THE REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF AGRICULTURE

PREPARATORY SURVEY REPORT ON THE PROJECT FOR COMMUNITY DEVELOPMENT IN CONFLICT-AFFECTED AREAS IN MINDANAO

FEBRUARY, 2015

JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)
NTC INTERNATIONAL CO., LTD
IC NET LIMITED
SUNCOH CONSULTANTS CO., LTD

EI
JR
15-037

Preface

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey and entrust the survey to Joint Venture that consists of NTC INTERNATIONAL CO., LTD., IC NET LIMITED., and SUNCOH CONSULTANTS CO., LTD.

The study team held a series of discussions with the officials concerned of the Government of the Republic of the Philippines, and conducted field investigations. As a result of further studies in Japan, the present report was finalized.

I hope that this report will contribute to the promotion of the Project and to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of the Philippines for their close cooperation extended to the study team.

December, 2014

Akira Nakamura
Director General,
Infrastructure and Peacebuilding Department
Japan International Cooperation Agency

Summary

1. Outline of the Country

Mindanao is the southern most major island of the Philippines, which has 102,000 km^2 of land area and a population of approximately 22 million (as of 2010). The southwest and central Mindanao had been affected by the conflict for more than 40 years and consequently, it has a relatively high poverty rate. Thus, the region has issues such as lacking in basic social services and deteriorated public infrastructure facilities including schools, health centers, and so on. Mindanao is called “the Land of Promise”, having fertile soil and relatively less damages due to natural disasters such as typhoons, which allows Mindanao to have high agricultural potential.

Philippines’ economy achieved the highest growth in the ASEAN in 2013, at 7.2%. Nominal GDP was 270.2 billion US$, GDP per capita was 2,790 US$, and inflation rate was 3% in 2013. Of Philippines’ GDP, nearly 60% is occupied with service industries, approximately 30% is mining and manufacturing industries, and roughly 10% is agriculture and forestry. But 31% of whole work force is working for agriculture, forestry and fishery and 53% is for service industries[1].

2. Background of the Project

“The Philippine Development Plan 2011-2016” (hereinafter mentioned as PDP) lists 3 items as crucial strategic goals for growth, aiming at “comprehensive economic growth”. Of the 3 items, “improved food security and increased rural income” describes to improve rural infrastructure in order to increase farmers’ productivity and income. It also depicts that improvement of access to markets through Farm to Market Road (FMR) is an effective way of improvement of area productivity and added value of products. Under Department of Agriculture, “the Mindanao Rural Development Plan” (MRDP) has been conducted, which aims at poverty reduction in Mindanao through an improvement of agricultural and fishery infrastructure and an increase in the rural income. Likewise, “PAMANA (2011-2016)”, a development plan targeting the conflict-affected areas and areas with much less accesses, has been conducted to realize poverty reduction through rural development in accordance with target areas’ issues so as to promote not only peace-process.

---

[1] GDP: Japan External Trade Organization
Work Force: Ministry of Foreign Affairs

The purposes of this Project are securing all-year traffic access, promotion of agricultural development of the target areas, and improvement of employment and livelihood of rural people in the target areas, through development of the existing FMR that prevents traffic of vehicles for transportation of agricultural products due to undeveloped / ageing roads and bridges. In addition, it is expected that the people in the target areas can realize “peace dividend” through this Project that is supposed to contribute to poverty reduction, prevention of conflicts, and stable peace.

3. Outline of Survey Result and Contents of the Project

3-1. Schedule

The survey team conducted 2 on-site surveys (1st: between February 23, 2014 and March 18, 2014. 2nd: between April 20, 2014 and June 4, 2014). The team had meeting with DA, OPAPP and BDA and concerned 3 municipalities for discussion of issues of the Project and conducted on-site surveys and data collection. After analyses conducted in Japan, the team confirmed plausibility of the contents of the request and cooperation. The team also finalized the draft preparatory survey, while considering appropriate project scale and contents as a Japanese Grant Aid Project.

Finally, JICA dispatched the team to Philippines to explain and discuss the outline design of the Project with Filipinos concerned from November 23 to November 29, 2014.

3-2. Survey Result

(1) The Target Route

The purposes of this project are not only rehabilitation of FMR that prevents traffic of vehicles for transportation of agricultural products due to the existing condition of the roads and bridges that are undeveloped and deteriorated , but also capacity building in terms of maintenance that enables people to sustainably use improved facilities.

It is expected that all-year traffic flow between farmlands and markets will be secured. This Project includes construction of roads and river-crossings such as bridges.

Municipalities, DA, OPAPP, and BDA have confirmed the following contents.

Table Comparison of the Contents of the Request and the Results of the Site Survey

Target Area	Contents of the Project (Original)	Contents of the Project (Results of the site survey)	Overview of the Proposed FMR (Farm to Market Road)
Lot 1 Northern region; Lanao del Sur, Bumbaran	Construction/rehabilitation of FMR (approx.5km in length) Bridge; one bridge (approx. 15m), River crossing structures; culvert, drainage, etc.	Construction/rehabilitation of FMR (approx.4.7km in length) River crossing structures; one bridge (about 18m), one spillway, culvert, drainage, etc.	This FMR connects Francfort and Sumugot and the existing road surface is rough, which hampers vehicles. The start point intersects PCCP paved barangay road. The End point has been under construction by ADB. Construction work will be completed by 2015. After the Project, the proposed road will be covered by concrete up to the national road, securing all-year traffic flow.
Central region; Cotabato province, Alamada	FMR (farm road level) Construction/Rehabilitation (approx, 5 to 10km,detailed Specifications are not yet determined), facilities; culvert, drainage, etc.	FMR (farm road level) Construction/Rehabilitation (Section-1; approx. 6.3km in length, Section-2; approx.2.3km in length), River-Crossing facility ; four box culverts, Facilities; culvert, drainage, etc.	This target FMR is separated into section 1 and 2, and the section-1 connects national road at the center of the municipality of Alamada to Mapurok barangay. It is difficult to access to the center of the town when the water level of the Libungan River is high. A 4-wheel vehicle could cross the river during the low flow level season, but it could not pass there after rainfall. Section-2 is along the Libungan River, which enables access to the town center from the section-1 without crossing the river, although it takes extra time. Steep sections on the way are, however, severely eroded, which makes it difficult to pass in rainy seasons. Rehabilitation of the slope sections of both sections will secure all-year access to the national road, even though the distance to it will be longer.
Lot 3 Southern region; Maguindanao province, Datu Paglas	FMR (farm road level) Construction (approx. 10km) Bridge ; two bridges (approx. 10m each), Facilities; culvert, drainage, etc.	FMR (farm road level) Construction/Rehabilitation (approx. 8.7km in length) Bridge ; four bridges (approx. 10m each), Facilities; culvert, drainage, etc.	Both sections (1.6km from the start point and 1.5km from the end point) of the target road have already been paved by gravel. Although there is a footpath in the target area, most of this target FMR is undeveloped. Construction of this FMR makes it possible for trucks to travel throughout a year.

(2) Outline of Design

1) Design Policy

Basic design of FMR and river-crossing structure are shown below.

i) Among the target sites, the basic ideas for Bumbaran and Alamada are improvement of existing roads. But

a new road will be installed in Datu Paglas except a few sections. The width of the proposed routes in the former 2 sites should be considered not to influence the roadsides of the proposed FMR even while securing minimum widths of FMR. On the other hand, horizontal alignment of new construct section of Datu Paglas shall be set by site survey in cooperation with municipality officials.

ii) The basic idea of FMR, related river-crossing structures, and appurtenances will be designed under principles in accordance with the standard design of the Philippines.

iii) Regarding the type of bridge structure, the basic idea will be designed in accordance with the standard design of the Philippines, while securing economy and workability. The most appropriate structure will be designed, taking the surrounding environment, river status, and design conditions in mind.

2) Outline of the Plan

The following tables show the outline of the 3 target roads and river-crossing structures.

Bumbaran municipality:

No.	Structure	Specification	Current situation
1	Road	– Improvement/Rehabilitation of existing road, 4.7km in length – 4m (2.5m) carriageway with 0 ~ 0.5m shoulder at both sides, total of 3.5 ~ 5m + width of roadside ditch – Concrete pavement (PCCP)	There is an existing dirt road throughout the proposed FMR.
2	River-crossing Crossing - BI	– Structure type: Reinforced Concrete (RCDG) bridge – Approx. 18 m in length	There is an existing bailey bridge which has been damaged.
3	River-crossing Crossing - BII	– Structure type: Box Culvert type – Double Barrel 2.4m*1.8m	No existing bridge
4	River-crossing Crossing - BIII	– Structure type: Spillway – Triple Barrel Pipe culverts 910 ϕ mm	There is an existing bamboo bridge for pedestrians

Alamada municipality

No.	Structure	Specification	Current situation
Section 1 (North Route)			
1	Road	– Improvement/Rehabilitation of existing road, 6.3km in length – 4m carriageway with 0 ~ 0.5m shoulder at both sides, total 4 ~ 5m + width of roadside ditches – Concrete pavement(PCCP)	There is an existing concrete/dirt road throughout the target section.
2	River-crossing Crossing - AI	– Structure type: Box Culvert type – Triple Barrel 2.4m*2.1m	There is an existing bridge which collapsed recently.
Section 2 (South Route)			
3	Road	– Improvement/Rehabilitation of existing road, 2.3km in length – 4m carriageway with 0 ~ 0.5m shoulder at both sides, total 4 ~ 5m + width of roadside ditches – Concrete pavement (PCCP)	There is existing dirt road throughout the target section.
4	River-crossing Crossing - AII	– Structure type: Box Culvert type – Triple Barrel 2.4m*1.8m – DPWH standard structure	Existing bridge has already collapsed.
5	River-Crossing	– Structure type: Box Culvert type	ditto

	Crossing - AIII	− Triple Barrel 2.4m*1.8m	
6	River-crossing Crossing - AIV	− Structure type: Box Culvert type − Triple Barrel 1.8m*1.5m	ditto

Datu Paglas municipality:

No.	Structure	Specification	Current situation
1	Road	− New construction and rehabilitation for some sections of existing road, 8.7km in length − 4m carriageway with 0.5 ~ 1.5m shoulder at both sides, total 5 ~ 7m + width of roadside ditches − Concrete pavement (PCCP)	Some sections of the proposed FMR are existing gravel roads.
2	River-crossing Crossing - DI	− Structure type: Flat Slab bridge − Approx. 12m in length	No existing bridge
3	River-crossing Crossing - DII	− Structure type: Flat Slab bridge − Approx. 10m in length	Ditto
4	River-crossing Crossing - DIII	− Structure type: Flat Slab bridge − Approx. 10m in length	Ditto
5	River-crossing Crossing - DIV	− Structure type: Flat Slab bridge − Approx. 10m in length	Ditto
6	River-crossing Crossing-DV	− Structure type: Box Culvert type − Triple Barrel 1.8m*1.5m	Ditto
7	River-crossing Crossing-DVI	− Structure type: Box Culvert type Triple Barrel 1.8m*1.5m	Ditto

4. Implementation Schedule and Project Cost Estimation

4-1. Implementation Schedule

The expected duration for the bidding is 4 months. Construction will be separated into 3 Lots, and the work duration of the Lot 1 is 9 months, Lot 2 is 11 months, and Lot 3 is 21 months respectively.

4-2. Philippines' Project Cost Estimation

Philippines' expenditure in this Japanese Grant Aid Project is 93 million Yen (1 Php = 2.46 Yen)

5. Project Evaluation

5-1. Relevance

This Project is to be plausible as a Japanese Grant Aid Project because of the following reasons.

(1) Beneficiaries of this Project

The 3 roads targeted in this Project are the sole road in each target barangay. Rehabilitation of them will not only improve their functions as farm roads, but also improve functions as accesses to schools, public services,

and as community roads. Consequently, the beneficiaries of this Project will be all residents in the barangays, agricultural associations, and private companies nearby through activated economic activities.

(2) Consistency with Development Plans of the Philippines

The purposes of FMR construction in this Project are securing all-year traffic access, promotion of agricultural development of the target areas, and improvement of employment and income of rural people in the target areas, which is consistent with purposes of the plans called “Philippine Development Plan”, “Mindanao Rural Development Program”, and “PAMANA” as well.

(3) Consistency with Japanese Assistance Policies

Under the fundamental principle (grand purpose) “to implement economic cooperation to realize “comprehensive growth” at which the Philippines government aims, Japan states that “peace and development of Mindanao” is one of its 3 crucial fields. This Project aims at securing all-year traffic access connecting the target farm villages to major highways through rehabilitation and construction of FMR, and thus contributing to the employment creation and livelihood improvement through agricultural development driven by FMR. In addition, it is expected that the people in the target areas can realize “peace dividend” through the alleviation of regional conflicts. This Project is supposed to promote peace and development of Mindanao.

5-2. Effectiveness

Expected quantitative and qualitative effects from the implementation of this Project are as follows; and this Project is likely to be effective.

(1) Quantitative Effect

The following table shows expected quantitative effects from the implementation of this Project.

Table Quantitative Index

Index	Target Site	Reference Value (2014)	Target Value (In 3 years after completion of this Project)	Notes
Time to Go to Markets from Farmland	Bumbaran	60 min.	20 min.	Currently, water buffalos and manpower are used.
	Alamada	30 min.	18 min.	
	Datu Paglas	60 min.	30 min.	Currently, water buffalos and manpower are used.
The Amount of Traffic per day (Truck)	Bumbaran	2.5 trucks	20 trucks	
	Alamada	9 trucks	10 trucks	
	Datu Paglas	0	10.5 trucks	This is a new road.
Vehicle’s Impassable Points after Rainfall	Bumbaran	3	0	
	Alamada	4	0	
	Datu Paglas	-	0	No reference value because this is a new road.

Note: Reference values above (time and amount of traffic) are based on traffic surveys

(2) Qualitative Effects

Expected qualitative effects from the implementation of this Project are as follows.

- Development of FMR and bridges makes it possible to ship agricultural products to markets at an economical speed (time, fuel-efficiency), which will reduce time, cost, and damages on products during transportation and improve income.
- Development of FMR and bridges will allow all-year access to public facilities such as school and health centers, which will improve residents' livelihood and additionally, lead to external employment opportunities.
- Municipalities will help residents regularly maintain FMR and bridges through workshops for maintenance of them, which will lead to a system that realizes budgetary allocation for regular maintenance.
- Through maintenance of FMR and bridges, residents will more often communicate with each other, which will enhance communities.

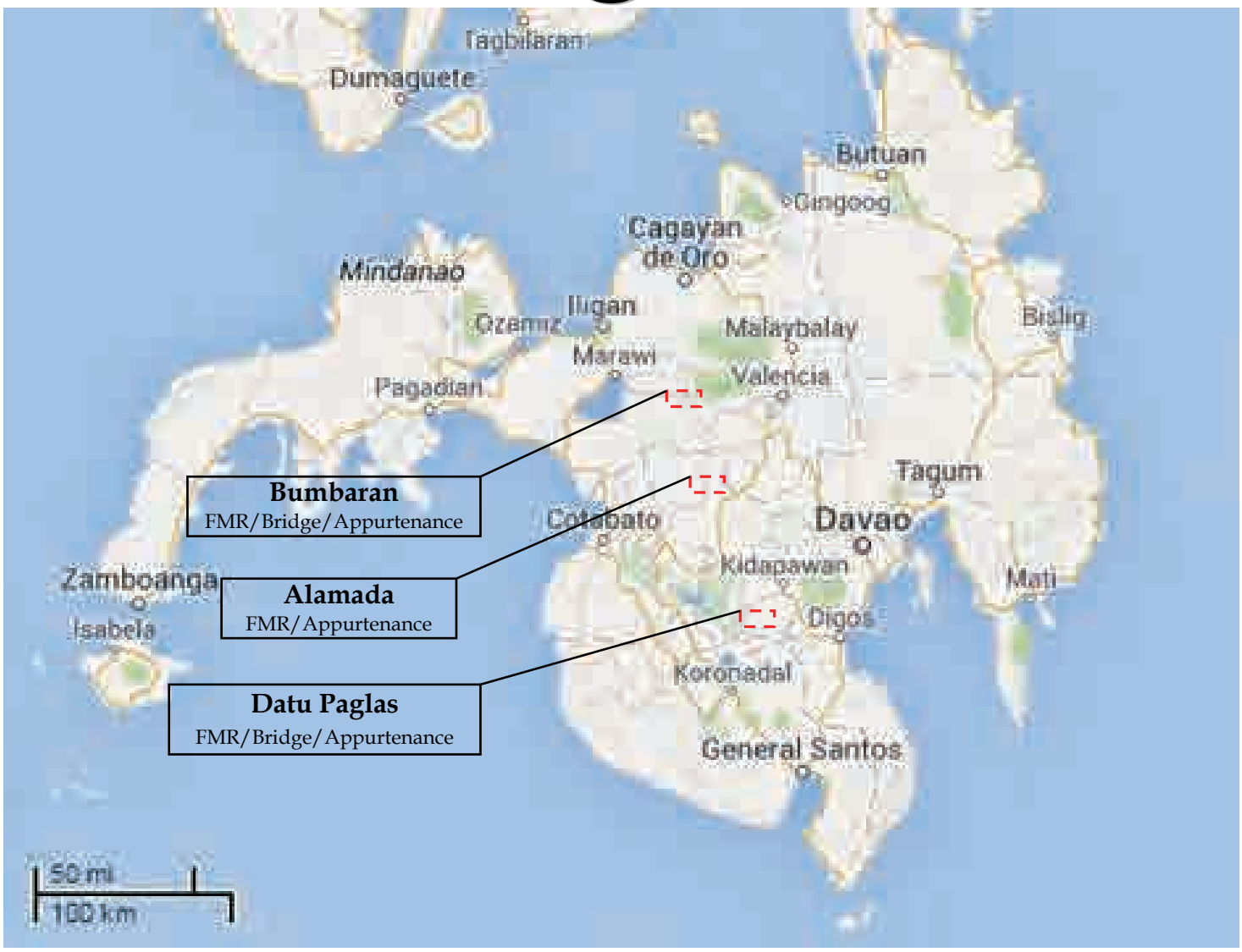
Preparatory Survey Report on the Project for Community Development in Conflict-Affected Areas in Mindanao

Contents

Page

Philippines

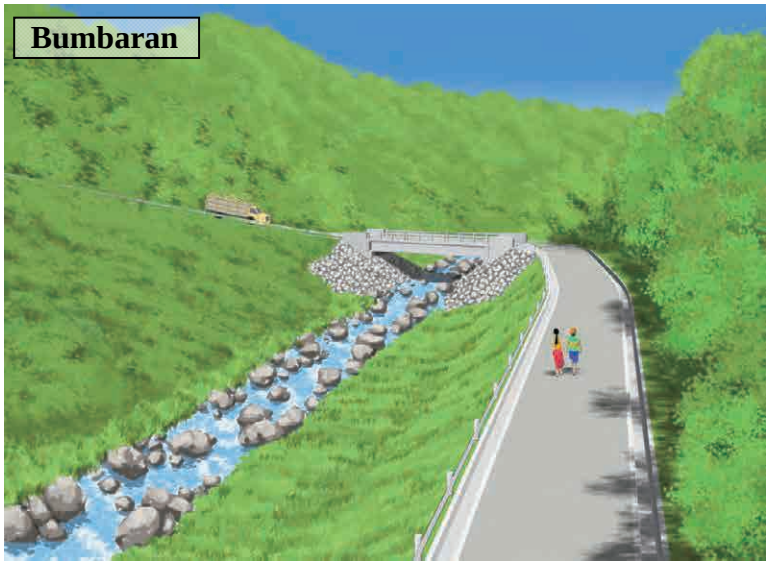
Mindanao

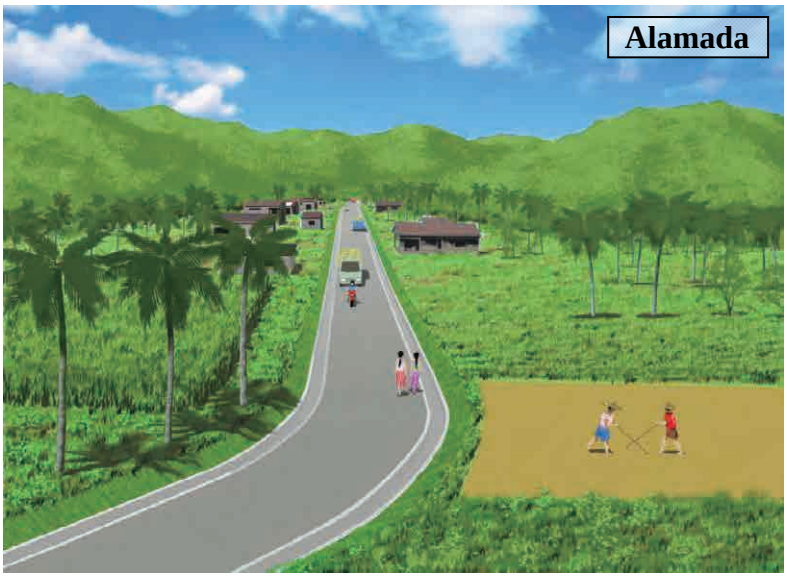


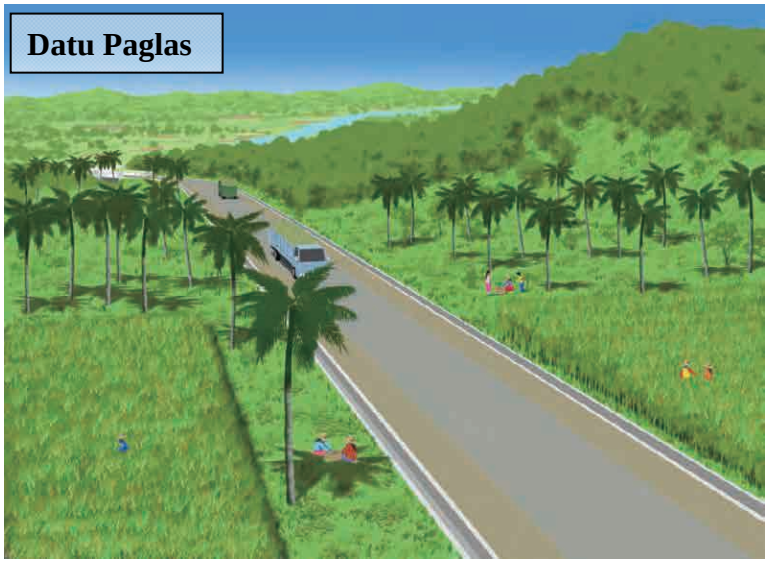
Bumbaran
FMR/Bridge/Appurtenance

Alamada
FMR/Appurtenance

Datu Paglas
FMR/Bridge/Appurtenance



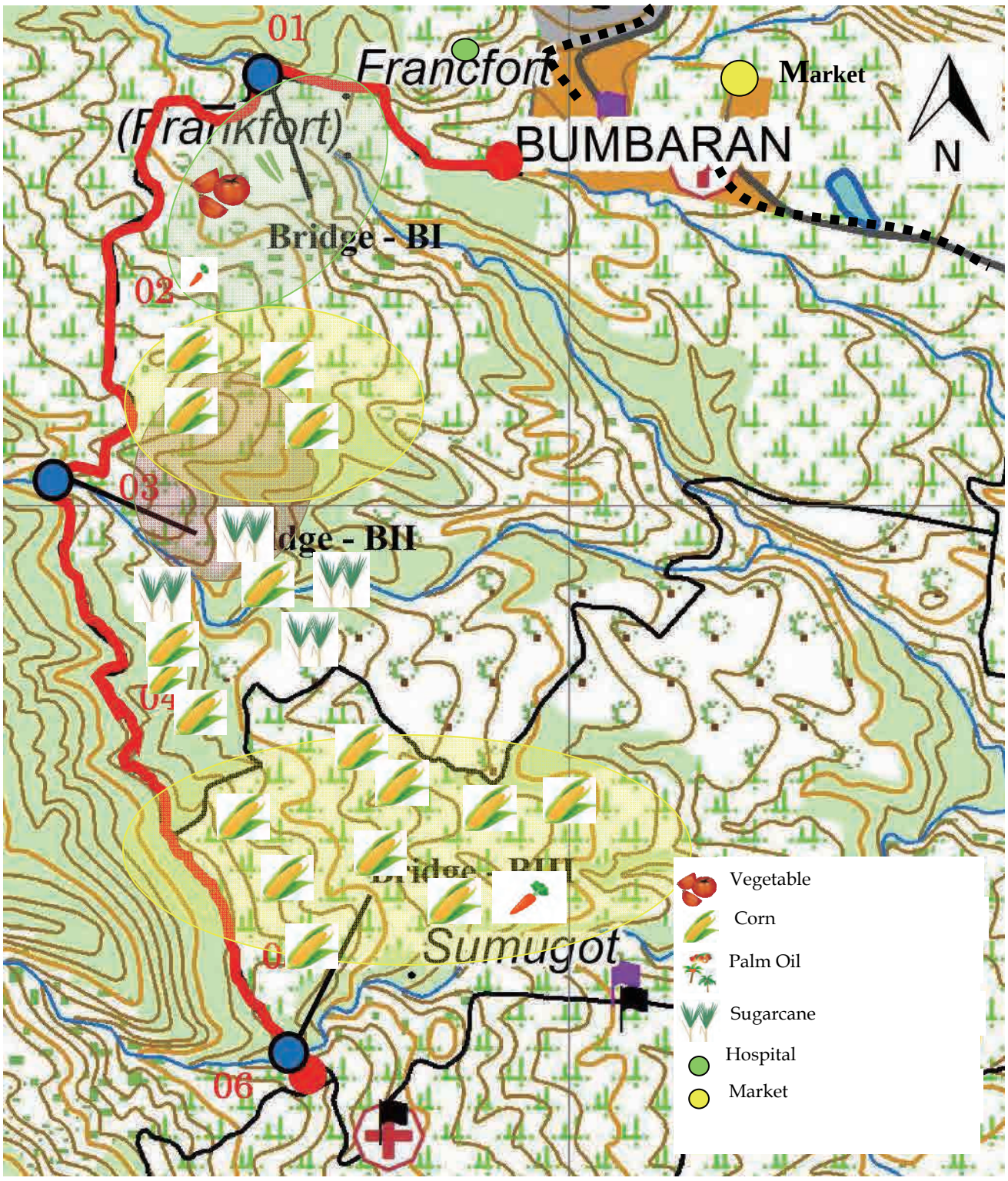




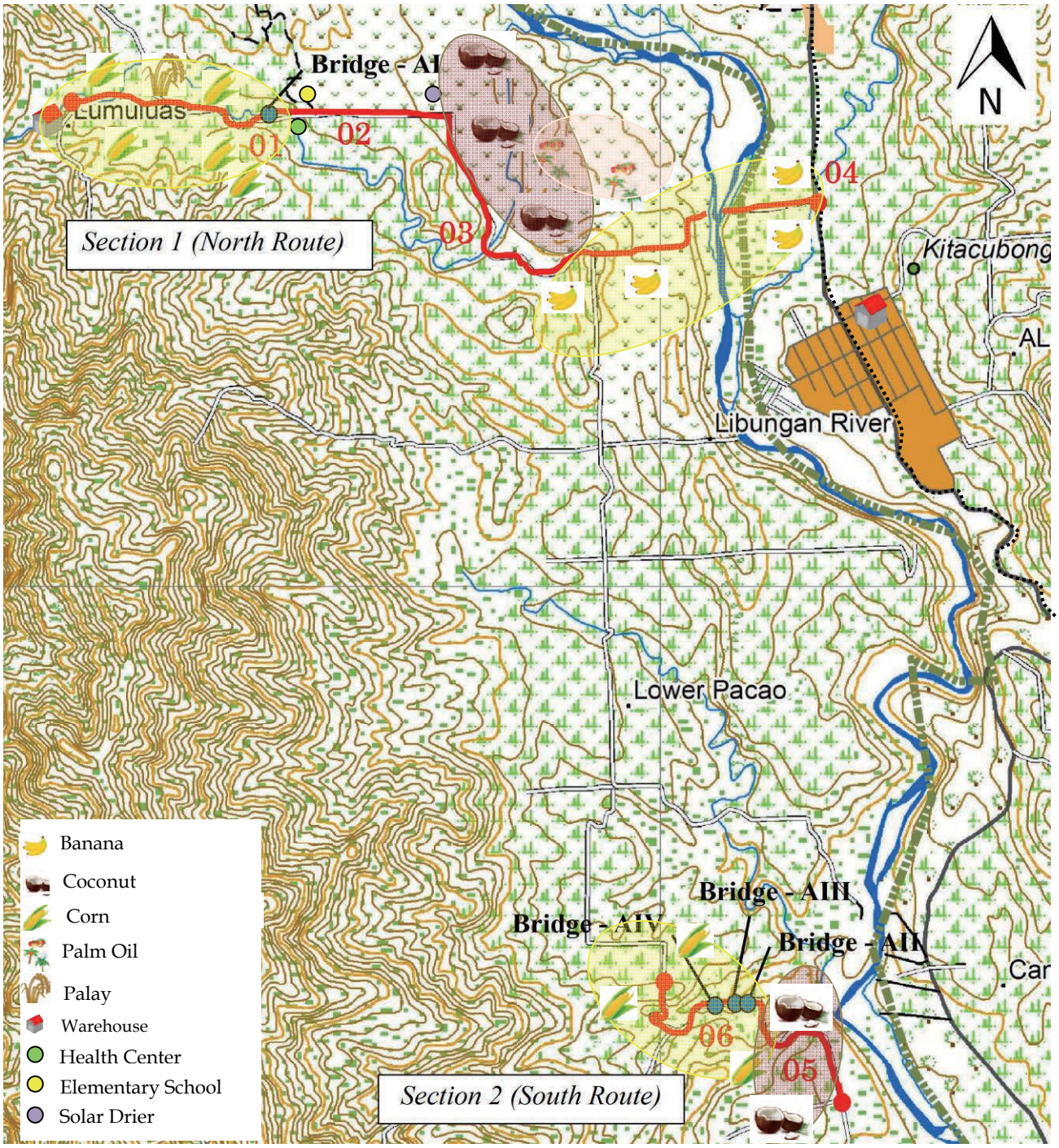
Perspectives

Locations of the Target Sites

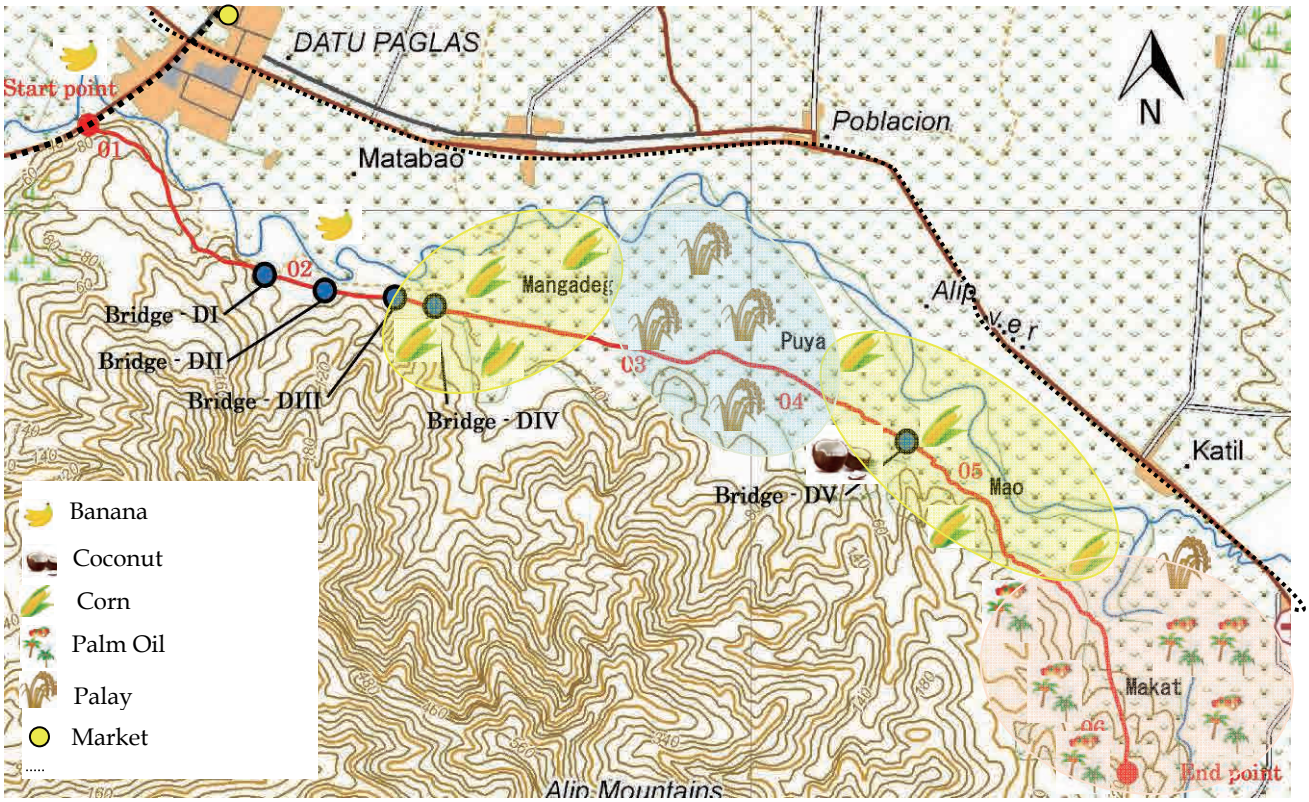
Bumbaran



Alamada


Bridge - AI
Lumuluas
01
02
03
04
Section 1 (North Route)
Kitacubong
AL
Libungan River
Lower Pacao
Bridge - AIII
Bridge - AIV
Bridge - AII
Car
06
05
Section 2 (South Route)
N
Banana
Coconut
Corn
Palm Oil
Palay
Warehouse
Health Center
Elementary School
Solar Drier

Datu Paglas


DATU PAGLAS
Start point
01
Matabao
Poblacion
N
02
Bridge - DI
Bridge - DII
Bridge - DIII
Bridge - DIV
Mangadeg
03
Puya
04
Alip River
Bridge - DV
05
Mao
Katil
Makat
06
End point
Alip Mountains
Banana
Coconut
Corn
Palm Oil
Palay
Market

List of Tables & Figures

<List of Tables>

Chapter 1

Chapter 2

Chapter 3

<List of Figures>

Chapter 1

Chapter 2

Abbreviations

Abbreviation	
ADB	Asian Development Bank
ARMM	Autonomous Region in Muslim Mindanao
BDA	Bangsamoro Development Agency
BIFF	Bangsamoro Islamic Freedom Fighters
CBMS	Community Barangay Monitoring System
CNC	Certificate of Non-Coverage
DA	Department of Agriculture
DAR	Department of Agrarian Reform
DAF-ARMM	The Department of Agriculture and Food in the Autonomous Region in Muslim Mindanao
DENR	Department of Environment and Natural Resources
DLP	Defect Liability Period
DPWH	Department of Public Works and Highways
DSWD	Department of Social Welfare and Development
ECA	Environmentally Critical Area
ECC	Environmental Compliance Certificate
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMB	Environmental Management Bureau
FMR	Farm to Market Road
IDP	Internally Displaced Persons
IEE	Initial Environmental Examination
IMT	International Monitoring Team
IPAP	Indigenous People's Action Plan
JICA	Japan International Cooperation Agency
JICS	Japan International Cooperation System
KBA	Key Biodiversity Area
LAPRAPs	Land Acquisition and Resettlement Action Plans
LARRIPP	Land Acquisition, Resettlement, Rehabilitation and Indigenous Peoples' Policy
LBT	Labour Based Technology
MAO	Municipality Agricultural Officer
MARO	Municipal Agrarian Reform Officer
MILF	Moro Islamic Liberation Front
MNLF	Moro National Liberation Front
NGO	Non-Governmental Organization
NPA	New People's Army
NSO	National Statistics Office
ODA	Official Development Assistance
OECD-DAC	Organisation for Economic Co-operation and Development－ Development Assistance Committee
OPAPP	Office of the Presidential Advisor on the Peace Process
PDP	Philippine Development Plan
PDR	Project Description Report
PNA	Peace-building Needs and Impact Assessment
QCE	Quality Control Engineering
RAP	Resettlement Action Plan
ROW	Right Of Way
SOW	Scope Of Work
TOR	Terms of Reference
USAID	United States Agency for International Development
UNHCR	United Nations High Commissioner for Refugees

Chapter 1 Background of the Project

Chapter 1 Background of the Project

Mindanao is the southern most major island of the Philippines, which has 102,000 km^2 of land area and a population of approximately 22 million (as of 2010). The southwest and central Mindanao had been affected by the conflict for more than 40 years and consequently, it has a relatively high poverty rate. Thus, the region has issues such as lacking in basic social services and aging public infrastructure facilities including schools, health centers, etc.

Mindanao is called “the Land of Promise”, having fertile soil and relatively less damages due to natural disasters such as typhoons, which allows Mindanao to have high agricultural potential.

Based on the above background, the Government of Philippines has been attempting to develop traffic infrastructure in Mindanao and improve distribution of agricultural products. Especially, development of Farm to Market Road (FMR, hereafter), the first distribution route connecting producing areas to markets, can increase agricultural productivity.

This Project aims at development and rehabilitation of FMR in the conflict-affected areas in Mindanao, which will not only improve livelihood and income of residents through agricultural development, but also contribute to poverty reduction, conflict prevention, and stable peace in the target areas.

1-1. Current Situation and Challenges of the Relevant Sectors

1-1-1. Current Situation and Challenges

In the Philippines, roads are categorized in response to their functions. National highways are controlled by the Department of Public Works and Highways (DPWH), and the other roads are by local governments. FMR, highly contributing to agricultural activities, is categorized as barangay road or municipal road.

Table 1-1-1 Road Category

Category	Function
National Highway (Major Highway)	➢ Highways connecting large cities
National Highway (Secondary Highway)	➢ Highways connecting the above major highways to cities, ports, and airports. ➢ Highways connecting state capitals in an area.
Regional Road	➢ Roads connecting cities to municipalities without passing national highways. Roads connecting barangays and national highways.
Municipal Road	➢ Roads connecting several barangays to staple institutions without passing regional roads.
Barangay Road	➢ Other roads connecting a barangays to staple institutions

Of the total length of Philippines'roads (205,497 km), 29,369 km is national highway (2009), 31,284 km is regional road, 7,052 km is city road, 15,803 km is municipal road, and 121,989 km is barangay road respectively.

Table 1-1-2 Road Status (2007)

Category	Length (km)	Pavement Length (km)	Pavement Rate (%)
National Highway	29,369	20,558	70
Regional Road	31,284	7,821	25
City Road	7,052	5,430	77
Municipal Road	15,803	5,373	34
Barangay Road	121,989	8,539	7
Total	205,497	47,721	23

Source:DPWH

The following table shows road length and pavement status of Datu Paglas, a target barangay of this Project. According to the table, most of municipal and barangay roads are gravel roads. Of 18 km (8.7%) of concrete roads, only 6 km (4.3%) are municipal and barangay roads.

Table 1-1-3 Length of Each Road in Datu Paglas

Category	Length (km)	Pavement Length (km)	Pavement Rate (%)
National Highway	8.0	8.0	100%
Regional Road	8.0	4.2	52.5%
Municipal Road	139	6.0	4.32%
Barangay Road	54.5	0	0
Total	209.5	18.2	8.7

Source:Interviews with municipality engineers

On the other hand, the largest number of on-going projects planned by DA in the Region XII is FMR. DA considers improvement of FMR that connects agricultural lands to markets as one of the prioritized projects among improvement projects of agricultural facilities necessary for modanization of agriculture, because improvement of FMR leads to improvement of agricultural productivity and to decrease in loss in distribution of products[1]. Of 34 on-going projects in the Region XII, 23 are for improvement of FMR, which indicates the improvement of FMR is an important and urgent issue.

Table 1-1-4 The Number of Each Project Type in the Region XII

Project Type	Number	Notes
FMR	23	Total Length L=68.04km (Longest 14.83km, Shortest 0.34km)
Demo Farm	2	-
SEED	2	-
Other	7	Flatbed Dryer, Multi Purpose Drying Pavement, Nurseries, Organic Mixing Plant
Total	34	

[1] Republic Act No.8435, "Agriculture and Fishery Modernization Act of 1997 AFMA"

1-1-2. Development Plan

"The Philippine Development Plan 2011-2016" (hereinafter mentioned as PDP) lists the following 3 items as crucial strategic goals for growth, aiming at "comprehensive economic growth"

① Improved food security and increased rural income
② Increased agricultural and fishery sector resilience to climate change risks
③ Enhancement of governance

Of the above crucial items, the item ① describes to improve rural infrastructure to increase farmers' productivity and income. It also depicts that improvement of access to markets through FMR is an effective way of improvement of area productivity and added value of products.

Under DA, "the Mindanao Rural Development Plan" (MRDP) has been executed and the 4 fields below are main contents.

① Rural infrastructure
② Rural financing for agricultural development
③ Natural resource management
④ Enhanced governance capacity

This plan targets poverty reduction in Mindanao through improvement of agricultural and fishery infrastructure and increase in the rural income. Item ① prescribes that FMR development is a measure to improve farmers' productivity and access to the markets.

"PAMANA (2011-2016)", a development plan targeting the conflict-affected areas and areas with much less accesses, depicts poverty reduction through rural development in accordance with target areas' issues so as to promote not only peace-process itself at but also the livelihood of the conflict-affected areas.

For the eternal peace, the plan requires enhancing rural communities to realize foundation of peace and sound communities through development, while securing equal rights and opportunities for even marginalized beneficiaries. Construction of FMR is a part of it.

The purposes of FMR construction in the Project are securing all-year traffic access, promotion of agricultural development of the target areas, and improvement of employment and income of rural people in the target areas, which is consistent with purposes of the PDP, MRDP, and PAMANA as well.

1-1-3. Social Economic Situation

Philippines' economy achieved the highest growth in the ASEAN in 2013, at 7.2%. Nominal GDP was 270.2 billion US$, GDP per capita was 2,790 US$, and inflation rate was 3% in 2013. Of Philippines' GDP, nearly 60% is occupied with service industries, approximately 30% is

mining and manufacturing industries, and roughly 10% is agriculture and forestry. But 31% of whole work force is working for agriculture, forestry and fishery and 53% is for business process outsourcing (BPO) such as call centers[2].

The following is social economic situations of the target 3 municipalities of this Project.

(1) Bumbaran Municipality

Bumbaran is located in the eastern area of the province of Lanao del Sur in ARMM. The average altitude is over 900 m and farmlands stretch from 500 m to 1,500 m. Soil is fertile and agriculture is a staple industry. The area of the municipality as a whole is 54,700 ha, consisting of 17 Barangays.

The city hall and markets are located at Francfort. Most residents are Muslims, and Christians are living at 2 Barangays, namely, Francfort and Sumugot.

Bumbaran has a close relationship in terms of economy and industry with neighboring Kalilangan, consequently, residents in Bumbaran often visit Kalilangan's markets for daily commodities. An improvement of a regional road connecting Kalilangan to Marawi via Bumbaran is under construction.

1) Population

According to a census in 2010, the population of Bumbaran is 8,734 and the number of households is 1,586. Francfort has the largest population that is much more than that of the other barangays, and Comara and Apartfort have the second and third largest population, respectively.

Table 1-1-5 Population and the Number of Households

	Barangay	Population	Number of Household		Barangay	Population	Number of Household
1	Apartfort	664	109	10	Pagonayan	554	89
2	Bagumbayan	532	104	11	Pagalamatan	355	59
3	Bandara-Ingud	220	40	12	Piagma	212	42
4	Comara	725	139	13	Punud	629	121
5	Francfort	1237	256	14	Ranao-Baning	379	63
6	Lambanogan	334	66	15	Salam	356	58
7	Lico	484	85	16	Sigu-an	382	60
8	Mansilano	551	89	17	Sumugot	622	123
9	Natangcopan	498	83		**Total**	8,734	1,586

Source: Census 2010, National Stasistical Office

[2] GDP: Japan External Trade Organization
Work Force: Ministry of Foreign Affairs

2) Religions, Tribes, and Peoples

The proportion of Muslims and Christians is 6:4 in Bumbaran. Muslims are relatively the majority. The constitution of tribes and peoples is shown below

Table 1-1-6 The Details of Bumbaran Municipality's Religions, Tribes, and Peoples

Religion	Muslims: 60%	Christians: 40%
Tribes and Peoples	Maranao: 60%	Peoples of Christian Origin: 40% The details of the people of Christial origin: Ivatan・Ilonggo・Ilocano・Cebuano・Kapampangan

3) Industry

The staple industry is agriculture and the main products are corn, rice (both wet and dry field), banana, palm oil, coconut, gum, and mango.

There are banana plantations (320 ha) in Sumugot and Comara that are the target barangays of this Project. And a local company supported by Japanese companies tentatively cultivates buckwheat in Bumbaran (41 ha). The detail of agricultural land use is below.

Table 1-1-7 Agricultural Land Use in Bumbaran

Products	ha	Products	ha
Corn	6,491	Sugarcane	700
Rice	330	Vegetables	5
Banana	840	**Total**	8,366

Source: Interview with Barangay captains and residents

4) Poverty

The poverty rates of Francfort and Sumugot, the target areas of this Project are low. Barangays in semi-mountainous areas with less population such as Lico and Ranao Baning have high poverty rates.

