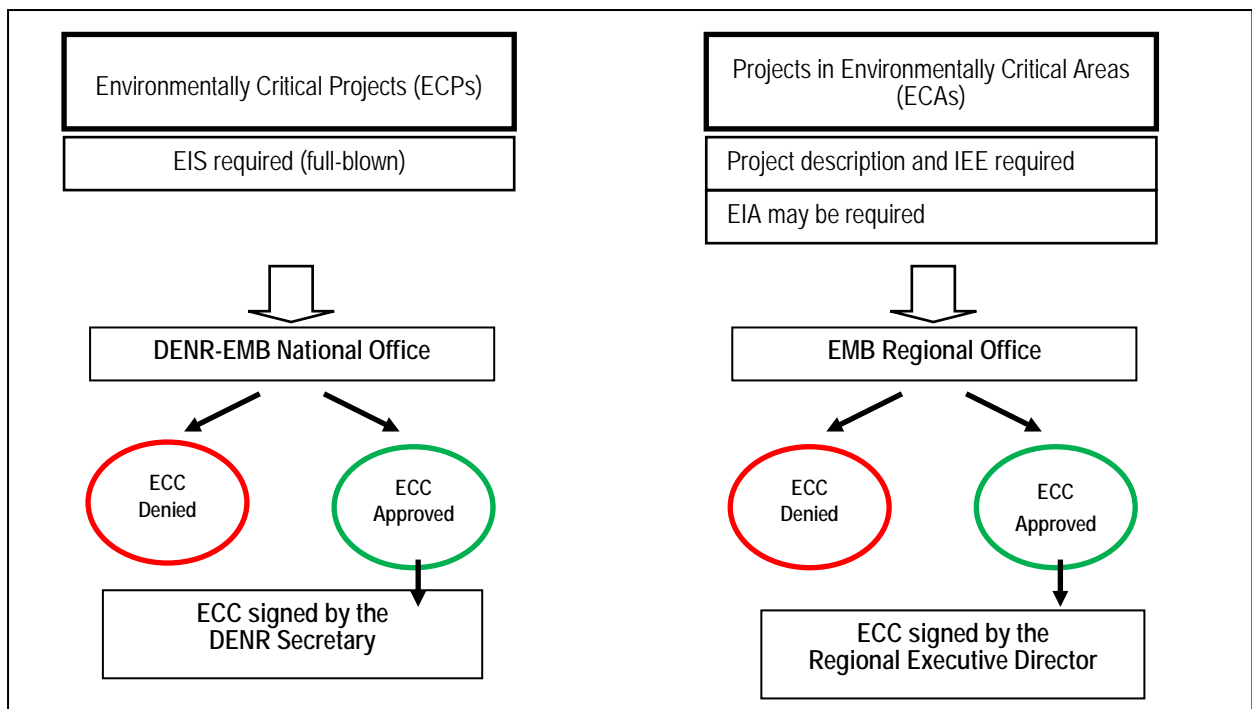
PD 1586 requires proposed projects to undergo the EIA process. The DENR-EMB technically defines Environmentally Critical Projects (ECPs) and in Environmentally Critical Areas (ECAs) as the ones that will be subjected to EIA process and thus requires submission of full-blown EIA Report. EMB issued listing of all projects that are ECAs and are in ECAs. For projects that are not ECPs or are not in ECAs, environmental safeguards and protection mechanisms may still be required by DENR if deemed necessary. An Environmental Compliance Certificate (ECC) is the document issued by the authority (EMB) to the proponent after thorough review of the EIA Report.

The ECC outlines the commitment and obligation of the proponent to comply with the provisions stipulated in the issued clearance. **Figure 7.2.1-2** below illustrates the process and screens the project if it is going the ECC way or securing Certificate of Non-Coverage. Securing ECC requires either preparing a full-blown EIA Report or filling up an IEE Checklist with Project Descriptions. Comprehensive EIA Report is submitted to DENR National Office and requires the approval of the Department Secretary whereas IEE Checklist is submitted to the EMB Regional Offices. The EMB Regional Executive Director can sign the IEE Checklist submission.