Table 1-1-8 The Household Poverty Rate of Barangays in Bumbaran

Rank	Barangay	**Household Poverty Rate** (%)	Rank	Barangay	**Household Poverty Rate** (%)
1	LICO	89.7	10	SALAM	61.8
2	RANAO-BANING	87.8	11	PUNUD	57.0
3	PAGONAYAN	82.8	12	BANDARA-INGUD	56.8
4	LAMBANOGAN	78.6	13	COMARA	53.2
5	APARTFORT	75.7	14	SAGUA-AN	52.5
6	NATANGCOPAN	72.7	15	SUMUGOT	49.0
7	PAGALAMATAN	66.7	16	BAGUMBAYAN	40.5
8	PIAGMA	65.3	17	FRANKFORT	39.4
9	MANSILANO	61.8			

Source: Community Barangay Monitoring Sysytem (CBMS) 2009, DILG

5) The Target Barangays

Basic information on the target barangays is below.

Table 1-1-9 Basic Information on the Target Barangays

	Francfort	Sumugot
Population	1,237	662
No. of Households	256	123
	Households are flocked in the center of the barangay locating short of the beginning of the planned site, so few houses are along the road. The road goes through farmlands.	Houses concentrate at the end and a few hundreds meters short of the end of the planned road. Other parts of the road are along farmlands.
Religion	Muslim 2% Chrictian 98%	Muslim 0% Christian 100%
Tribe	Ivatan 60% Ilonggo 15% Cebuano 15% Ilocano 5% Kapampangan 3% Maranao 2%	Ilocano 80% Ilonggo 10% Cebuano 10%
Staple Agri-Product	Corn, Sugarcane, Rice (dry field), Fruit, Vegetable (Carrot, Cabbage, Tomato, Squash, Onion)	Corn, Sugarcane, Rice (dry field), Fruit, Vegetable (Carrot, Cabbage, Tomato, Squash, Onion)
	The area of Uni Frutti's banana plantation is 25 ha in Sumugot and Francfort. Its products are carried to Kalilangan's markets in the neighboring municipality.	
Detail of Land use	Total 1,221(ha) 4.8 ha/ farmer Corn 600 Rice 5 Banana 10 Sugarcane 600 Vegetable 2 gum 4	Total 291(ha) 2.4 ha/ farmer Corn 120 Rice 8 Banana 60 Sugarcane 100 Vegetable 3
Main Facility	Elementary School 1 High School 1 Islamic School 1 Mosque Church Health Center 1	Elementary School 1 High School Islamic School Mosque Church Health Center
Residents' Transportation	They use horses and water buffalos to carry products from farmlands to national highways and/ or corn drying facilities, because existing roads are impassable for vehicles. This does not mean that every household has horses and water baffalos. They hire them including manpower when they need to carry their products or to plow fields. Farmers' current purposes to use the planned road are; ➢ to commute to farmlands from their houses, ➢ to carry products from farmlands to corn drying facilities and/ or where they can put them on trucks, ➢ to drive the trucks with products to markets (A part of roads to markets). Although the Project targets the above barangays that are only 2 barangays where Christians are the majority in Bumbaran, rehabilitation of the target road will contribute to increase in traffic volume in the other barangays where Muslims are the majority.	

Note:The above information is based on interviews with relevant persons.

(2) Alamada Municipality

Alamada is located in the Region XII (*SOCCSKSARGEN)*, northeastern edge of Cotabato province. Its altitude is about 500 m or more. The width of the municipality is 78,750 ha, and the northern area is mountainous. It consists of 17 Barangays and several rivers including the Libungan River are running through communities. The target barangays of Mapurok, Pacao, and Macabasa are west to the Libungan River.

The eastern side is the center of economy, including municipal governmental bodies, high schools, and Kitacubong barangay having the cityhall. A national highway is east to the Libungan River and running from Libungan municipality (south to Alamada) to Banisilan municipality (east to Alamada). Trade is highly active in Alamada through the national highway east to the Libungan River, partly because Libungan is connected to a national highway connecting Davao and Cotabato.

The central government gave “Good Seal governance” to Alamada in terms of governance and transparency.

1) Population

The 2010 census shows that Alamada’s population is 56,813, and the number of households is 11,354. Dado barangay and Bao barangay have relatively large population.

Table 1-1-10 Population and the Number of Households

	Barangay	Population	No. of Households		Barangay	Population	No. of Households
1	Kitacubong	5,183	1,036	10	Mapurok	2,128	425
2	Mirasol	1,351	270	11	Pacao	1,944	388
3	Bao	7,338	1,467	12	Paruayan	2,579	515
4	Barangiran	3,991	798	13	Pigcawaran	3,778	755
5	Camansi	1,523	304	14	Polayagan	2,226	445
6	Dado	9,733	1946	15	Rangayen	2,793	558
7	Guiling	5,284	1056	16	Lower Dado	1,532	306
8	Macabasa	1,634	326	17	Raradangan	1,650	330
9	Malitubog	2,146	429		**Total**	56,813	11,354

Source:NSO 2010

2) Religions, Tribes, and Peoples

The constitution of tribes and religions of the municipality is shown below. Christians occupy more than 80% and Muslims are over 10%. Of Christians, migrants from Bisaya are the majority. Native tribes do not form their own communities, but live in several barangays. Some co-exist with other Christians and Muslims

Table 1-1-11 The Details of Bumbaran Municipality’s Religions, Tribes, and Peoples

Religion	Muslim: 13% Christian: 85% Others: 2%
Tribes/ Peoples	Ilonggo: 50% Cebuano: 23% Ilanon: 10% Ilocano: 6% Karaya: 5% Maguindanaon: 2% Manobo: 1% Maranao: 1% Others: 2%

Source: Interviews with municipality-related persons

3) Industry

The staple industry is agriculture and the main products are corn, rice (both wet and dry field), palm oil, coconut, and gum. Basically, these products are harvested in every barangay in the municipality. Brokers from Midsayap come to buy coconuts and palm oil, so the areas with maintained FMR are advantageous. Regarding the 3 barangays west to a river, trucks of brokers are not capable of crossing the river when the water level rises, which can mean that they lost opportunities for sales. The following shows agricultural land use of the municipality. Rangayen barangay at the height of the municipality grows vegetables such as potatoes, carrots, and greens.

Table 1-1-12 Agricultural Land Use in Alamada

Products	ha		
Rice	4,142	Gum	386
Corn	22,000	Fruit	45
Coconut	1,815	Vegetable	1.25
Palm oil	569	**Total**	28,958.25

Source: Interview with municipality-related persons

4) Poverty

According to Alamada municipality's staff, more than 60% of its population is in poverty that they monthly earn less than 6,000 Pesos. The CBMS data in 2009 show that Maprok, a target barangay of this Project, has the highest poverty rate. The second and third highest are Guiling and Bao, which indicates that barangays distant from the city center have high poverty rate.

Table 1-1-13 The Household Poverty Rate of Barangays in Alamada

Rank	Barangay	Household Poverty Rate (%)	Rank	Barangay	Household Poverty Rate (%)
1	MAPUROK	78.74	10	RANGAYEN	61.83
2	GUILING	78.30	11	BARANGIRAN	58.93
3	BAO	75.12	12	PIGCAWARAN	56.15
4	MALITUBOG	72.92	13	LOWER DADO	51.57
5	PARUAYAN	70.70	14	CAMANSI	45.05
6	MACABASA	68.91	15	RARADANGAN	44.88
7	DADO	65.98	16	MIRASOL	44.10
8	PACAO	64.98	17	KITACUBONG (POB.)	34.51
9	POLAYAGAN	61.95			

Source: Community barangay Monitoring System (CBMS) 2009, Department of Interior and Local Government (DILG)

5) Target Barangays

Basic information on the target barangays is as follows. Except for the barangays in the table 1-1-14, Camansi and Polayagan barangays are located at the planned sites. The length of FMR running in Camansi is short and Camanci has only a few households. Only 500 m of FMR will run in Polayagan and Polayagan has just 3 farmers along it. Here, Mapurok and Pacao shall be depicted.

Table 1-1-14 Basic Information on the Target Barangays

	Mapurok		Pacao	
Population	2,128		1,944	
No. of Households	458		432	
Religion	Muslim	95%	Muslim	5%
	Christian	4%	Christian	80%
	Other	1%	other	15%
Tribe	Iranono	95%	Ilonggo	80%
	Cebuano	4%	Maguindanaon	4%
	Manobo (Native tribe)	1%	Manobo (Native tribe)	15%
Staple Agri-product	Rice (Wet and dry field), corn, coconut, palm oil, and fruit		Rice (Wet and dry field), corn, coconut, palm oil, and fruit	
	Corn and sugarcane are shipped to markets in Kalilangan municipality. Palm oil and coconut are shipped to Midsayap.			
Agricultural Land Use	Total 837.50(ha) 0.5ha/ farmer		Total 871.75(ha) 0.5ha/ farmer	
	Rice	50	Rice	90
	Corn	530	Corn	655
	Coconut	150	Coconut	63
	Palm oil	82	Palm oil	43
	Fruit	25	Fruit	20
	Vegetable	0.50	Vegetable	0.75
Main Facility	Elementary school	1	Elementary school	2
	Islamic school	3	Health center	1
	Mosque	4		
	Health center	1		
Residents' Transportation	Although a part of the target FMR is paved, pavement is damaged and graveled parts of other parts are not good for vehicles as surfaces are eroded. Regardless of this, vehicles can run slowly, so trucks for agri-products and buses are operating. The Libungan River, however, is impassable for vehicles when the water level is high, as it has only footbridges and rafts.			

Note: The above information is based on interviews with relevant persons.

(3) Datu Paglas Municipality

Datu paglas is located at the eastern edge of Maguindanao province of the ARMM, having flat ground of 0-3 meters above sea level. It also has sloped ground along Mt. Alep, northeastern to the municipality. The area of municipality is 26,950 ha, composed of 23 barangays. Poblacion barangay has urban functions such as city hall and markets. Most of residents are Muslims.

Datu Paglas has close economic and industrial relationships with neighboring Buluan municipality, Tacurong City, and Koronadal City. The central government gave "Good Seal Governance" to Datu Paglas for its governance and transparency.

1) Population

According to the census in 2010, the population of Datu Paglas is 20,290 and the number of households is 3,338. Poblacion has the largest population, followed by Alip and Dawamato. The target barangays' population in this Project is relatively small.

Table 1-1-15 Population and the Number of Households

	Barangay	Population	No. of Households		Barangay	Population	No. of Households
1	Alip (Pob.)	1,436	275	13	Bonawan	530	84
2	Damawato	1,664	265	14	Bulod	658	120
3	Katil	704	101	15	Datang	1,023	185
4	Malala	673	102	16	Elbebe	308	61
5	Mangadeg	664	117	17	Lipao	655	110
6	Manindolo	744	108	18	Madidis	1,174	180
7	Puya	463	85	19	Makat	489	72
8	Sepaka	933	140	20	Mao	485	72
9	Lomoyon	683	111	21	Napok	626	106
10	Kalumenga (Kalumanga)	641	100	22	Poblacion	3,393	587
11	Palao sa Buto	740	107	23	Salendab	681	100
12	Damalusay	923	150		**Total**	20,290	3,338

Source: Census 2010, NSO

2) Religions, Tribes, and Peoples

Most residents are Muslims, and Maguindanao tribe is the majority.

Table 1-1-16 The Details of Datu Paglas Municipality's Religions, Tribes, and Peoples

Religions	Muslim: 96% Christian: 3% Other: 1%
Tribes/ Peoples	Maguindanaon: 96% Ilocano: 2% Cebuano: 1% Manobo: 1%

3) Industry

The staple industry is agriculture and the main products are corn, rice (both wet and dry field), palm oil, coconut, banana, and mango. These main products are the same as the other barangays in Datu Paglas.

A firm called Ardexcor is running a large banana plantation in Alip barangay, a neighboring barangay of the target areas. Moreover, a firm called Garcia has a palm oil plantation of 400 ha in Makat, a target barangay of this Project. Besides, a firm called Uni Frutti holds a banana plantation in Buluan, a neighboring municipality of Datu Paglas. The detail of agricultural land use is below.

Table 1-1-17 Agricultural Land Use in Datu Paglas

Products	Ha	Products	Ha
Rice	3,000	Corn	1,000
Banana	800	Mango	5
Palm oil	1,400	Coconut	35
		Total	6,240

Source: Interviews with Barangay captains and residents

4) Poverty

CBMS data in 2009 shows relatively higher poverty rate than the other target municipalities of this Project. Makat and Mangadeg have high poverty rate in Datu Paglas.

Table 1-1-18 The Household Poverty Rate of Barangays in Datu Paglas

Rank	Barangay	Household Poverty Rate (%)	Rank	Barangay	Household Poverty Rate (%)
1	Palao sa Buto	99.66	13	Madidis	94.53
2	Napok	99.65	14	Mao	93.72
3	Kalumenga(Kalumanga)	99.32	15	Bulod	92.83
4	Datang	99.25	16	Damalusay	90.89
5	Makat	98.62	17	Manindolo	90.46
6	Mangadeg	98.48	18	Puya	88.57
7	Malala	97.15	19	Lipao	85.71
8	Salendab	96.27	20	Katil	84.36
9	Elbebe	96.26	21	Alip	72.42
10	Damawato	95.42	22	Sepaka	68.8
11	Lomoyon	95.13	23	Poblacion	67.47
12	Bonawan	94.55			

Source: Community Barangay Monitoring Sysytem (CBMS) 2009, DILG

5) Target Barangay

Basic information on the target barangays is below.

Table 1-1-19 Basic Information on the Target Barangays

	Mangadeg	Puya	Mao	Makat
Population	664	463	485	489
No. of Households	117	85	72	72
	Along the planned site, houses gather along the existing road up to 500 m from a national highway.	These barangays do not have roads connecting to national highways. Residents cross rivers to reach the other shore.		
Religion	Muslim 100%	Muslim 100%	Muslim 100%	Muslim 99% Others 1%
Tribes/ Peoples	Maguindanao 100%	Maguindanao 100%	Maguindanao 100%	Maguindanao 99% Others 1%
Staple Agri-Products	Corn, rice (wet and dry field)	Corn, rice (wet and dry field), coconut (copra)	Corn, rice (wet and dry field), mango, coconut (copra)	Corn, rice (wet and dry field), palm oil
	Palm oil is the majority in Mangadeg as large plantations have already hired contract farmers. Garcia has a palm oil plantation of 400 ha in Makat, a target barangay of this Project.			
Detail of Agricultural Land Use	Total 403(ha), 5.0ha/ farmer Rice 98 Banana 3 Corn 300 Mango 0.5 Coconut 1.5	Total 359(ha) 4.4ha/ farmer Rice 280 Corn 56 Coconut 18 Mango 5	Total 400 (ha) 3.0ha/ farmer Rice 80 Corn 200 Coconut 20 Palm oil 100	Total 1,430(ha) 3.0ha/ farmer Rice 30 Corn 100 Palm oil 1,300
Main Institutions	Elementary school 1 Islamic school 1 Health center 1	Elementary school 1 Islamic school 1 Health center 1	Elementary school 1 Islamic school 1	Elementary school 1 Islamic school 1 Health center 1
Residents' Transportation	4-wheel vehicles basically cannot pass other than a part connecting to national highway, consequently, the number of 4-wheel vehicle along the planned site in Puya and Makat is only 1 each. In contrast, much more households own motorcycles. Fundamental means for carrying products are water baffalos. With them, residents cross the Alip River for shipment of products when the water level is low.			

Note:The above information is based on interview with relevant persons.

1-2. Background and Outline of the Requested Grant Aid

(1) Request from the Government of Philippines

This survey project is carried out in succession to “The Study for Socio-Economic Reconstruction and Development of Conflict-Affected Areas in Mindanao” (2007-2009). This Project was initially requested as a project including construction of “Farm to Market Road” (FMR) and several other components. Afterwards, however, this Project was designed to focus on construction and rehabilitation of FMR considering the significance of agricultural development in the region, from the viewpoint of community development of the target areas.

Based on the above background, this Project aims at securing all-year traffic access connecting the target farm villages to major highways through construction of FMR, and thus contributing to the employment creation and livelihood improvement through agricultural development driven by FMR (This aim was confirmed in the preparatory survey on April, 2013). It is expected that the people in the target areas can realize “peace dividend” in the process of employment creation and livelihood improvement, and through the alleviation of regional conflicts, which will result in an environment without conflicts.

The government of Philippines requested development and rehabilitation of FMR in the following 3 districts that were affected by the Mindanao Conflict. The contents of the request were confirmed in the on-site survey this time and Alamada’s target roads were finally concluded through discussion with DA, BDA, and the municipality.

(2) Outline of the Target Roads

The above contents were confirmed through on-site surveys. Regarding Alamada municipality in which 3 roads were requested, the contents of the request were confirmed through on-site surveys with municipality staff, DA, OPAPP, and BDA. As the municipality asked us to survey 1 road, this time’s on-site survey did not cover the other 2 roads. The outline of the current status of roads we surveyed this time is below. For your information, Annex 4 is the request form from cities relevant to the target roads.

Table 1-2-1 Outline of Roads

Target Areas	Contents of Request
Northern region; Lanao province, Bumbaran	Target:Rehabilitation of Farm to Market Road(FMR) Length: Approx. 5km Start Point: Francfort Barangay End Point: Sumugot Barangay Facilities: 3 river-crossings (1 Bridge, 1 Box Culvert, 1 Cause Way), Road-crossing, Drainage Outline of Roads: This is a road connecting Francfort to Sumugot whose starting point joins to a concreted barangay road. ADB has been implementing a road rehabilitation project at the end point, whose expected completion year is 2015. After the completion of the Project, this road will be concreted up to the junction with a national highway.
Central region; Cotabato province, Alamada	Target: Rehabilitation of FMR(Farm to Market Road) Length: Approx. 6km Start Point: Polayagan Barangay (national highway) End Point: Mapurok Barangay Facilities: 2 river-crossings (1 Bridge), Road-crossing, Drainage Outline of Roads: This is a FMR connecting a national highway penetrating the town center to Mapurok barangay. Accesses to the town center depend on the Libungan River water level, and 4-wheel vehicles can pass it when the water level is low. But it is impossible if the water level is high after rainfall. There are 2 river-crossings within the planned road area, which deny crossing after rainfall. Target: Rehabilitation of FMR (Farm to Market Road) Length: Approx. 2km Start and End Point: within Pacao Barangay Facilities: River-crossing (Box culvert), Road-crossing, Drainage Outline of Roads: This road parallels to a river accessing to a national highway from Mapurok Barangay. Although this road was rehabilitated to secure all-year traffic access into national highway in 2009, a part of it is impassable for vehicles due to damaged river-crossing. Rehabilitation of the damaged part in this Project will secure all-year traffic access into thenational highway.
Southern region; Maguindanao province, Datu Paglas	Target: Construction and rehabilitation of FMR (Farm to Market Road) Length: Approx. 9km Start Point: Mangadeg Barangay (national highway) End Point: Makat Barangay Facilities: River-crossings (4 Bridges, 1 Box culvert) Outline of Roads: Most of the planned road is a new construction, although 1 km from both ends are graveled and have footpaths as a FMR.

(3) Consideration on Validity of the Target Roads

Following the project's policy; "securing all-year traffic access connecting the target farm villages to major highways through construction of FMR, and thus contributing to the employment creation and livelihood improvement through agricultural development driven by FMR", plausibility as a Grant Aid Project for conflict prevention and peace-building was confirmed after grasping situations around the requested roads through on-site surveys and interviews about prospected effects after the Project with relevant institutes.

Table 1-2-2 Plausibility of Project Implementation (Results of On-site Surveys and Interviews)

Target	Consideration
Bumbaran	As follows, rehabilitated FMR will be used as paved ways connecting to major highways that allows vehicles to pass. Consequently, shipment of products will become easy. Improvement of income is also likely due to cultivation of buckwheat with high market value. ・**Current Status of Road**: The surface of the road are so rough that it is impassable for 4-wheel vehicles. Although agricultural products are carried by men or on carts drawn by cattles, there are difficulties in carrying them. Besides, 3 river-crossings are aged and/ or undeveloped, which hampers passing after rainfalls. ・**Current Status of Agricultural Activities**: Most of areas along the road are cultivated lands for corn and sugarcane. Cultivation of buckwheat has begun in the municipality in these days, and the target areas also will begin buckwheat cultivation after rehabilitation of the road. ・**Connection to Major Highways**: Development of roads connecting the planned road to a national highway is now under construction. After the completion, the planned road will connect to national highway and make it possible to access to important institutions such as markets.
Alamada	As follows, rehabilitation of a certain part of the road will improve living environment and secure accesses to national highways in emergency such as flooding. Ordinarily, people and vehicles normally cross the Libungan River to access to town markets and storage spaces. FMR rehabilitation will improve transferring efficiency of agricultural products. Moreover, the municipality intends to introduce palm oil and coconut cultivation. FMR improvement has a huge positive impact on residents' income as shipment of them needs large trucks. ・**Current Status of Roads**: They are undeveloped FMR. Although vehicle can manage to run, it is unstable. 2 river-crossings within the planned roads hamper passing when the water level rises after rainfalls. ・**Current Status of Agricultural Activities**: Most of areas along the roads are cultivated lands for corn, rice, and coconut. The municipality positively introduces palm oil, gum, and so on, as products with high market values. ・**Connection to Major Highways**: A road that parallels to the Libungan River leads to the neighboring town. All-year traffic access into national highway will be secured by rehabilitation of impassable parts. When it comes to accesses to the town center, passing the Libungan River is common. Whereas the river is normally shallow and passable for vehicles, it hampers passing when the water level rises after rainfalls.
Datu Paglas	As follows, both residents' farming and industrial large plantations are running in the target area. When vehicles currently crossing a river use the rehabilitated FMR, they can directly access to national highway, which will largely improve transferring efficiency and lead to employment in their plantations. This will result in livelihood improvement. ・**Current Status of Road**: Although 1 km from both ends are graveled, the other parts are undeveloped. Besides, 5 river-crossing points prevent vehicles from passing. ・**Current Status of Agricultural Activities**: Rice, palm oil, corn, etc. are cultivated in the target area. Beyond the end of the road there are plantations for palm oil and banana run by firms, and they are supposed to be widened. ・**Connection to Major Highways**: Residents around the start point have accesses to national highway because the point connects to the highway. The others cross the Alip River to access to the town center.

1-3. Japanese Assistance Trend

(1) Relationship with Japanese Assistance Policy

Under the fundamental principle (grand purpose) “to implement economic cooperation to realize “comprehensive growth” which “the Philippines Development Plan (2011-2016)” aims at and to further enhance strategic partnership”, the following 3 crucial fields are described.

① Sustainable economic growth through investment promotion
② Overcoming vulnerability and stabilization of livelihood infrastructure
③ Peace and development of Mindanao

This Project aims at securing all-year traffic access connecting the target farm villages to major highways through construction of FMR, and thus contributing for the employment creation and livelihood improvement through agricultural development driven by FMR. In addition, it is expected that the people in the target areas can realize “peace dividend” through the alleviation of regional conflicts. This Project is supposed to promote the third crucial field above, namely, peace and development of Mindanao.

The following table shows Japanese assistances to Mindanao. Development of small-scale agricultural infrastructure for enhanced agricultural productivity is implemented as Yen Loan Projects. Rice development, mapping for infrastructure development, improvement of governance capacity, and community development are fulfilled as Technical Cooperation Projects.

Table 1-3-1 Japanese Technical Cooperation and Yen Loan Projects
(Programs for Mindanao’s Peace and Development)

Category	Year	Title/ Others	Outline
Technical Cooperation	2005.2~ 2010.2	Rice-Based Farming Systems Training and Support Program for the ARMM	Cooperating with International Rice Research institute Philippines, this project aimed at livelihood improvement of 3,450 farmers by improving their farming methods.
	2008.5~ 2013.3	ARMM Human Capacity Development Project	A project for ARMM government’s governance, economic development, and capacity development of staff in infrastructure development sectors.
	2010.3~ 2013.2	Topographic Mapping Project for Peace and Development in Mindanao	A project to formulate an integrated and sustainable infrastructural development plan for the ARMM Autonomy’s community development. This project aimed at a timely infrastructure development plan while confirming urgency and gap in ARMM’s infrastructure rehabilitation.
	2012.3~ 2015.2	Project for Capacity Building for Community Development in Conflict-Affected Areas in Mindanao	A technical cooperation project for effective and efficient community development of the conflict-affected areas and for enhancement of BDA’s capacity.
	2012.4~ 2017.3	Rice-Based Farming Technology Extension Project for the Autonomous Region of	This project’s purposes are to solve issues related to rice crops dependent on natural rainfalls in ARMM, traditional farming,

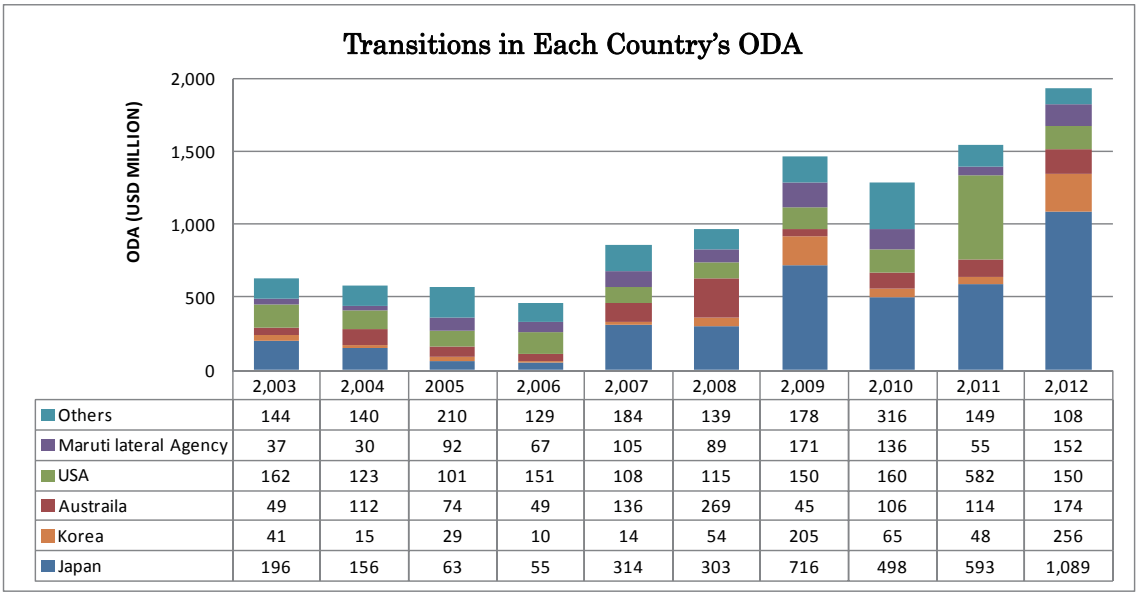
Category	Year	Title/ Others	Outline
		Muslim Mindanao (ARMM)	low-quality seeds, and to improve rice crop farming.
	2013.7~ 2016.7	Comprehensive Capacity Development Project for the Bangsamoro	Assistance for formulation of the Bangsamoro Development Plan for the establishment of Bangsamoro Autonomous Government.
Technical Cooperation for Development Planning	2007.2~2009.8	The Study for Socio-Economic Reconstruction and Development of Conflict-Affected Areas in Mindanao	Support for formulation and implementation of emergent revival projects and while conducting necessary surveys for formulation of revival and development plans.
	2008.8~2009.3	The Study on Infrastructure(Road Network) Development Plan for the Antonomous Region in Muslim Mindanao(ARMM)	Promotion of economic revival and poverty reduction and improvement of basic social services in the ARMM through rehabilitation of infrastructure of the ARMM.
	2010.3~2012.10	Development Study on Promotion of Local Industry in ARMM	Formulation of a strategy for local economy activation through promotion of local industries in the ARMM, After analyzing their potential and limitations.
Dispatch of Expert	2006.3~2013.7	ARMM Regional Development Senior Advisor (No. of Experts: 1)	Advising and instructing on administrative capacity building and support for community development of the ARMM.
	2012.7~2013.3	Short-term Advisor for Business Development Services in ARMM (No. of Expert: 1)	Reinforcement of ARMM's business development services and reinforcement of small groups' and microfinance institutes' business planning capacity.
	2012.7~2013.3	Short-term Advisor for Agri-Business Development in ARMM (No. of Expert: 1)	Reinforcement of ARMM's, small groups', and farmers' agri-business capacity.
Official Development Assistance Loans	2004~2012	ARMM Social Fund for Peace and Development Project (Credit limit: 2.47billion Yen)	This project was funded by WB and Canadian International Development Agency, consisting of 1. Support for community development (roads, water supply etc.), 2. Support for strategic regional infrastructure development (road rehabilitation, community center etc.), 3. Peace building (peace education program, human rights campaign etc.), 4. Institutional reinforcement and support for governance (reinforcement of the ARMM government's and LGU's budgetary and supervising capacity). Support the target 200 barangays on abovementioned 1. 2. 4.
	2004.4~2011.12	Central Mindanao Road Project (Credit limit: 3.117billionYen)	Extension and pavement works of existing roads between Cotabato city and Sultan Kudarat around which many people with lower income live. Exchange of 3 tentative bridges with permanent bridges. After works abovementioned, the project contributed to promotion and activation of Cotabato city including its vicinity and southeastern area of Mindanao's economy through transportation efficiency and cost reduction and promotion of human/ material exchange.
	2012.3~2016.12 (expected)	Mindanao Sustainable Agrarian and Agriculture Development	A Yen Loan project contributing to agricultural production enlargement and

Category	Year	Title/ Others	Outline
		Project (Credit limit: 6.063 billion Yen)	improvement of farmers' income by improving small farmers' productivity through development of market accesses, development of infrastructure such as small irrigations, and support for farming in Mindanao.
Group Training	2005~2007	Course title: Participatory Comprehensive Health Administration Promotion In the Autonomous Region in Muslim Mindanao For the Republic of the Philippines Participants:12×3years	Improvement of access and quality of health care services through 1. Trainings, in which trainees were health officers and health workers, in management of barangay health centers and participatory development. 2. Implementation of regional health activities selected after the abovementioned trainings. 3. Development of communities' health centers.
Grant Aid	2004	Grant Aid for Increase of Food Production for underprivileged farmers in Mindanao (Credit limit: 0.2 billion Yen)	A project aiming to improve food self-sufficiency rate of underprivileged farmers in Mindanao through responding to FAO's ask for assistance for increase of food production.
	2005	The Food Aid Programme (via WFP) (Credit limit: 0.14 billion Yen)	Assistance for stabilization of regional politics and economy and reduction of shortage of food in Mindanao through assisting WFP's food distribution projects.
	2006	The Food Aid Programme (via WFP) (Credit limit: 0.14 billion Yen)	Continued assistance for stabilization of regional politics and economy and reduction of shortage of food in Mindanao through assisting WFP's food distribution projects.
	2012	The Project for Construction of a Training Center for Bangsamoro (the Grant Assistance for Grassroots Human Security Projects) (Credit limit: 80 million Yen)	Helping Bangsamoro Development Agency (BDA) to continuously give effective and quality trainings. Necessary materials for BDA's training facilities such as projectors, audio system, furniture (tables and chairs etc.) were provided.
	2013	The Project for Construction of Post Harvest Facilities in Datu Abdullah Sanki, Maguindanao (the Grant Assistance for Grassroots Human Security Projects) (Credit limit: 10 million Yen)	Provision of post harvest facilities and agricultural machineries such as tractors to Datu Abdullah Sanki in Maguindanao to improve farmers' agricultural productivity.

1-4. Other Donors' Assistance Trend

(1) Each Countries' Transitions

Transitions of assistance of each country for the Philippines are shown in the following figure. Japan is the largest donor in 2012 ($1 billion), followed by South Korea ($256 million), Australia ($174 million), and US ($150 million).



	2,003	2,004	2005	2,006	2,007	2,008	2,009	2,010	2,011	2,012
Others	144	140	210	129	184	139	178	316	149	108
Maruti lateral Agency	37	30	92	67	105	89	171	136	55	152
USA	162	123	101	151	108	115	150	160	582	150
Austraila	49	112	74	49	136	269	45	106	114	174
Korea	41	15	29	10	14	54	205	65	48	256
Japan	196	156	63	55	314	303	716	498	593	1,089

Figure 1-4-1 Transitions in each Country's ODA

Source: OECD- DAC, on a commitment basis

ODA allotments to projects of Loan and Grant Aid in each sector in the Philippines are below. FMR projects have been fulfilled in the sectors of agriculture, agrarian reform, and natural resources[3]. $1.3 billion and $370 million are allotted to these sectors for Loan and Grant Aid projects, respectively.

Table 1-4-1 Allotment of ODA to each Sector

Sector	No. of Project	Amount	Share
(1) Loan		(Billion USD)	
Infrastructure	38	5.713	56.19
Agriculture, Agrarian Reform, and Natural Resources	23	1.393	15.33
Social Development, and Community Development	9	1.070	11.77
Governance, Institutional Reform	5	1.338	14.72
Industry, Trade, and Tourism	2	0.115	1.27
Total	77	9.089	100
(2) Grant Aid		(MillionUSD)	
Infrastructure	35	382.	12.91
Agriculture, Agrarian Reform, and Natural Resources	127	377.30	12.7287
Social Development, and Community Development	217	1,537.25	51.84
Governance, Institutional Reform	104	598.08	20.17
Industry, Trade, and Tourism	20	69.99	2.36
Total	503	2,965.49	100

National Economic Development Authority CY 2013 ODA Portfolio Review Report (2013)

[3] The 3 sectors have done the following supports; FMR, Irrigation System/ Facilities, Agricultural Credit for Agri-business Promotion, Multi-purpose Facility, Bridge, Contermeasure against Flooding, Solar Dryer, Warehouse Management, Small Water Supply Facility, Catchment Area Management, Forestry Management, Agro-forestry, Agri-business, and Environmental Management etc.

(2) Outline of Other Donors' Assistance in Mindanao

According to interviews at the areas subjected to our surveys, US and Australia provide much assistance. ADB is also implementing development of roads. The following table shows each donor's assistance.

Table 1-4-2 Other Donors' Assistance

Donor	ODA Field
USA	USA implemented "Growth with Equity in Mindanao (GEM3)" for small and fundamental infrastructure development and livelihood improvement at the municipality level from 2008 to 2012. "Country Development Cooperation Strategy 2012-2016" states that USA has been doing assistance for rural governments' capacity development, and for peace and development through residents' participation.
Australia	Australian assistance's pillars are improvement of access to basic education, improvement of administrative services through administrative capacity development, and rehabilitation of Mindanao's conflict-affected areas. Regarding improvement of administrative services, Australia has implemented teachers's capacity development and construction of schools in the education sector, and it has fulfilled health staff's capacity development through workshops in the health sector. Australia has improved female leaders' capacity in the conflict-affected areas so that they can lead communities.
ADB	A project called "Improving National Roads for Inclusive Growth in Mindanao Project 2016-2020" is planned to develop major highways in Mindanao. This includes development of major highways connecting to Datu Paglas, which will improve accesses to other areas such as Davao from Datu Paglas.
WB	WB has been fulfilling community development projects in Mindanao. These projects aim at improvent of rural income and agricultural/ fishery productivity through increases in small farmers' market-oriented products and improvement of their accesses to markets. To realize these, WB helps revising agricultural plans and promoting investment in rural infrastructure. It approved a community development project ($500 million) in August, 2014.
UNDP	UNDP is implementing a project called "Support to Framework Agreement on Bangsamoro" between January, 2013 and the end of 2015. The contract amount is about a million dollars as of 2014. This project intends to contribute to the transition from ARMM to the Bangsamoro autonomous government through the conflict parties' capacity development.

1-5. Current Situations of Project Site and its Surroundings

1-5-1. Natural Conditions

In order to secure required data for designing, cost estimation and execution schememe, the Project conducted topographic survey, boring exploration, traffic volume survey, and geological survey (including profiling of existing proposed roads, geological survey and underground installation). Details of the survey are shown in the table below.

Table 1-5-1 Items for Site Survey

	Bumbaran	Alamada	Datu Paglas
Profiling of the existing proposed road	Road condition, local circumstances, evaluation of existing road related facilities, underground installation, flood water level and slope stability analysis	Road condition, local circumstances, evaluation of existing road related facilities, underground installation, and flood water level	Road condition, local circumstances, evaluation of existing road related facilities, underground installation, and flood water level
Topographic survey	Centerline survey 5km cross section survey, detailed river survey at 4 sites, slope topographic survey at 1 site	Centerline survey 8.4km cross section survey, detailed river survey at 4 sites	Centerline survey 10km cross section survey, detailed river survey at 4 sites
Boring survey	2 bridges, 1 slope(5 holes ,55m), CBR at 5 sites, geological survey	1 bridges, 2 box culverts, (4 holes, 30m), CBR at 8 sites, geological survey	4 bridges, 1 box culvert, (9 holes, 85m), CBR at 10 sites, geological survey
Traffic Volume Survey	Starting point and end point of the proposed FMR	River crossing (1 site)	River crossing (2 sites)
Others	Detailed geological survey has been conducted to analyze reasons of the slope failure	—	—

(1) Results of Site Survey

1) Bumbaran

Existing graveling road is markedly uneven and rutted. There are broken bridges (see Picture1), 2 meter-deep abyss by erosion, breakage of crossing water channel and narrowed part along the proposed FMR. Therefore, only 20 percent of the entire proposed road is passable by 4 wheel vehicles. The project term recognized few small-diameter water supply pipes under the ground. Surface of the target section was composed of the mixture of loam soil, pyroclastic rocks, and the dirt sediment. Slope is stable with rather solid ground.


Picture 1


Picture 2

2) Alamada

Alamada is a mountainous region where andesitic molten rock is widely found. There are a numbers of small creeks that flow into a river which travel down to South. Hence, riverine sediment is distributed in comparatively wide area. In this area, surface water is abundant and all of the existing constructions, such as pipe culverts, have been demolished by erosion (Picture 3). Although the proposed FMR passes through residential areas, none of the household is required to be relocated. The Project observed only a decrepit crossing drainage (Picture 4).


Picture 3


Picture 4

3) Datu Paglas

Most part of the proposed road sections are used as footpath or agricultural land (Picture 5). In the middle of the proposed FMR, 1.5 km of paddy fields could be seen around Puya barangay. Currently, people cross Alip River for school commuting and transporting agricultural products (Picture 6). The ground of the proposed area is consisted by effusive rocks and pyroclastic rocks and its secondary deposited materials covered the surface of the ground, which created fertile ground. Comparatively solid viscous soil was found on the floor part of the eroded ground. The Project plans to install constructions at some 5 sites of the proposed FMR to cross creeks. No special attention should be paid to other natural conditions.

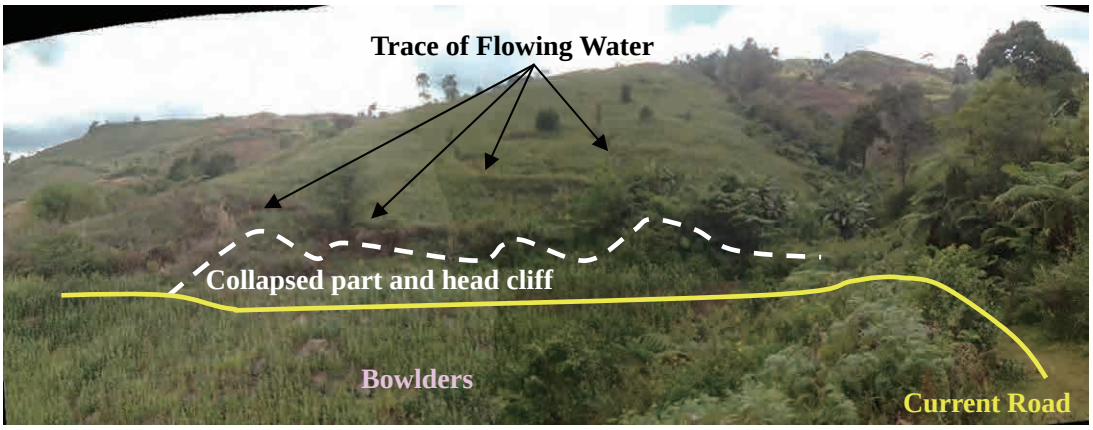

Picture 5


Picture 6

(2) Slope Protection in Bumbaran

1) Overview

Slope has been eroded at approximately 50 m of the section which can collapse easily. The Project team identified minor block-like collapses and head cliff. Also, existing road is narrow due to erosion. Ferns are prospering around the slope, and the repose angle of the slope is 30°, which is equivalent to other average slope. There are a few numbers of large debris from the secondary deposited materials at the bottom of the slope, which indicated collapse of the slope had occurred repeatedly.



2) Site Survey

The results of the survey revealed that scour of the surface of the slope was found at the apex of the head cliff. Causes of the collapse lied in the flush water running the surface of the slope. Head cliff could be collapsed because of this running water. Composition of the ground was not considered as a cause of the slide, as the composition (secondary deposited materials of pyroclastic rocks) was basically the same as other slopes.

3) Stability Analysis

The project team conducted boring survey on the slopes and analyzed stability based on N value and cross section survey. The project team acquired 2.69 for safety ratio from half of the minimum N value. This proved the soil was not imbalance clod.

4) Slope Protection Works

The result of boring survey and analysis showed the ground itself was stable and not major problem had been identified. Therefore, for the countermeasure against the collapse, the Project decided to employ collective pipe and catch drain to receive running water from the end point of the trace of water and to let the water flow travel down the slope.

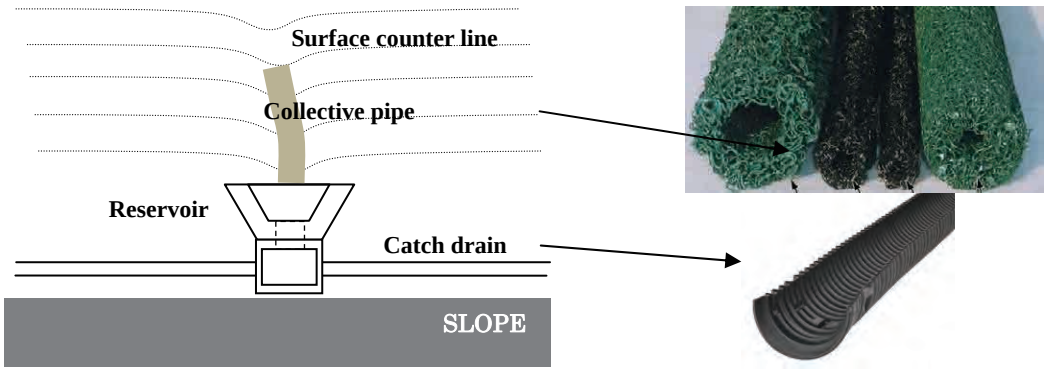
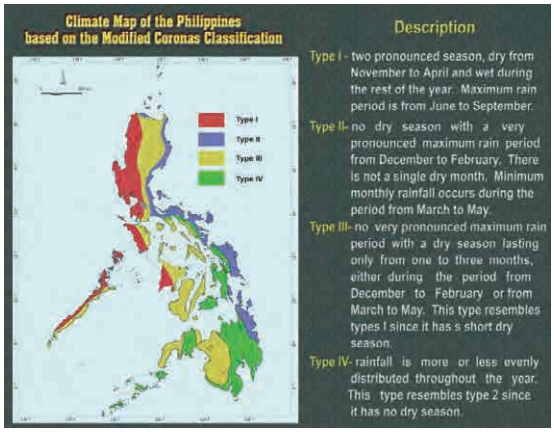


Figure 1-5-1 Image of the Drainage of Water

(3) Rainfall Period

Climate of the Philippines is categorized into 4 types (figure 2-3-1), and Bumbaran, Alamada and Datu Paglas are all categorized into type 3; therefore, rainfall data at Cotabato observing station could represent all the 3 proposed sites. Analyzing the timeframe rainfall data from 1986 to 2012, the Project has defined a rainy day as the day with more than or equal to 10 mm per day. As a result, average value for 27 years showed there are 6 months when the number of rainfall date is more than or equal to 8 days. The Project should therefore take the number of rainfall date with more than or equal to 10 days into consider in order to formulate execution plan.



(http://kidlat.pagasa.dost.gov.ph/cab/climate.htm)

Figure 1-5-2 Meteorological Category

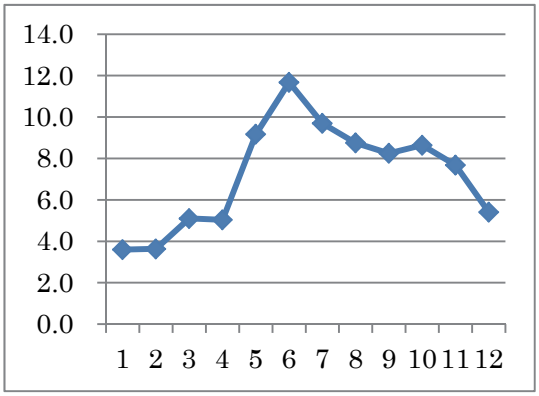


Figure 1-5-3 Monthly Precipitation (more than or equal to 10mm)

1-5-2. Environmental and Social Considerations

1-5-2-1. Environmental Impact Assessment

1-5-2-1-1. Basic Environmental and Social Conditions

(1) Natural Environment

1) Ecosystems and Reserves

By 2012, 240 areas have been designated as nature reserves in the Philippines by National Integrated Protected Area System Law (NIPAS) of 1992. The total area of the reserves is 25,700km^2 that covers 12% of the national land area (figure 1-5-4). The reserves are classified into 12 categories according to their purposes. In the Project, the project site in Alamada is located inside Libungan Watershed Forest Reserve. This reserve covers an area of 51,829 ha and is classified as category IV (To maintain, conserve and restore species and habitats).

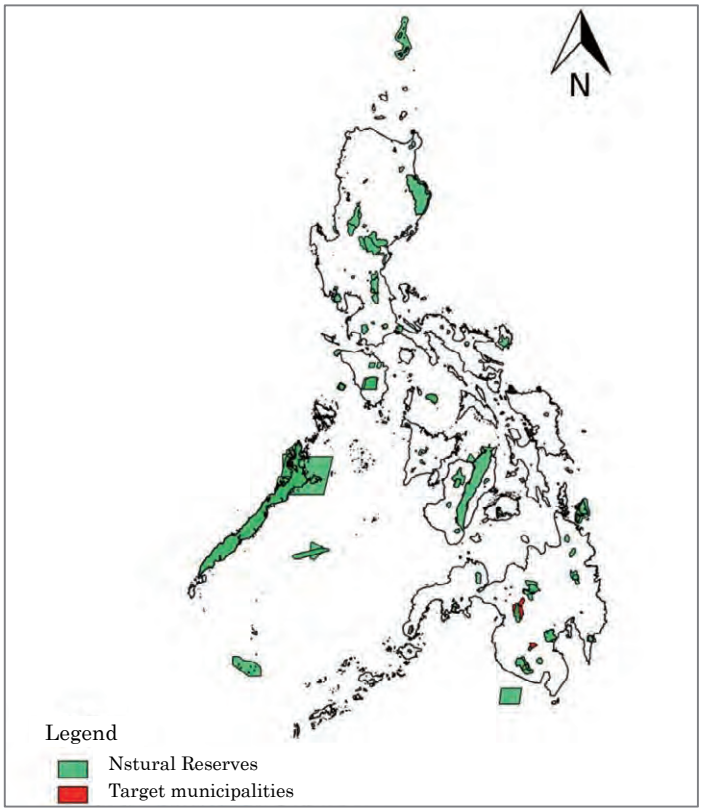


Figure 1-5-4 Nature Reserves (in gree n) and Target Municipalities for the Project (in Red)

Also, the country has a total of 228 Key Biodiversity Areas (KBA) (128 terrestrial KBA and 123 marine KBA), which are among the internationally recognized standard for identifying important areas for biodiversity conservation (Figure 1-5-5). None of the project site is located inside KBA, however, Mt Piagayungan KBA is located in the west side of the project site of Bumbaran (Figure 1-5-6). The list of IUCN Red list and CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) species are shown in the Annex-7 B-1).

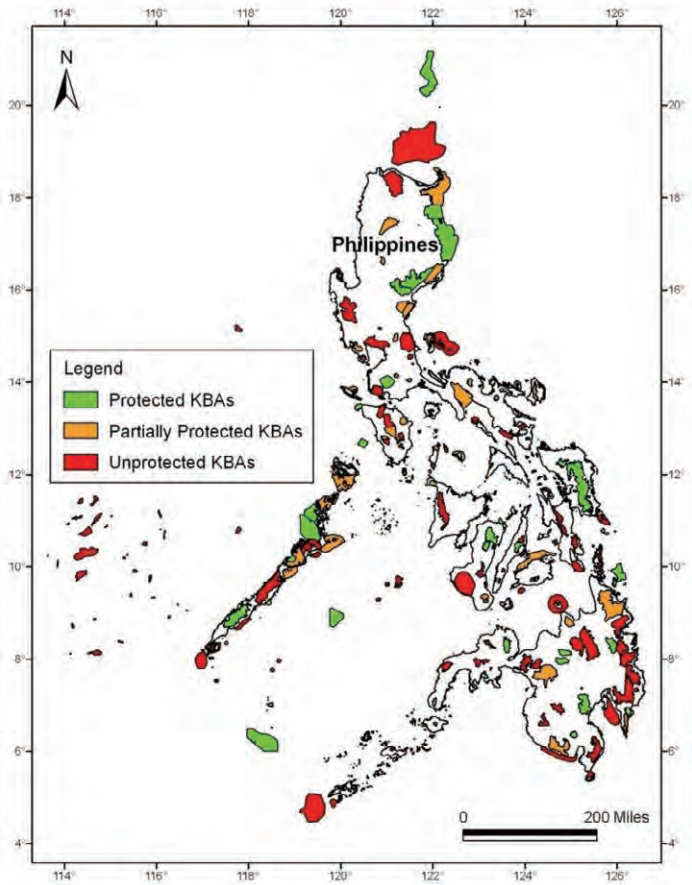


Figure 1-5-5 KBA in the Philippines
Source: Ambal, R.G.R., M.V. Duya, M.A. Cruz, O.G. Coroza, S.G. Vergara, N. de Silva, N. Molinyawe & B. Tabaranza (2012). Key Biodiversity Areas in the Philippines: Priorities for Conservation. Journal of Threatened Taxa 4(8): 2788–2796.

Figure 1-5-6 Locations of KBAs and the Project Sites

(2) Social Environment

1) Indigenous people

The major law related to indigenous people in the Philippines is Indigenous Peoples Rights Act (IPRA) (RA 8371), which came into effect in 1997. Under IPRA, National Commission on Indigenous Peoples (NCIP), which is an independent agency in the Office of President, is the responsible agency for the formulation and implementation of the policies to approve, protect and improve the right of indigenous people. According to NCIP and the target municipalities, no residential areas of indigenous communities certified by Certificate of Ancestral Domain Title (CADT) exist in and around the project sites. However, a small number of indigenous groups, such as *Manobo* inhabit in Alamada and Datu Paglas (Table 1-5-2). In Alamada, Manobo reside from the middle to upper ranges of the Akir-Akir Mountains in Barangay Pacao, and Kaolo are found in mountainous areas of Barangay Upper Dado. In Datu Paglas, indigenous communities are found in mountainous areas between the adjacent Barangays of Mangudadatu and Columbio. Because those areas are 8.0 km far from the project site and mountain is between the site and those areas, no negative impact of the Project is expected. In Alamada, indigenous communities are found at the part of mountain more than 5.0 km far from the site, according to the Municipality officers. In the both sites, accessing to indigenous communities from the project sites is difficult due to lack of access road. Nevertheless, no negative impact is expected due to the distance between the project sites and the settlement areas. Also no objects of cultural and spiritual importance of these indigenous communities, such as sacred trees, appear to exist in the project areas.

Table 1-5-2 Population of Indigenous Groups in Respective Barangay

Municipality	Barangay	Total		Indegnous people		
		No. Household	Population	Indigenous groups	% of indigenous population	Estimated population
Bumbaran	Frankfort	256	1237	N/A	0%	0
	Sumugot	123	662	N/A	0%	0
Alamada	Maprok	458	2128	Manobo	1%	21
	Pacao	432	1944	Manobo	15%	291
Datu Paglas	Mangadeg	117	664	Manobo	1%	6
	Puya	85	463	N/A	0%	0
	Mao	72	485	N/A	0%	0
	Makat	72	489	Manobo	10%	48

2) Socio-Economic Conditions

Chapter 1-1-3 describes social economic information, such as population, religion, industry, poverty and transport, and Chapter 1-5-1 illustrate the situation of infrastructures including roads, electricity and water, in the project areas.

1-5-2-1-2. Environmental and Social Safeguards Systems and Institutions

(1) Environmental and Social Safeguards Systems and Institutions in the Philippines

In the Philippines, Environmental Management Bureau (EMB) of Department of Environment and Natural Resources (DENR) is responsible for survey, coordination and monitoring in the implementation of Environmental Impact Assessment (EIA) in the country. EIA system of the Philippines is called Environmental Impact Statement (EIS), which is stipulated in Presidential Decree No.1586, and its procedure is described in the Revised Procedural Manual for DAO 2003-3 that was published in August 2007. Environmental and social considerations of the Project follow JICA's Environmental and Social Considerations Guideline as well as the DENR's Revised Procedural Manual. Other related environmental laws are shown in Table 1-5-3.

Table 1-5-3 Relevant Environmental Laws and Regulations of the Philippines

Laws and Regulations	
RA 9275	Clean Water Act of 2004
RA 10121	Philippine Disaster Risk Reduction Management Act of 2010
RA 9147	Wildlife Resources Conservation and Protection Act (2001)
RA 9003	Ecological Solid Waste Management Act of 2000
RA 8749	Clean Air Act of 1999
RA 7942	Philippine Mining Act (1995)
RA 7586	National Integrated Protected Areas System (NIPAS) Act of 1992
RA 6969	Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990
PD 1144	Fertilizer and Pesticide Act
RA 8550	Philippine Fisheries Code
PD 1067	Water Code of the Philippines (1976)
PD 984	Pollution Control Law (1976)
PD 705	Revised Forestry Code (1975)
PD 1586	Philippine Environmental Impact Assessment (EIA) System
Notes	R.A. – Republic Act P. D. – Presidential Decree

Under the EIS system, projects are categorized according to the combination of following factors: 1) the sector of a project is Environmentally Critical or not 2) a project is located inside Environmentally Critical Area (ECA) or not. This categorization determines the requirement for Environmental Compliance Certificate (ECC), application documents, jurisdiction and other requirements. The acquisition of ECC has 6 steps as shown in Table 1-5-4. Project proponents are required to conduct screening, scoping, and EIA and produce the report. Then EMB, DENR reviews and evaluate the report. Proponents are responsible for monitoring, and EMB, DENR implement evaluation and inspection of these projects.

Table 1-5-4 The Procedure and Responsible Parties for EIA and Initial Environmental Examination (IEE)

EIA/IEE procedures	Responsible parties	
	Project Proponents	DENR-EMB
(1) Screening	○	
(2) Scoping	○	
(3) EIA/IEE and production of reports	○	
(4) Review and evaluation of EIA		○
(5) Judgment of insurance of ECC		○
(6) Monitoring, evaluation and inspection	○	○

Table 1-5-5 shows the categorization of the Project in the EIS System. For the Project, the submission of IEE or IEE Checklist may be required for the acquiring ECC. IEE Checklists Reports for 3 project sites were prepared and are now under the review of DA. The reports are to be submitted to EMB in January 2015 after the approval of DA. Approval or disapproval of IEECR shall be informed to the applicant within 60 working days from the application date.

Table 1-5-5 Categorization of Sub-Projects under the EIS System

Project sites	ECA/Non-ECA	Project type	Category	Requirement	Required documents
Alamada	ECA	Road rehabilitation (no widening)	II (Non-ECP in ECA)	IEE/IEE Checklist	ECC
Bumbaran	Non-ECA	Road rehabilitation (no widening)	III (Non-ECPs in Non-ECAs)	IEE/IEE Checklist	ECC
Datu Paglas	Non-ECA	Road rehabilitation and construction	III (Non-ECPs in Non-ECAs)	IEE/IEE Checklist	ECC

Notes:
IEE - Initial Environmental Examination Report
IEEC - Initial Environmental Examination Checklist
Source: Revised Procedural Manual for DENR Administrative Order No.30 Series of 2002 (DAO 03-30) (2007) (Annex 21b, page 65)

1-5-2-1-3. Assessment of Alternative

The alternatives to the suggested roads have been assessed as below. The assessment has shown that the Project is expected to bring positive impacts on the agricultural production in the area and therefore is deemed economically feasible. Thus it is recommended to carry out the Project that will expand the agricultural production of the area.

1) Bumbaran

The proposed road in Bumbaran connects Francfort and Sumogot Barangays, and its major goal is to enable the transport of agricultural products from farms. The route that connects 2 barangays runs across the halfway up a slope. If the road rehabilitation is conducted on a new route, the construction will require more cutting and embankment compared to the proposed existing route. As the proposed route has the economical and environmental advantages, the rehabilitation of the existing road, as requested by the municipality, shall be chosen as the route for the Project.

2) Alamada

The target population for he proposed road is the residents of Maprok Barangay, and similar to Bumbaran, the rehabilitation of the existing road requires less earthworks. Also the proposed route is surrounded by the local communities and is used as a community road. Therefore, the rehabilitation of the existing route has the highest potential in terms of contribution to agricultural production and livelihood improvement as in addition to relatively small environmental impact. Thus the route proposed by the municipality shall be chosen for the Project.

3) Datu Paglas

In Datu Paglas, as there was no existing road, the new construction of the road was proposed. In Target barangays, villages and farms are seen a flat terrain between mountains and the Alip River. Local residents cross the Alip River for communing and transportation of agricultural products. Given the situation, following plans are suggested as alternatives.

- Plan A (proposed): The construction of the road that connects multiple barangays along the Alip River.
  Overview: The starting point of the route is connected to national road, and hence markets and schools will be more accessible. The route is also recommended by the Municipality.
- Plan B: The construction of the bridge crossing the Alip River. This is proposed to connect respective target barangay to the municipal center without land acquisition.
  Overview: The bridges will be constructed at the routes currently in use to enable access throughout the year.
- Plan C (Zero option): The maintenance of existing foot paths and the use of boats for crossing the Alip River.
  Overview: This plan maximizes the current situation and does not involve any construction.

The following table shows assessment of alternatives in technical, economic and socio-environmental terms.

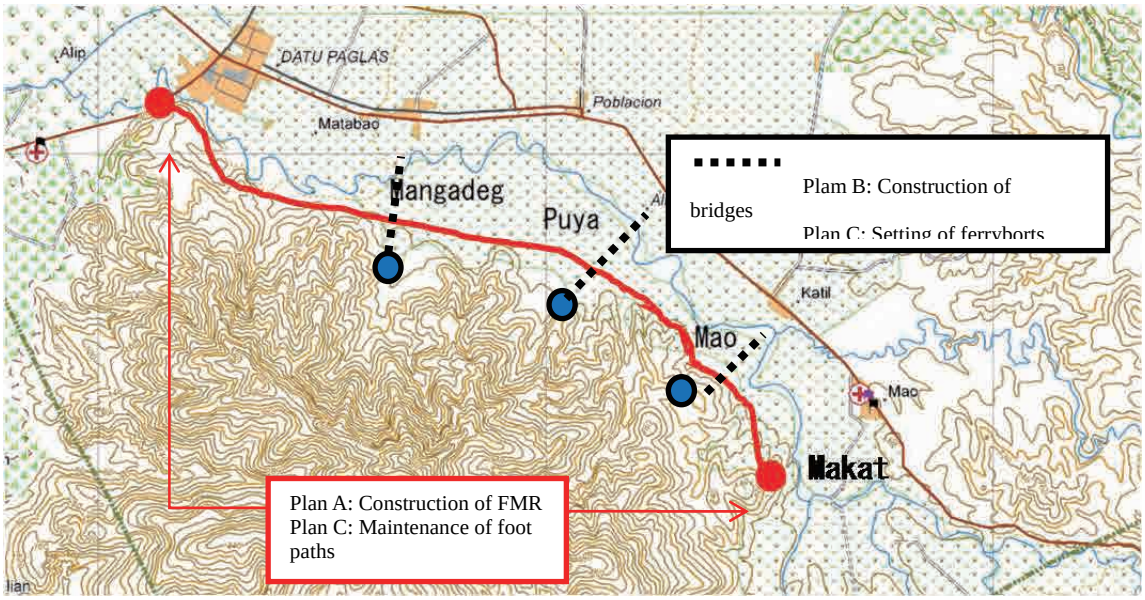


Figure 1-5-7 Assessment of Alternatives in Datu Paglas

Table 1-5-6 Assessment of Alternatives

Alternatives	Assessment Items	Assessment
Plan A: Proposed FMR	1) Technical: Since the construction involves no large building, there is no technical difficulties. The FMR can improve the effectiveness of the transportation of agricultural products from farms to market. 2) Economic: It is less costly than Plan B as it will require no bridges. 3) Environmental and Social Consideration: Few significant environmental impact are expected due to small-scale construction. The road will require some land acquisition.	N technical difficulty, and high economic impact are expected. If there is no problem with land acquisition is, this plan is the most effective.
Plan B: Construction of bridges on the Alip River	1) Technical: The width of the river is between 200 and 300 meters and hence large-scale bridge construction will be required. The bridges will not secure access between villages and farms. 2) Economic: Since no access from farms to the bridges is secured, the transportation of the goods to the market will be limited. Also the construction of 1 bridge may cost several hundred million Japanese Yen, and thus the total cost of more than 1 billion Yen is expected if several bridges from respective barangays are to be built. 3) Environmental and Social Consideration: This will enable access across the river throughout the year for easier transportation. The construction of bridges may alter the environment of River.	The large scale bridges are technically difficult. Also economic impact relative to the cost is small.
Plan C: Zero option (Maintenance of the footpaths and the uses of ferry boats)	1) Technical: The transportation of vehicles will not be possible on the footpaths. Wharfs for boats will be required. 2) Economic: Crossing of river by boats requires running costs. Since the income for transportation may be limited, the impact is also limited. 3) Environmental and Social Consideration: the increased traffic across the river may cause constant water pollution.	Although the impact on the environment is low, the economic impact will be limited and do not lead to economic development of the surrounding communities.

The selection of the route has involved intensive discussion and consultation with the municipality and barangay residents in addition to multiple field assessments. Based on the dialogues, following points are considered for social and environmental impacts.

- The existing roads footpaths will be utilized where possible.
- The route has been selected to avoid any resettlement.
- The route secures higher altitude to prevent negative impacts from flooding.
- The route was selected to minimize the cutting and embankment.

1-5-2-1-4. Scoping

Scoping of 20 items that are subjected to potential impacts from the implementation of the Project has been conducted. The potential impacts "before construction or during construction" and "during the operation" were separately assessed in this scoping process. The results of scoping at respective project sites are shown in Table 1-5-7.

Table 1-5-7 Scoping of Environmental Impact Items

Category	Impact items	Rating		Reasons for rating
		Before construction, During construction	During operation	
Pollution Natural Environment	Air pollution	B-	B-	【All project sites】 During construction: although the low level of air pollution may occur, the extent is expected to be within the normal condition During operation: a certain level of air pollution may occur due to the increase in the traffic
	Water pollution	B-	D	【All project sites】 During construction: the construction of the bridges may temporarily increase the turbidity, and the maintenance of construction vehicles may cause waster pollution from Oil and SS. During operation: No or little impact is expected.
	Waste	C	D	【All project sites】 During construction: the Project may potentially create wastes from accumulated sediments and old structures as well as other general industrial wastes. During operation: No or little impact is expected.
	Soil contamina-tion	B-	D	【All project sites】 During construction: a low level of soil contamination may occur, though its extent is likely to be within normal condition During operation: No soil contamination that would affect surrounding environment is expected.
	Noise/Vib-ration	B-	C	【All project sites】 During construction: the construction is likely to cause some noise and vibration. During operation: the increase in the traffic may cause some noise and vibration.
	Protected areas	B-	B-	【Alamada】 During construction: as the project site is located inside the Libungan Watershed Forest Reserve, the construction may have some impacts on its ecosystems. During operation: some impacts on he Libungan Watershed Forest

Category	Impact items	Rating		Reasons for rating
		Before construction, During construction	During operation	
				Reserve are expected.
		C	C	【Bumbaran】 During construction: Mt. Pigayayungan KBA is located relatively close to the west side of the project site, and therefore there is a concern of potential impacts on the ecosystems. During operation: the Project may potentially impact the environment of Mt. Pigayayungan KBA.
		D	D	【Datu Paglas】 No protected areas or KBA exist around the project site.
	Ecosystems	B-	B-	【Alamada】 During construction: the construction work may cause negative impact on the ecosystems in the Libungan Watershed Forest Reserve. During operation: an increase in the traffic may have some impacts on the ecosystems in the Libungan Watershed Forest Reserve.
		C	C	【Bumbaran】 During construction: the construction work may have a low level of impact on the ecosystems of the Mt. Pigayayungan KBA, which is located close to the west side of the project site. During operation: n increase in the traffic may have some impacts on the ecosystems in the Mt. Pigayayungan KBA.
		C	C	【Datu Paglas】 During construction: no rare fauna and flora are found around the project site, nevertheless the Project may cause potential impact on the exisiting ecosystems of the area. During operation: an increase in the traffic may cause some impacts such as road kill of animals.
	Hydrology	D	D	【All project sites】 During construction, During operation: no or little impact on hydrology in the surround areas is expected.
	Geography and geology	D	D	【Alamada,Datu Paglas】 During construction, During operation: no or little impact on Geography and geology in the surround areas is expected.
		C	C	【Bumbaran】 During construction and operation: the improvement of the road may potentially affect the collapse of the slopes in a section of the proposed road.
Social Environment	Resettle-ment	D	D	【Alamada,Bumbaran】 Before construction: as road improvement takes place within the width of the existing road, no resettlement is expected.
		B-	D	【Datu Paglas】 Before construction: in the sections without an existing road, the construction of new road may involve some land acquisition.
	Local economy (i.e. employment, livelihoods)	B+	B+	【All project sites】 During construction: project is likely to cause temporally increase in the local employment. During operation: positive impact on local economy is expected as a result of the Project.
	Water use	D	D	【All project sites】 No impact on water use is expected in the project areas.
	Cultural heritage	D	D	【All project sites】 No Cultural heritage exists in the project sites.
	Landscape	D	D	【All project sites】 Since the Project mainly covers the improvement of the FMR, the impact

Category	Impact items	Rating		Reasons for rating
		Before construction, During construction	During operation	
				on landscape is highly limited.
	Gender	D	C+	【All project sites】 The Project is likely to decrease the time used for transport and therefore have a positive impact on women.
	Ethnic minorities	C	C	【All project sites】 During construction: the construction may have a potential impact on the living environment of ethnic minorities. During operation: the increase in the level of convenience in transportation may affect the living environment of ethnic minorities.
	Ingectious diseases (e.g. HIV)	D	D	【All project sites】 No significant impact on infectious diseases is expected.
	Work environment	D	D	【All project sites】 No significant impact on infectious diseases is expected.
Others	Accidents	B-	B-	【All project sites】 During construction: an increase in the risk of accidents is expected. During operation: an increase in the traffic may cause the increase in the risk of accidents.
	Trans-boundary influence, climate change	D	D	【All project sites】 No significant impact is expected.

Note) A+/-: a significant impact is expected (positive/negative), B+/-:Some impact is expected but less than A (positive/negative), C+/-: Impact is uncertain and further survey is necessary (positive/negative), D: no or little impact is expected

1-5-2-1-5. TOR of Environmental and Social Consideration Survey

The next table shows survey contents and methods as TOR for the impact items that were assessed to have negative impacts or uncertain impact in the scoping above. Of the items below, "Resettlement" will be described in "1-5-2-2. Land Acquisition, Resettlement", not here.

Table 1-5-8 TOR of Environmental and Social Consideration Survey

Environmental items	Survey items	Survey methods
Air pollution	- Confirmation of environmental standards - Impacts during construction - Impact during the operation - Distance between the source of air pollution and the building such as houses, schools and hospitals	- Review of relevant literatures - Review of relevant literatures - Confirmation of the contents, scale, methods, locations, schedule of construction, types of required machines and number of construction vehicles, site survey and hearing. - Impact assessment based on traffic survey, site survey and hearing - Confirmation of residential areas and construction sites
Water pollution	- Confirmation of environmental standards - Impacts during construction - Local use of surface water	- Review of relevant literatures - Confirmation of construction details including its contents, scale, methods, locations, schedule site survey and hearing - Site survey and hearing
Waste	- Impacts during construction	- Confirmation of construction details including its contents, scale, methods, locations, schedule site survey and hearing

Environmental items	Survey items	Survey methods
Soil contamination	- Impacts during construction	- Confirmation of construction details including its contents, scale, methods, locations, schedule
Noise/Vibration	- Confirmation of environmental standards - Impacts during construction - Impact during the operation - Distance between the source of air pollution and the building such as houses, schools and hospitals	- Review of relevant literatures - Confirmation of construction details including its contents, scale, methods, locations, schedule site survey and hearing - Impact assessment based on traffic survey, site survey and hearing - Site survey and hearing
Protected areas	- Location of project areas and Protected areas and KBA - Current conditions of protected areas around the project sites - Confirmation of necessary permits (if any)	- Confirmation of geographical locations of project areas and protected areas and KBA - Site survey, hearing and the review of relevant literatures - Hearing from DENR-EMB
Ecosystems	- Ecosystems around the project sites	- Land use survey, Site survey, hearing and review of relevant literatures
Geography and geology	- Impacts during construction and during the operation	- Review of the result of environmental condition survey regarding the slope with a risk of collapse in Bumbaran
Resettlement	- Land acquisition	- Census survey of project affected persons in Datu Paglas
Ethnic minorities	- Impact on ethnic minorities	- Review of relevant literatures, Site survey
Accidents	- Accidents during construction - Accident during operation	- Construction of geographical location of residential areas and the proposed roads - Confirmation of construction details including its contents, scale, methods, locations, schedule site survey and hearing - Traffic survey including average speed

1-5-2-1-6. The Result of Survey on Environmental and Social Considerations

The result of the surveys on environmental and social consideration is shown in table below.

Table 1-5-9 The Result of the Surveys on Environmental and Social Consideration

Environmental items	Survey results
Air pollution	The construction work is likely to cause some air pollution such as dust during the construction period; however, as most areas along the road are farmland, the impacts on houses are expected to be relatively low. The current traffic level is assessed to be 2.5 vehicles per day in Bumbaran, 9 in Alamada and 0 in Datu Paglas. The future traffic level based on the current level and future agricultural land area along the proposed road is expected to be 20 vehicles per day in Bumbaran, 9 in Alamada and 10 in Datu Paglas. Therefore, the possibility of air pollution above the Philippines's standards[4] is highly unlikely.

[4] In the Philippines, the environmental standard on air quality has been stipulated by the DENR Administrative Order No.14 of 1993 and Revised Air Quality Standards of 1992, Revising and Amending the Air Quality Standards of 1978 of 1992.

Environmental items	Survey results
Water pollution	Although the construction of bridges may potentially cause temporal increase in TSS and turbidity, since duration of construction of bridge is 2 or 3 months and heavy machine does not work in the river, it is unlikely to exceed the water quality standard of the Philippines[5]. Also, since local people do not use surface water for domestic purpose, the level of impact on the local livelihoods seems to be relatively low. During the construction, the maintenance of construction vehicles may cause oil and SS.
Waste	The Project is expected to produce some wastes such as the debris from replaced structures. Evaluating and assuming based on the past example or the construction items in this project; the level of its daily emission is likely to be low.
Soil contamination	There is a possibility of minor soil contamination caused by the maintenance of the construction vehicles at the parking of heavy machine. The reason why it is minor soil contamination is that; the number of heavy machine is not so much (such as one grader, roller and truck etc.,) and changing of oil is done at the paring with proper measurement, etc.
Noise/Vibration	During the construction, some noise is expected, but no construction at night is planned, machineries used in daytime is only a grader, a roller, and a truck. In addition, work duration is one day or two. The level of noise is expected to meet the National Pollution Control Commission's (NPCC) standards of residential areas (9am-6pm: < 65dBA, 5am-9am/6pm-10pm: < 60dBA, 10pm-5am: < 55dBA) in areas at least 5m away from the proposed road. Also no school or hospitals are located close to the roads. No negative impact of noise and vibration is expected due to the limited expected traffic level which is 9~20 vehicles per day.
Protected areas	The project site in Alamada is located inside the protected area; however no rare fauna and flora seem to exist in the area of agricultural and residential land uses. Forest ecosystems are not found in the area. The improvement of the FMR does not require separate permission as long as the Project ensures ECC. Mount Piagayungan KBA, which is inhabited by some endangered species lies on the west side of the project area of Bumbaran. However the land uses of the surrounding area is predominantly agricultural, and no valuable fauna and flora seem to be seen.
Ecosystems	Land uses of the project sites are predominantly farm land followed by residential areas, and therefore no valuable ecosystem is found in the areas. Some endangered bird species are believed to inhabit in the Mount Piagayungan KBA close to the site in Bumbaran, however, the improvement of the FMR is unlikely to have significant impact on these species because the habitat area does not border on the road.
Geography and Geology	As the trace of water flow was found on the top of the scarp in Bumbaran, it is expected that water flowing down the slope is causing the collapse on its terminal parts. The construction of canal at the terminal portion of the slope would be necessary to induce the water to flow into run-off at both sides (Also refer to the section 1-5-2 Natural Conditions (1) Result of site condition, (2)-4 assessment of countermeasure construction)
Ethnic minorities	Small number of indigenous people resides in the target municipalities, nevertheless no significant impact on the population is anticipated because; there is sufficient distance between the project sites and their areas of residence on mountainous areas; the impact of road improvement is limited in nature.
Accidents	The construction will increase the potential risk of accidents caused by increased traffic and construction vehicles. During the operation of FMR, the risk of accident is unlikely to increase because; the traffic level will still be low in absolute terms despite the relative increase in the traffic; average speed of the vehicles would be about 30km per hour.

[5] The water quality standards of the Philippines is defined by DENR Administrative Order No.34 , Series of 1990, Revised Water Usage and Classification / Water Quality Criteria Amending Section No: 68 and 69, Chapter Ⅲ of the 1978 NPCC Rules and Regulations and DENR Administrative Order No. 35, Series of 1990, Revised Effluent Regulations of 1990, Revising and Amending the Effluent Regulations of 1982. The standard mentioned here is of he Class B (Recreational water class 1) of freshwater.

1-5-2-1-7. Environmental Impact Assessment

Following the environmental and social considerations survey, the content and the extent of the expected negative and uncertain impacts are assessed in the following table. For expected negative impacts and items whose impacts are yet to be determined, prevention and mitigation measures are assessed in 1-5-2-1-8.

Table 1-5-10 Assessment of Environmental Impact Items

Category	Impact item	Scoping		Rating		Reasons for rating
		Before const-ruction, During const-ruction	During operation	Before const-ruction, During const-ruction	During operation	
Pollution	Air pollution	B-	B-	B-	D	During construction: low level of air pollution, such as dust, caused by the increase in the construction vehicles is expected. During operation: Since the expected traffic volume is 9~20 vehicles per day, based on anticipation from a survey on traffic volume and expected vastness of future farmlands along the road, no significant air pollution is expected.
	Water pollution	B-	D	B-	D	During construction: the construction of the bridges is likely to cause temporarily increase the turbidity, and the maintenance of construction vehicles may cause waster pollution from Oil and SS. During operation: No or little impact is expected, because no facilities are constructed in the river.
	Waste	C	D	B-	D	During construction: the Project is expected to produce wastes from accumulated sediments and old structures as well as other general industrial wastes.
	Soil contamina-tion	B-	D	B-	D	During construction: a low level of soil contamination may occur, though its extent is likely to be within normal condition
	Noise/Vib-ration	B-	C	B-	D	During construction: the construction is likely to cause some noise and vibration. During operation: traffic volume is low in absolute terms and hence little noise and vibration is expected.
Natural Environment	Protected areas	B-	B-	B-	B-	【Alamada】 During construction: Despite its location inside the Libungan Watershed Forest Reserve, the area consists of agricultural lands and residential areas and no rare fauna and flora are found. Nevertheless, the impact on ecosystems shall be monitored consideration its location inside the protected area. During operation: As the Project involves road improvement and the traffic volume is limited, the impact on protected area also seems to be insignificant. However there can be potential impacts, such as road kill. Some countermeasures should be taken.
		C	C	B-	B-	【Bumbaran】 During construction: As the Project involves road improvement and the traffic volume is limited, the impact on protected area also seems to be insignificant. However there can be potential impacts, such as road kill. During operation: as the Project involves road improvement and the traffic volume is limited and the site does not border on KBA, the impact on KBA seems to be quite limited.

Category	Impact item	Scoping		Rating		Reasons for rating
		Before const-ruction, During const-ruction	During operation	Before const-ruction, During const-ruction	During operation	
		D	D	D	D	【Datu Paglas】 No protected areas or KBA exist around the project site.
	Ecosystems	B-	B-	B-	B-	【Alamada】 During construction: although no rare fauna and flora are found around the project area, the construction may cause some impacts on the surrounding ecosystems. During operation: As the Project involves road improvement and the traffic volume is limited, and the site does not border the KBA, the impact on ecosystems also seems to be insignificant. However there can be potential impacts, such as road kill.
		C	C	B-	B-	【Bumbaran】 During construction: Although there is a certain distance from Mt. Pigayayungan KBA, the monitoring of impact on endangered bird and species is necessary. During operation: as the Project involves road improvement and the traffic volume is limited, and the site does not border the KBA, the impact on ecosystems also seems to be insignificant. However there can be potential impacts, such as road kill.
		C	C	D	D	【Datu Paglas】 During construction: Since no rare fauna and flora are found around the project site, no significant impact on the surrounding ecosystems is expected. During operation: an increase in the traffic would have no significant impact on the surrounding ecosystems.
	Hydrology	D	D	D	D	【All project sites】 During construction/During operation: no or little impact on hydrology in the surround areas is expected.
	Geography and geology	D	D	D	D	【Alamada,Datu Paglas】 During construction/During operation: no or little impact on Geography and geology in the surround areas is expected.
		C	C	B-	B-	【Bumbaran】 During construction/During operation: the improvement of the road may potentially affect the collapse of the slopes in a section of the proposed road.
Social Environment	Resettlem-ent	D	D	D	D	【Alamada,Bumbaran】 Before construction: as road improvement takes place within the width of the existing road, no resettlement is expected.
		B-	D	B-	D	【Datu Paglas】 Before construction: in the sections without an existing road, the construction of new road may involve some land acquisition.
	Local economy (i.e. employment, livelihoods)	B+	B+	D	D	【All project sites】 During construction: project is expected to increase the local employment. During operation: positive impact on local economy is expected as a result of the Project.
	Water use	D	D	D	D	【All project sites】 No impact on water use is expected in the project areas.
	Cultural heritage	D	D	D	D	【All project sites】 No Cultural heritage exists in the project sites.

Category	Impact item	Scoping		Rating		Reasons for rating
		Before const-ruction, During const-ruction	During operation	Before const-ruction, During const-ruction	During operation	
	Landscape	D	D	D	D	【All project sites】 Since the Project mainly covers the improvement of the FMR, the impact on landscape is highly limited.
	Gender	D	C+	D	D	【All project sites】 During operation: The Project is likely to decrease the time used for transport and therefore have a positive impact on women.
	Ethnic minorities	C	C	D	B+/-	【All project sites】 During construction: the construction will have little impact on the living environment of ethnic minorities due to the physical distance and also the nature of the Project as road improvement. During operation: the Project is likely to have a positive impact due to the improvement in the transportation. Although no large-scale negative impact is expected from the Project, it may cause unknown negative impact; therefore continuous monitoring would be essential.
	Infectious diseases (e.g. HIV)	D	D	D	D	【All project sites】 No significant impact on infectious diseases is expected.
	Work environment	D	D	D	D	【All project sites】 No significant impact on infectious diseases is expected.
Others	Accidents	B-	B-	B-	B-	【All project sites】 During construction: an increase in the risk of accidents is expected. During operation: No significant impact is expected because of the low level of traffic in absolute terms despite relative increase in the traffic.
	Trans-bound-ary influence, climate change	D	D	D	D	【All project sites】 No significant impact is expected.

1-5-2-1-8. Mitigation Measures

Mitigation measures have been devised for expected social and environmental impacts (items rated B- in section above) during construction and operation.

Table 1-5-11 Mitigation Measures for Social and Environmental Impacts

Impact	Mitigation measures	Implementation agency	Responsible agency	Cost
【During construction】				
Air pollution	- In case of construction close to residential areas, the necessary measures, such as sprinkling of water, shall be taken to minimize the impact from dust.	Contractor	Contractor	Construction budget
Water pollution	- Materials that may cause water pollution, such as oil and sewage, shall be properly managed. - In case the construction works produce muddy water, the water shall be temporally stored separately downstream. Then, following the precipitation of sediments, supernatant can be put back to waterways. The sediment deposition can be either used as cover soil or backfilled as normal soil.	Contractor	Contractor	Construction budget
Waste	- The surplus soil from construction works shall be used for embankment whenever possible. If there is a surplus, it shall be temporally stored in a pre-defined area away from houses or water bodies and disposed. - Other wastes, following the DENR Guideline (DENR Procedural Manual Title III of DAO 92-29 “Hazardous Waste Management” Series of 2004), shall be categorized into hazardous and non-hazardous wastes. Hazardous wastes shall be treated by authorized companies with TSD Facilities. - Other wastes shall be disposed in a disposal areas defined by the municipality, following DENR AO 98-49.	Contractor	Contractor	Construction budget
Soil contamination	- The special area should be designated for storing oil, sewage and fuel and maintenance purpose. - The contaminated soil shall be stored in the designated area and be cleaned by bio-remediation or other measures. The contaminated soil should be replaced with uncontaminated soil. - Vehicles and other equipment shall be inspected regularly to avoid oil leaks and other problems.	Contractor	Contractor	Construction budget
Noise/Vibration	- Hours of operation shall be limited to day time to minimize the impact on the local livelihoods. - Maintenance of heavy machinery and construction vehicles shall be done properly.	Contractor	Contractor	Construction budget
Protected areas	- Proper instruction related to protected areas and KBA shall be given to the parties involved in the construction. - Illegal logging and hunting by parties involved in the construction shall be prohibited in and around the project sites.	Contractor	Contractor	Construction budget

Impact	Mitigation measures	Implementation agency	Responsible agency	Cost
Ecosystems	- Proper instruction related to ecosystems shall be given to the parties involved in the construction. - Illegal logging and hunting by parties involved in the construction shall be prohibited in and around the project sites.	Contractor	Contractor	Construction budget
Geography and geology	- Proper countermeasure construction such as, canal at the terminal portion of the slope to induce the water to flow into run-off at both sides, shall be installed	Contractor	Contractor	Construction budget
Resettlement (Land acquisition)	- Sufficient explanation on the Project shall be given to local stakeholders to gain their support for the Project. - Third-party organization shall be established to deal with grievance regarding land acquisition.	DA/LGU	DA	Administrative budget
Administrative budget	- Monitoring shall be conducted to observe the influence on ethnic minorities.	LGU	LGU	Administrative budget
Accidents	- Place traffic controller to avoid traffic accidents. - Information on the contents of the day's construction work and safety measures should be disseminated to construction workers. - Maintenance of heavy machinery shall be conducted properly.	Contractor	Contractor	Construction budget
- 【During operation】				
Protected areas	- Environmental education on protected areas and KBA among local residents. - Monitoring of illegal logging and hunting by local people and outsiders.	LGU	LGU/DENR	Administrative budget
Ecosystems	- Environmental education on ecosystems among local residents. - Monitoring of illegal logging and hunting by local people and outsiders.	LGU	LGU/DENR	Administrative budget
Ethnic minorities	- Monitoring shall be conducted to observe the influence on ethnic minorities.	LGU	LGU	Administrative budget
Accidents	- In the sections surrounded by residential houses, humps shall be installed to decrease the driving speed of the car to reduce the risk of accidents.	Contractor	Contractor	Construction budget
	- LGU shall hold road safety seminars for local residents to increase their awareness.	LGU	LGU	LGU

1-5-2-1-9. Monitoring Plan

Monitoring will be conducted for environmental items that are expected be impacted during and after the construction.

Table 1-5-12 Environmental Monitoring Plan

Environmental items	Items	Monitoring method	Location	Frequency	Responsible organization
【Before construction, During construction】					
Air pollution	Dust	Visual examination: see whether the level of dust pollution in surrounding areas covers surrounding farms and houses. Countermeasures are taken if necessary.	Construction sites	Every morning	Contractor
Water pollution	Suspended Solid (SS) pH	Transparency Meter pH Meter	Bridge construction sites	Every morning during construction	Contractor
Waste	The amount of soil and waste produced	Assessment of construction Record (Daily Report: the amount of soil waste and its disposal/recycle)	Construction sites	Monthly	Contractor
Soil contamination	The degree of Soil contamination from construction materials	Visual examination: assessment of soil contamination caused by leaks of cement and oil.	Concrete construction sites. Parking for heavy machineries.	Monthly	Contractor
Noise/Vibration	Level of noise and vibration	Sound level instrument, vibrometer	Construction sites near to villages	Monthly	Contractor
Protected areas	Number and extent of illegal logging and hunting	Records of illegal logging and hunting by construction-related people	All project sites	Monthly	Contractor
Ecosystems	Record of road kill	Record of road kill	All project sites	Monthly	Contractor
Geography and geology	Risk of collapse	Visual examination: Check changes in geography (measurements will be done if necessary)	Identified site of Bumbaran	Every week	Contractor
Resettlement	Record of cases of handing grievances	Grievance handing mechanism	All project sites	Monthly	DA, LGU
Accidents	The number and extent of accidents occurred	Record of accidents	All project sites	Monthly	Contractor
【During operation】					
Protected areas	Number and extent of illegal logging and hunting	Records of illegal logging and hunting	All project sites	Quarterly	LGU
Ecosystems	Record of road kill	Record of road kill	All project sites	Quarterly	LGU

Environmental items	Items	Monitoring method	Location	Frequency	Responsible organization
Geography and geology	Risk of collapse	Visual examination	Identified site of Bumbaran	Monthly	Contractor
Ethnic minorities	Number of grievance related to ethnic minorities	Grievance mechanism, hearing from barangay captains	All project sites	Quarterly	LGU
Accidents	The number and extent of accidents occurred	Record of accidents	All project sites	Quarterly	LGU

For water quality standards, Class B Standards of the Revised Water Usage and Classification/Water Quality Criteria (DENR AO 34) will be used for monitoring. For noise and vibration, the standards specified by National Pollution Control Commission (NPCC) shall be used for monitoring.

Table 1-5-13 Standards for Monitoring

Environmental items	Indicator	Standard	
Air pollution	Suspended Particulate Matter	180 microgram/scm	NPCC Standard (1978) Article 63
Water pollution	Suspended solid (SS)	Less than 30mg/Little	DENR A.O. No.34
	pH	6.5＜pH＜8.5	
Wastes	-	-	Ecological Solid Waste Management Act (RA9003,2001)
Soil contamination	-	-	As there is no law on soil contamination, the standards of Ministry of Environment, Japan shall be referred for monitoring
Noise and vibration	Noise level	9am-6pm: < 65 decibel 5am-9am/6pm-10pm: < 65 decibel 10pm-5am: <55 decibel	NPCC Standards

The attached monitoring form is suggested for during construction and during the operation. Responsible agencies submit the form to DA following the instruction. The figure below shows a suggested monitoring system in order to assure the implementation of the mitigation measures for environmental impacts. First, contractors submit the monitoring results to Municipal Environment and Natural Resources Officer (MENRO). Then MENRO review the contents of the monitoring forms regularly or whenever necessary. If countermeasures are required, the municipality shall apply improvement strategy. These contents shall be shared and discussed at the Group for Project Management (GPM) at the regional level. DA is the responsible organization for the entire Environmental Management Plan (EMP), and PDS of DA shall place staffs who deals with the implementation as the project management group. This group shall monitor the implementation of EMP during the construction period. Alamada is under the jurisdiction of Region 12, while Datu Paglas and Bumbran are placed under ARMM; therefore DA Region 12 Office and DAF-ARMM shall take charge of regional-level activities. However, since DA does not have direct authority over DAF-ARMM, central-level

GPM will include OPAPP and BDA to enable smooth directive to the regional level.

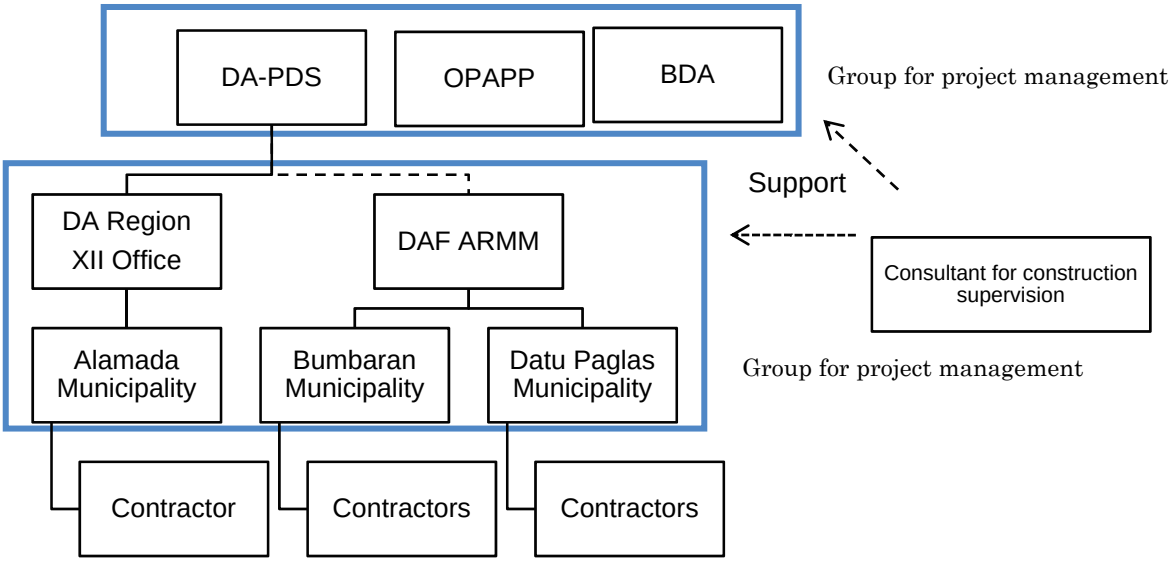


Figure 1-5-8 Proposed Organization of EMP Implementation Structure Chart during Construction

1-5-2-1-10. Stakeholder Meeting

During the preparatory survey, the first stakeholder meeting was held on 18 September 2014. 85 participants including municipality official, barangay captains and local residents attended the meeting. Following the brief summary of the Project, participants discussed the issue of land acquisition. The local residents showed little concern over the environmental impacts of the Project. The second stakeholder meeting was held on 2 December 2014 with 83 participants including the affected landowners. In both meetings, local residents have been briefed on the prospective environmental impacts of the Project; however they have showed no concern on the environmental issues. The details of the discussion on land acquisition are described in the section 1-5-2-2-10.