Source : Revised Procedural Manual for DENR Administrative Order No.30 Series of 2003 (DAO 03-30)(2007)

Figure 7.2.1-1 EIA Process Flow Chart



Source: Revised Procedural Manual for DENR Administrative Order No. 30 Series of 2003 (DAO 03-30) (2007 Guidelines on public participation under the Philippine environmental impact statement (EIS) system (DAO2017-15)

Figure 7.2.1-2 EIA/IEE Process

7.2.2 Project Screening

Table 7.2.2-1 takes reference to EMB Memo Circular 005 issued in July 2014 which provides the revised/updated guidelines for coverage screening and standardized requirements particularly governing road projects. The said circular clarifies which road projects are covered to secure ECC. Moreover, it also screens the project if it is required to submit full-blown ECC Report or just the IEE Checklist.

Table 7.2.2-1 EIS and IEE Requirements for Road Projects

Project Description	Covered (Required to secure ECC)			Not covered (may secure CNC)
	Category A: ECP	Category B: Non-ECP		Category D
	EIS	EIS	IEE Checklist	PD (Part I only)
3.4.1 Roads, new construction	NATIONAL ROAD: ≥ 20 km (length with no critical slope)OR ≥ 10 km (length with critical slope)	PROVINCIAL ROAD and OTHER TYPES OF ROADS: ≥ 20 km (length with no critical slope)OR ≥ 10 km (length with critical slope)	ALL TYPES OF ROADS: > 2 km but <20 km, (length with no critical slope)OR > 2 km but < 10 km (length with critical slope)	≤ 2 km
3.4.2 Roads, widening, rehabilitation and/or improvement	None	> 50 % increase in capacity (or in terms of length/width) AND ≥ 20.0 km, (length with no critical slope) OR ≥ 10.0 km (length with critical slope)	> 50 % increase in capacity (or in terms of length/width) AND > 2 km but < 20.0 km, (length with no critical slope) OR > 2 km but < 10.0 km (length with critical slope)	> 50 % increase in capacity (or in terms of length/width) but ≤ 2 km increase in length

Source: JICA Study Team, based on “Revised Guidelines for Coverage Screening and Standardized Requirements, EMB MC# 005, July 2014”

The trans-central project falls under **Minor Roads and Bridges Item C.4.b (Roads, new construction, widening including RO-RO facilities)**. With a total length of less than 20 kilometres (per package) and have no identified critical scopes, the project is just required to submit the IEE Checklist as per the Revised Procedural Manual for DAO 03-30. **Table 7.2.2-2** below presents screening criteria and process. The basis or justification for taking the IEE Checklist process is the nature of the project which is only a road rehabilitation and improvement undertaking. Moreover, the nature and main component of the road rehabilitation project is repair of existing road network. In particular this entails road reconstruction and pavement concreting. Furthermore, the project will not go beyond 50% increase in capacity in terms of width as it will just cover and make use of the existing ROW. Furthermore, in terms of length, the proposed trans-central road packages are below

20 km in length, which is the limit for IEE Checklist coverage. In addition to these, there are no critical slopes in the proposed road alignments.

Table 7.2.2-2 Project Screening Process

Screening Process (EIA/IEE Coverage)	Full EIA Report	IEE Checklist	Marawi Trans-central Project
Nature of the Project/ Project Components	New construction	Road Rehab/Repair	Road Reconstruction/ Pavement Repair
Road Width	> 50 % increase in capacity	> 50 % increase in capacity	Works on existing ROW
Road Length	≥ 20 km	> 2 km but < 20.0 km	Package 1 – 12.40 km Package 2 – 8.88 km Package 3 – 13.83 km Package 4 – 12.36 km Package 5 - 14.2 km
Slope	With critical slopes	No critical slopes	No critical slopes

7.2.3 Project's IEE Process

(1) Methodology

Initial assessment is undertaken to determine the possible impacts of the project, the range of actions to be put forward, the alternatives to be closely examined and the list of mitigation actions to be complied by the project proponents.

The project is conceived primarily to support the recovery and revitalization of socio-economic conditions of the residents in Marawi City and nearby municipalities who were affected by the recent armed conflict. Key to alleviate the living condition of people in the area is the improvement in mobility that is seen to boost economic dynamism. Road rehabilitation and improvement of transport network is key to support this objective. It is an important driver to improve the present condition of the people in the area as it will facilitate transfer of goods and products. This will restore and revive the economic activities in the locality and will open various opportunities to the affected residents mainly employment and other livelihood prospects.