1-5-2-2. Land Acquisition, Resettlement

1-5-2-2-1. Necessity for Land Acquisition and Resettlement

As the Project mainly aims at rehabilitation of the existing roads, there will be no land acquisition and resettlement except for Datu Paglas. In cases that land acquisition not requiring resettlement is necessary in Datu Paglas, we shall basically follow JICA's Guideline to compensate for it. The basic policies on land acquisition are as follows.

① Other than the construction of a new road in Datu Paglas, rehabilitation works of the existing roads shall be implemented so that neither land acquisition nor resettlements happen.

② Although the construction of a new road in Datu Paglas involves land acquisition, the route and design of it shall be WITHOUT resettlement.

[Route selection of Datu Paglas]

The development work in Datu Paglas involves land acquisition as it includes construction of a new road. In discussions with municipalities, DA, and BDA, however, we reached a conclusion that the finalized route will avoid buildings such as residences. So, there will be no resettlement of residences and other buildings. Land that will be acquired is mostly used for cultivation of corn, sugarcane, vegetable, and coconut, and a part of it is residential areas (excluding buildings) (See Figure 1-5-9).

Figure 1-5-9 Farmlands at Datu Paglas's New Road Sites

Respective barangays had a great need for the whole route including the section that will be newly constructed, and this is well reflected in its high priority in the municipal development plan. Based on a proposal from the barangays, the route runs along a path that connects the barangays (the paths used by local people). During the field survey, representatives from the survey team, DA, BDA, Datu Paglas municipality (i.e. the Mayor, municipal engineer, development officer) and barangays (including barangay captains) conducted a site survey and made adjustment to identify the route. In identifying the route, the survey team has explained that the route will be principally set along the existing road with some technical (e.g. no large-scale embankment or earth cutting, transit safety is secured, intersect rivers at a right angle) and social considerations (e.g. no resettlement, not crossing farm diagonally).

Interviews with available local land owners and residents along the road during the site survey confirmed no opposition regarding the route. For those landowners whose consents were not confirmed during the site visit, barangays have confirmed their initial approval. Furthermore, the municipality hosted stakeholder meetings and gained their approval for the Project.

1-5-2-2-2. Institutions and Organizations Relevant to Land Acquisition and Resettlement

(1) Legislative System Related to Land Acquisition and Resettlement in the Philippines

The legislative system and regulations related to land acquisition and resettlement in the Philippines are shown in the table 1-5-14. Of them, DPWH's "Land Acquisition, Resettlement, Rehabilitation and Indigenous Peoples' Policy: LARRIPP" might be the most relevant law to the Project. The table 1-5-15 shows gaps between the Philippines' legislative system including LARRIPP and JICA's Guideline and World Bank's O.P.4.12. As a result of comparison, the Philippines' legislative system is not hugely different from JICA's guideline and WB's O.P.4.12.

Table 1-5-14 The Legislative System and Regulations Related to Land Acquisition and Resettlement in the Philippines

Policy	Relevant Law and Regulation
LARRIPP, 3rd edition (2007)	Land Acquisition, Resettlement, Rehabilitation and Indigenous Peoples' Policy
D.O.327 (2003)	Guidelines for Land Acquisition and Resettlement Action Plans (LAPRAPs) for Infrastructure Projects
D.O. 5 (2003)	Creation of the Infrastructure Right of Way and Resettlement Project Management Office (PMO) and the Implementation of the Improved IROW Process
2000 R. A. 8974	R. A. 8974: An Act to Facilitate the Acquisition of Right-Of-Way (ROW), Sites or Location for National Government Infrastructure Projects and for other purposes (2000)
DPWH's Policy Framework for LARR (1999)	Policy Framework for Land Acquisition, Resettlement, and Rehabilitation (LARR)
Regulation 67 Procedure of Civil Suit (1997)	Regulation 67: Land Acquisition
R.A.7279 (1992)	Urban Development and Housing Act
R.A.7160 (1991)	The Local Government Code Of the Philippines
P.D.1533 (1978)	Establishing a Uniform Basis for Determining Just Compensation and the Amount of Deposit for Immediate Possession of the Property Involved in Eminent Domain Proceedings
C.A. 141(1936)	Commonwealth Act 141: An Act to Amend and Compile the Laws Relative to Lands of the Public Domain

Note: R.A. – Republic Act
P. D. – Presidential Decree
E.O. – Executive Order
I.R.R. – Implementing Rules and Regulations
D.O. – Department Order

Source: Land Acquisition, Resettlement, Rehabilitation and Indigenous Peoples' Policy, 3rd ed., 2007, DPWH ESSO

Table 1-5-15 Comparison of the Philippines' Legislative System of Land Acquisition and Resettlement and JICA's Guideline/ World Bank's O.P.4.12

No	Key Issues	(A) JICA Guidelines and WB O.P.4,12	(B) Laws of the Republic of the Philippines	Gap between (A) and (B)	Project Policy
①	Avoidance of involuntary resettlement	Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives.	Eminent Domain is last resort; No person shall be deprived of ... property without due process of law (Philippine Constitution – Article III, Section 1); No person shall be deprived of ... property without due process of law (Philippine Constitution – Article III, Section 9); LARRIP refers to ADB/World Bank' policy, "Involuntary resettlement should be avoided where feasible".	JICA guideline has the stronger emphasis on avoidance of involuntary resettlement; however there is no significant difference as LARRIP refers to ADB/WB policy.	Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives.
②	Minimization of impact caused by involuntary resettlement	When population displacement is unavoidable, effective measures to minimize impact and to compensate for losses should be taken. (JICA GL)	No person shall be deprived of ... property without due process of law (Philippine Constitution – Article III, Section 1); LARRIP refers to ADB/World Bank' policy "Where population displacement is unavoidable, it should be minimized by exploring all variable project options".	No significant gap	When population displacement is unavoidable, effective measures to minimize impact and to compensate for losses should be taken.
③	Policy on compensation	People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels. (JICA GL)	LARRIP refers to ADB/World Bank' policy, "People unavoidably displaced should be compensated and assisted that their economic and social future would be generally as favorable as it would have been in absence of the Project".	No significant gap	People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels.
④	Compensation for housing/ structures	Compensation must be based on the full replacement cost as much as possible (JICA GL).	Valuation of improvements and structures shall be based on current market prices for materials, equipment, labor, contractor's profit &	No significant gap	Replacement housing or full replacement cost; Valuation to be determined as

No	Key Issues	(A) JICA Guidelines and WB O.P.4,12	(B) Laws of the Republic of the Philippines	Gap between (A) and (B)	Project Policy
			overhead, etc. (LARRIPP); Damage to perennials for commercial value, damaged crops at market value & entitlement for fruit- bearing trees assessed (LARRIPP);		described in LARRIPP;
⑤	Compensation for land	Compensation must be based on the full replacement cost as much as possible. (JICA GL) Land in Urban areas: market value of land of equal size/use w/similar public infrastructure and services in same vicinity, plus cost of any transfer taxes (BP 4.12); Agricultural land: market value of land of equal productive potential in vicinity plus the cost of preparing land to levels similar to affected land plus cost of transfer taxes & registration (BP 4.12); "Land" also includes anything growing or permanently affixed to land – including crops (OP 4.12);	Each PAP is entitled to receive just compensation for his/her affected plot at a rate to be negotiated between BIR zonal value and the fair market value as provided by RA 8974 (RA 8974, LARRIPP); Land can be acquired from PAPs through donation, quit claim, exchange or barter, negotiated sale or expropriation (RA 8974, LARRIPP); Holders of free patents (under Public Lands Act or CA141) compensated for land improvements only; Holders of Certificates of Land Ownership Award (CLOA) granted under Comprehensive Agrarian Reform Act compensated in accordance with RA 8974; CLOAs granted under Public Land Act or CA141 compensated for land improvements only. Expropriation contestations available – courts must determine just compensation be paid owner within 60 days of filing expropriation case (RA 8974) If relocation is not possible, financial assistance equivalent to prevailing minimum wage x 60 shall be extended to the impacted families by LGU (RA 7279) Land valuation determined by: classification of property, development costs for land, owner's declaration, selling price of lands in vicinity, etc. (RA 8974); Agricultural relocation/ resettlement for	Zonal value for land may not meet the full replacement cost	Replacement land or compensation at full replacement value

No	Key Issues	(A) JICA Guidelines and WB O.P.4,12	(B) Laws of the Republic of the Philippines	Gap between (A) and (B)	Project Policy
			tenants/ farmers: equivalent to gross harvest for 1 year based on annual gross harvest for past 3 years - not less than P 15,000 (EO 1035)/ Agricultural lessee: disturbance compensation equivalent to 5x average gross harvest on land during previous 5 years (RA 6389);		
⑥	Timing of compensation and assistance measures	Compensation and other kinds of assistance must be provided prior to displacement. (JICA GL)	The timing of provision is not clearly stated in LARRIP.	No significant gaps	
⑦	Requirement for Resettlement Action Plan (RAP) / Resettlement Policy Framework (RPF)	For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. (JICA GL)	Investment Coordination Committee of Nat'l Economic Development Authority (NEDA) requires RAP for projects that exceed P500 million (ICC NEDA Guidelines and Procedures March 4, 2005); DPWH requires RAP for all projects (Dept Order 5 & 327, 2003) & requires inclusion of ROW, squatter relocation, development of resettlement site in costs (DO 187, 2002)	No significant gaps	For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public.
⑧	Consultation with affected people	In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. (JICA GL)	People affected should be fully informed and consulted on resettlement and compensation options. Participation of beneficiaries, LGUs, Presidential Council for Urban Poor and government agencies shall afford beneficiaries ... opportunity to be heard & to participate in decision-making process over matters involving the protection & promotion of their legitimate collective interests – including documentation and proper feedback mechanisms (RA 7279); The implementing agency... shall conduct an extensive public information campaign among the local inhabitants that will be affected by the Project ...	No significant gaps	In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance.

No	Key Issues	(A) JICA Guidelines and WB O.P.4,12	(B) Laws of the Republic of the Philippines	Gap between (A) and (B)	Project Policy
			(EO 1035)		
⑨	Considerations in the manners of consultation with affected people	When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people. (JICA GL)	Select a master of ceremonies, preferably someone experienced who can speak the native language. Select also a key local official to welcome the participants; Arrange provision for food well in advance; Arrange transportation to and from the site if requested (DPWH Social and Environmental Management Systems Operational Manual)	No significant gaps	When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people.
⑩	Participation of affected people	Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans. (JICA GL)	Same as 8. above	No significant gaps	Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans. (JICA GL)
⑪	Grievance mechanisms	Appropriate and accessible grievance mechanisms must be established for the affected people and their communities. (JICA GL)	LARRIP specify following procedures for grievance mechanisms; 1) The PAPs will lodge their grievances by writing to the Resettlement Implementation Committee (RIC) for immediate resolution; 2) If the complaint is not satisfactory resolved within 15 days or the PAP does not receive any response from the RIC, the PAP can forward the complaint to or file an appeal at the DPWH Regional Office (RO); 3) if the complaint is not satisfactorily resolved in 15 days or the PAP does not receive any response from DPWH RO, the PAP can file a legal complaint any appropriate Court of law.	The legal instruments of the Philippines shows specific mechanism, however there is no significant gap	Project shall establish appropriate and accessible grievance mechanisms that include relevant stakeholders, such as municipality, DA and JICA.
⑫	Identification of affected people	Affected people are to be identified and recorded as early as possible in order to	All major projects require feasibility study to include: social, political, cultural &	No significant gaps	Affected people are to be identified and recorded as

No	Key Issues	(A) JICA Guidelines and WB O.P.4,12	(B) Laws of the Republic of the Philippines	Gap between (A) and (B)	Project Policy
		establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits. (WB OP4.12 Para.6)	environmental impact/detailed parcellary surveys required (EO 1035);		early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits.
⑬	Eligibility criteria	Eligibility of benefits includes, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal right to the land they are occupying. (WB OP4.12 Para.15)	Eligible persons (LARRIPP): 1. Landowners with legal title to land 2. Users of arable land who have no land title or tax declaration 3. Agricultural lessees 4. Owners of structures who have full title 5. Owners of structures who have no title (including informal settlers) 6. Renters	Although (B) states more specific categories, there is no significant differences	Eligible persons are: 1. Landowners with legal title to land 2. Users of arable land who have no land title or tax declaration 3. Agricultural lessees 4. Owners of structures who have full title 5. Owners of structures who have no title (including informal settlers) 6. Renters
⑭	Preference for different types of resettlement strategies	Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based. (WB OP4.12 Para.11)	N/A	No significant gaps	Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based.
⑮	Livelihood support / Transitional	Provide support for the transition period (between displacement and livelihood	To the extent feasible ... resettlement projects shall be located near areas where	Gap – Philippine laws do not provide	Provision of rehabilitation assistance through

No	Key Issues	(A) JICA Guidelines and WB O.P.4,12	(B) Laws of the Republic of the Philippines	Gap between (A) and (B)	Project Policy
	assistance	restoration). (WB OP4.12 Para.6)	employment opportunities are accessible (RA 7279); Occupants of resettlement sites are entitled to: land surveys at minimal cost, liberalized terms on credit facilities & housing loans & 100% deduction from homebuyer gross income tax, exemption from some taxes & fees for transfer of certificate of titles (RA 7279); Informal Settler PAFs, if relocating, will be provided free transportation; Informal settlers who choose to return to place of origin or to be shifted to government relocation sites will be given free transportation (LARRIPP); Income loss: For loss of business/income, the PADs will be entitled to an income rehabilitation assistance to be based on the latest copy of the PAF's Tax record for 3 months, or not to exceed P 15,000 for severely affected structures (LARRIPP). Inconvenience Allowance: the amount of P10, 000 shall be given to PAFs with severely affected structures, which require relocation and new construction (LARRIPP). Rehabilitation Assistance: Skills training and other development activities equivalent to P15,000 per family will be provided in coordination with other government agencies, if the present means of livelihood is no longer viable and PAF will have to engage in a new income activity (LARRIPP)	additional livelihood transitional training; In addition, Philippine law/policies do not specify loss of business premises or impact on vendors and/or small shop owners;	training and other appropriate livelihood support as required

No	Key Issues	(A) JICA Guidelines and WB O.P.4,12	(B) Laws of the Republic of the Philippines	Gap between (A) and (B)	Project Policy
⑯	Considerations for socio-economically vulnerable groups	Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc. (WB OP4.12 Para.8)	The State…shall protect the rights of indigenous cultural communities to their ancestral lands to ensure their economic, social and cultural well-being (Philippine Constitution Article XII, Section 5); The women, children, and the elderly who are among PAP shall likewise be consulted and mobilized to participate in the consultation meeting and discuss with them the socio-cultural implication of the RAP.	No significant gaps	Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc.
⑰	Requirement for Abbreviated Resettlement Action Plan (RAP)	For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan (ARAP) is to be prepared (WB OP4.12 Para.25).	Minimum number of PAPs for regular PAP is not mentioned in relevant laws.	Condition for ARAP is not specified in the laws of the Philippines.	For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared

(2) Consideration on Land Acquisition in the Project

In the Philippines, there are 4 types of legal land acquisition including 1) donation, 2) land swapping, 3) negotiated sale and 4) expropriation (RA 8974-Section 3, RA 7279-Section 10). When land acquisition is required for road development, the donation is considered first followed by negotiated sale (in case negotiation for donation fails), and the expropriation is the final option if the negotiation fails.

Accordingly, in the first place, the JICA study team and municipalities concerned considered whether donation could be applied to the project sites. Based on the other similar cases implemented before, the concerned parties agreed that donation of the land could be appropriate for this case. In the next step, based on JICA Guidelines for Environmental and Social Consideration, voluntary donation could be applied based on the criteria of OP 4.12 endnote 7 in World Bank Sourcebook. As a result, voluntary donation could be applied to this case, as it met criteria for “rights of choice” (meaning that the concerned parties, without pressures from the authority, can be for or against land acquisition) and “informed consent”.

Voluntary resettlement and voluntary offer of land mean resettlement without any form of authority such as rights for land acquisition. These are fundamentally possible only when

"informed consent" and "rights of choice" are secured when a project implementation is not yet confirmed.

As for the land acquisition in Datu Paglas, "rights of choice" was considered to be secured, since the proposed route had been selected based on the proposal resulted by consultation among municipalities and residents in the barangays concerned.

It should be noted that voluntary land donation was not proposed as a prerequisite choice for local stakeholders. In the stakeholder meeting of December 2014, the mayor has explained to the landowners that they are entitled to land swapping with the municipality land if they do not agree with land donation. The agreement on land donation has been reached based on the above mentioned dialogue with local stakeholders (refer to Annex B-4 for further details).

The most important reason for the voluntary donation is that the expected merits (improved convenience in terms of traffic and shipment of products by road development, and economic growth) outweigh the demerits (decreases in farmlands). The assessment of the informed consent is described in the table below.

Table 1-5-16 Criteria for Informed Consent

	Criteria	Results of Consideration
1	The infrastructure must not be site specific.	As the location and scale of roads are to be confirmed in detailed design, changes of design in response to residents' will are possible. The routes at this stage are the ones residents suggested via barangays.
2	The impacts must be minor, that is, involve no more than 10 percent of the area of any holding and require no physical relocation.	During the preparatory survey, it has been confirmed that the Project will not involve land acquisition that exceed 10% of the land holdings of affected land owners. Also, it involves no physical relocation.
3	The land required to meet technical project criteria must be identified by the affected community, not by line agencies or project authorities (nonetheless, technical authorities can help ensure that the land is appropriate for project purposes and that the Project will produce no health or environmental safety hazards).	The local residents have been briefed on detailed information of the Project and their consent has been confirmed through 2 stakeholder meetings (Please refer to attached minutes for details)
4	The land in question must be free of squatters, encroachers, or other claims or encumbrances.	It has been confirmed through the municipal office that the project site is free from squatters, encroachers, or other claims or encumbrances.
5	Verification (for example, notarized or witnessed statements) of the voluntary nature of land donations must be obtained from each person donating land.	Landowners have been briefed on the "right of choice" through 2 stakeholders meeting and showed their support for voluntary donation (See Annex B-4). As the eligible resident has waived their right to receive compensation, the donation can be regarded as voluntary.

	Criteria	Results of Consideration
6	If any loss of income or physical displacement is envisaged, verification of voluntary acceptance of community-devised mitigation measures must be obtained from those expected to be adversely affected.	Although decreases in income and resettlement are not assumed, municipalities shall prepare substitutive farmlands if landowners are likely to lose 10% or more of their land, which had already been explained to them. Discussion about contents of compensation will be hold in the field.
7	If community services are to be provided under the Project, land title must be vested in the community, or appropriate guarantees of public access to services must be given by the private titleholder.	The Project is rehabilitation of the existing roads used by all residents. All residents' accesses are secured.
8	Grievance mechanisms must be available.	Grievance mechanism based mainly on LGU's Grievance Redress Committee is currently considered (refer to 1-5-2-2-5 for details).

Source: WB Involuntary Resettlement Sourcebook, p22-25）

The assessment as in the table above shows that the Project meets the criteria of the voluntary donation described in WB OP 4.12. The local people seem to have an understanding of the positive impact of the Project on transport and the development of agricultural production. Considering the result of the stakeholder meeting, the donation of land for the Project can be considered voluntary and no compensation will be required.

1-5-2-2-3. Scale of Land Acquisition and Resettlement

The population of the surrounding of the project area accounts for 754 people. The population concentrates on barangay Poblacion, which is located close to the municipal centre. There are 82 land owners, and the total of 6.3 ha of land owned by 52 people will be subjected to land acquisition for the Project. The area is agricultural land that mainly produces corn, rice, fruits such as mango and banana. As a result of an on-site survey on the scale of land acquisition for the new road construction in Datu Paglas, acquisition of approximately 6 ha is expected. The Municipal Assessor's office has confirmed that 51 land owners will be subjected to land acquisition. For the section that requires land acquisition, all concerned land owners have approved the voluntary donation through 2 stakeholders meetings.

The information on the landowners and the local residents who live within 50 meters from the centre line of the proposed road is shown in the table below.

Table 1-5-17 The Data on Project Affected Units (PAUs) and Project Affected Persons (PAPs)

Type of loss	No. of Project Affected Unit						No. of Affected People					
	Poblacion	Mangadeg	Puya	Mao	Makat	Total	Poblacion	Mangadeg	Puya	Mao	Makat	Total
Required for displacement												
1. Land owner (without residence)	1	21	12	11	4	49	-	-	-	-	-	-
2. HH (with land ownership)	0	0	0	1	1	2	0	0	0	11	9	20
Sub-total	1	21	12	12	5	51	0	0	0	11	9	20
Not Required for displacement												
1. Land owner (without residence)	17	1	0	5	3	26	-	-	-	-	-	-
2. HH (with land ownership)	3	0	2	0	0	5	26	0	7	11	0	44
2. HH (Tenants)	94	18	6	10	0	128	522	108	32	48	0	710
Sub-total	114	19	8	15	3	159	548	108	39	59	0	754
Total (HH)	115	40	20	27	8	210	548	108	39	70	9	774

1-5-2-2-4. Detail of Compensation and Assistance

The land required for the Project is secured by voluntary donation from land owners. Therefore, there is no plan for specific compensation and assistance. Although concerned parties reached an agreement through the stakeholder meetings, continuous monitoring shall be conducted through grievance mechanism.

1-5-2-2-5. Grievance Mechanism

It is suggested that the DA becomes the responsible party for grievance redress procedures for the PAPs, and Grievance Redress Committee (GRC), comprised of the municipality, barangays, community representatives, and others, shall deal with grievances at the local level and proceed to discussion for reaching agreement following below-mentioned flow.

1. Stakeholders will put their claims in writing as “grievance form”, and submit it to GRC. If it is difficult to submit it in a document, LGU officials provide them with necessary supports.
2. If the problem cannot be solved within 15 days since the date of a grievance, or the person has not received any respond from GRC, the person can submit “grievance form” about the claim to DA through DAF-ARMM.
3. If the problem cannot be solved even 15 days have passed since the notification to DA, or a demurrer has not received any respond from DA, the demurrer can request implementation of legal measure in court.

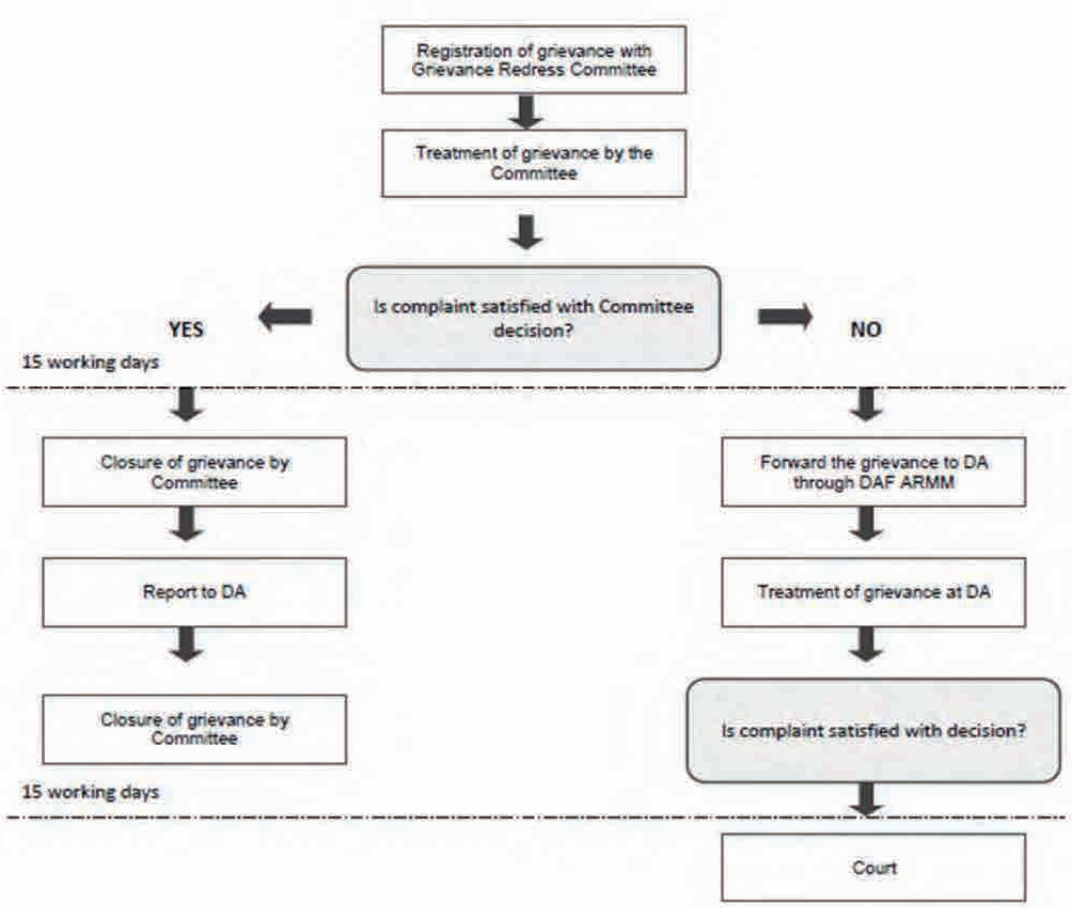


Figure 1-5-10 Grievance Mechanism

Following the procedure above, stakeholders will be exempted from payment of fee. Also, GRS keeps and manages all “grievance form”. Also, GRC shall store and manage all grievance forms. As DA and the Datu Paglas municipality are arranging the system and done the necessary preparation for grievance mechanism, such as establishing GRC, lodgment of a complaint can be made by any people in February, 2015.

1-5-2-2-6. Implementation Structure

The table below shows governmental bodies and their duties in land acquisition.

Table 1-5-18 Implementing Structure in Land Acquisition

Governmental Body	Duties
DA-PDS	Holding stakeholders' meetings, Inspection on residents' complaints, Administrative assistance for compensation for the acquired land, Estimation of expenses, Application for budget, Payment of compensation
LGU (Datu Paglas)	Assist holding stakeholders' discussions, Reception of residents' complaints, Survey relevant to land acquisition, Negotiation with landowners, Other on-site works
OPAPP	Administrative assistance for land acquisition
BDA	Administrative assistance for land acquisition

1-5-2-2-7. Implementation Schedule

Implementation schedule regarding a voluntary donation and small-scale land acquisition is shown below. Although the finalized location and scale of facilities will be fixed in the detailed design, tentative expected location and area of land acquisition had been measured at the phase of the preparatory survey.

Tasks for Voluntary donation	2014				2015	
	Spt.	Oct.	Nov.	Dec.	Jan.	Feb.
1. Stakeholder meeting						
2. Negotiation for voluntary donation						
3. Agreement on voluntary donation						
4. Grievance mechanism and procedures						

1-5-2-2-8. Expenses and Funds

As discussed in the section 1-5-2-2-2, no cost will be required due to the voluntary donation of required land.

1-5-2-2-9. Monitoring Structure during Implementing Institutes, and Monitoring Form

DA shall regularly monitor the activities during and after construction through local governments' co operations. During construction, sufficient instructions will be given to contractors to minimize negative effects, while holding conferences with residents to lessen issues on the land and property. Contractors and local governments shall submit monthly reports to DA.

1-5-2-2-10. Stakeholders Meeting

During the implementation of the Project's preparatory survey, the public hearing as a stakeholders' discussion took place in Datu Paglas on 18th of September, 2014. Datu Paglas municipality officers, barangay representatives, and residents participated in it. After the explanation about the outline of the Project, Datu Paglas municipality and the Preparatory Survey Team discussed crucial topics such as land acquisition. Although some residents expressed their anxieties about being negatively affected by the Project, Mayor and local government officers explained that careful consideration not to damage residences will be given and that they will be compensated if negatively affected (see attached minute for the details). These conferences are kick-off meetings to keep discussing with this project's implementing bodies and concerned local persons. The public hearing shall be continued in response to necessity.

Following the first public hearing, the second one has been held on 2nd December 2014. The total of 83 PAPs including all of 51 land owners who were affected have participated in the meeting. In the meeting, following the review of the first public hearing, the municipality officials have explained the project outline, positive socio-economic impact and negative environmental impacts of the Project. Then they have briefed the eligibility of compensation for landowners who will be affected by the Project. It was followed by a question-and-answer session, and municipal official have provided answers for the questions. The further details can be found in the minutes in Annex-7 B-4. The public hearing shall continue to be held whenever necessary.

1-5-2-3. Others

1-5-2-3-1. Monitoring Form

A draft monitoring form is attached as Annex-7 B-3.

1-5-2-3-2. Environmental Check-List

An environmental check-list is attached as Annex-7 B-5.

Chapter 2 Contents of the Project

Chapter 2 Contents of the Project

2-1. Basic Concept of the Project

2-1-1. Overall Goal and Project Objective

The target sites of the Project are areas with high poverty rate, having issues of lack in fundamental social services and aging infrastructures. The Philippine Government attempts to improve local residents' employment and income status through promotion of agricultural development of the target sites. Undeveloped agricultural distribution route is one of the obstacles to agricultural development, and improvement of agricultural distribution is regarded as important. The purposes of the Project are to promote agricultural development of the target areas, and thus improve employment and livelihood of rural people in the target areas, through development of the FMR. In addition, it is expected that the people in the target areas can realize "peace dividend" through the Project that is supposed to contribute to poverty reduction, prevention of conflicts, and stable peace in the target areas.

2-1-2. Outline of the Project

In the Project, in order to achieve the above objectives, rehabilitation of damaged FMR and river-crossing facilities that are hampering agricultural production activities in the target 3 municipalities shall be implemented. At the same time, capacity building for operation and maintenance of the improved facilities will be implemented, so that local people can sustainably use them. As a result, it is expected that all-year traffic access between farmlands and markets will be assured. This Project therefore aims at construction of roads and river-crossing facilities such as bridges.

The contents of this Project were confirmed by municipality officials and the Department of Agriculture (DA), OPAPP and BDA, and are as follows.

Table 2-1-1 Comparison of the Contents of the Request and the Results of the Site Survey

Target Area	Contents of the Project (Original)	Contents of the Project (Results of the site survey)	Overview of the Proposed FMR (Farm to Market Road)
Lot 1 Northern region; Lanao del Sur, Bumbaran	Construction/rehabilitation of FMR (approx.5km in length) Bridge; one bridge (approx. 15m), River crossing structures; culvert, drainage, etc.	Construction/rehabilitation of FMR (approx.4.7km in length) River crossing structures; one bridge (about 18m), one spillway, culvert, drainage, etc.	This FMR connects Francfort and Sumugot and the existing road surface is rough, which hampers vehicles. The start point intersects PCCP paved barangay road. The End point has been under construction by ADB. Construction work will be completed in 2015. After the Project, the proposed road

Target Area	Contents of the Project (Original)	Contents of the Project (Results of the site survey)	Overview of the Proposed FMR (Farm to Market Road)
			will be covered by concrete up to the national road, securing all-year traffic access.
Central region; Cotabato province, Alamada	FMR (farm road level) Construction/Rehabilitation (approx, 5 to 10km,detailed Specifications are not yet determined), facilities; culvert, drainage, etc.	FMR (farm road level) Construction/Rehabilitation (Section-1; approx. 6.3km in length, Section-2; approx.2.3km in length), River-Crossing facility ; four box culverts, Facilities; culvert, drainage, etc.	This target FMR of section-1 connects national road at the center of the municipality of Alamada to Mapurok barangay. It is difficult to access to the center of the town when the water level of the Libungan River is high. A four-wheel vehicle could cross the river during the low water level season, but it could not pass there after rainfall. On the other hand, section-2 will secure all-year traffic access after development of the section, even though the distance to the center of town will get longer than the other one.
Lot 3 Southern region; Maguindanao province, Datu Paglas	FMR (farm road level) Construction (approx. 10km) Bridge ; two bridges (approx. 10m each), Facilities; culvert, drainage, etc.	FMR (farm road level) Construction/Rehabilitation (approx. 8.7km in length) Bridge ; four bridges (approx. 10m each), Facilities; culvert, drainage, etc.	Both sides (1.6km from the start point and 1.5km from the end point) of the target road have already been paved by gravel. Although there is a footpath in the target area, most of this target FMR is undeveloped. Construction of this FMR makes it possible for trucks to travel throughout a year.

2-2. Outline Design of the Japanese Assistance

2-2-1. Design Policy

Basic design policy of FMR and river-crossing structures are discussed below.

1) Among the target sites, the basic ideas for Bumbaran and Alamada are improvement of existing roads. But a new road will be constructed in Datu paglas except a few sections. Regarding these 2 sites, the width of the proposed routes should be considered not to influence the roadsides of the proposed FMR while securing minimum widths of FMR. On the other hand, alignment of new construct route of Datu Paglas was set by site survey in cooperation with municipality officials.

2) The basic idea of FMR and related structure will be designed under principles in accordance with the standard design of the Philippines.

3) Regarding the type of bridge structure, the basic idea of FMR and related river-crossing structure will be designed in accordance with the design standard of the Philippines, while securing economy and workability. The most appropriate structure will be designed, taking

into account the design condition and the natural condition, such as river flow.

(1) Design Criteria

This Project referred to various design criteria published by DPWH, in addition, “Road Structure Ordinance (Japan criteria)”will complement them if necessary. On the other hand, the natural conditions of each site are based on the result of the site survey reported on section “1-5-1. Natural Conditions”.

Table 2-2-1 Design Criteria

Title	Published year	Reference
Design Standards for Tourism and Farm to Market Roads	2014	Department order No.11 of DPWH
Design Guideline Criteria and Standards VOLUME– II (Highway Design)	1984	DPWH
Enhancement of Management and Technical Processes for Engineering Design in DPWH Volume5-Bridge Design	2014	DPWH
AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURE 1986	1986	Association of State Highway and Transportation Officials. Washington, D.C.
Standard specifications for highway bridges 17th edition	2002	Association of State Highway and Transportation Officials. Washington, D.C.
Government Order on Road Design Standard	1999	Japan Road Assoc.
Specifications For Highway Bridges	2012	Japan Road Assoc.
Concerning Structural Standards for River Management Facilities (Criteria applied in Japan)	2000	Japan River Association

(2) Classification of the Target Road

- Classification of the target road: FMR (Farm to Market Road)
- Design speed:30km/hour

(3) Outline of the Planning

1) Bumbaran

Table 2-2-2 Outline of the Planning in Bumbaran

No.	Structure	Specification	Current situation
1	Road	– Improvement/Rehabilitation of existing road, 4.7km in length – 4m (2.5m) carriageway with 0 ~ 0.5m shoulder at both sides, total of 3.5 ~ 5m + width of roadside ditch – Concrete pavement (PCCP)	There is an existing dirt road throughout the proposed FMR.
2	River-crossing Crossing - BI	– Structure type: Reinforced Concrete (RCDG) bridge – Approx. 18 m in length	There is an existing bailey bridge which has been damaged.
3	River-crossing Crossing - BII	– Structure type: Box Culvert type – Double Barrel 2.4m*1.8m	No existing bridge
4	River-crossing Crossing - BIII	– Structure type: Spillway – Triple Barrel Pipe culverts 910 ϕ mm	There is an existing bamboo bridge for pedestrians

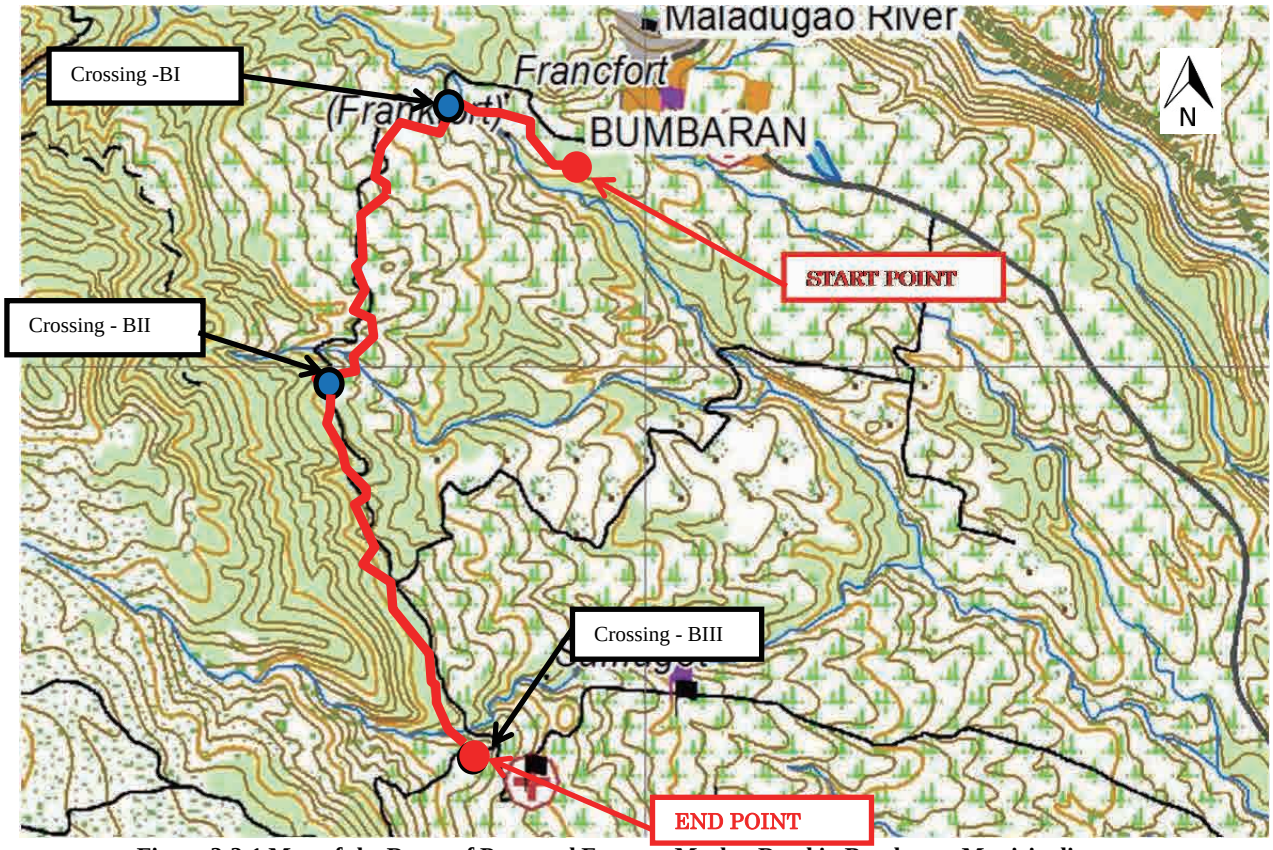


Figure 2-2-1 Map of the Route of Proposed Farm-to-Market Road in Bumbaran Municipality

2) Alamada

Table 2-2-3 Outline of the Planning in Alamada

No.	Structure	Specification	Current situation
Section 1 (North Route)			
1	Road	– Improvement/Rehabilitation of existing road, 6.3km in length – 4m carriageway with 0 ~ 0.5m shoulder at both sides, total 4 ~ 5m + width of roadside ditches – Concrete pavement(PCCP)	There is an existing concrete/dirt road throughout the target section.
2	River-crossing Crossing - AI	– Structure type: Box Culvert type – Triple Barrel 2.4m*2.1m	There is an existing bridge which collapsed recently.
Section 2 (South Route)			
3	Road	– Improvement/Rehabilitation of existing road, 2.3km in length – 4m carriageway with 0 ~ 0.5m shoulder at both sides, total 4 ~ 5m + width of roadside ditches – Concrete pavement (PCCP)	There is existing dirt road throughout the target section.
4	River-crossing Crossing - AII	– Structure type: Box Culvert type – Triple Barrel 2.4m*1.8m – DPWH standard structure	Existing bridge has already collapsed.
5	River-Crossing Crossing - AIII	– Structure type: Box Culvert type – Triple Barrel 2.4m*1.8m	Ditto
6	River-crossing Crossing - AIV	– Structure type: Box Culvert type – Triple Barrel 1.8m*1.5m	Ditto

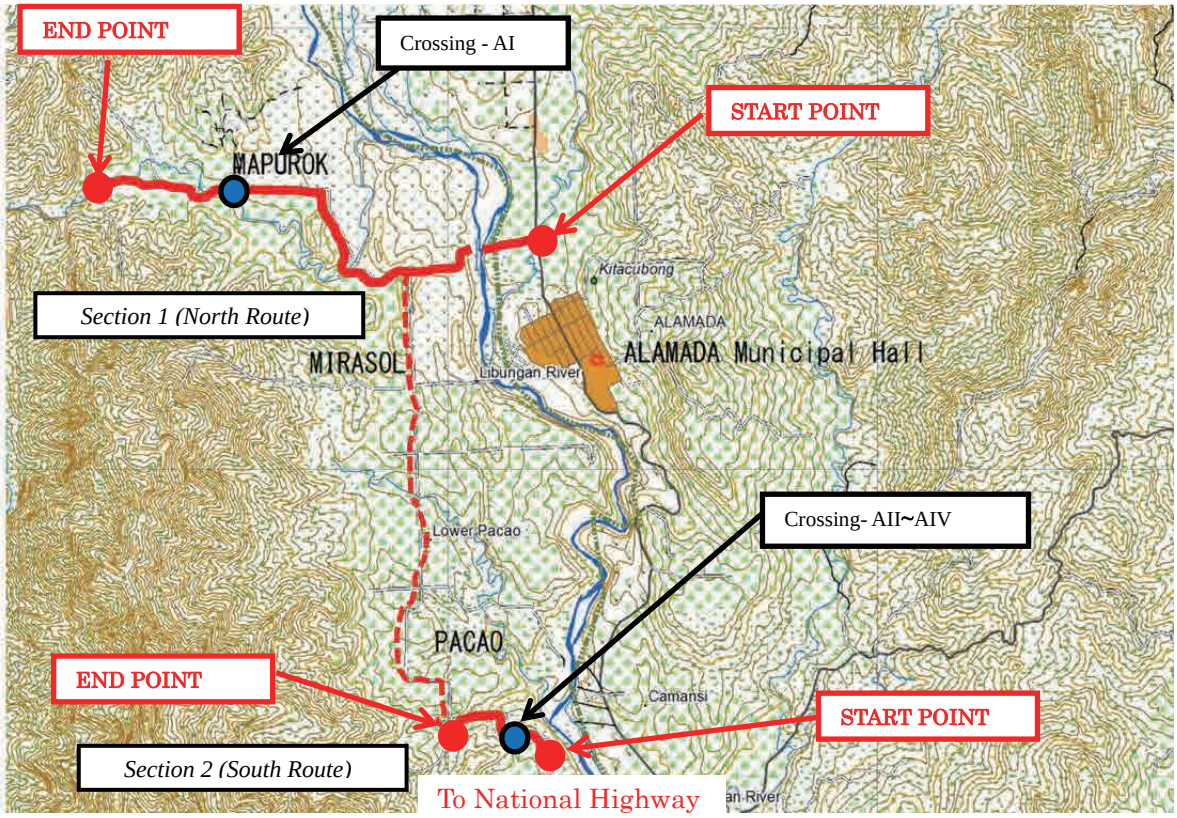


Figure 2-2-2 Map of the Project Site in Alamada

3) Datu Paglas

Table 2-2-4 List of Structures and Specification in Datu Paglas

No.	Structure	Specification	Current situation
1	Road	– New construction and rehabilitation for some sections of existing road, 8.7km in length – 4m carriageway with 0.5 ~ 1.5m shoulder at both sides, total 5 ~ 7m + width of roadside ditches – Concrete pavement (PCCP)	Some sections of the proposed FMR are existing gravel roads, but there is only a foot path or no existing road in other sections.
2	River-crossing Crossing - DI	– Structure type: Flat Slab bridge – Approx. 12m in length	No existing bridge
3	River-crossing Crossing - DII	– Structure type: Flat Slab bridge – Approx. 10m in length	Ditto
4	River-crossing Crossing - DIII	– Structure type: Flat Slab bridge – Approx. 10m in length	Ditto
5	River-crossing Crossing - DIV	– Structure type: Flat Slab bridge – Approx. 10m in length	Ditto
6	River-crossing Crossing-DV	– Structure type: Box Culvert type – Triple Barrel 1.8m*1.5m	Ditto
7	River-crossing Crossing-DVI	– Structure type: Box Culvert type – Triple Barrel 1.8m*1.5m	Ditto

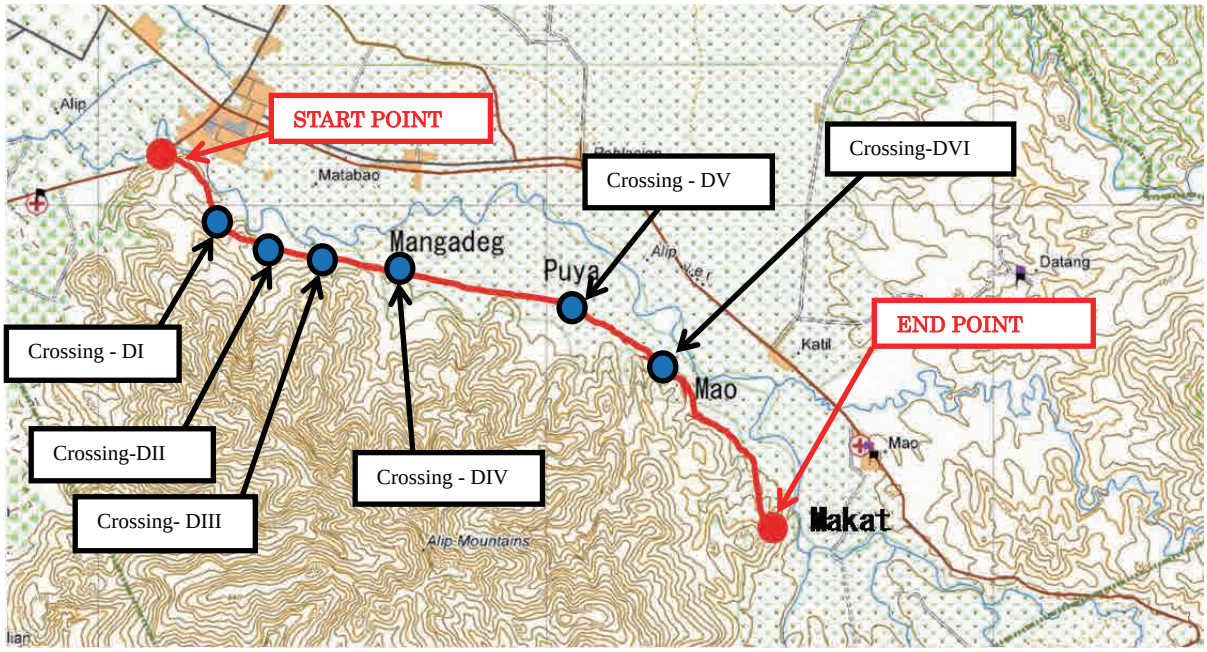


Figure 2-2-3 Map of the Project Site in Datu Paglas

If there is a surplus of budget, an access road between the main road and Puya and Mangadeg barangays will be rehabilitated.

2-2-2. Basic Plan

(1) Planning of Road Construction

1) Planning of Typical Cross Section

In this preparatory survey, the Criteria of DPWH[1] were adopted as the standard design of the Philippines, judging from the position of the proposed route in the target area.

- Pavement width : 4.0m (Average daily traffic of less than 200:DO No.11)
- Roadway cross slope : 1.5% (for PCCP)
- Width of shoulder : 0.5m ~ 1.5m
- Material of shoulder : Gravel surfacing
- Shoulder cross slope : 3.0%
- Side slope ratio(H:V) : Cut slope of 1.5 : 1,Minimum fill slope of 1.5 : 1
- Pavement type : Portland cement concrete pavement (Minimum of 150mm: DO No.11)
- Sub base course : Aggregate sub-base course (Minimum of 100mm: It depends on the result of CBR-test.)

※ [1]DPWH Guideline Criteria and Standards VOLUME II
DPWH FMR DEPARTMENT ORDER No.11 (DO No.11)

i) Width of the Road

Pavement widths were confirmed through DONo.11 based on the future traffic volume which was estimated in this preparatory survey. Future traffic volume for each proposed FMR which was estimated from both the result of traffic survey and assumption of future cultivated land area when the target road's construction is finished is shown below in the following table. Pavement widths of each route were determined as 4.0 m since future average daily traffic volume will be less than 200 per day.

Table 2-2-5 Future Traffic Volume for each Route

Target Area	Future annual traffic volume(Trucks)	Future average daily traffic volume(Trucks)
Bumbaran	5,200vehicles/per year	20 vehicles/per day
DatuPaglas	2,700 vehicles/per year	10 vehicles/per day
Alamada	2,300 vehicles/per year	9 vehicles/per day

ii) Pavement Type

Pavement type was decided in line with PCCP (Portland cement concrete pavement) for the following reasons.

- Request from the target municipalities
- DO No.11 sets PCCP as the standard pavement type for FMR.
- Maintenance conditions of the existing road

iii) Roadway Cross Slope

Roadway cross slope was set as 1.5% in accordance with DO No.11for concrete pavement.

iv) Road Shoulder

Width of the shoulder was determined as 1.5 m in accordance with DO No.11 for concrete pavement, and adjusted to 0.5 m in section of improvement of existing road when it is needed.

v) Material of Shoulder

Material of shoulder was set as gravel surfacing based on DO No.11, not PCCP.

vi) Shoulder Cross Slope

Shoulder cross slope was decided as 3% according to DO No.11.

vii) Side Slope Ratio

Side slope ratio was set as follows in accordance with DO No.11.

- Cut slope of 1.5 : 1
- Fill slope of 2 : 1

viii) Thickness of Pavement (PCCP)

In order to apply standard design of the Philippines, the thickness of PCCP was confirmed through calculation using both future traffic volume and CBR-value conducted in each target site in this preparatory survey as provided in DPWH Guideline and AASHTO Guide for Design of Pavement Structure1993 that is listed on DO No.11. In this calculation, a formula for determination of rigid pavement slab thickness listed on AASHTO for Design of Pavement Structure1993 was used, and the minimum thickness of pavement were determined as 150 mm by DPWH Guideline and DO No.11.

ix) Countermeasure against Cracking in PCCP

Reinforcement will be used near the surface of PCCP to prevent cracking. Besides, in order to correspond with 1-lane construction, tie bar and dowel bar will be properly installed as joint member.

2) Planning of Typical Cross Section

In this preparatory survey, the proposed FMR can be clearly divided into 2 types of section, such as rehabilitation of existing roads and newly constructing section. Almost all the sections of Bumbaran and Alamada are to be rehabilitated. Datu Paglas is a new construction section except 2 parts, i) the part which is about 1.6 km in length from the start point and ii) the part which is 1.5 km in length toward the end point. The pavement widths for the section of rehabilitation of existing roads, with reduction of width of shoulder when necessary, were determined as around 4.0m which is as wide as the existing road before construction, even though it is based on the element of standard cross section. On the other hand, typical cross section regulated on DO No.11 was adopted in the new construction section.

Table 2-2-6 Typical Cross Section for FMR

Target Area	Section	Current situation of existing road	Implementation policy
Bumbaran	STA 0+000~STA 4+600	Existing roads	Rehabilitation
Datu Paglas	STA 0+000~STA 1+600	Existing roads	Rehabilitation
	STA 1+600~STA 7+200	No existing road or foot path	New construction
	STA 7+200~STA 8+700	Existing roads	Rehabilitation
Alamada			
Section-1	STA 0+000~STA 0+550 (Libungan River)	Existing roads	Rehabilitation
	STA 0+760~STA 6+300	Existing roads	Rehabilitation
Section-2	STA 0+000~STA 2+300	Existing roads	Rehabilitation

The adopted types of typical cross section are shown below, corresponding to geological conditions for each section.

i) Section of Rehabilitation of Existing Road

a) Standard section (Type-A1): The road section in which road drainage should be adequately dealt with because of no differences of height between the roadsides such as original ground level and the road.

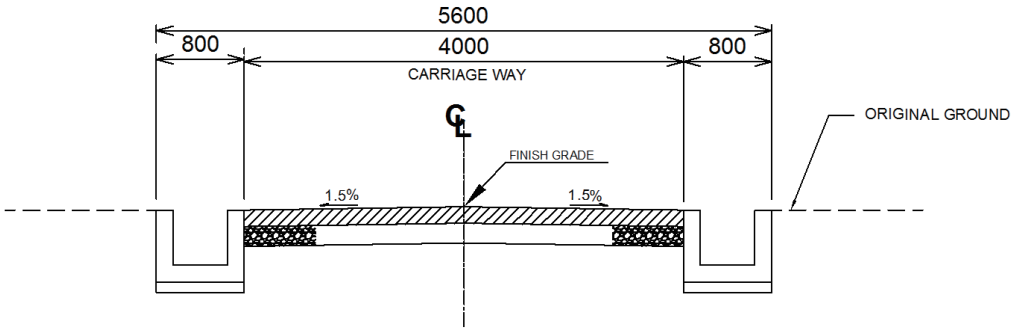


Figure 2-2-4 Typical Cross Section (Standard Section)

b) Slope section: The road section will be constructed in gently sloped area, then runoff from the side slope and beyond the right-of-way are expected to flow in proposed route.

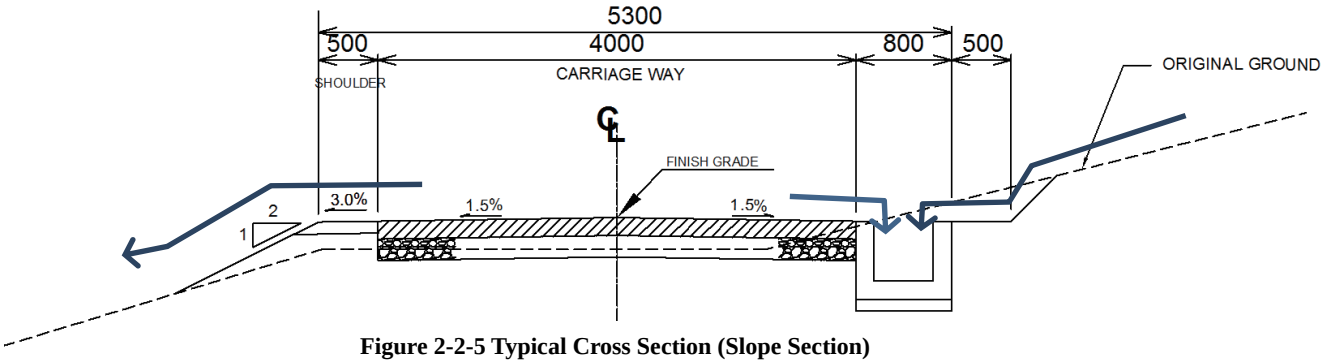


Figure 2-2-5 Typical Cross Section (Slope Section)

c) Cut slope section: The section which is lower than the surrounding area. Runoff is likely to flow in it.

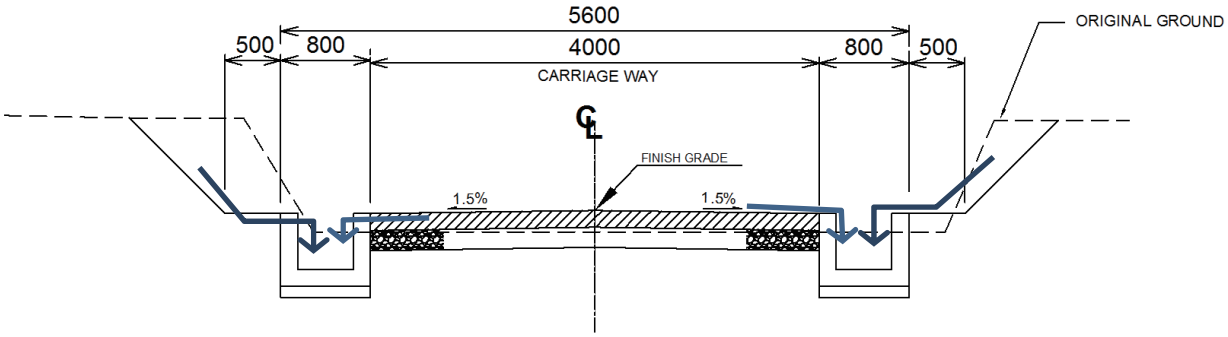


Figure 2-2-6 Typical Cross Section (Cut Slope Section)

d) Flat section: The section will be constructed in area where no rainfall inflows to the proposed route are expected due to the features of terrain like cultivated land area or other flat area.

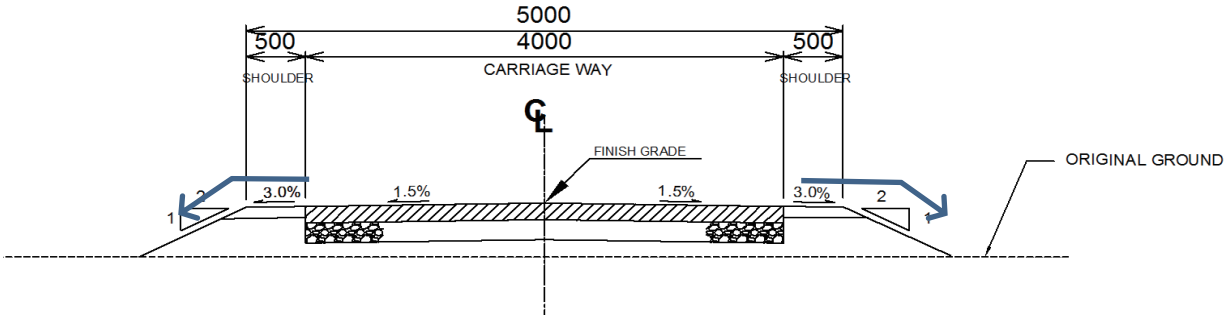


Figure 2-2-7 Typical Cross Section (Flat Section)

ii) New constructed section

a) Standard section: The road section in which road drainage should be adequately dealt with because of no differences of height between the roadsides such as original ground level and the road.

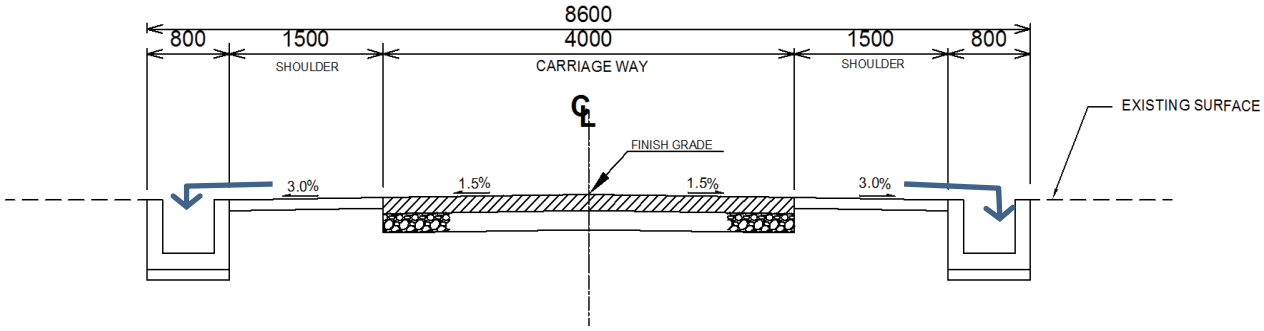


Figure 2-2-8 Typical Cross Section (Standard Section)

b) Slope section: The road section will be constructed in gently sloped area, then runoff from back slope and beyond the right-of-way are expected to flow in proposed route.

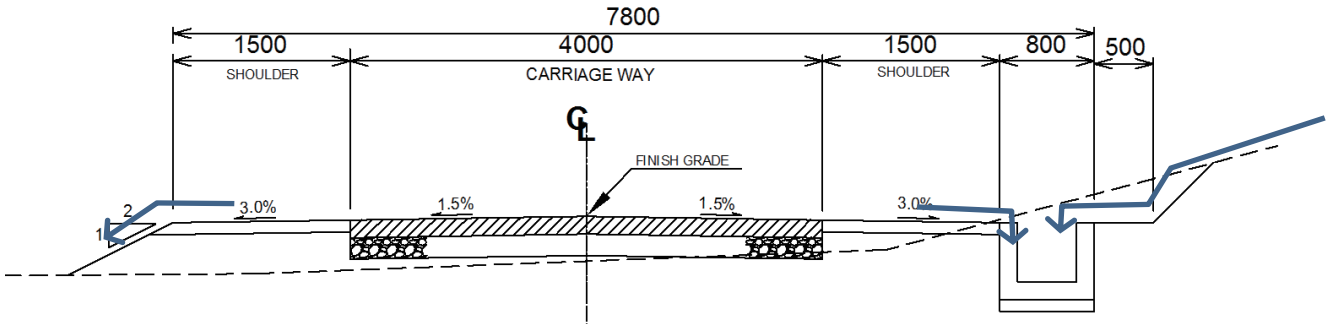


Figure 2-2-9 Typical Cross Section (New Slope Section)

c) Cut slope section: The section which is lower than the surrounding area. Runoff is expected to flow in it.

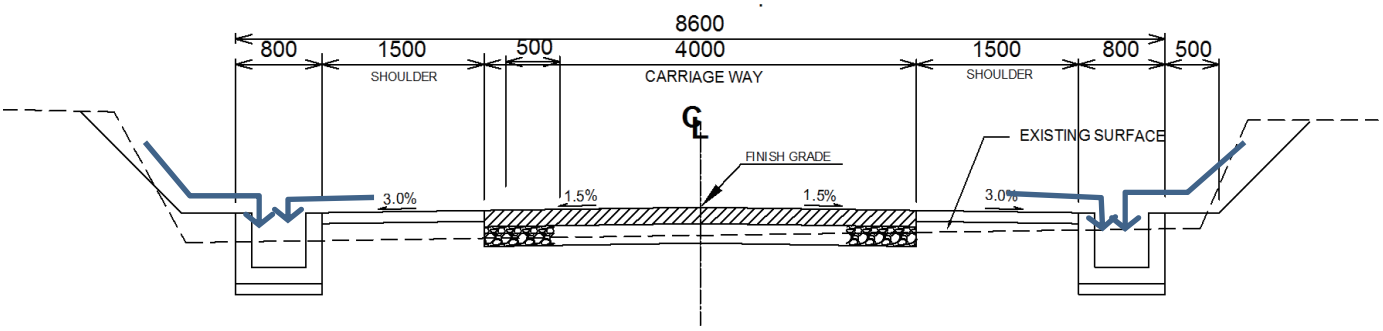


Figure 2-2-10 Typical Cross Section (New Cut Slope Section)

d) Flat section: The section will be constructed in area where no rainfall inflows to the proposed route are expected due to the features of terrain like cultivated land area or other flat area.

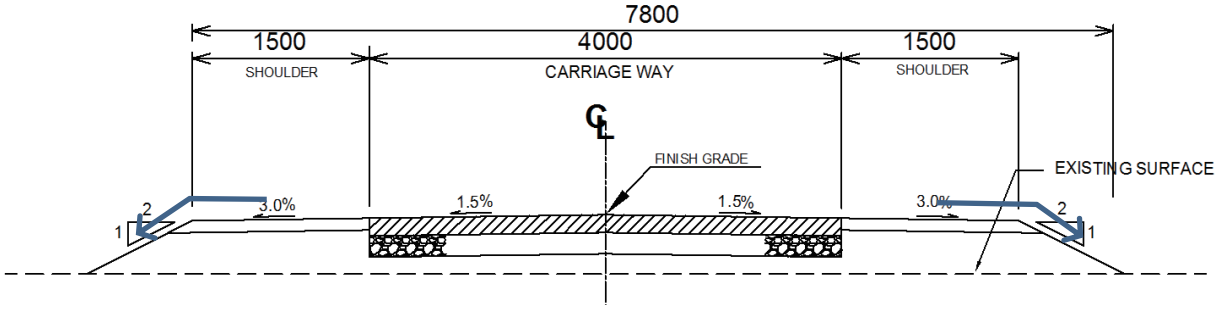


Figure 2-2-11 Typical Cross Section (New Flat Section)

3) Horizontal Alignment Planning

Setting horizontal alignment of exiting road section and new road section are based on the standard geometric structure of the Philippines as explained below. However, horizontal alignment of existing road section will be set to avoid as much modification on the ground and influence around the proposed FMR as possible, after considering the existing road status and conditions of the vicinity.

In order to minimize the length of river-crossing structure and the modification of terrain, horizontal alignment are set through confirmation of positions of control point and private households to be avoided with the guidance of municipal engineer at newly constructed section of Datu Paglas,

- Design speed : 30km/hour (Based on DPWH Guideline and DO No.11)
- Radius of horizontal curve : Minimum is 30m (Based on DPWH Guideline and DO No.11)
- Minimum curve length : Not considered (No description on DPWH Guideline)
- Easement curve : Installed if necessary
- Widening of pavement on curves : Not considered (No description on DPWH Guideline on the condition that the design speed is less than 40km/h.)

・Super elevation : Max 10.0% (depending on the radius of horizontal curve)

Design value of super elevation is determined from the following formula, instead of maximum value of less than 10%.

$$e = \frac{0.004V^2}{R}$$

Where, V: design speed (km/hour) R: radius of curvature(m)
e: super elevation (%)

4) Longitudinal Section Planning

This preparatory survey used standard geometrical structure of the Philippines below in longitudinal section planning. But in a case that geological conditions do not meet the requirement, the preparatory survey adjusted the longitudinal section planning for the purpose to prevent as much change in the ground and influence to the vicinity as possible, even if unavoidable.

・Grades: Minimum of 0% and maximum of 12% (the Project shall use the grades more than 12% at some sections in order to mitigate as much change in terrain as possible)
・Length of vertical curve: Minimum of length of 60 m (the Project shall use the length of vertical curve of less than 60 m if necessary.)

(2) River-Crossing Structure Planning

1) Basic Approach in Selection of the Structure Type of River-Crossing

As the target route crosses a small river in several points, small structures including bridges are designed in order to allow residents and vehicles for transportation of agricultural products to cross the river safely. The basic approach for determination of structure type which will be installed at the target sites is set corresponding to the condition of approach section.

The preparatory survey team sets the basic structure type as “box culvert” which can 1) minimize the workload of construction works such as installment of approach roads and incidental works,2) restrict the height of road surface, and 3) be preferable in terms of economic efficiency and workability if landscape is flat and there is little elevation difference between surrounding ground elevation and riverbed.

On the other hand, the survey team set the structure type as “bridge” while taking into account the condition of the concerned river (amount of river flow etc.), if there is more than 5 m elevation difference between surrounding ground elevation and riverbed and/ or if the structure can be more than 10 m in length.

Based on the above approach, selection of the structure type of river-crossing is determined for each site as shown in the following table through consideration of economic efficiency, workability, and influence to surrounding area, while confirming the conditions around target site and the features of concerned river, using the results of field survey and topographical

survey.

2) Selection of River Crossing Structure Type

Table 2-2-7 Type of Superstructure

Bridge length	Type of Superstructure	Details
6-12m	Flat slab (Rigid frame which connects between superstructure and substructure is adopted.) ・Datu Paglas : DI~DIV (L=10, 12m)	The thermal expansion and contraction of girder is small due to short length of bridge. The rigid frame has superior earthquake resistance.
10-24m	Reinforced Concrete Deck Girder (RCDG) ・Bumbaran : BI (L=18m)	This type constructs superstructure and substructure, respectively.
20-40m	Pre-stressed Concrete Girder (PSCG) ・not applicable (N/A)	Same as the above.

Table 2-2-8 Selection of Structure Type

	Type A	Type B
Geographical features	Depth of creek is deep	Depth of creek is shallow
Details	The difference in height between the surface of existing road and the river bed is huge. Box culvert is not suitable to this kind of target site.	The difference in height between the surface of existing road and the river bed is nearly flat. Hence, this can control the height of planning road as low as possible from the existing road.
Type of structure	**Bridge**	**Box culvert**
Figure		

Table 2-2-9 Type of Substructure and Foundation

Type		Type A-1 spread footing	Type A-2 pile	Type B box culvert
The height of bearing layer	above the river bed	○: There is no need to excavate the river bed, and abutment can be small.	△: Pile is suitable in the case of deep bearing layer.	×: The height of bottom slab sets is as same as the river bed, so this type requires to excavate below the river bed. Workability will be poor.
	below the river bed	△: Bad workability (Excavation amount is large and recovery and rolling compaction of river bed is required)	○: Good workability (This type can be installed without damage to the river bed)	×: Bad workability (The bottom slab will be installed during temporary closure of half of the stream. In addition, the water path is likely to occur under the bottom slab due to scouring.)
Evaluation	adoption	It can be adopted if the bearing layer is above the river bed.	This type is adopted in the case that the bearing layer is below the river bed.	This type is not adopted in the case of deep creek.

Type		Type A-1 spread footing	Type A-2 pile	Type B box culvert
	type	H≧5m : Reversed T type H＜5m : Gravity type	Type of substructure is determined by the number of columns in the pile.	-
Where to be applied		・Bumbaran: One bridge; BI ・Datu Paglas: Two bridges; DI, DIV	・ Datu Paglas: Two bridges; DII, DIII	Adopted in shallow creek ・Alamada: Four box culvert AI~AIV

3) Basic Condition of Bridges

i) Designed Discharge

Designed flood level of the bridge waterway was confirmed by interviews with residents and engineers of municipal governments, after the contents of the interviews on flood level were verified through calculation of flood discharge using topographic map of 1:50,000 scale.

ii) Soil Parameters

Foundation soil parameters for calculation are as follows;

a) Unit weight γ (kN/m^3)

Unit weight was determined based on the proposed value from the result of geological survey.

b) Cohesion c (kN/m^2)

Regarding cohesive soil, the value of cohesion was determined based on the N value from the result of geological survey. Regarding sandy soil, the value of cohesion wasn't considered

c) Internal friction angle φ (°)

Regarding sandy soil, the value of internal friction angle was determined based on the N value from the result of geological survey. Regarding cohesive soil, the value of internal friction angle wasn't considered.

iii) Bearing Layer

The bearing layer was selected based on the criteria applied in Japan.

・Sandy layer : N value is more than 30.

・Cohesive layer : N value is more than 20.

4) Determination of Bridge Specification

i) Condition of Bridge Waterway

・Vertical Clearance (the height of between D.F.L and the bottom of girder) :
Considering debris carried by streams, vertical clearance is 1.5 m based on DPWH Guideline.

・Design Flood Level (D.F.L):

D.F.L was determined by the points of consideration shown as follows;

a) By the interviews with residents and municipal engineers

b) By estimation of flood discharge using topographic map of 1:50,000 scale and rainfall data

・Slope of the river bed : the result of the survey

・river cross section : the result of the survey

ii) Determination of Bridge Length

Length of bridge was determined by considering the items shown below,

a) Securing the existing waterway

b) Securing the vertical clearance above the D.F.L

iii) Determination of Span Length

In consideration of river width and runoff status, the number of span was determined as single-span to avoid the installation of structure.

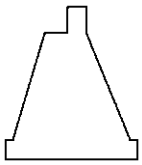
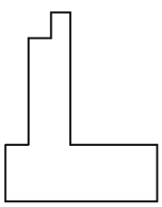
iv) Skew (bridge alignment)

Bridge alignment was determined as the right bridge (90 degrees)

v) Type of Substructure

In consideration of the topographic and geological survey, the type of substructure was determined as the reversed T type abutment.

Table 2-2-10 Type of Substructure

Type of abutment	Height of abutment	Details
Gravity type 	Approximately H≦4m~5m	・Cross sections of this abutment are designed to be dominated only by compressive stresses by increasing self-weight. ・Benefits of facile construction in terms of simple structure is obtained in exchange for greater reaction against bearing layer due to the heavier self-weight.
Reversed T type 	Approximately 5m≦H≦15m	・The maximum height of this type is approximately 15m due to facile construction in terms of simple structure. ・Cross section of vertical wall is designed as RC structure, which axial force and bending moment act onto unit width. ・The mass of the backfill behind the vertical wall maintains structural stability, and self-weight (concrete volume) can be reduced. ・When the front-footing cannot be constructed due to the restriction of construction space, L type abutment can be adopted.

vi) Determination of the Height of Abutment

The height of abutment was determined, considering the items shown below,

a) The footing is planned to be embedded into the bearing layer.

b) The bottom of the abutment installed in the embankment is planned to be set on the ground of the embankment.

vii) Width of the Bridge

- Width of the roadway : 4.6 m (for the road width 4.0m)
- Sidewalk : Sidewalk will not be installed
- Safety facility : parapet will be installed

Image of Parapet

viii) Condition of the Design Loads

- Dead load : Dead loads are calculated using values as follows;

Concrete, plain or reinforced	24kN/m^3
Compacted sand, earth and gravel or ballast	19kN/m^3
Loose sand, earth and gravel	16kN/m^3
Macadam or rolled gravel	22kN/m^3

- Live load : MS 18(HS20-44)
- Impact fraction : I=15.24/(L+38)
- Seismic force : The ground acceleration coefficient is 0.4

5) Basic Condition of Box Culvert

i) Determination of Structure Size

Size of structure was determined by considering the items shown in the following,

a) To secure the existing waterway

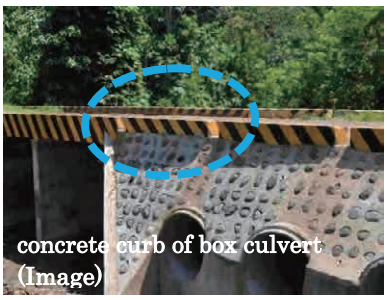
b) In consideration of the deposition of sand, the inner space of the box culvert is determined with the 20% freeboard.

ii) Determination of Foundation Type

Spread footing was adopted as foundation type.

iii) Width of the Box culvert

- Width of the roadway : 4.6m (for the road width 4.0m)
- Sidewalk : Sidewalk will not be installed
- Safety facility : Safety facility will not be installed



concrete curb of box culvert (Image)

6) Planning of River Crossing Structure

i) Bumbaran (for planning location, see figure 2-2-1)

a) River crossing structure BI (Bridge)

<Basic Concept>

- Length of Bridges: Length of existing bridge is 16m. In consideration of the bridge seat width of 1.0 m of each abutment, length of this bridge shall be 18.0m.
- Design Flood Level (D.F.L): According to the interview with residents.
  D.F.L is approximately 0.5 m below the bottom of girder and 2.7 m above the river bed.
- Vertical Clearance (the height is between D.F.L and the bottom of girder):
  Minimum vertical clearance is 1.5 m (design standard of DPWH)

<Type of Superstructure: Reinforced Concrete Deck Girder (RCDG) >

- The height of the bottom of girder is approximately 50 cm higher than the surface of existing road.
- Taking into consideration the influence to the approach road, the total height of the depth of girder and the slab thickness shall be kept low. As the result of consideration, the total height of the depth of girder and slab thickness is set to 1.5 m.

<Type of Substructure : Reversed T type abutment>

The height of abutment is more than 5 m based on the result of topographic and geological survey. Therefore, type of substructure was determined as the reversed T type abutment.

<Foundation Type : Spread footing>

Bearing layer is in the shallow position from the existing ground surface based on the result of geological survey. Therefore, spread footing was adopted as foundation type.

<Type of revetment : Stone masonry>

Type of revetment is stone masonry in accordance with the standard design of the Philippines.

b) River crossing structure BII (Box culvert)

<Current Situation>

・The different height between the existing road and the river bed is approximately 2.5 m. The preparatory survey team did not find river flow during the site survey.
Therefore, rain runoff was estimated to be flow out in a short time.

<Basic Concept>

- Size of structure: Width and height of the waterway will be secured. Size of structure is set as double barrel 2.4 m× 1.8 m.
- Design flood level: To secure the existing waterway.

c) River crossing structure BIII (Spillway)

<Current Situation>

The difference of height between the surface of existing road and the river bed is small and nearly flat, and residents usually move to the other side by passing through the river.

A bamboo bridge for pedestrians was laid downstream of a creek. The height between undersurface and the river bed was 2.2 m.
Existing road is in a curve section.

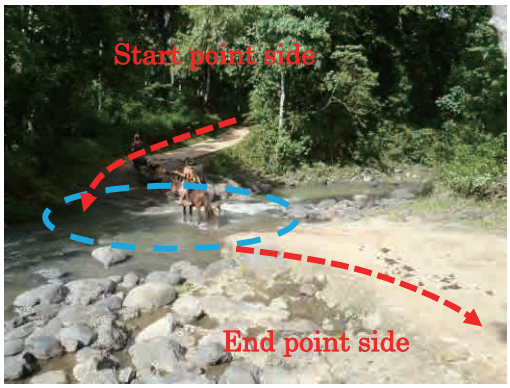
<Type of Structure: Spillway >

Because the water depth is shallow, vehicles usually move to the other side by passing through the river. On the other hand, the pedestrians use the bamboo bridge. In consideration of improvement of accessibility of vehicles, the Project planned that type of structure should be spillway. In order to make the current volume flow down all the time, 3 pipe culverts will be installed.

ii) Alamada (for planning location, see figure 2-2-2)

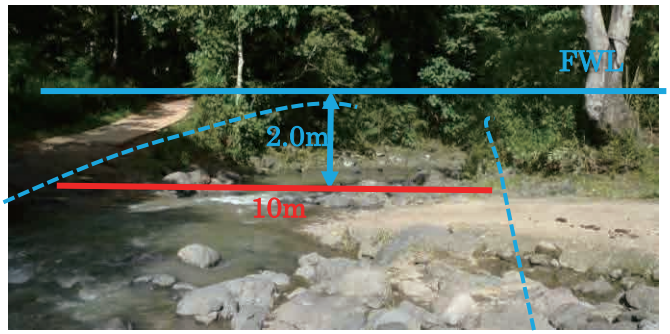
a) River crossing structure AI (Box culvert)

<Current Situation>



- The difference of height between the surface of existing road and the river bed is nearly flat at the end point side.
- A portion of the river bed is covered with concrete pavement because existing bridge has already collapsed.

<Basic Concept>



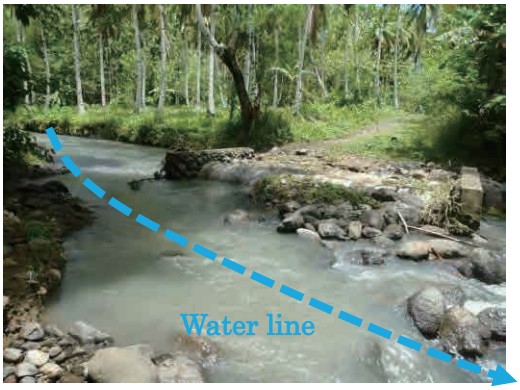
- Size of structure : Width and height of waterway will be maintained. Size of structure is triple barrel 2.4 m ×2.1 m.
- D.F.L: 2.0 m above the riverbed, based on interviews with residents.

<Type of structure: Box culvert>

- The difference in the height between the existing road and the river bed is nearly flat.
- In consideration of the width and height of the existing waterway, the height of the planned road shall be determined.
- The maximum diameter of the stone around the location is 1.3 m. Therefore, the internal dimension of box culvert is more than 1.3 m.

b) River crossing structure AII~AIV (Box culvert)

<Current Situation>



- There is little or no gap between the height of the road before and after the planned site and river bed.
- The φ900 pipe culvert was already collapsed duo to flood. Currently, vehicle cannot cross the river.

<Basic Concept>

- Size of structure: Width and height of current waterway will be maintained. Size of structure of AI, AII and AIII is triple barrel 2.4 m × 1.8 m. Size of structure of AIV is triple barrel 1.8 m × 1.5 m.
- Design discharge: Design discharge can flow down the cross section of existing waterway based on the results of site survey and interviews.
  Verification against amount of discharge is carried out by the calculation using topographic map of 1:50,000 scale.

<Type of structure: Box culvert>

- The difference of height between the surface of existing road and the river bed is nearly flat.
- In consideration of the width and height of the existing waterway, the height of the planned road shall be determined.
- The maximum diameter of the stone around location is 1.2 m. Therefore, the internal dimension of box culvert is more than 1.2 m.
- The structure back face is protected by the concrete in order to prevent damages due to flood.

iii) Datu Paglas (for planning location, see figure 2-2-3)

a) River crossing structure DI~DIV (Bridge)

<Current Situation>

・As the result of site survey, the difference of height between the surface of existing road and the river bed is approximately 5~6m.

・A little waterline is found at river bed at the survey.

<Basic Concept>

・Length of Bridge: To secure the existing waterway, the length of bridge is 10m, maximum length of bridge is 12m.

・Design Flood Level (D.F.L): As the result of site survey, D.F.L were confirmed as follows;

DI:2.0m DII:1.5m DIII:1.8m DIV:3.0m

・Vertical Clearance (the height is between D.F.L and the bottom of girder) : Minimum vertical clearance is 1.5 m (design standard of DPWH)

<Type of Superstructure: Flat Slab>

・In consideration of D.F.L + clearance 1.5m, the height of the bottom of girder is approximately 4.5~3.0 m above the surface of the river bed.

・The bridge surface is determined not to be extremely lower than the ground level back and forth.

・Type of superstructure is set as flat slab based on the design standard of DPWH.

<Type of Substructure>:

・Type of substructure are as follows;

Reversed T type abutment (foundation type: spread footing)

Single-row pile (foundation type: pile foundation)

<Foundation Type: spread footing and pile foundation>

・The foundation type is spread footing or pile foundation based on the result of geological survey.

<Type of revetment: Stone masonry>

・Type of revetment is stone masonry in accordance with the standard design of the Philippines.

b) River crossing structure DV~DVI (Box culvert)

<Current Situation>

- The maximum difference of height between the surface of existing road and the river bed is approximately 1.0 m.
- Water flow was not found in the target site.
- Waterline was found after heavy rain.

<Basic Concept>

- Size of structure : Width and height of waterway will be maintained. Size of structure is triple barrel 1.8 m × 1.5 m.
- Type of structure : Box culvert
- Box culvert that maintains the existing waterway.

(3) Drainage Plan

1) Roadside Ditches

The installation of roadside ditches is the basic idea for the proposed FMR in order to drain runoff water properly. The type of roadside ditches is adopted as concrete U-TYPE ditch among the standard structures defined by DPWH in the Philippines from the point of view of maintenance and economic efficiency. Also the survey team carefully designed the roadside ditches with sufficient drainage capacity, taking catchment area into consideration based on the topographical conditions of the target areas.

i) Types of Roadside Ditches

The standard structure defined by DPWH in the Philippines has 3 different types of road side ditches in terms of materials and shapes, respectively. The types of materials are as follows i) earth type, ii) concrete type, and iii) masonry type. And the types of shapes are also as follows i) TYPE-I, ii) TYPE-II, and iii) TYPE-III. In this preparatory survey, the standard type of road side ditch is adopted to be “Concrete Type” and TYPE-III for the following reasons.

MATERIALS;

The type of material for standard ditch is determined as “Concrete Type” considering easiness of maintenance from the long term perspective. Earth type is inferior to both concrete type and masonry type because one needs to continue not only cleaning works for keeping flow areas, but also periodic control of the shape. Masonry type is also inferior to concrete type due to the

necessity of maintenance including daily cleaning and mending the structure from the possibility of breaks resulting from vehicles traffic.

SHAPE;

It is desirable for the shape of the roadside ditches not to require land acquisition owing to the position, because almost all the sections of target roads involves the rehabilitation of existing roads whose width is around 4 m. After considering the necessary width for all TYPEs, TYPE-III was chosen as the standard type of road side ditch given that it does not take any additional width.

a) TYPE-I (It requires around 2.0 m width. The bigger the size is, the more land will be needed.)

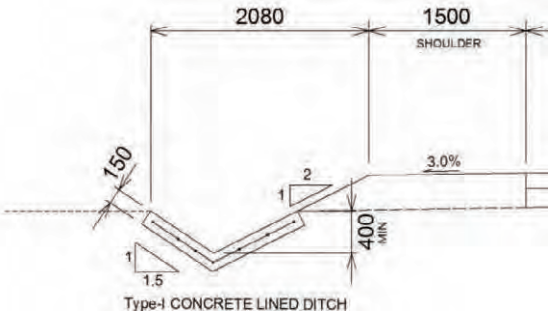


Figure 2-2-12 Roadside Ditches Type I

b) TYPE-II (It requires around 2.5m width. The bigger the size is, the more land will be needed.)

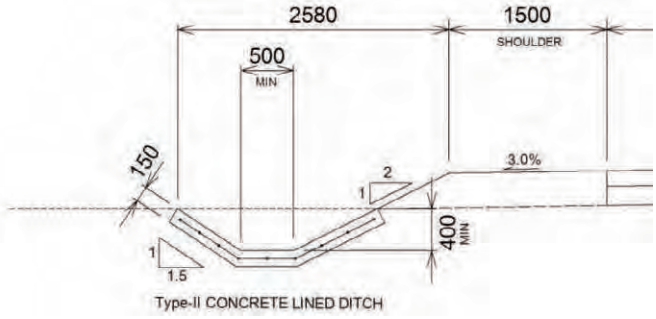


Figure 2-2-13 Roadside Ditches Type II

c) TYPE-III (0.8m width is required. If it adopts more than 0.5m width, extra land will be needed.)

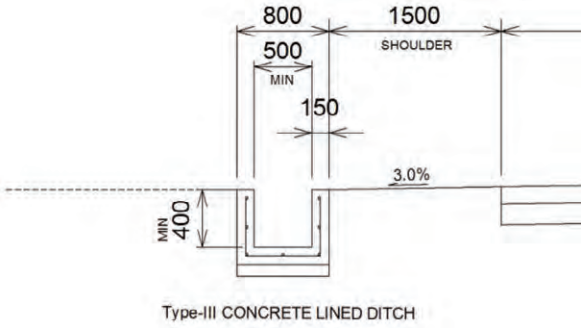


Figure 2-2-14 Roadside Ditches Type III

2) Road Drainage Work

Roadside ditches are installed at the following locations;

a) The preparatory survey team selected locations where runoff water from slopes is expected to be collected, referring to the current geological conditions. In addition, drainage is set at places where discharge points are needed at sag points in the longitudinal profile plan.
b) Places where pools of rainwater were found or crossing waterways were measured in the current conditions.
c) Places where the existing conduits are installed. However, if the existing conduits are not confirmed as damaged through site survey, the survey team will keep them unchanged. Otherwise the existing conduits are replaced with new ones with the appropriate internal diameter in case the existing one is found damaged, or is not fully functional.

The adopted types of road-crossing structures are both pipe culvert and box culvert, which are generally used as the standard type of structure in the Philippines. The selection criteria are shown below.

a) The preparatory survey team designs the cross section to secure the flow area, while analyzing the volume of drainage at the installation point, and adopting the pipe culvert (ready-made) in view of the workability of construction.
b) The combination of pipe culverts should not exceed 3 in account of maintenance. The survey team will adopt box culvert as drainage system if the amount of discharge exceeds the discharge ability of the 3 pipe culverts.
c) Pipe culverts (cast in place) are designed in line with the standard of DPWH. Their diameters are not less than 910mm ϕ according to DPWH Guidelines.

The types of road-crossing structure for each target sites are summarized in the following tables.

Table 2-2-11 Types of Road Crossing Structures in Bumbaran

Station	Type	Amount of discharge m^3/s	Number	Length m	Pipe culvert	Box culvert	
					Diameter mm	Width m	Height m
0+382.50	Pipe	3.46	2	6.00	910	-	-
0+500.00	Pipe	4.31	2	6.00	1,220	-	-
0+560.00	Pipe	0.84	1	6.00	910	-	-
1+265.05	Pipe	4.12	2	6.00	1,070	-	-
1+790.65	Box	7.83	3	6.00	-	1.80	1.50
2+346.56	Pipe	0.50	1	6.00	910	-	-
2+857.39	Pipe	2.38	2	6.00	910	-	-
3+318.38	Box	9.38	2	5.00	-	1.80	1.80
3+617.56	Box	9.55	1	7.00	-	2.40	2.10
4+642.00	Pipe		3	7.00	910		

Table 2-2-12 Types of Road Crossing Structures in Alamada

Station	Type	Amount of discharge m^3/s	Number	Length m	Pipe culvert Diameter mm	Box culvert Width m	Box culvert Height m
0+612.50	Pipe	1.09	1	6.00	910	-	-
0+900.00	Pipe	9.42	3	6.00	1,220	-	-
1+050.00	Pipe	4.40	2	7.00	1,070	-	-
1+150.00	Pipe	0.15	1	7.00	910	-	-
1+512.50	Pipe	2.02	1	6.00	1,070	-	-
2+540.00	Pipe	1.34	1	8.00	910	-	-
3+200.00	Pipe	1.40	1	8.00	910	-	-
3+525.00	Box	9.43	2	8.00	-	1.80	1.80
4+100.00	Box	12.80	2	8.00	-	1.80	2.10
4+600.00	Box	20.08	2	8.00	-	2.40	2.10
5+100.00	Box	20.80	2	8.00	-	2.40	2.10
5+600.00	Box	16.62	2	6.00	-	2.40	1.80
6+142.50	Pipe	4.60	2	6.00	1,220	-	-
6+887.50	Box	8.76	2	6.00	-	2.40	2.10
7+250.00	Pipe	2.05	1	8.00	1,070	-	-
7+525.00	Box	10.04	2	6.00	-	1.80	1.80
8+000.00	Box	15.04	2	8.00	-	1.80	2.10
8+300.00	Pipe	1.92	1	8.00	1,070	-	-

Table 2-2-13 Types of Road Crossing Structures in Datu Paglas

Station	Type	Amount of discharge m3/s	Number	Length m	Pipe culvert Diameter mm	Box culvert Width m	Box culvert Height m
1) Upper							
1+000.00	Pipe	0.09	1	7.00	910	-	-
2+300.00	Pipe	2.24	1	8.00	1,220	-	-
2+800.00	Pipe	1.91	1	6.00	1,220	-	-
3+050.00	Pipe	0.64	1	8.00	910	-	-
3+500.00	Pipe	4.86	2	6.00	1,220	-	-
5+125.00	Pipe	1.09	1	8.00	910	-	-
5+425.00	Pipe	5.81	2	6.00	1,220	-	-
6+262.50	Pipe	0.21	1	8.00	910	-	-
2) Lower							
0+887.50	Pipe	0.84	1	19.00	910	-	-
1+737.50	Pipe	0.22	1	7.00	910	-	-
2+030.00	Pipe	0.27	1	14.00	910	-	-

3) Drainage for Slope Protection

Slope drainage systems were set at each necessary point on the slope sections found from the site survey. The preparatory survey team also narrows down the road width to 2.5 m to minimize the modification of the terrain slope.