The trans-central road network covers (4 (four) local government units and is seen to complement the on-going Marawi Ring Road Network. The ring road network will function to support the mobility of the people area. These two on-going road projects can facilitate a planning unit that goes beyond political boundary. It can set a geographic space for economic dynamism and opportunities with Marawi City as the focal point and competitiveness driver.

The trans-central project considers these factors in grouping the roads for rehabilitation and reconstruction. **Table 7.2.3-1** below are the considerations for the cluster grouping.

Table 7.2.3-1 Trans-central Road Project Road Clustering

Groups	Road Length	Cluster Grouping	Functions
Group 1	12.40 km.	National Road (Marawi-Iligan Road)	Main arterial road, inter-provincial linkages
Group 2	8.88 km.	Lanao Lake Circumferential Road	Alternative route to city center, lakeside development
Group 3	13.83 km.	City Center/CBD; Government Centers	Support to rehabilitation of Ground Zero, urban re-development and revitalization
Group 4	12.36 km.	Academic Center (MSU)	Urban expansion area, cultural and tourism development
Group 5	14.28 km.	Agricultural areas; Protection and Production areas	New resettlement spaces, agricultural development, protected area development, water supply and irrigation, tourism

Table 7.2.3-2 and **Figure 7.2.3-1** show the road groupings based on the above-mentioned considerations. Group 1 covers just one (1) road which is the main arterial highway (Iligan-Marawi Road). Group 2 covers two (2) roads traversing the lakeside areas (Lake Lanao Circumferential Road). Group 3 covers ten (10) roads in the city center (downtown area). It is also the site of government institutions (provincial hall, city hall, schools and military camp). Group 4 covers seven (7) roads mostly area of MSU campus and nearby vicinities. Group 5 covers eight (8) roads mostly agricultural lands and waste lands. This is also the site of resettlement areas that the government made for the displaced residents due to recent armed conflict.

Table 7.2.3-2 Road Groups and Coverage

Group	Road No.	Name of Road	Road Length	Total Number of Roads
Group 1	1	Iligan – Marawi Road (National Road)	12.40 km.	1
Group 2	2	Bangon-Poona Marantao Road	4.58 km.	
	3	Raya Madaya-Gumisa-Alawiya-Gadungan Road	4.30 km.	
	Sub-total		8.88 km.	2
Group 3	5	Gumisa Avenue	0.73 km.	
	16	Marawi-Kapai Rd (Macalilay Road)	3.36 km.	
	17	Kilala-Tuali Road (LASURECO Road)	1.21 km.	
	18	Marawi Cadre-New Capitol Road	2.15 km.	
	19	Marcos blvd (Tampilong-Mapandi-Moncado-Colony)	2.55 km.	
	22	Marawi-Landing Road	0.95 km.	
	23	Pangarungan Road (Roxas Avenue)	0.70 km.	
	24	Disumangcop Road	0.80 km.	
	27	Idarus Road	0.83 km.	
	28	Tampilong Road	0.55 km.	
	Sub-total		13.83 km.	10
Group 4	4	New Marawi-Diversion Road (Sagunsungan Road)	2.37 km.	
	6	Cabingan-MSU Campus-Amai Pakpak Road	2.30 km.	
	7	MSU Campus-Matampay Road	1.41 km.	
	8	MSU-GMA Terminal Road	3.10 km.	
	12	GMA Terminal Access Road (Capitol GMA Terminal)	0.59 km.	
	20	Rapasan-Bayaba Road	1.23 km.	
	21	Lumidong-Amai Pakpak Avenue	1.36 km.	
Sub-total		12.36 km.	7	
Group 5	9	Emie-Sagunsangun-Linao-Rantian Road	4.36 km.	
	10	New Marawi Diversion Road (Sagunsungan Road)	1.50 km.	
	11	Bito-Rorogagus Road	3.17 km.	
	13	MSU-Bobo Road	1.25 km.	
	14	Paling-Rantian Road	1.16 km.	
	15	Linao-Alinan Road	0.54 km.	
	25	Rorogagus-Mipaga Road	1.60 km.	
	26	Bito-Rorogagus-Guimba Road	0.70 km.	
Sub-total		14.28 km.	8	
Grand Total			61.75 km.	28