・Intermediate point of the target barangays

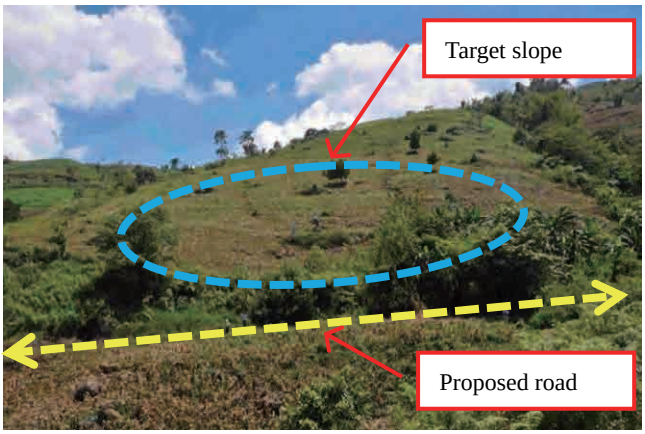


Figure 2-2-15 Drainage of Slope Section (Bumbaran)

4) Calculation of Discharge

Sizing of roadside ditches and closed conduits were carried out based on the computed possible discharge. The computations are based on formulas and coefficients used in the Philippines.

i) Rainfall Runoff Calculation Formula

Rainfall runoff calculation is based on the Rational Formula presented in the DPWH Guidelines.

a) Runoff Coefficient

Runoff Coefficient (C) is estimated from characteristics of the catchment area, and "0.4" is adopted as the intermediate value according to the DPWH Guidelines.

b) Design Frequency

Design frequency is adopted according to the tables in DPWH Guidelines which show the frequency for each structure concerned.

Table 2-2-14 Adopted Design Frequency

Item	Design frequency	Notes
Bridges	1 in 50years	
Box Culverts	1 in 25years	
Pipe Culverts	1 in 15years	
Ditches and Road Surface	1 in 2years	

c) Rainfall Intensity

Rainfall intensity is estimated through observed data provided by "PAGASA" (The meteorological agency of the Philippines) as the data near the target area.

d) Time of Concentration

"Kirpich Formula" indicated in the DPWH Guidelines is adopted to determine the time of concentration. However, in case that the time of concentration is expected to be long due to

the vast scale of the catchment area, the preparatory survey team uses the “Kravan formula” instead in order to reflect the site condition.

ii) Sizing of Ditches and Closed Conduits

a) The hydraulic design of ditches is based on Manning’s Formula indicated in DPWH Guidelines. (Roughness coefficient was determined according to the values described in the DPWH Guidelines)

b) When the sizes of roadside ditches are designed, an allowance of at least 20% is required against the obtained value from the above formula taking into account the disturbance to the drain area caused by the accumulation of earth soil (Pipe culverts need sufficient allowance of height to be able to drain a 25year return period discharge above the drain area based on a design corresponding to a 15year return period storm. Box culverts anticipate a sufficient allowance of height for 50year return period discharge based on a design corresponding to a 25year return period storm.).

c) The minimum width of roadside ditches for TYPE-III is 0.5 m.

d) Standard type of crossing-structure is based on Reinforced Concrete Pipe Culvert (RCPC). The box culvert will be adopted when more than 3 pipe culverts are needed. Minimum size of box culvert is determined as 1.25*1.0.

e) Minimum velocity is set at 3.0m/s as drainage system made of concrete coming from DPWH Guideline.

f) The minimum size of RCPC is not less than φ910 in accordance with D.O.No.11. The layer of earth covering of at least 0.6 over the top of pipes should be assured.

2-2-3. Outline Design Drawing

Outline design drawings are shown as follows.

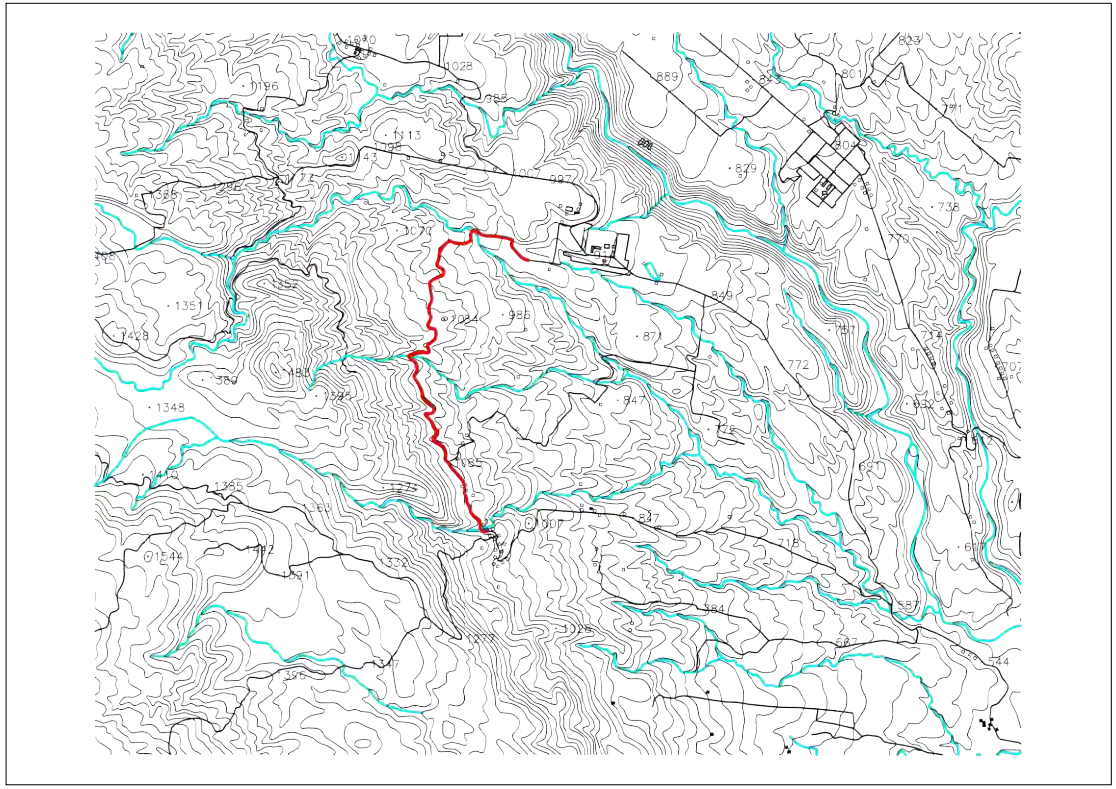
Table 2-2-15 List of Outline Design Drawings

Target site	No.	Item	Details	Application
Bumbaran	1	Location and vicinity map		
	2	Roadway work	Typical road cross section	
	3	River-crossing structure	General Plan, Section, General Elevation	BI ; Bridge
	4	River-crossing structure	General Plan, Section, General Elevation	BII ; Culvert
	5	River-crossing structure	General Plan, Section, General Elevation	BIII ; Spillway
Alamada	6	Location and vicinity map		
	7	Roadway	Typical road cross section	

Target site	No.	Item	Details	Application
		structure		
	8	River-crossing structure	General Plan, Section, General Elevation	AI; Culvert
	9	River-crossing structure	General Plan, Section,General Elevation	AII~AIV; Culvert
Datu Paglas	10	Location and vicinity map		
	11	Roadway structure	Typical road cross section	
	12	Roadway structure	Typical road cross section	
	13	Roadway structure	Typical road cross section	
	14	River-crossing structure	General Plan, Section, General Elevation	DI, DIII ; Bridge(Spread footing)
	15	River-crossing structure	General Plan, Section, General Elevation	DII, DIV ; Bridge (Pile foundation)
	16	River-crossing structure	General Plan, Section, General Elevation	DV, DVI ; Culvert

Outline design drawings are continued to the next page.

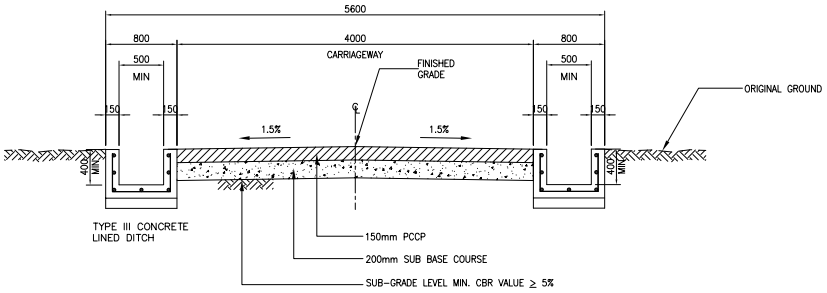
A BG-02 LOCATION MAP
SCALE AS SHOWN



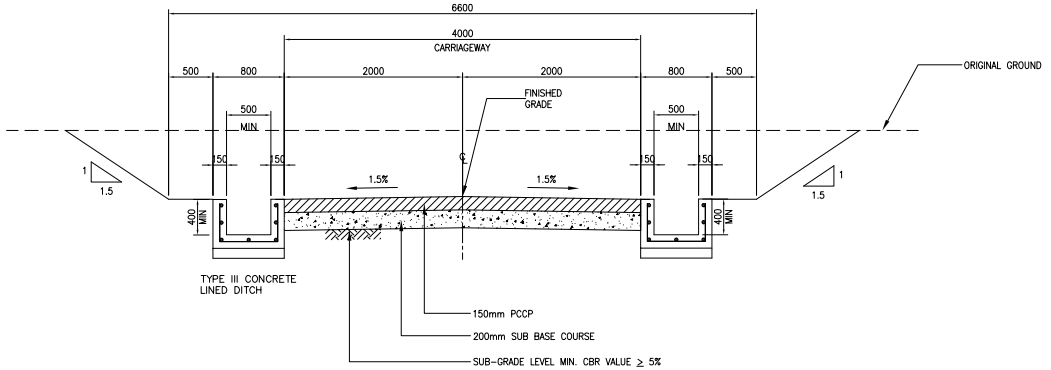
B BG-02 VICINITY MAP
SCALE AS SHOWN

1 BG-02 LOCATION AND VICINITY MAP
SCALE AS SHOWN

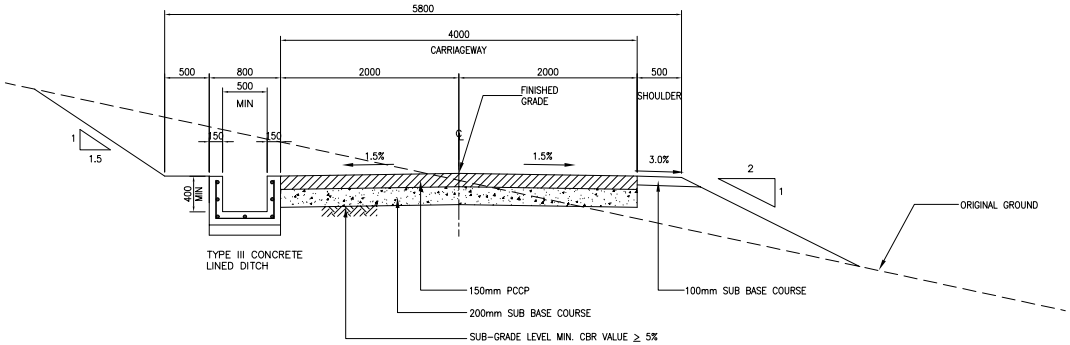
JICA Japan International Cooperation Agency	DESIGNED:	SUBMITTED :	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF AGRICULTURE	RECOMMENDING APPROVAL :	REVIEWED :	RECOMMENDING APPROVAL :		APPROVED :	PROJECT / LOCATION	SHEET CONTENTS	SHEET NO.
	DRAWN	FUSASHIGE SATO TEAM LEADER DATE :		PROJECT DIRECTOR DATE :	CHIEF DATE :	DIRECTOR DATE :	UNDERSECRETARY DATE :	SECRETARY DATE :	THE PROJECT FOR ROADS IMPROVEMENT IN BANGSAMORO BUMBARAN FARM TO MARKET ROAD	- LOCATION AND VICINITY MAP - -	BG-02
	CHECKED FUSASHIGE SATO										



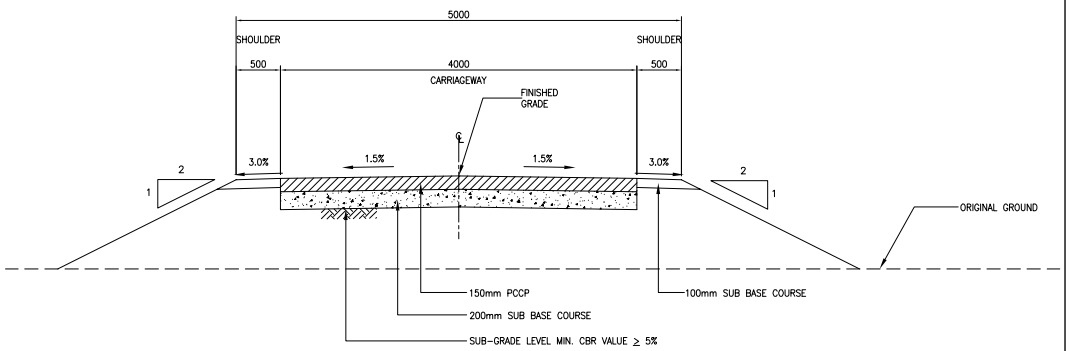
B BR-01 TYPE B2 SCALE 1:30



C BR-01 TYPE B3 SCALE 1:30



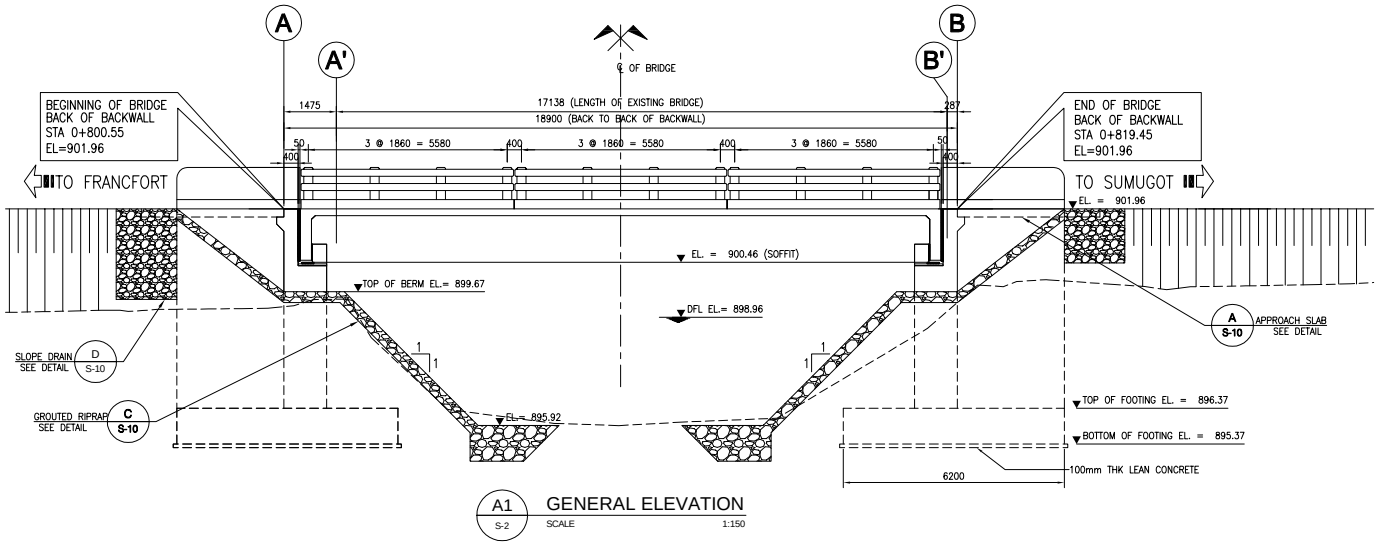
A BR-01 TYPE B1 SCALE 1:30



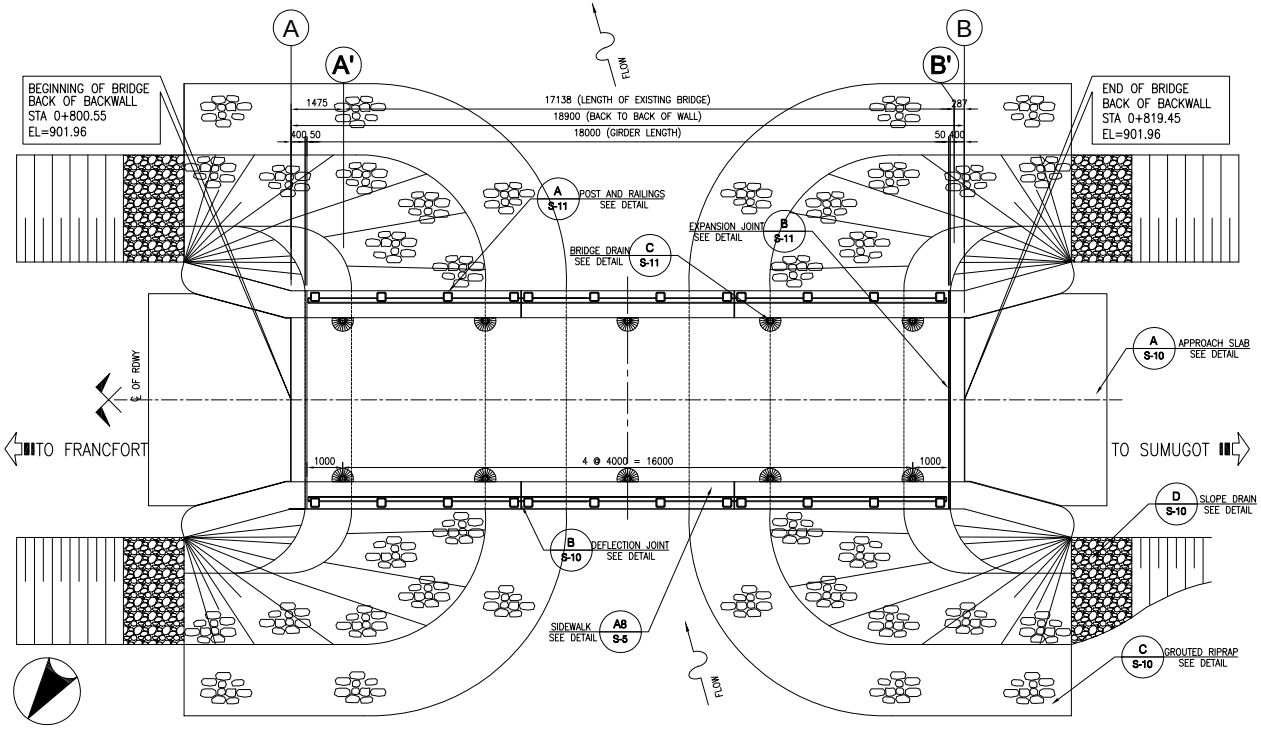
D BR-01 TYPE B4 SCALE 1:30

- – TYPICAL ROAD SECTION SCALE AS SHOWN

JICA Japan International Cooperation Agency	DESIGNED:	SUBMITTED :	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF AGRICULTURE	RECOMMENDING APPROVAL :	REVIEWED :	RECOMMENDING APPROVAL :		APPROVED :	PROJECT / LOCATION	SHEET CONTENTS	SHEET NO.
	DRAWN	FUSASHIGE SATO TEAM LEADER DATE :							THE PROJECT FOR ROADS IMPROVEMENT IN BANGSAMORO BUMBARAN FARM TO MARKET ROAD	TYPICAL CROSS SECTION	BR-01
	CHECKED FUSASHIGE SATO			PROJECT DIRECTOR DATE :	CHIEF DATE :	DIRECTOR DATE :	UNDERSECRETARY DATE :	SECRETARY DATE :			



A1 S-2 GENERAL ELEVATION
SCALE 1:150



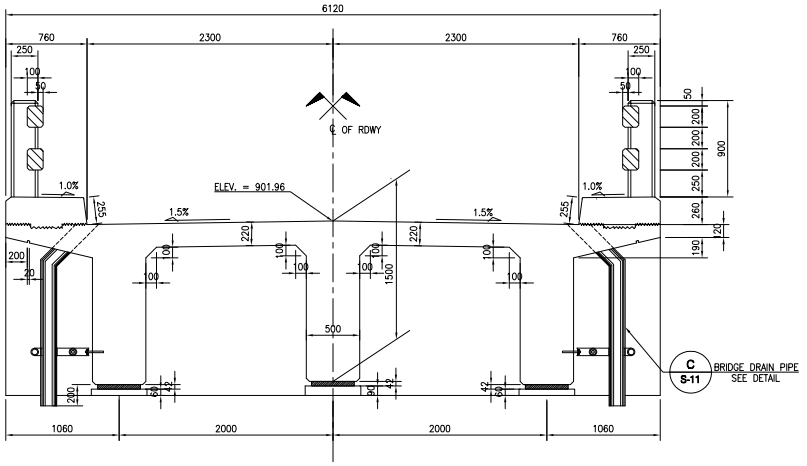
A2 S-2 GENERAL PLAN
SCALE 1:150

SUMMARY OF ESTIMATED QUANTITIES

PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT (TWO)	SUPER-STRUCTURE	TOTAL
101(1)a	REMOVAL OF EXISTING STRUCTURE	l.s.	_	_	1
103(2)a	BRIDGE EXCAVATION, COMMON MATERIAL (BELOW WATER LEVEL)	cu.m	379.20	_	379.20
103(2)c	RIVERBED CHANNEL EXCAVATION	l.m	586.09	_	586.09
401	REINFORCED CONCRETE RAILINGS	cu.m	_	36	36
404(2)	REINFORCING STEEL, GRADE 60	kgs	22634.48	14458.48	37092.96
405(1)a	STRUCTURAL CONCRETE CLASS "A"	cu.m	207.02	85.85	292.87
405(1)b	STRUCTURAL CONCRETE CLASS "C"	cu.m	_	3.56	3.56
405(1)b	LEAN CONCRETE	cu.m	10.09	_	10.09
504	GROUTED RIPRAP, CLASS "A"	cu.m	243.77	_	243.77
SPL-1	BRIDGE DRAIN	l.m	10	_	10
412	ELASTOMETRIC BEARING PAD, LAMINATED (400mmX350mmX42mm)	each	6	_	6
SPL-2	GALVANIZED DOWEL BARS	each	6	_	6

NOTES :

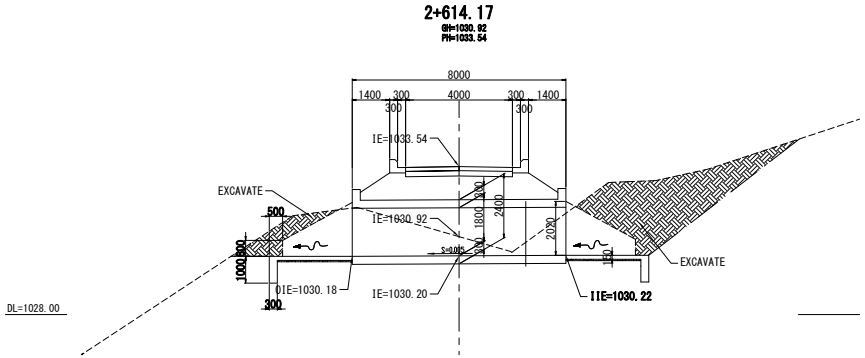
1. ALL QUANTITIES SHALL BE VERIFIED DURING CONSTRUCTION.
2. ALL STATIONS, ELEVATIONS AND DIMENSIONS SHALL BE VERIFIED DURING CONSTRUCTION.
3. EXISTING BRIDGE AND OTHER OBSTRUCTIONS SHALL BE REMOVED IN ACCORDANCE TO ITEM 101. SUBSTRUCTURE OF EXISTING BRIDGE SHALL BE DEMOLISHED AND CUT TO DESIGNATED ELEVATION.
4. (A') & (B') ARE BACK OF BACKWALL OF EXISTING BAILEY BRIDGE.



A3 S-2 CROSS SECTION
SCALE 1:50

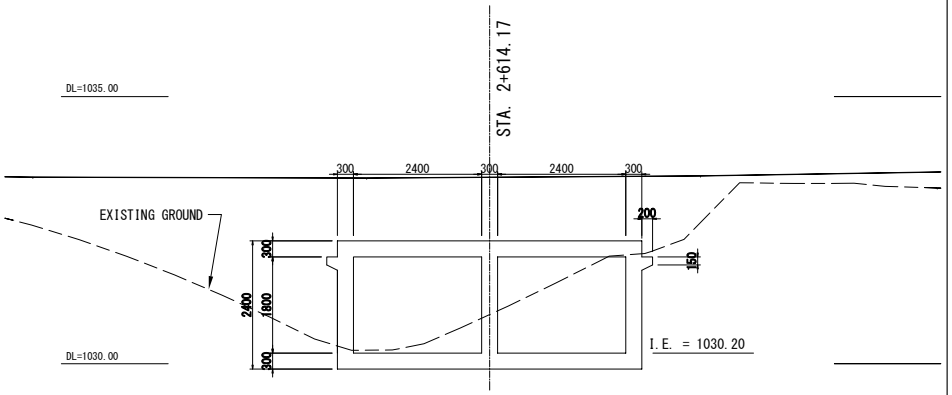
JICA JAPAN INTERNATIONAL COOPERATION AGENCY	DESIGNED:	SUBMITTED :	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF AGRICULTURE	RECOMMENDING APPROVAL :	REVIEWED :	RECOMMENDING APPROVAL :		APPROVED :	PROJECT / LOCATION: ROAD IMPROVEMENT IN BANGSAMORO INCLUSIVE REGIONAL DEVELOPMENT PROJECT; BUMBARAN FRANCFORT-SUMUGOT; BRGY. FRANCFORT, BUMBARAN, LANAO DEL SUR	SHEET CONTENTS: BUMBARAN BRIDGE; GENERAL ELEVATION, GENERAL PLAN, CROSS SECTION AND SUMMARY OF QUANTITIES	SHEET NO.
	DRAWN	FUSASHIGE SATO		PROJECT DIRECTOR DATE :	CHIEF DATE :	DIRECTOR DATE :	UNDERSECRETARY DATE :	SECRETARY DATE :			
	CHECKED FUSASHIGE SATO	TEAM LEADER DATE :									

2_31



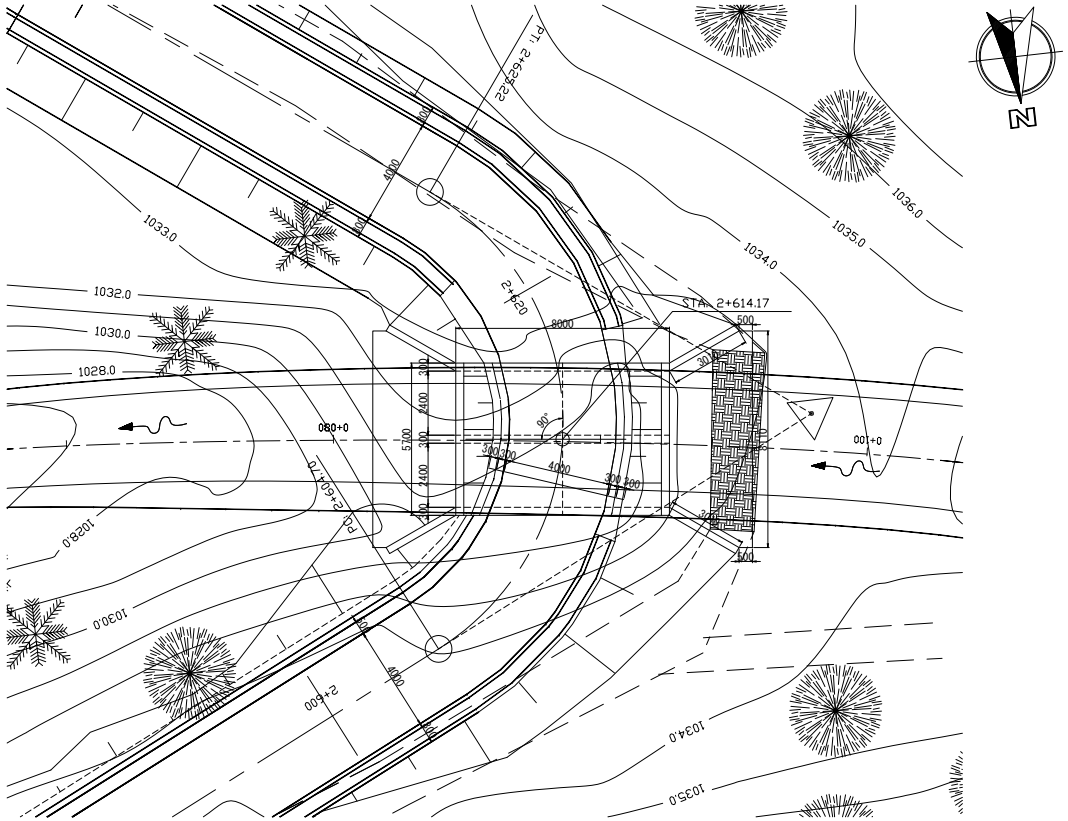
A1 GENERAL ELEVATION

SCALE 1:100



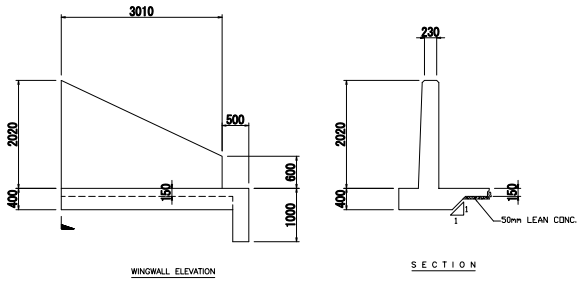
SECTION - DOUBLE BARREL

SCALE 1:50



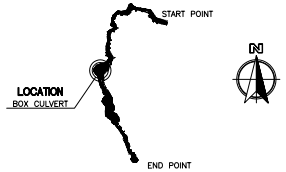
A2 GENERAL PLAN

SCALE 1:100



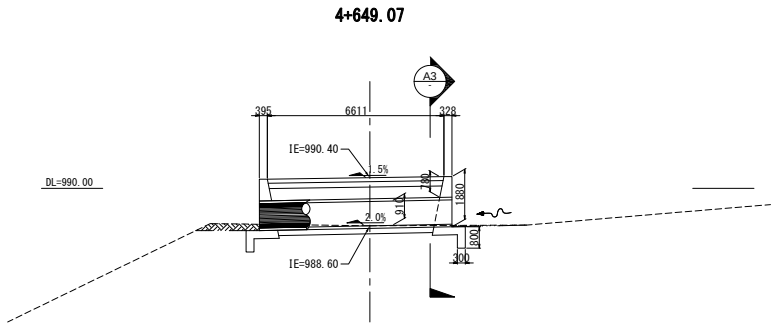
WINGWALL DETAILS

SCALE 1:50

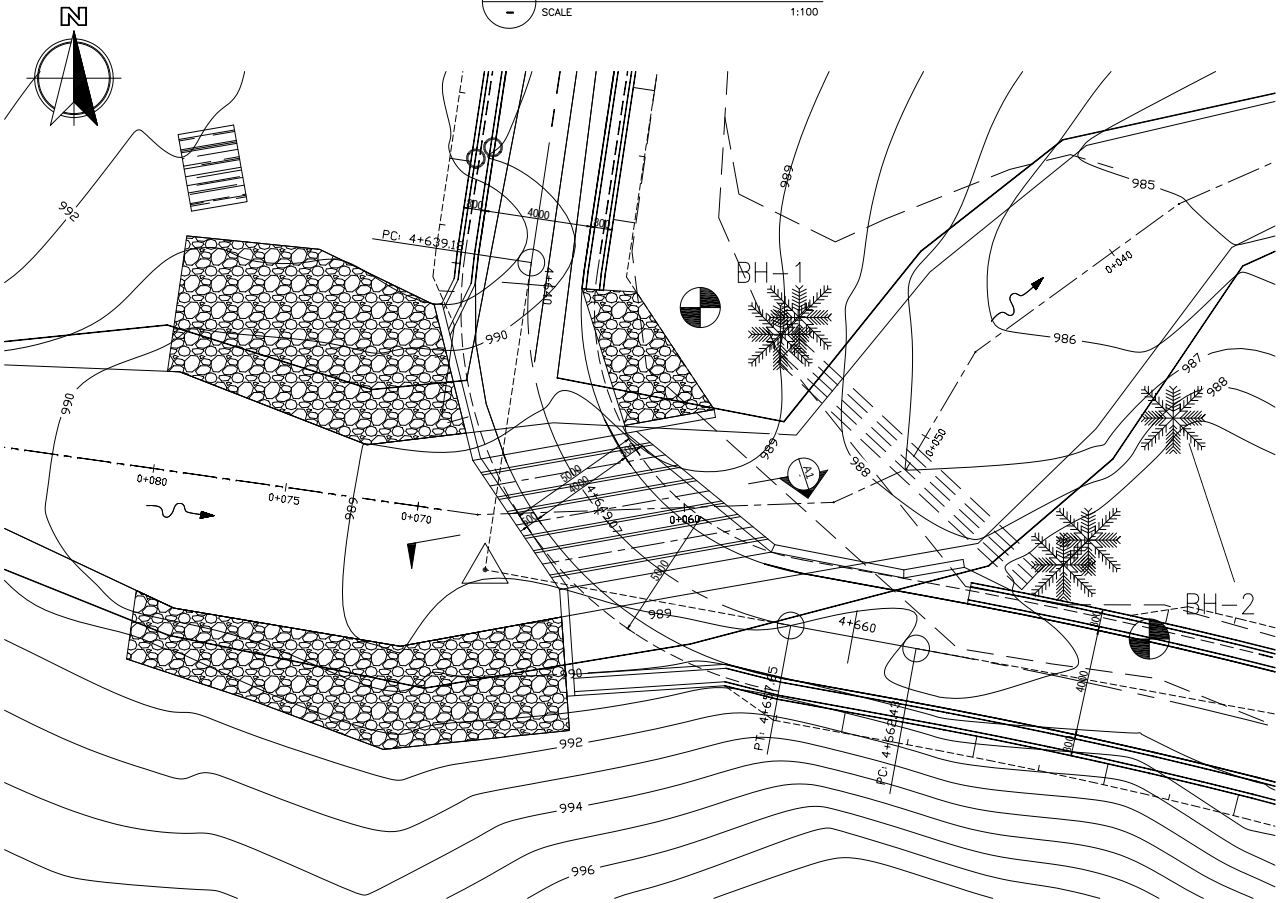


LOCATION MAP

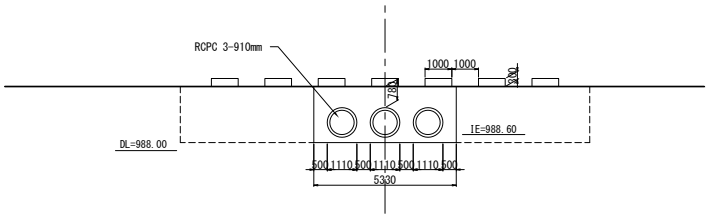
JICA JAPAN INTERNATIONAL COOPERATION AGENCY	DESIGNED:	SUBMITTED :	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF AGRICULTURE	RECOMMENDING APPROVAL :	REVIEWED :	RECOMMENDING APPROVAL :		APPROVED :	PROJECT / LOCATION	SHEET CONTENTS	SHEET NO.
	DRAWN	FUSASHIGE SATO TEAM LEADER DATE :							ROAD IMPROVEMENT IN BANGSAMORO INCLUSIVE REGIONAL DEVELOPMENT PROJECT BUMBARAN FRANCFORT-SUMUGOT BRGY. FRANCFORT, BUMBARAN, LANAO DEL SUR	REINFORCED CONCRETE BOX CULVERT (RCBC)	
	CHECKED FUSASHIGE SATO			PROJECT DIRECTOR DATE :	CHIEF DATE :	DIRECTOR DATE :	UNDERSECRETARY DATE :	SECRETARY DATE :			



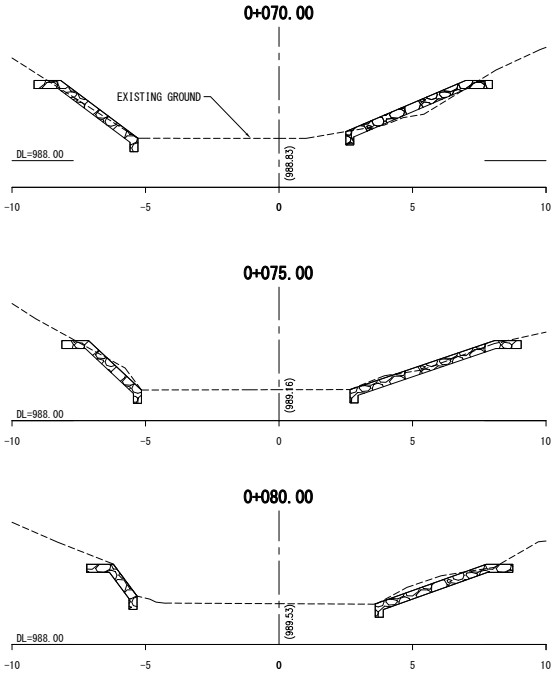
A1 GENERAL ELEVATION
– SCALE 1:100



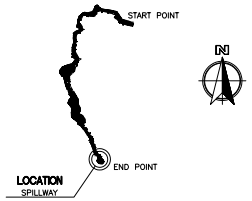
A2 GENERAL PLAN
– SCALE 1:100



A3 SECTION – ROAD
– SCALE 1:100

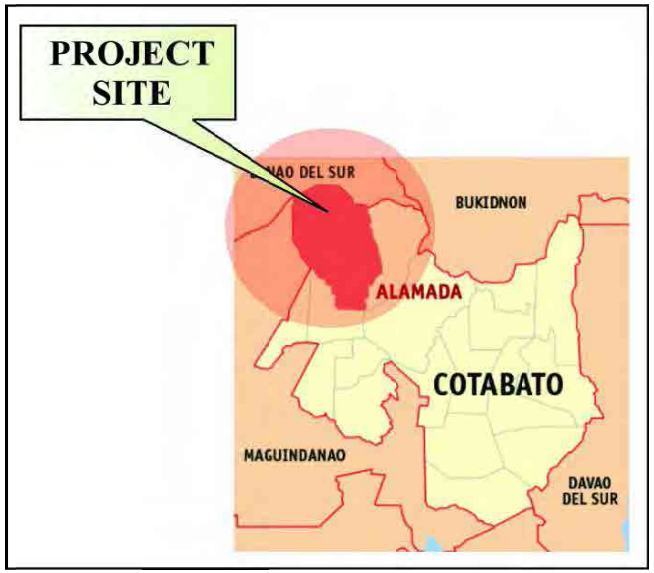


A4 SECTION – RIVER
– SCALE 1:100

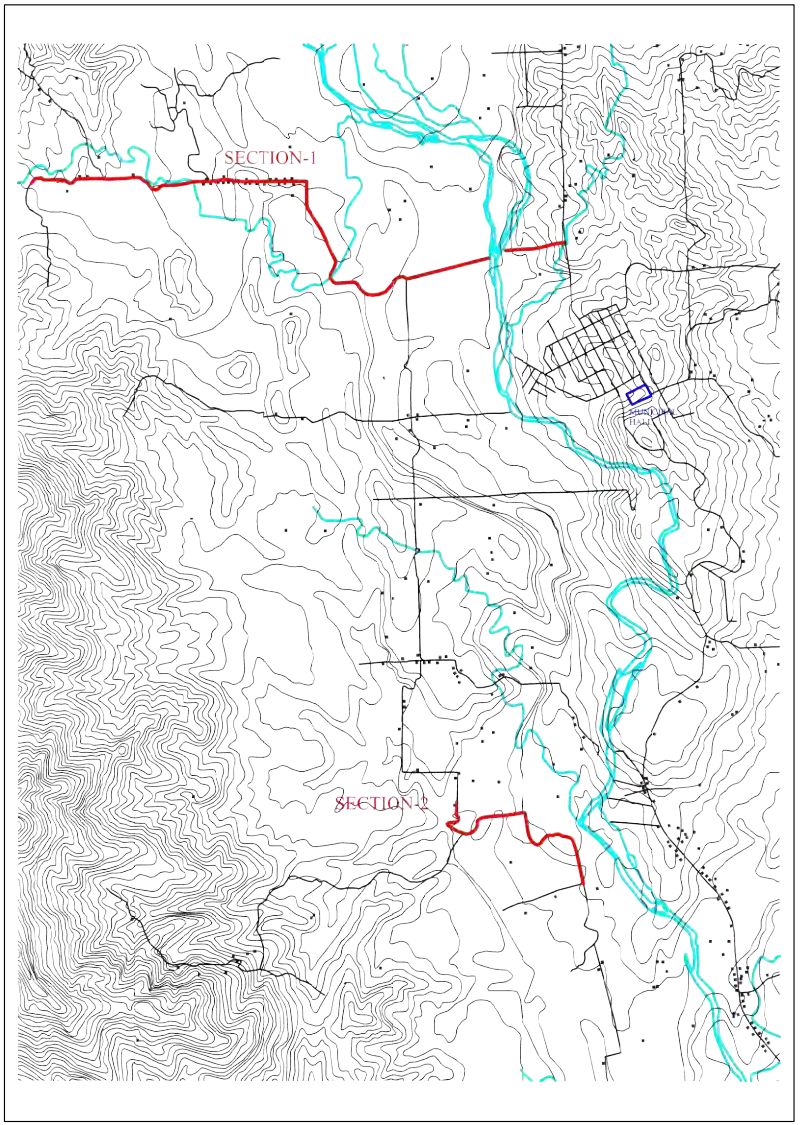


LOCATION MAP

JICA JAPAN INTERNATIONAL COOPERATION AGENCY	DESIGNED:	SUBMITTED :	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF AGRICULTURE	RECOMMENDING APPROVAL :	REVIEWED :	RECOMMENDING APPROVAL :		APPROVED :	PROJECT / LOCATION	SHEET CONTENTS	SHEET NO.
	DRAWN	FUSASHIGE SATO TEAM LEADER DATE :		PROJECT DIRECTOR DATE :	CHIEF DATE :	DIRECTOR DATE :	UNDERSECRETARY DATE :	SECRETARY DATE :	ROAD IMPROVEMENT IN BANGSAMORO INCLUSIVE REGIONAL DEVELOPMENT PROJECT BUMBARAN FRANCFORT-SUMUGOT BRGY. FRANCFORT, BUMBARAN, LANAO DEL SUR	REINFORCED CONCRETE SPILLWAY (RCPC)	
	CHECKED FUSASHIGE SATO										



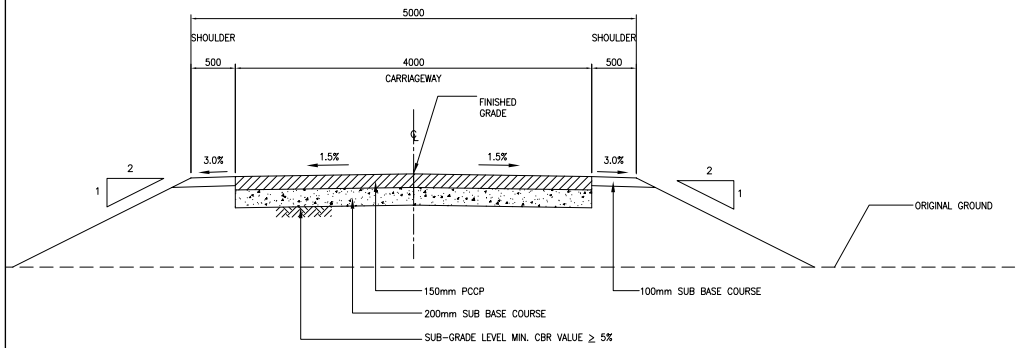
A G-02 LOCATION MAP
SCALE AS SHOWN



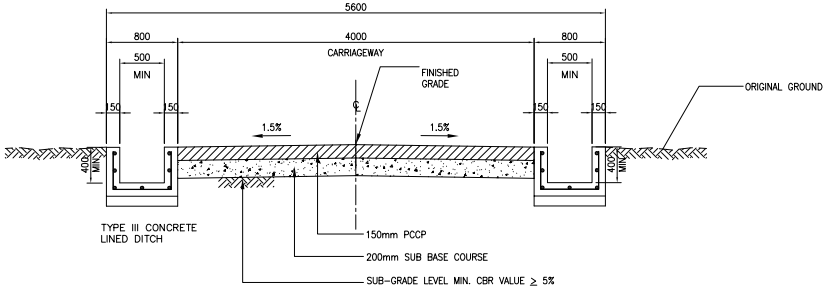
B G-02 VICINITY MAP
SCALE AS SHOWN

- - LOCATION MAP / VICINITY MAP
SCALE AS SHOWN

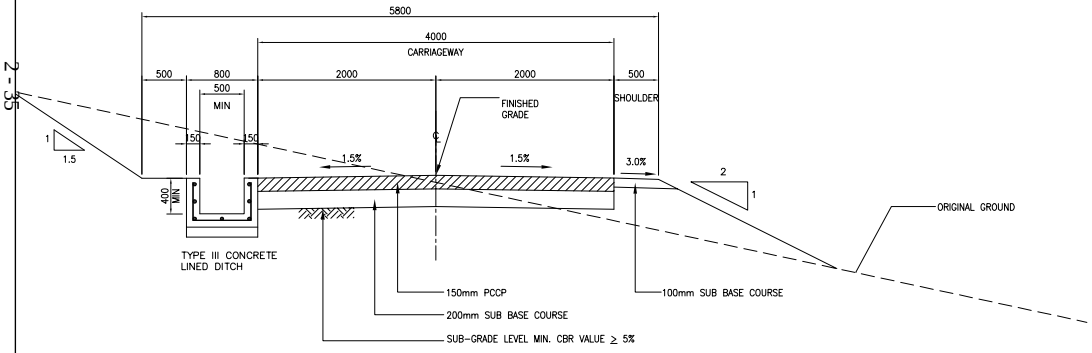
JICA Japan International Cooperation Agency	DESIGNED:	SUBMITTED :	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF AGRICULTURE	RECOMMENDING APPROVAL :	REVIEWED :	RECOMMENDING APPROVAL :		APPROVED :	PROJECT / LOCATION	SHEET CONTENTS	SHEET NO.
	DRAWN								THE PROJECT FOR ROADS IMPROVEMENT IN BANGSAMORO ALAMADA FARM TO MARKET ROAD	LOCATION AND VICINITY MAP	AG–02
	CHECKED FUSASHIGE SATO	FUSASHIGE SATO TEAM LEADER DATE :		PROJECT DIRECTOR DATE :	CHIEF DATE :	DIRECTOR DATE :	UNDERSECRETARY DATE :	SECRETARY DATE :			



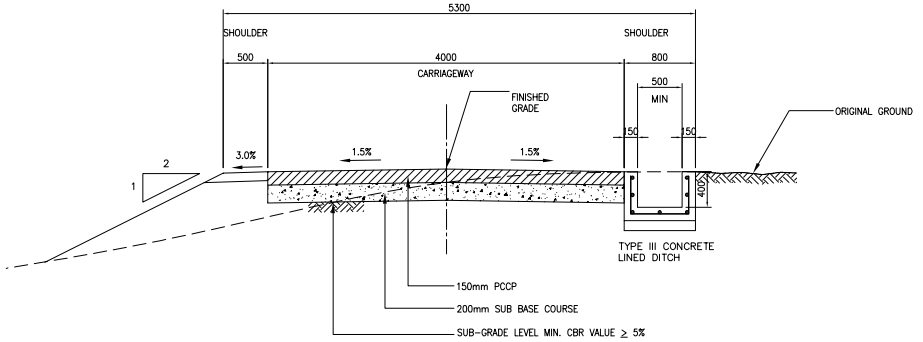
B TYPE A2
SCALE 1:30



C TYPE A3
SCALE 1:30



A TYPE A1
SCALE 1:30

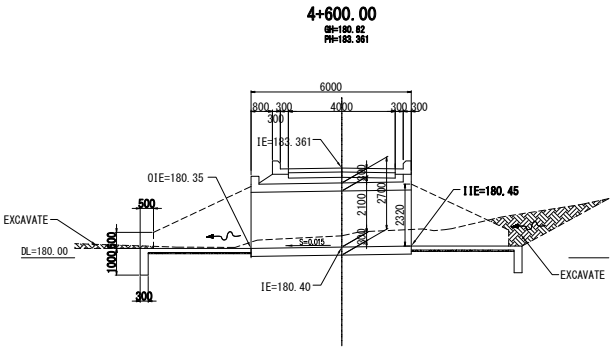


D TYPE A4
SCALE 1:30

2 - 35

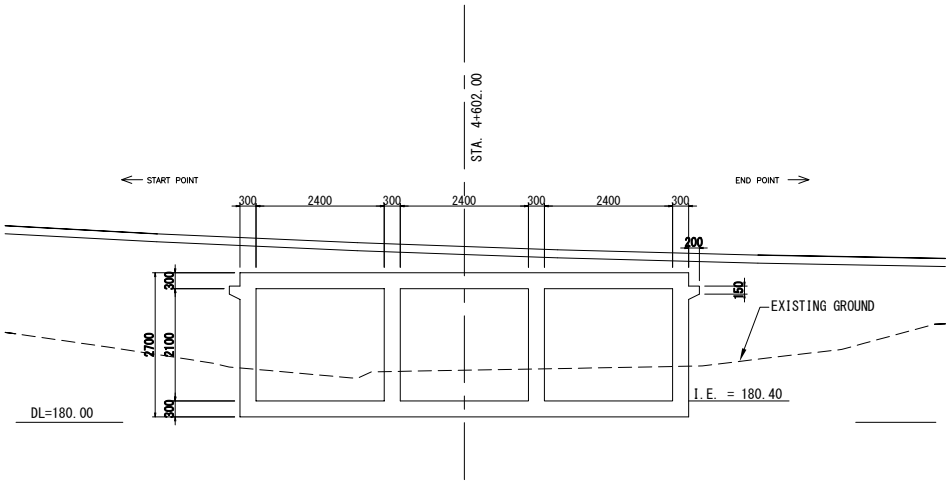
- ROAD CROSS-SECTION
SCALE AS SHOWN

JICA Japan International Cooperation Agency	DESIGNED:	SUBMITTED :	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF AGRICULTURE	RECOMMENDING APPROVAL :	REVIEWED :	RECOMMENDING APPROVAL :		APPROVED :	PROJECT / LOCATION	SHEET CONTENTS	SHEET NO.
	DRAWN	FUSASHIGE SATO TEAM LEADER DATE :							THE PROJECT FOR ROADS IMPROVEMENT IN BANGSAMORO ALAMADA FARM TO MARKET ROAD	- TYPICAL CROSS SECTION -	AR-01
	CHECKED FUSASHIGE SATO			PROJECT DIRECTOR DATE :	CHIEF DATE :	DIRECTOR DATE :	UNDERSECRETARY DATE :	SECRETARY DATE :			



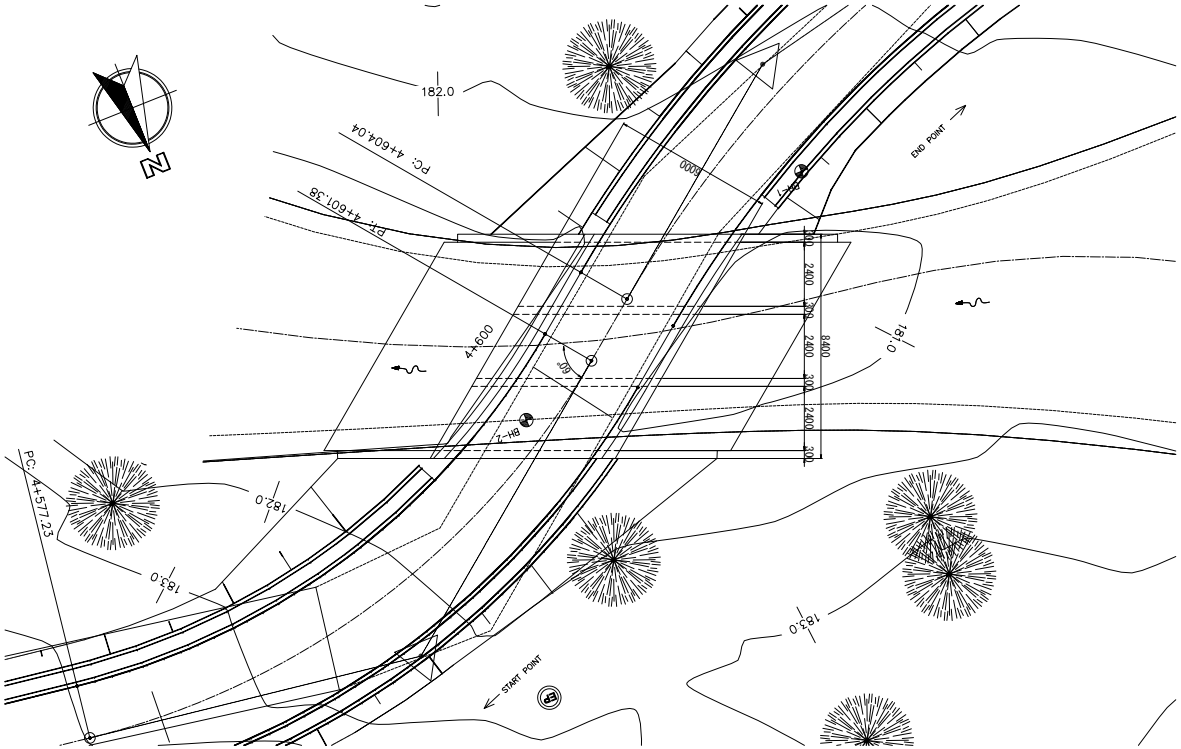
GENERAL ELEVATION

SCALE 1:100



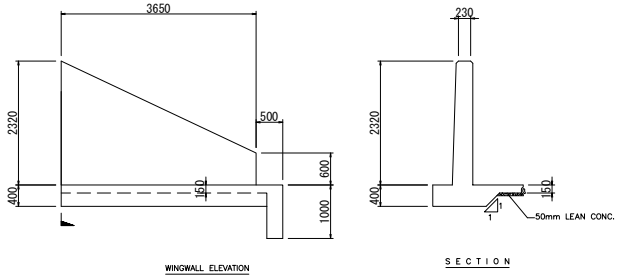
SECTION-TRIPLE BARREL

SCALE 1:50



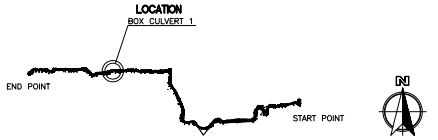
GENERAL PLAN

SCALE 1:100



WINGWALL DETAILS

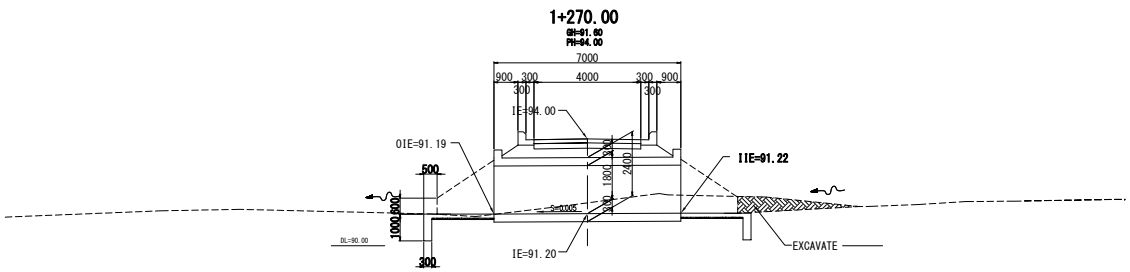
SCALE 1:50



LOCATION MAP

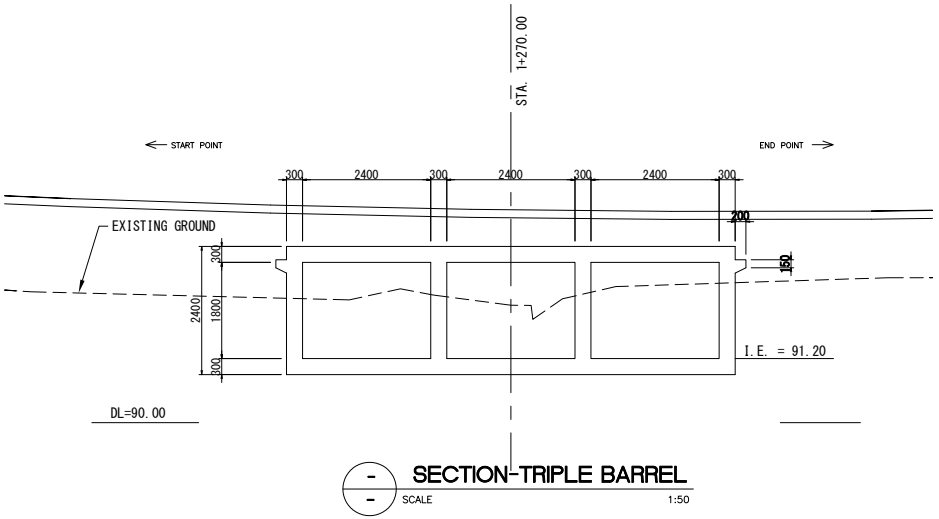
SECTION - 1

JICA JAPAN INTERNATIONAL COOPERATION AGENCY	DESIGNED:	SUBMITTED :	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF AGRICULTURE	RECOMMENDING APPROVAL :	REVIEWED :	RECOMMENDING APPROVAL :		APPROVED :	PROJECT / LOCATION	SHEET CONTENTS	SHEET NO.
	DRAWN								(SUPPLEMENTAL DRAWING) THE PROJECT FOR ROADS IMPROVEMENT IN BANGSAMORO ALAMADA	REINFORCED CONCRETE BOX CULVERT (RCBC) SECTION - I BOXCULVERT I	
	CHECKED FUSASHIGE SATO	FUSASHIGE SATO TEAM LEADER DATE :		PROJECT DIRECTOR DATE :	CHIEF DATE :	DIRECTOR DATE :	UNDERSECRETARY DATE :	SECRETARY DATE :			



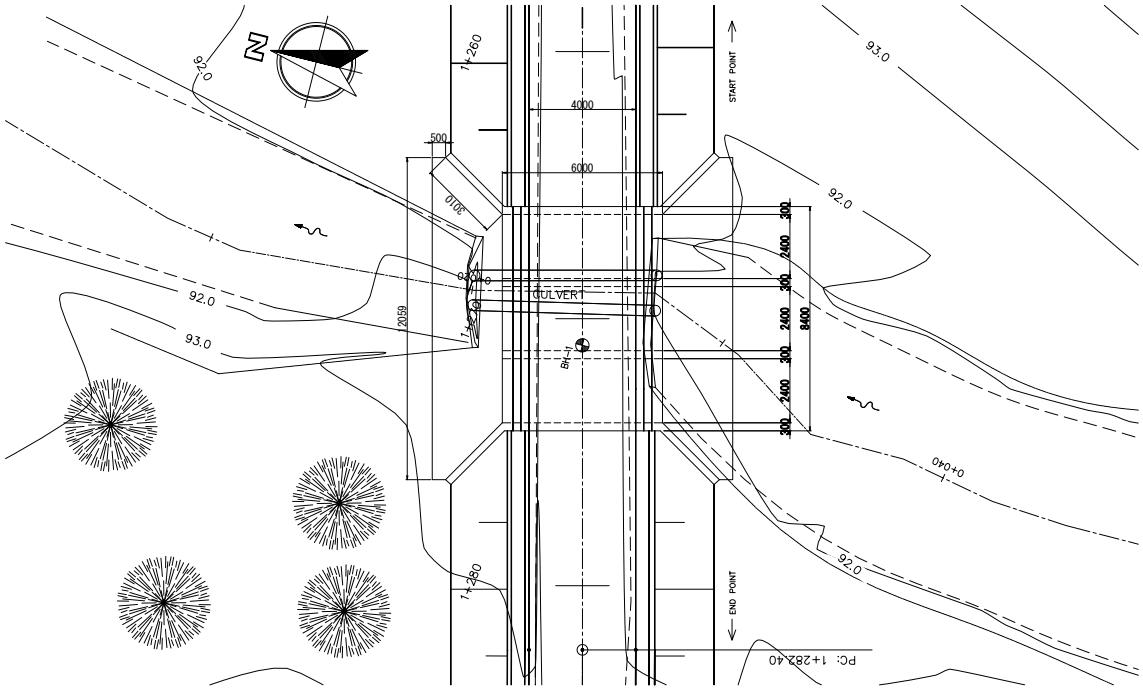
GENERAL ELEVATION

SCALE 1:100



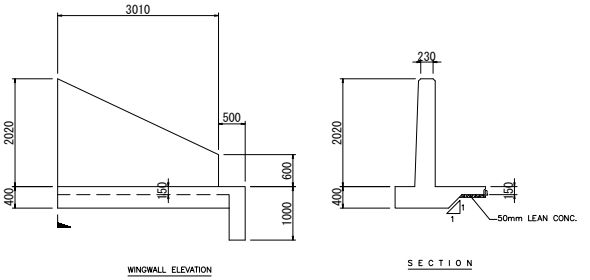
SECTION-TRIPLE BARREL

SCALE 1:50



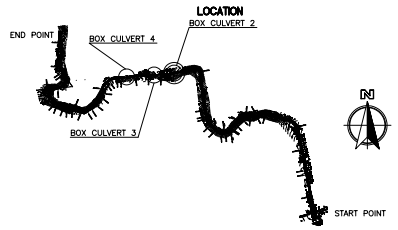
GENERAL PLAN

SCALE 1:100



WINGWALL DETAILS

SCALE 1:50

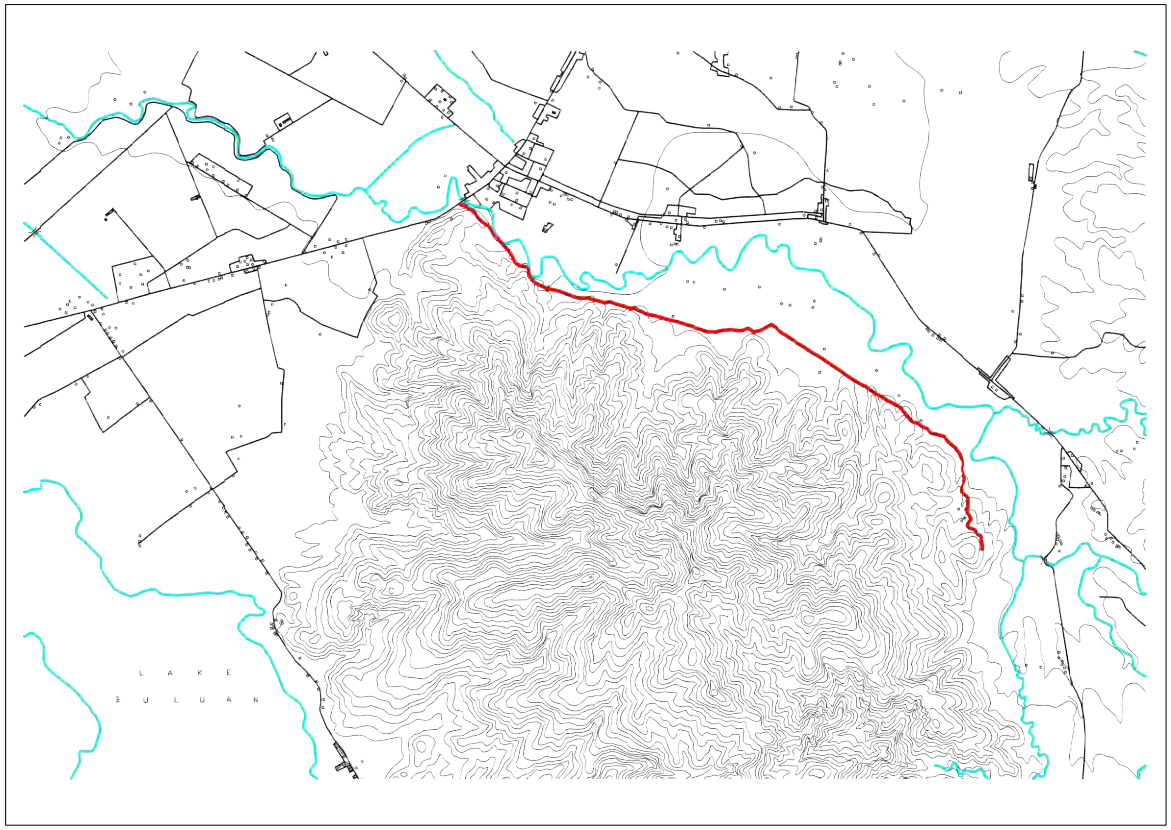


LOCATION MAP

SECTION - 2

JICA JAPAN INTERNATIONAL COOPERATION AGENCY	DESIGNED:	SUBMITTED :	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF AGRICULTURE	RECOMMENDING APPROVAL :	REVIEWED :	RECOMMENDING APPROVAL :		APPROVED :	PROJECT / LOCATION	SHEET CONTENTS	SHEET NO.
	DRAWN								(SUPPLEMENTAL DRAWING) THE PROJECT FOR ROADS IMPROVEMENT IN BANGSAMORO ALAMADA	REINFORCED CONCRETE BOX CULVERT (RCBC) SECTION - 2 BOXCULVERT 2	
	CHECKED FUSASHIGE SATO	FUSASHIGE SATO TEAM LEADER DATE :		PROJECT DIRECTOR DATE :	CHIEF DATE :	DIRECTOR DATE :	UNDERSECRETARY DATE :	SECRETARY DATE :			

A G-02 LOCATION MAP
SCALE AS SHOWN

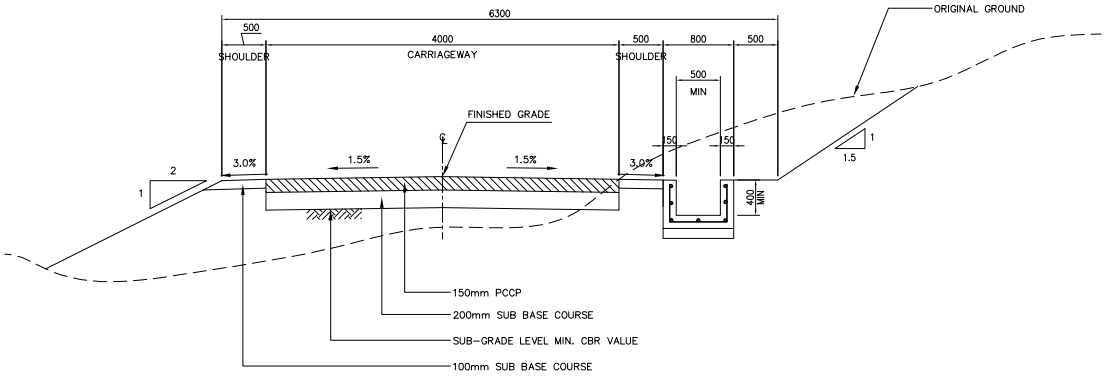


B G-02 VICINITY MAP
SCALE AS SHOWN

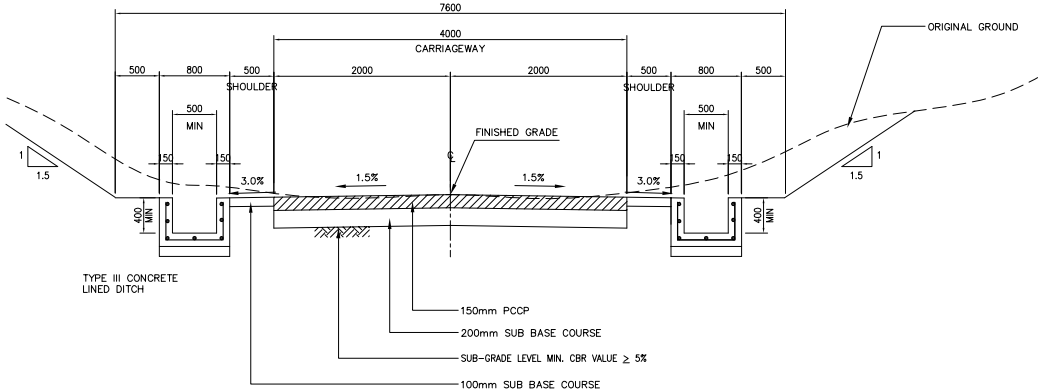
- - LOCATION MAP / VICINITY MAP
SCALE AS SHOWN

JICA JAPAN INTERNATIONAL COOPERATION AGENCY	DESIGNED:	SUBMITTED :	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF AGRICULTURE	RECOMMENDING APPROVAL :	REVIEWED :	RECOMMENDING APPROVAL :		APPROVED :	PROJECT / LOCATION	SHEET CONTENTS	SHEET NO.
	DRAWN								THE PROJECT FOR ROADS IMPROVEMENT IN BANGSAMORO DATU PAGLAS FARM TO MARKET ROAD	LOCATION AND VICINITY MAP	G-02
	CHECKED FUSASHIGE SATO	FUSASHIGE SATO TEAM LEADER DATE :		PROJECT DIRECTOR DATE :	CHIEF DATE :	DIRECTOR DATE :	UNDERSECRETARY DATE :	SECRETARY DATE :			

2-38



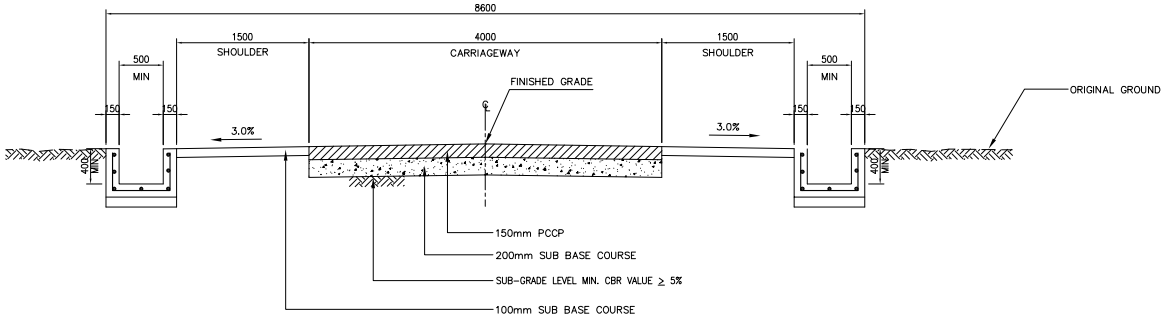
B - TYPE D2
SCALE 1:30



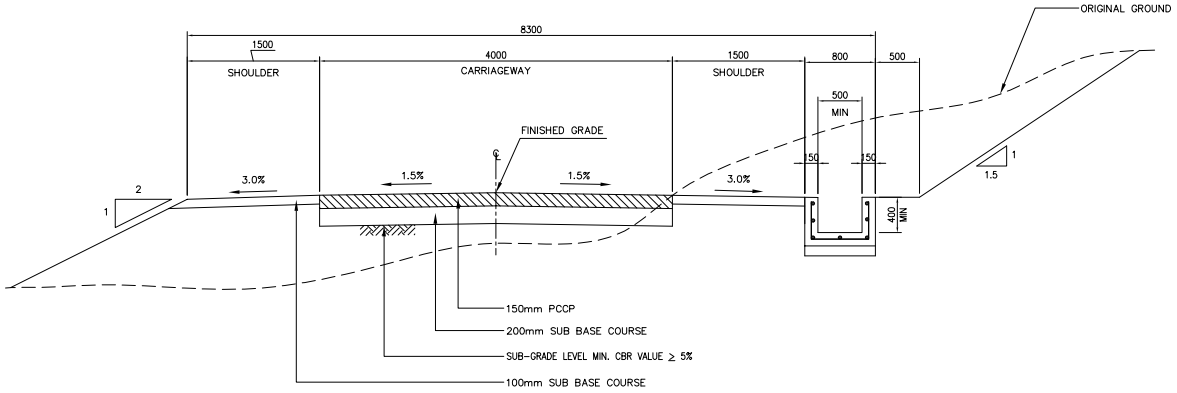
A - TYPE D1
SCALE 1:30

- TYPICAL ROAD SECTION
- SCALE AS SHOWN

JICA JAPAN INTERNATIONAL COOPERATION AGENCY	DESIGNED:	SUBMITTED :	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF AGRICULTURE	RECOMMENDING APPROVAL :	REVIEWED :	RECOMMENDING APPROVAL :		APPROVED :	PROJECT / LOCATION	SHEET CONTENTS	SHEET NO.
	DRAWN	FUSASHIGE SATO TEAM LEADER DATE :							THE PROJECT FOR ROADS IMPROVEMENT IN BANGSAMORO DATU PAGLAS FARM TO MARKET ROAD	- TYPICAL CROSS SECTION - -	DR-01
	CHECKED FUSASHIGE SATO			PROJECT DIRECTOR DATE :	CHIEF DATE :	DIRECTOR DATE :	UNDERSECRETARY DATE :	SECRETARY DATE :			



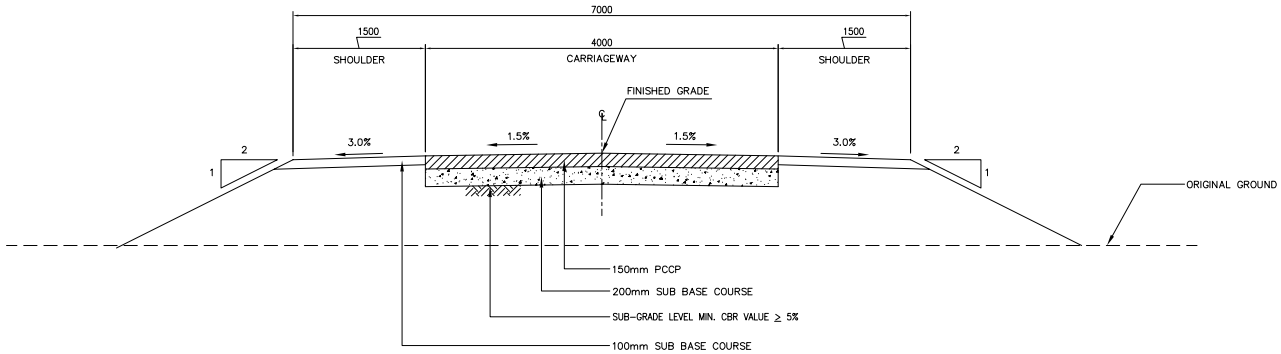
B - TYPE D4
SCALE 1:30



A - TYPE D3
SCALE 1:30

- TYPICAL ROAD SECTION
- SCALE AS SHOWN

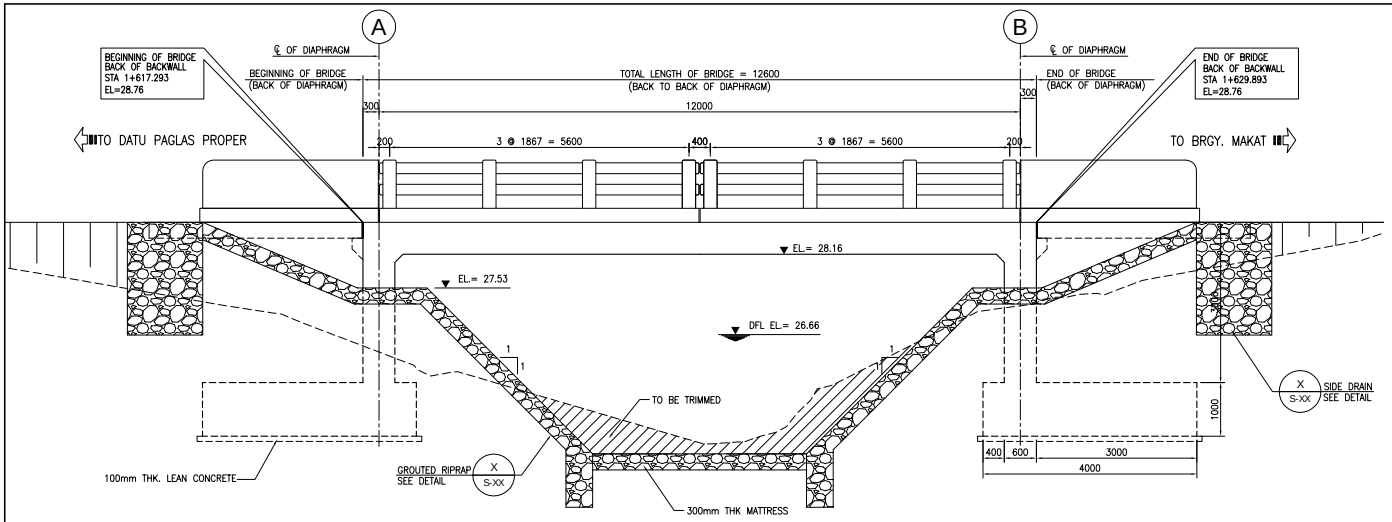
JICA JAPAN INTERNATIONAL COOPERATION AGENCY	DESIGNED:	SUBMITTED :	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF AGRICULTURE	RECOMMENDING APPROVAL :	REVIEWED :	RECOMMENDING APPROVAL :		APPROVED :	PROJECT / LOCATION	SHEET CONTENTS	SHEET NO.
	DRAWN	FUSASHIGE SATO TEAM LEADER DATE :							THE PROJECT FOR ROADS IMPROVEMENT IN BANGSAMORO DATU PAGLAS FARM TO MARKET ROAD	- TYPICAL CROSS SECTION - -	DR-02
	CHECKED FUSASHIGE SATO			PROJECT DIRECTOR DATE :	CHIEF DATE :	DIRECTOR DATE :	UNDERSECRETARY DATE :	SECRETARY DATE :			



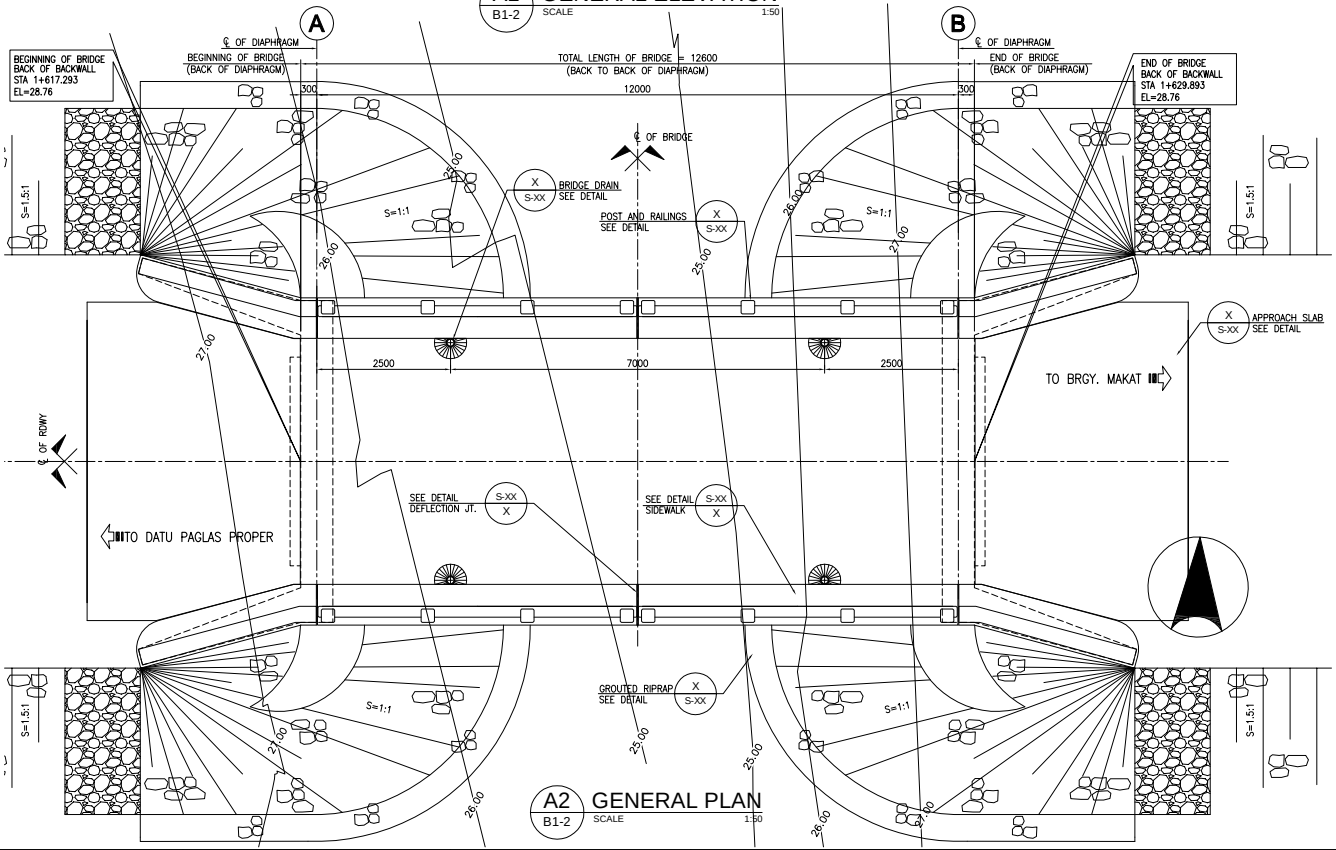
A - TYPE D5
SCALE 1:30

- - TYPICAL ROAD SECTION
SCALE AS SHOWN

JICA JAPAN INTERNATIONAL COOPERATION AGENCY	DESIGNED:	SUBMITTED :	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF AGRICULTURE	RECOMMENDING APPROVAL :	REVIEWED :	RECOMMENDING APPROVAL :		APPROVED :	PROJECT / LOCATION	SHEET CONTENTS	SHEET NO.
	DRAWN	FUSASHIGE SATO TEAM LEADER DATE :							THE PROJECT FOR ROADS IMPROVEMENT IN BANGSAMORO DATU PAGLAS FARM TO MARKET ROAD	- TYPICAL CROSS SECTION - -	DR-03
	CHECKED FUSASHIGE SATO			PROJECT DIRECTOR DATE :	CHIEF DATE :	DIRECTOR DATE :	UNDERSECRETARY DATE :	SECRETARY DATE :			



A1 B1-2 GENERAL ELEVATION SCALE 1:50



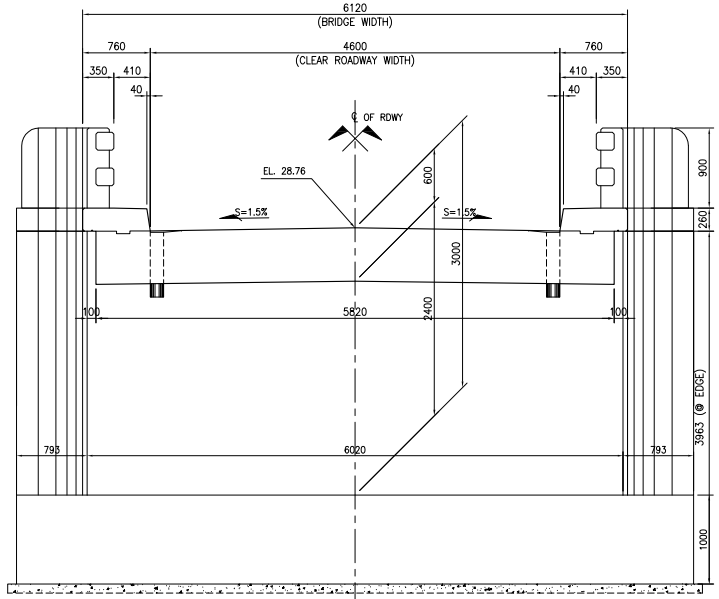
A2 B1-2 GENERAL PLAN SCALE 1:50

SUMMARY OF ESTIMATED QUANTITIES

PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT (TWO)	SUPER - STRUCTURE	TOTAL
103(2)a	BRIDGE EXCAVATION, COMMON MATERIAL (ABOVE WATER LEVEL)	cu.m	74.20	–	74.20
103(2)b	BRIDGE EXCAVATION, COMMON MATERIAL (BELOW WATER LEVEL)	cu.m	183.54	–	183.54
103(2)c	RIVERBED CHANNEL EXCAVATION	cu.m	141.37	–	141.37
401	REINFORCED CONCRETE RAILINGS	l.m	–	24	24
404(2)	REINFORCING STEEL, GRADE 60	kgs	10970.36	8133.42	19103.77
405(1)a	STRUCTURAL CONCRETE CLASS "A"	cu.m	104.75	63.48	168.23
405(1)b	LEAN CONCRETE	cu.m	6.55	–	6.55
504	GROUTED RIPRAP, CLASS "A"	cu.m	128.83	–	128.83
707	BRIDGE DRAIN	each	–	4	4

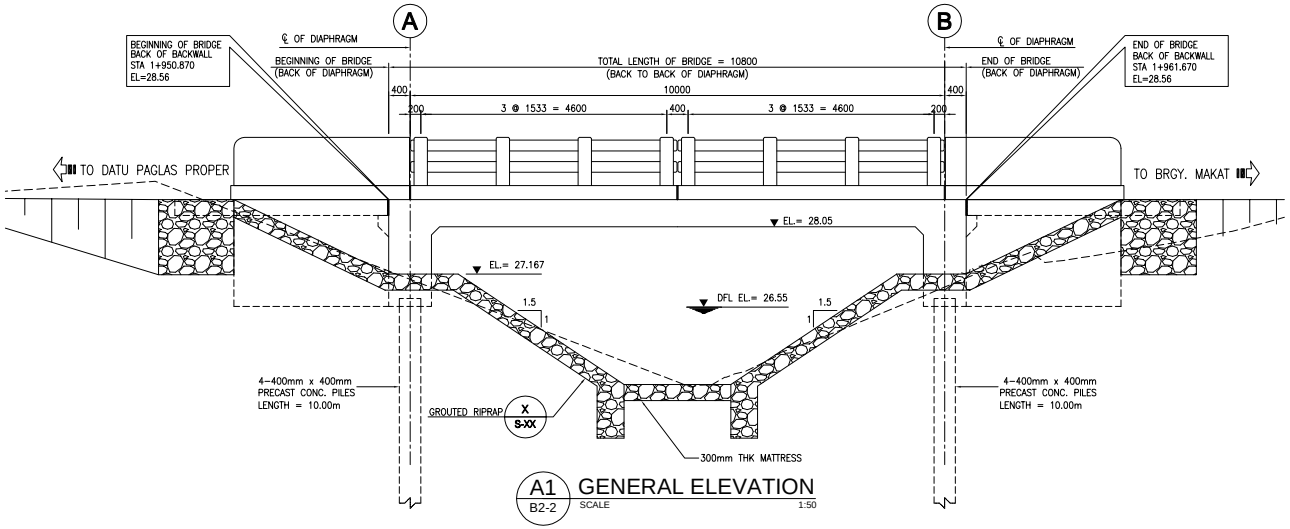
NOTES :

1. ALL QUANTITIES SHALL BE VERIFIED DURING CONSTRUCTION.
2. ALL STATIONS, ELEVATIONS AND DIMENSIONS SHALL BE VERIFIED DURING CONSTRUCTION.
3. EXISTING BRIDGE AND OTHER OBSTRUCTIONS SHALL BE REMOVED IN ACCORDANCE TO ITEM 101. SUBSTRUCTURE OF EXISTING BRIDGE SHALL BE DEMOLISHED AND CUT TO DESIGNATED ELEVATION.