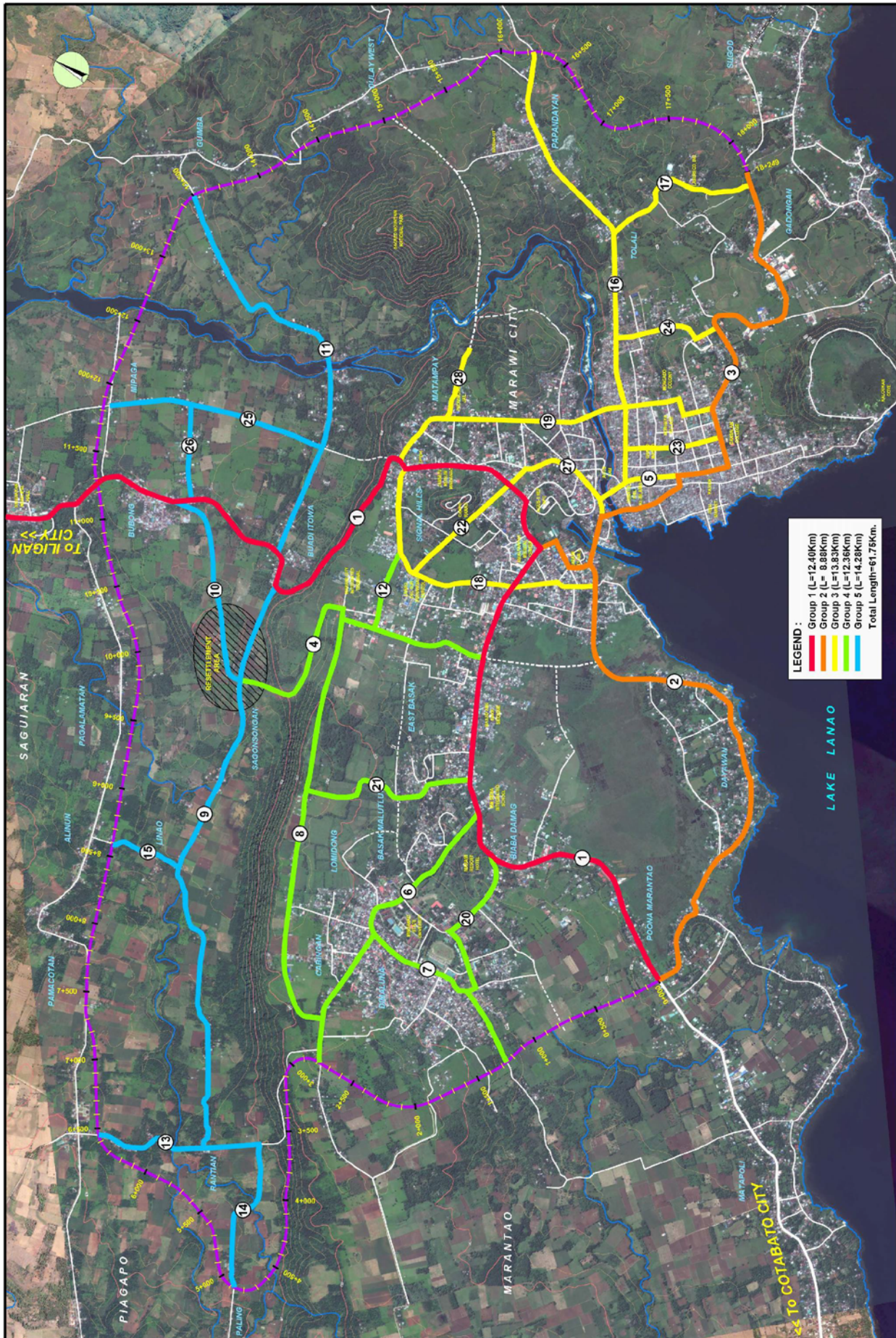


Figure 7.2.3-1 Trans-central Roads and Road Groups

Table 7.2.3-3 presents the different components and methodologies employed for this undertaking. Mainly documents reviews, online research and coordination with concerned LGUs for the needed data were done to support the environmental and social baseline assessment. Complementary support were solicited from the Cotabato Office staff for information and data validation and related inquiries.

Table 7.2.3-3 Components and Methodologies of the Project

COMPONENTS	METHODOLOGY
Project Description	Document reviews (project documents and references)
Baseline Environmental Condition	On-line research, secondary data gathering from project proponent, concerned government offices and institutions, coordination with local team (Cotabato Office)
Impact Assessment	Qualitative assessment and expert's opinion based on data gathered/with reference to data collected

(2) IEE Checklist and Requirements

Forms required for IEE Checklist as per the Revised Procedural Manual were filled up. **Table 7.2.3-4** below listed the forms and the approaches employed for the data entries.

Table 7.2.3-4 IEE Checklist Forms and Methodology

COMPONENTS	METHODOLOGY
Project Fact Sheet	Document reviews, internal JICA Study Team (JST) meetings and coordination, work on the summary profile for each road package
Project Components and Operation Information	Document reviews, JICA Project Team (JPT) meetings, on-line researches, coordination with Cotabato Office
Location Map, Topographic Map	Internal JST coordination; project document reviews, mapping of geo-tagged photos and alignments (start and end points/coordinates)
Site Plan, Project Lay-out, Road Cross-Section Lay-out	Internal JST coordination, project documents reviews
Environmental Impact and Management Plan	Qualitative assessment and expert's opinion based on data gathered/with reference to data collected; Internal JST coordination
Project Environmental Monitoring and Audit Prioritization (PEPAMS) Questionnaire	Qualitative assessment and expert's opinion based on data gathered/with reference to data collected; Internal JST coordination, project document reviews
Abandonment-Decommissioning-Rehabilitation Information	Project document reviews, Internal JST coordination

COMPONENTS	METHODOLOGY
Institutional Plan	Solicit inputs from DPWH-ESSD, Internal JST coordination, Consultation with principals from project proponent (DPWH)
IEE Checklist Sown Statement, Accountability Statement, Proof of Authority to the Project, Affidavit of No Complaint	Coordination meetings with DPWH (Office of Dir. Hasim); securing buy-in and commitment of DPWH
Certification from the Concerned LGUs (no objection and conformity with the existing land use)	Coordination with DPWH for the letter of request and coordination with Cotabato Office for the issuance of the LGU Certifications (no objection and land use conformity) from the concerned Mayors

Annex 1 presents Package 1 IEE Checklist Report and forms.

7.2.4 Institutional Coordination and Responsibilities

Coordination among project partners especially the government agencies involved in the project is very crucial in the preparation and submission of the IEE Checklist Report (see **Table 7.2.4-1**). DPWH, as the main implementing agency for this project assumed the lead role in inter-government coordination. Internal to DPWH organization, UPMO provided the overall support in complying with the policies and other compliances involved in the preparing the project detailed design and environmental clearance. Also, in term of getting the stakeholder's support which involves the concerned LGUs and project affected communities and constituents. ESSD also provided valuable support in the review of IEE documents and forms. RMC III extended support in the certification of documents and in processing various governmental requirements within the department

The concerned LGUs provided valuable support in various request for data. Also in terms of validating information in support of IEE Checklist report preparation. In addition, the LGU processed the issuance of certification of no objection as well as land use conformity.

Table 7.2.4-1 Roles and Responsibilities of Relevant Agencies on IEE Preparation and Submission

Relevant Agencies	Roles
DPWH	Takes the ownership of the project; lead role in institutional coordination; logistical support (UPMO)
	Provide key inputs to IEE forms data entries and review (ESSD)
	Facilitate the signing of IEE documents and submission to DENR-ARMM (RMC III)
DENR - ARMM	Acceptance and review of IEE Checklist Report
	Convening of the EIS Review Committee including arrangement for site validation
	Issuance of decision document (ECC)
Local Government Units (Marawi Cty, Piagapo, Saguiaran, Marantao)	Support to data collection and validation - Provided the socio-economic profiles, planning documents to project team for assessment and reference to IEE report and forms
	Facilitate issuance of needed certifications (no objection and proof of conformity)
	Provided inputs on project design (Saguiaran LGU suggested to extend the Road 1 alignment all the way to Pantar Bridge to cover the important road segment which is seen to be critical for mobility and economic development of the area)