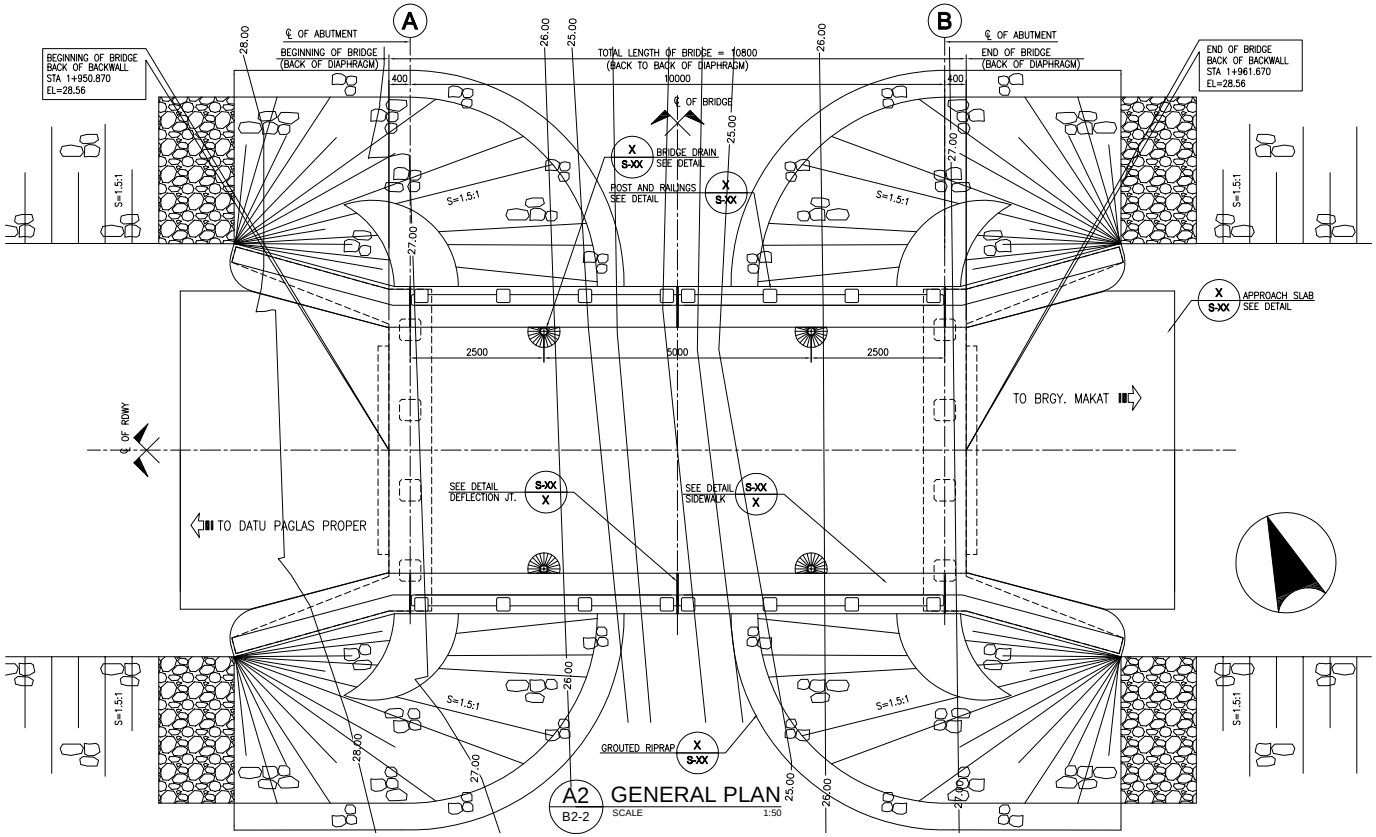


A3 B1-2 SECTION SCALE 1:30

JICA JAPAN INTERNATIONAL COOPERATION AGENCY	DESIGNED:	SUBMITTED :	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF AGRICULTURE	RECOMMENDING APPROVAL :	REVIEWED :	RECOMMENDING APPROVAL :		APPROVED :	PROJECT / LOCATION: ROAD IMPROVEMENT IN BANGSAMORO INCLUSIVE REGIONAL DEVELOPMENT PROJECT BRGY. MANGADAG DATU PAGLAS, MAGUINDANAO	SHEET CONTENTS: DATU PAGLAS BRIDGE 1 GENERAL ELEVATION, GENERAL PLAN, CROSS SECTION AND SUMMARY OF QUANTITIES	SHEET NO.
	DRAWN										
	CHECKED FUSASHIGE SATO	FUSASHIGE SATO TEAM LEADER DATE :		PROJECT DIRECTOR DATE :	CHIEF DATE :	DIRECTOR DATE :	UNDERSECRETARY DATE :	SECRETARY DATE :			



A1 B2-2 GENERAL ELEVATION
SCALE 1:50



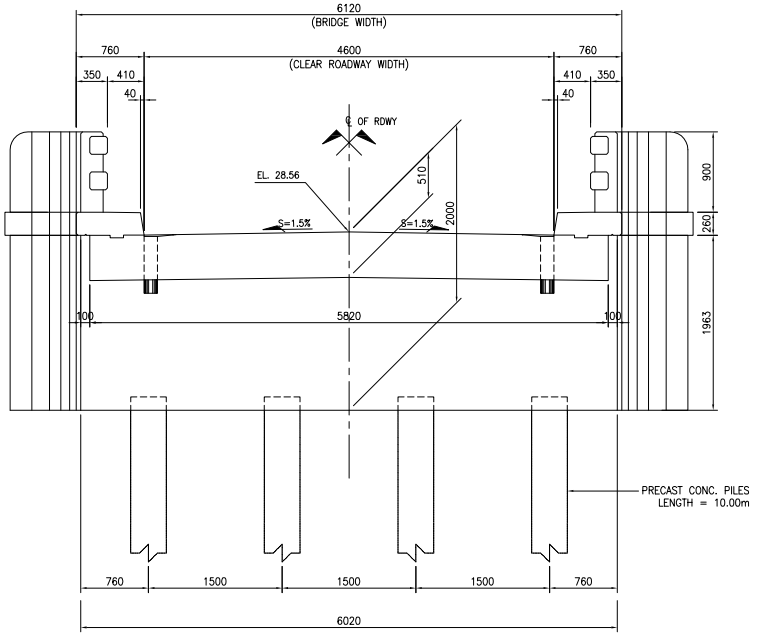
A2 B2-2 GENERAL PLAN
SCALE 1:50

SUMMARY OF ESTIMATED QUANTITIES

PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT (TWO)	SUPER - STRUCTURE	TOTAL
103(2)a	BRIDGE EXCAVATION, COMMON MATERIAL (ABOVE WATER LEVEL)	cu.m	–	–	–
103(2)b	BRIDGE EXCAVATION, COMMON MATERIAL (BELOW WATER LEVEL)	cu.m	79.66	–	79.66
103(2)c	RIVERBED CHANNEL EXCAVATION	cu.m	78.95	–	78.95
401	REINFORCED CONCRETE RAILINGS	l.m	–	20	20
404(2)	REINFORCING STEEL, GRADE 60	kgs	3797.69	7339.22	11136.91
405(1)a	STRUCTURAL CONCRETE CLASS "A"	cu.m	29.45	56.08	85.53
405(1)b	LEAN CONCRETE	cu.m	1.56	–	1.56
504	GROUTED RIPRAP, CLASS "A"	cu.m	169.59	–	169.59
707	BRIDGE DRAIN	l.m	–	4	4
400(1)	PRECAST PILE, 400mm X 400mm, FURNISHED	l.m	80	–	80
400(2)	PRECAST PILE, 400mm X 400mm, DRIVEN	l.m	80	–	80
400(3)	TEST PILE, PRECAST PILE, 400mm X 400mm, FURNISHED AND DRIVEN	l.m	20	–	20

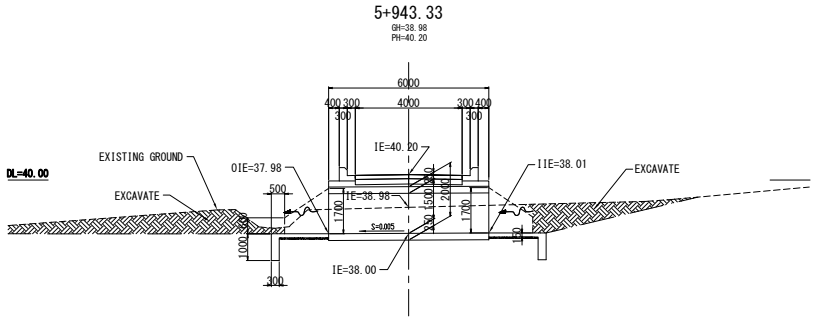
NOTES :

1. ALL QUANTITIES SHALL BE VERIFIED DURING CONSTRUCTION.
2. ALL STATIONS, ELEVATIONS AND DIMENSIONS SHALL BE VERIFIED DURING CONSTRUCTION.
3. EXISTING BRIDGE AND OTHER OBSTRUCTIONS SHALL BE REMOVED IN ACCORDANCE TO ITEM 101. SUBSTRUCTURE OF EXISTING BRIDGE SHALL BE DEMOLISHED AND CUT TO DESIGNATED ELEVATION.



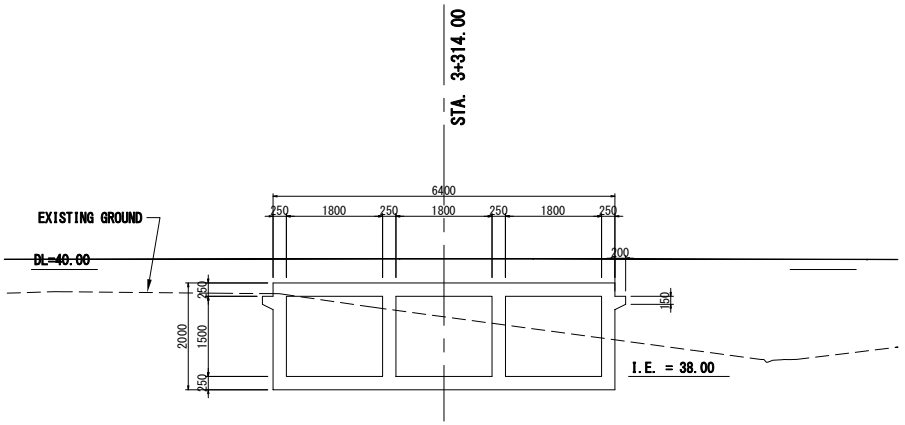
A3 B2-2 SECTION
SCALE 1:30

JICA JAPAN INTERNATIONAL COOPERATION AGENCY	DESIGNED:	SUBMITTED :	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF AGRICULTURE	RECOMMENDING APPROVAL :	REVIEWED :	RECOMMENDING APPROVAL :		APPROVED :	PROJECT / LOCATION	SHEET CONTENTS	SHEET NO.
	DRAWN								ROAD IMPROVEMENT IN BANGSAMORO INCLUSIVE REGIONAL DEVELOPMENT PROJECT	DATU PAGLAS BRIDGE 2	
	CHECKED FUSASHIGE SATO	FUSASHIGE SATO TEAM LEADER DATE :		PROJECT DIRECTOR DATE :	CHIEF DATE :	DIRECTOR DATE :	UNDERSECRETARY DATE :	SECRETARY DATE :	BRGY. MANGADAG DATU PAGLAS, MAGUINDANAO	GENERAL ELEVATION, GENERAL PLAN, CROSS SECTION AND SUMMARY OF QUANTITIES	



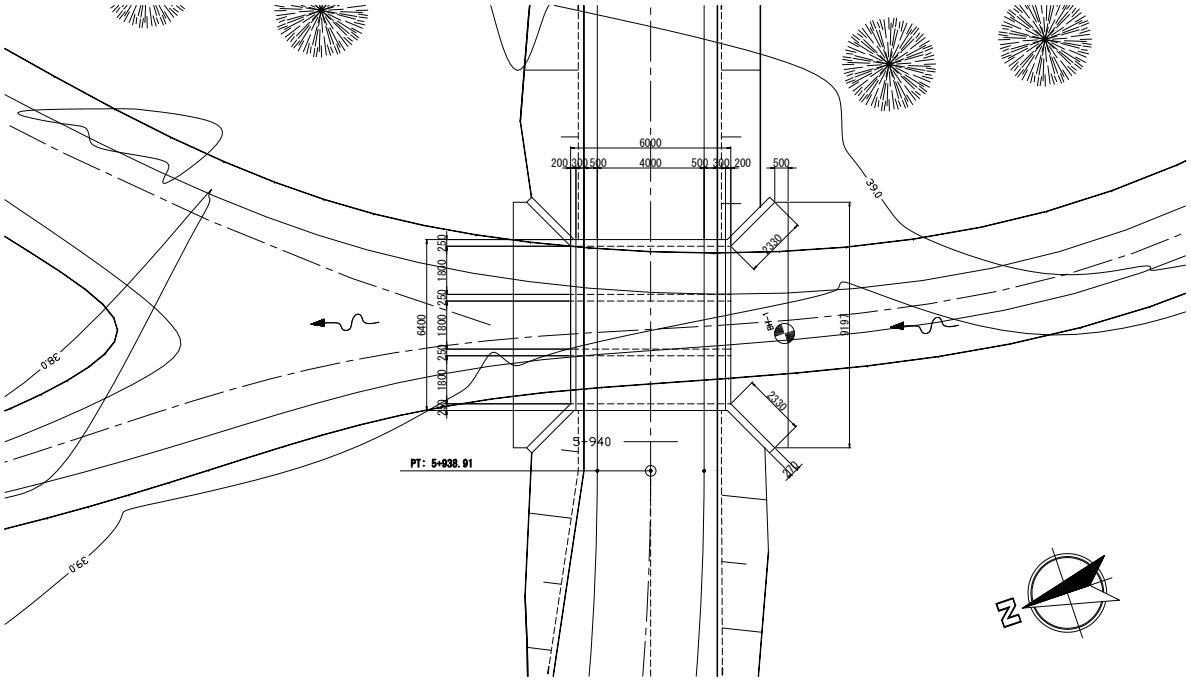
A1 GENERAL ELEVATION

SCALE 1:100



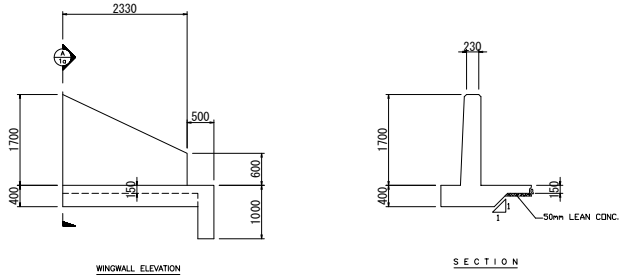
- SECTION - TRIPLE BARREL

SCALE 1:50



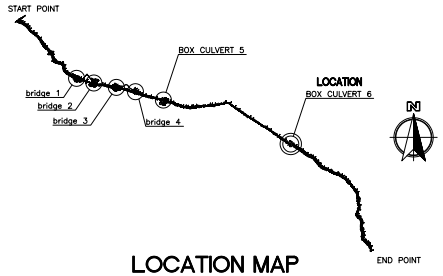
A2 GENERAL PLAN

SCALE 1:100



- WINGWALL DETAILS

SCALE 1:50



LOCATION MAP

JICA JAPAN INTERNATIONAL COOPERATION AGENCY	DESIGNED:	SUBMITTED :	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF AGRICULTURE	RECOMMENDING APPROVAL :	REVIEWED :	RECOMMENDING APPROVAL :		APPROVED :	PROJECT / LOCATION	SHEET CONTENTS	SHEET NO.
	DRAWN	FUSASHIGE SATO TEAM LEADER DATE :		PROJECT DIRECTOR DATE :	CHIEF DATE :	DIRECTOR DATE :	UNDERSECRETARY DATE :	SECRETARY DATE :	ROAD IMPROVEMENT IN BANGSAMORO INCLUSIVE REGIONAL DEVELOPMENT PROJECT BRGY. MANGADAG DATU PAGLAS, MAGUINDANAO	REINFORCED CONCRETE BOX CULVERT (RCBC) BOX CULVERT 6	
	CHECKED FUSASHIGE SATO										

2-2-4. Implementation Plan

2-2-4-1. Implementation Policy

(1) Labor Availability

1) Civil Engineers

As AA or upper class companies hire full-time road and structural engineers, it is unlikely that problems related to construction supervision occur. Soon after contractors are procured, the contractor shall submit implementation plans and clarify the on-site construction supervision structure.

2) Workers

According to on-site interviews with relevant contractors, it is likely that many prime contractors ask local sub-contractors to assist them. The Project shall consider employing local workers from neighboring communities.

3) The Philippines' Regulations under the Labor Standards Laws and Working Conditions

DPWH's "Presidential Decree 442 - Labor code of the Philippines" states local labors must be paid not less than minimum wage and that positive consideration for local workers' employment is given. Regarding the Working Safety Standard, ISO9001: 2008 is adopted.

4) Others

Asian Development Bank has been implementing "Labor Based Technology (LBT)" to allow local residents to have opportunities to make money at road constructions in Bumbaran.

(2) Materials for Construction

Materials for this project shall be procured in the Mindanao Island. Sand, aggregate, hard rock, cement, and reinforcing bars are main materials. Aggregate will be procured at the sites shown in the following table.

Table 2-2-16 Materials for Construction

Site	Material	Place for Procurement	Distance
Bumbaran	Sand	Musuan River Quarry (Valencia City, Bukidnon)	Approx. 100km
	Gravel	Ditto	
Alamada	Sand	Simuay's Quarry (Simuay River, Sultan Kudarat Maguindanao)	Approx. 10km
	Gravel	Barangay's Quarry (Kapayawi Libungan, North Cotabato)	
Datu Paglas	Sand	Alip River's Quarry (DatuPaglas), Kapingkong Quarry (Islan)	Ditto
	Gravel	Alip River's Quarry (DatuPaglas, Maguindanao)	

As shown above, procurement of aggregates at the vicinity of the construction sites is possible except for Bumbaran. Regarding Bumbaran, aggregates will be obtained in Valencia City, which indicates that cost will be higher than the other sites. According to interviews with municipality engineers, prices of aggregate are as follows.

Table 2-2-17 Aggregates Prices

Item	Bumbaran (Php)	Other Sites (Php)
Sand	1,900	486
Gravel	2,000	795
Cobbled Stone	1,800	710

Reinforcing bars and cement are available in the large cities close to the target sites (Valencia, Cotabato, and General Santos, etc.). This Project follows the Philippines' standard designs, uses the existing construction methods, and uses locally available materials. Ready-mixed concrete will be obtained by introducing batcher plants and mobile concrete mixers (0.5 m^3 / 1 batch) to each site, because there are no concrete mixing plants nearby and because the project sites are far from each other. Implementation of design mixture and slump tests will contribute to ensuring quality.

Table 2-2-18 Procurement Plan for Main Construction Materials

Item		Procurement Category			Place of Procurement, Procurement Route, Reasons for Procurement, etc.
Material	Specification	The Philippines	Japan	Others	
Materials for Structure					
Cement	40kg/ bag	○			Domestic
Reinforced Bar		○			Ditto
Aggregate for Concrete		○			Ditto
Admixture	Water-reducing agent	○			Ditto
Gabion	2 x 1 x 1m,	○			Ditto
Cobblestone		○			Ditto
PVC Pipe	D=100mm	○			Ditto
Hume pipe	D=900mm, 600mm	○			Ditto
Basecourse Material		○			Ditto
Form Timber		○			Ditto
Form Plywood		○			Ditto
Fuel/ Grease and Oil		○			Ditto

Upper class companies basically hold heavy machineries including batcher plants which are necessary for rehabilitation of roads. Precast RC piles are available at Cagayan de Oro and Iligan (a city close to the project sites). Transportation cost, however, is relatively high, so making them at nearby yards and using them will be an option.

(3) Machineries for Construction

The following table shows machineries owned by an "AAA" company in Mindanao. There is no problem with the machineries the company owns.

Table 2-2-19 Status of Heavy Equipment Owned

Company Name	UKC BUILDERS INC.
Address	TABLON, CAGAYAN DE ORO CITY
Capital	394,702,611Php (2012)
Category	AAA
Machineries Owned	4 Rough Terrain Cranes
	10 Crawler Cranes
	6 Truck Cranes
	1 Tower Crane
	6 Backhoes

(4) Local Construction Companies

The following is a list of companies which were interviewed.

Table 2-2-20 A List of Main Local Construction Companies

Location	Company name	Address	Contact No	Class
Manila	ASIAN Construction and Development Corporation	Rm.802, 8th Floor Rninsula Court Building 8735 Paseo De Roxas Makati Cty 1200, Philippines	632-890-6337 +63 918 900 3864	AAA
	D.M.Consunji, Inc	DMCI Plaza Bldg., 2281 Don Chino Roces Ave., Ext. Makati City 1231, Philippines	632-888-3102 +63 917 536 0537	AAA
	A.A. ALARILLA Construction co., Inc	2nd Floor, Verde Oro Building 535 Commonwealth Avenue,Diliman, Quezon City	931-4607 0927 768 1932	AAA
Davao	VICENTE T. LAO Construction	KM12, Diversion RD, Panacan Davao City	082-234-0577 0923 490 5478	AAA
	P.L. SEBASTIAN CONSTRUCTION	Sitio Calumpang, Brgy, Inawayan, Sta. Cruz, Davao del sur	082 286 3884/229 2711	AAA
	MONOLITHIC CONSTRUCTION & CONCRETE PRODUCTS INC.	Aquarius St., Cor. Pisces St., Matina, Davao City	082 299 0984 0925 510 0623	AA
Cotabato	FFJJ Construction	12, 2nd Batch Block 11, Notre Dame Village, Cotabato City	09065716628	AAA
South Cotabato	GEMMA CONSTRUCTION SUPPLY INC.	Pantua Village, Zone III, Koronadal, South Cotabato	083 2282366/510 5208 /0939 904 0932	AAA
	MARBEL CONSTRUCTION DEVELOPMENT	Non building, Alunan Avenue, Koronadal, South Cotabato	083 2286207/228 3985/0922 8287733	AAA
Misamis Occidental	GRACE CONSTRUCTION CORPORATION	Grace Compound, Bernad Subdivision, Ozamis City, Misamis Occidental	088 521 1540	AAA
	HSO CONSTRUCTION CORPORATION	HSO bldg., Oaminal Cmpd, Circumferential Road, Lam-an Ozamis City, Misamis Occidental	088 521 2855	AAA
	NELSON S. LEE CONSTRUCTION	Don Anselmo Bernad Avenue, Ozamis City, Misamis Occidental	088 521 2156	AA
Marawi City	FIAT CONSTRUCTION SERVICES	Ambol Compound, Highway, Brgy. Saber, Marawi City, Lanao del Sur	063 221 5963/727 9750	AAA
	AL HUSSEIN CONSTRUCTION	Marcos Ave, Marawi City, Lanao del Sur	063 223 9145	AA
Pagadian City	ESR CONSTRUCTION AND SUPPLY	Tiguma, National Highway, Pagadian City, Zamboanga del Sur	062 214 1653	AAA

The table below shows the questions and results of interviews.

Table 2-2-21 Interviews with Local Companies

Question	Outline of Question	Answer	Note
Interest in the Project	After explaining this Project, the preparatory survey team asked if they got interested in.	Although companies around the project sites got interested in this Project, companies distant from the sites (e.g. at Manila, Davao, etc.) did not that much. Datu Paglas drew much attention as the target road is long.	
Construction	Although the construction plan of this Project was incomplete, the preparatory survey team asked about bridges and concrete pavement.	Concreting shall be done after construction of batcher plants around the sites. There is no worry as some companies have standard design and experiences of bridge construction. They own necessary devices for construction. Although construction duration must be carefully considered, utmost duration might be 1 year. No problem in construction.	Only 2 companies' brochures were available.
Unit Price of Construction	The preparatory survey team asked for submission of unit prices of construction for a certain type of works necessary for this Project.	・DPWH has unit prices and the best way is to use them. ・While each company has their original unit prices, only 2 revealed them.	
Material	Whether construction materials are available in Mindanao	Crucial materials are available.	
Company Status	Owned machineries, quality, construction management level, and engineers' level were checked through a visit to companies.	While the preparatory survey team could not check machineries in warehouses as we mainly visited Headquarters, quality and construction management level is high and engineers' level is moderate. It, however, seemed that not so many engineers are capable of grasping a whole construction process due to specialization of each employees.	

2-2-4-2. Implementation Conditions

(1) Lot Splitting

Number of lots was considered as following conditions.

a) The project sites are located in 3 municipalities and each site is rather distant from each other. It is, from the viewpoint of risk management, not preferable to consider these works as an integrated project and to manage work duration, quality, and security, since this means that this project will largely depend on just a contracted company's motivation and capacity.

b) Each sites' environmental conditions are severe and road profiles can be changeable. Careful construction is indispensable for each site.

Hence, this project will be divided into following three lots.

1) Northern region; Lanao Del Sur, Bumbaran
2) Central region; Cotabato province, Alamada
3) Southern region; Maguindanao province, Datu Paglas

(2) Qualifications for Bidding

In the Philippines, qualifications for participation in bidding are categorized in accordance with license categories (companies' size) and construction scale (the required amount of money for a single project and maximum contract amount).

Table 2-2-22 License Categories and Required Experiences

License Category	Required Amount of Money for a Single Project	Maximum Contract Amount
AAA	150M Php or more	300M or more
AA	From 100M to 150M Php	Up to 300M
A	From 50M to 100M Php	Up to 200M
B	From 10M to 50M Php	Up to 100M
C&D	10M Php or less	Up to 15M
Trade	500^{Th} or less	Up to 500^{Th}

In order to secure construction quality and keep the schedule, the Project needs participations of companies with high technological and managerial skills. Therefore, AAA class companies would be promising from the viewpoint of this Project's scale. Regarding Bumbaran, however, AA rank companies will not be omitted because the target road is rather short.

Categorization of registered companies follows DPWH's list, and according to it, 11 AAA class companies, 7 AA class companies, and 69 A class companies are registered. Although only AA class or upper companies are promising, there are 139 B class companies, 82 C class companies, and 300 D class companies in Mindanao. Only companies registered at Mindanao are plausible as the others have to pay transportation cost. Of these plausible companies, ones with experiences in the target municipalities are below.

Table 2-2-23 List of Experienced Contractors

LIST OF ACTUAL CONTRACTORS

1. ALAMADA

Location	Company name	Adress	Contact person	Contact No	E-mail adress	Category	Remarks
Libungan	YR BUILDERS AND SUPPLY	Poblacion, Libungan, North Cotabato	Jose Montgomery B. Pader	0905 331 5235	yrbuildersand supply@yahoo.com	B	
	RDEN CONSTRUCTION AND SUPPLY	Poblacion, Libungan, North Cotabato	Ruperto A. Denolan	064-229-5025 / 09124124571		B	
	KA BUILDERS & SUPPLY	Poblacion, Libungan, North Cotabato	Kelie U. Antao	064-2295176 / 0912 4767212		B	
Midsayap	J-ONE BUILDERS	Sadaan, Midsayap, North Cotabato	Julius T Cadava	064-2296011 / 09282731412		B	
	PHILTIL CONSTRUCTION	1633 Bonifacio Street, Poblacion 2, Midsayap, North Cotabato	Leoterio C. Cambel	0947 832 8496 /09998095617	philtil_construction @yahoo.com	B	
Pigcawa - yan	PDL BUILDERS AND SUPPLY	Presbitero, Pigcawayan, North Cotabato	Philip D. Lopez	09308781837		B	

2. BUMBARAN

Location	Company name	Address	Contact person	Contact No	E-mail adress	Category	Remarks
Marawi City	FIAT CONSTRUCTION SERVICES	Ambol Compound, Highway, Brgy. Saber, Marawi City, Lanao del Sur	Farouk M. Macarambon	063 221 5963/727 9750	fiat_construction@ yahoo.com	AAA	
	AL HUSSEIN CONSTRUCTION	Marcos Ave, Marawi City, Lanao del Sur	Cosain C. Dalidig	063 223 9145	alhusseinconstructi on@yahoo.com	AA	
	M.M.A ACHIEVER CONSTRUCTION & DEVELOPMENT CORPORATION	Pugaan, Ditsaan Ramain, Lanao del Sur	Amir Guindolongan Rakim	352 0779/928 9491	mma_achiever@ya hoo.com	A	
Davao	DAVAO ROCK MIXER ENTERPRISES	27 Lacson Street, Bario Obrero, Davao City	Alejandro B. Adaptar	082-234-0577 0923 490 5478	davaorock@yahoo. com.ph	A	
	Davao Contractors Development Cooperative (DACODECO)	NO DATA ENTRY IN THE LIST OF PCAB LICENSED CONTRACTORS FOR CFY 2013-2					BAD

3. DATU PAGLAS

Location	Company name	Address	Contact person	Contact No	E-mail adress	Category	Remarks
Davao	VICENTE T. LAO Construction	KM12, Diversion RD, Panacan Davao City	DANTE V. JUNASA	082-234-0577 0923 490 5478	viclao_mla@yahoo. com	AAA	
	P.L. SEBASTIAN CONSTRUCTION	Sitio Calumpang, Brgy, Inawayan, Sta. Cruz, Davao del sur	PANTALEON B. SISON JR.	082 286 3884/229 2711	plscdavao@gmail.c om	AAA	
Cotabato	FFJJ Construction	12, 2nd Batch Block 11, Notre Dame Village, Cotabato City	Osmena A. Palanggalan	09065716628	roma_malibiran@y ahoo.com	AAA	
South Cotabato	GEMMA CONSTRUCTION	Pantua Village, Barangay Zone III, Koronadal, South Cotabato	Lora Barredo Uy	083 2282366/510 5208 /0939 904	gemmaconstruction 16@yahoo.com	AAA	
Tacurong City	BETALAC Construction and General Merchandise	Aluman Highway, Tacurong City	C.A. Betalac	(064) 200 4684/477 0513/	cbetalac@yahoo.co m	A	

(3) Construction Duration and Bidding Period

1) Setting of Construction Duration

i) Construction Machineries

The following table shows the main construction machineries in accordance with design standards, the quantity of soil, and workability.

Table 2-2-24 Construction Machineries for River-crossing Structures

Item	Appropriate Machinery	Note (Workload)
Earth Work		
Machinery Excavation	Backhoes Loading on trucks 0.2m^3	(38m^3/ day)
Backfill	Backhoes Loading on trucks 0.2m^3	(41m^3/ day)
Compaction	Tamper 6kg~8kg	W＜1.0m (37m^3)
Revetment		
Stone Masonry	Manpower	(5.8m^3/ day)

Table 2-2-25 Construction Machineries for Road Works

Item	Appropriate Machinery	Note (Workload)
Earth Work 1		
Unevenness Correction	Motor Grader	Blade Width 2.8 m (790m^2/ day)
Earth Work 2		
Machinery Excavation, Loading	Backhoes Loading on trucks 0.8m^3	(300m^3/day)
Carriage	Dump Truck (10t class)	Carriage Distance: 300m or less (167m^3/ day)
Machinery Leveling, Compaction	Bulldozer (15t class)	(410m^3/ day)
Concreted Pavement	PCCP t=0.15m, Mobile Mixer Reinforced Bars are deployed on the surfaces to protect from cracking.	30m^3/ day

ii) Working Days

Work-cessation coefficient, which is applied to ordinary construction, is also applied to calculate working days as river-crossings will be rehabilitated during the dry season to avoid influence of rainfalls. Given the work processes, operational rate is estimated while assuming that the processes would take 2 years.

Table 2-2-26 Operational Days

Category	Work-cessation Coefficient	Standard Operating Days per Month
1. Ordinary Construction (Type of Work, Operation)	1.76	17 days

While taking into consideration the construction scale (lot splitting) and construction capacities of the operating companies, work schedule and work duration were decided. As a result, the work duration of Lot1 is 9 months, Lot 2 is 11 months, and Lot 3 is 21 months.

2) Bidding Period

After the submission of the Final Preparatory Survey Report and the Cabinet Meeting in February, 2015, the Exchanged Notes will be signed and the Grant Aid scheme shall be concluded. Afterwards, additional 4 months are necessary for a contract between procurement agencies and Japanese consultant and bidding.

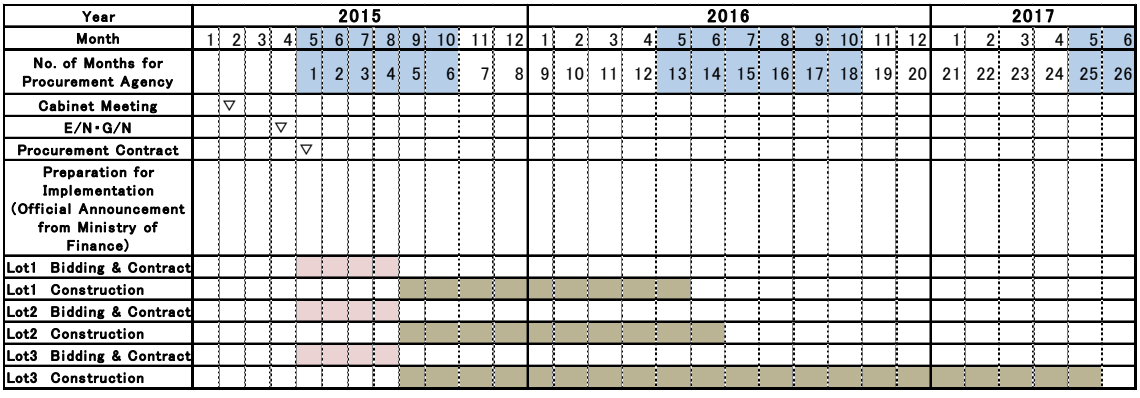


Figure 2-2-16 Bidding Period

(4) Process of Bidding

The processes of bidding were considered while taking DA's processes based on the following guidelines.

- Handbook on Philippine Government Procurement
- DEPARTMENT OF AGRICULTURE Farm-To-Market Road Development Program (FMRDP) Source Book

The following is the standard processes of bidding in the Philippines. In addition to the duration for ordinary procedures, rules for the shortest procedures, which will be applied when a case is relatively easy and/ or when there is no time, are also described. An example of procurement schedule obtained in the on-site survey had adopted a middle procedure. The table 2-2-29 shows this Project's tentative schedule, which will be officially approved by Bids and Award Committee (BAC).

Table 2-2-27 Duration for Expected Longest Procedure

Stage	Item	Due Date	Public Works	
			Budget for Contract 50M or less	Budget for Contract 50M or less
1	Announcement/ Invitation to Bid/ Request of Interest	At least 1 day/ 1 company on newspapers, and 7 days on the internet	7 days	7 days
2	Qualification Check			
3	Issuance and Distribution of Tender Document	Throughout stage 1 to 5		
4	Pre-bid Conference	At least 12 days prior to stage 5	(1 day)	(1 day)
	Eligibility Request	At least 10 days prior to stage 5		
	Supplemental Bidding Notice	At least 7 days prior to stage 5		
5	Bidding (Submission and Receipt of the Estimates)	Within 50 or 65 days from stage 2 to 5	(Bid opening and check of eligibility: 1 day) 50 days	(Bid opening and check of eligibility: 1 day) 65 days
	Submission of Additional Conditions			
6	Evaluation of Bidding		5days	7days
7	Notice for Negotiation		—	—
8	Negotiation		—	—
9	Post Qualification Check		30days	30days
10	Approval for Decision/ Issuance of Notice of Acceptance of an Order		4days	7days
11	Preparation for Contract and Signature		10days	10days
12	Approval by Upper Institutions		5days	15days
13	Issuance of Construction Notice		2days	3days
	Total		113days	144days

Table 2-2-28 Duration for Expected Shortest Procedure

Stage	Item	Due Date	Public Works
1	Announcement/ Invitation to Bid/ Request of Interest		(7days)
2	Qualification Check		
3	Issuance and Distribution of Tender Document	Throughout stage 1 to 5	
4	Pre-bid Conference	At least 12 days prior to stage 5	(1day)
	Eligibility Request	At least 10 days prior to stage 5	
	Supplemental Bidding Notice	At least 7 days prior to stage 5	
5	Bidding (Submission and Receipt of the Estimates)	The No. of days from stage 1 to 5 is 20	(Bid opening and check of eligibility : 1 day) 20 days
	Submission of Additional Conditions		
6	Evaluation of Bidding		1day
7	Notice for Negotiation		—
8	Negotiation		—
9	Post Qualification Check		1days
10	Approval for Decision/ Issuance of Notice of Acceptance of an Order		2days
11	Preparation for Contract and Signature		2days
12	Approval by Upper Institutions		1days
13	Issuance of Construction Notice		1days
	Total		28days

Table 2-2-29 Schedule of the Project

Stage	Item	Longest	Shortest	The Project (Tentative)
1	Announcement/ Invitation to Bid/ Request of Interest	7days	(7days)	7days
2	Qualification Check			
3	Issuance and Distribution of Tender Document			
4	Pre-bid Conference	(1day)	(1day)	(1day)
	Eligibility Request			
	Supplemental Bidding Notice			
5	Bidding (Submission and Receipt of the Estimates)	(Bid opening and check of eligibility : 1 day) 50 days	(Bid opening and check of eligibility : 1 day) 20 days	30days
	Submission of Additional Conditions			
6	Evaluation of Bidding	5days	1days	5days
7	Notice for Negotiation	—	—	—
8	Negotiation	—	—	—
9	Post Qualification Check	30days	1days	10days
10	Approval for Decision/ Issuance of Notice of Acceptance of an Order	4days	2days	4days
11	Preparation for Contract and Signature	10days	2days	10days
12	Approval by Upper Institutions	5days	1day	5days

Stage	Item	Longest	Shortest	The Project (Tentative)
13	Issuance of Construction Notice	2days	1day	2days
	Total	113days	28days	73days

(5) Roles of Procurement Agency and Consultants

1) Role of Procurement Agency

A procurement agency shall provide procurement services on behalf of the Philippine Government. Main roles are as follows

- Administration of the Funds
- Preparation of tender and evaluation, while considering how to do them
- Conclusion of contracts with service providers (Consultant, Contractors)
- Supervision of construction works through consultant
- Payment to service providers (they will be paid on the piece, based on BOQ agreement.)
- Progress management of the Project

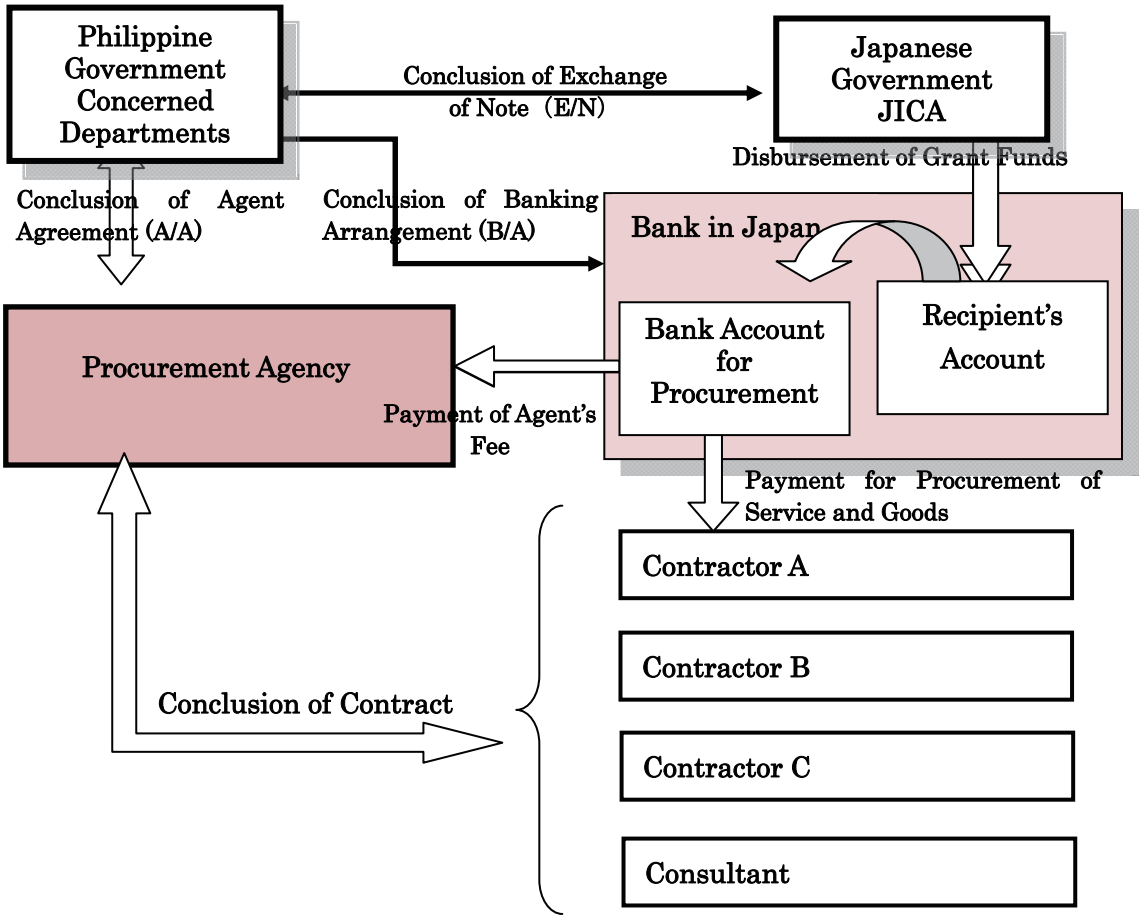


Figure 2-2-17 Relationship between a Procurement Agency and DA

The procurement agency shall manage the funds following the process below.

① After Philippine Government (Department of Finance / Department of Foreign Affairs) signs E / N and G / A, the Philippine Government opens a bank account in the Bank in Japan, and receives the funds.

② Department of Agriculture (DA) concludes the agreement on A / A (Agency Agreement) with a procurement agency, and grants permissions to the agency.

③ With consent of the Philippine Government, the procurement agency transfers the Grant Funds to a bank account opened by the procurement agency.

Bumbaran and Datu Paglas can be under the control of DA of the new governmental body after its establishment. In such case, MoU will be concluded among those who are concerned.

2) Roles of Procurement Agency and Consultant

The following table shows the work sharing. The table abstracts procurement agency's workloads and depicts what consultants are going to do in each stage.

Table 2-2-30 Work Sharing

Stage	Procurement Agency	Consultants	Remarks
Agent Agreement (AA)	◎		
Blanket Disbursement Authorization(BDA)	△		
Fund allocation	○		
Fund transfer	◎		
Environmental approval	△	○ ・In formulating a project brief, instruct municipalities. ・When the submitted project brief needs revising to add information, consultants help municipalities and promote DENR's approval.	
Land acquisition & community(s)'consensus	△	○ Promote municipalities' survey (including borrowed estates such as construction yards)	
Authorization of Design(s)	○	◎ Explain relevant materials to municipalities and the central government.	
Approval of tender documents (incl. specs)	○	◎ Explain relevant materials to municipalities and the central government.	
Bidding process	◎	○ Help procurement agency in procedure and implementation of bids.	
Evaluation approval	○	○ Help procurement agency in evaluation	
Contracting	◎		
Construction works & delivery	◎		
Progress supervision	◎	◎ Implement on-site construction supervision and arrange items relevant to the work plan, quality, and security.	Procurement agency assigns the Japanese consultant to supervise the works.
Monitor of the Works	○	○ Regarding monthly management of the work plan, assist the target municipalities to report progress of work.	Recipient monitors the works based on the progress reports and takes necessary measures.

Stage	Procurement Agency	Consultants	Remarks
Payment	◎	○ Arrange monthly yields through the above monitoring.	To consultant, contractors, suppliers and procurement agency.
Variation	◎	◎ Consider changes in design, if necessary.	
Certifying the Completion of Work	○	◎ Grasp and arrange each lot's yields.	Procurement agency assigns the Japanese consultant to check the completion of the works.
Certifying the Completion of DLP**	○	◎ Implement defect inspections. In inspections, notify relevant parties such as provinces and arrange items to be inspected.	Procurement agency assigns the Japanese consultant to check the completion of Defect.
Use of Remaining amount	○	◎ ・If there is a residual budget, decide the other target sites as the residual budget permits. ・In deciding the target sites, confirm the target components through discussions with municipalities and on-site surveys.	

◎ Parties concerned
○ Parties to be consulted or to receive documents (to confirm, agree, review, approval, and etc)
△ Parties to share information
Procurement & implementation stage

2-2-4-3. Scope of Works

The division of workloads is shown in the following table.

Table 2-2-31 Division of Workloads

Japan's Workloads	The Philippines' Workloads
Road Development : Suite	【Sites for construction】 The Government of Philippines assures construction sites by acquiring necessary sites for this project.
	【Exemption of value-added taxes】Domestic taxes such as customs and value added taxes that are imposed on products and services provided for this Project will be exempted. Or, responsible institutions will pay them instead of Japanese companies, corporations, and individuals.
	【Notification of Bank Agreement and Blanket Disbursement Authorization (BDA), and Payment of Service Charge】 The Philippines conclude the bank agreement, notify issuance of BDA, and pay for the service charges so as to make payment to Japanese procurement agencies.
	【Provision of Convenience for entry into and stay at the Philippines for the sake of Japanese Companies, Corporations, and Individuals】 The Philippines provide necessary conveniences for entry into and stay at the Philippines to this Project's relevant individuals and corporations, based on Procurement Agency Agreement and contracts between the Philippines and procurement agencies.
	【Proper Use of Facilities】 The Philippines properly use and maintain facilities procured through this Grant Aid Project for the Philippines.

2-2-4-4. Consultant Supervision

Regarding construction supervision, each lot has a Japanese engineer as construction supervisor so as to secure a certain quality, because the target sites are far from each other. 1 Japanese engineer shall grasp a whole Project, share and arrange information about supervision situations on each lot, hold regular monthly meetings with other engineers including local consultants to share information in order to secure a certain quality and work processes.

The necessary number of Japanese engineers is as follows.

a) Each lot has a Japanese engineer since the sites are distant from each other.
b) They will attend meetings (Monday morning) about construction companies and work details at least once a week.
c) Main Japanese engineers shall discuss progress in each site and issues once a month to secure a certain quality at all sites.

Based on the above mentioned, the following structure was adopted (see figure 2-2-18). The structure of construction supervision was fixed like below while taking into consideration

a) Each lot has a Japanese engineer for construction supervising.
b) Of the above mentioned Japanese engineers, one shall be responsible for management of overall quality and work processes.
c) Local engineers will be deployed as below and assist Japanese engineers.

    2 construction supervising engineers (road and structure) at each site: 6 engineers
    An engineer or clerk assisting overall work at each site: 3 staffs

Supervising implementing structure is shown below.

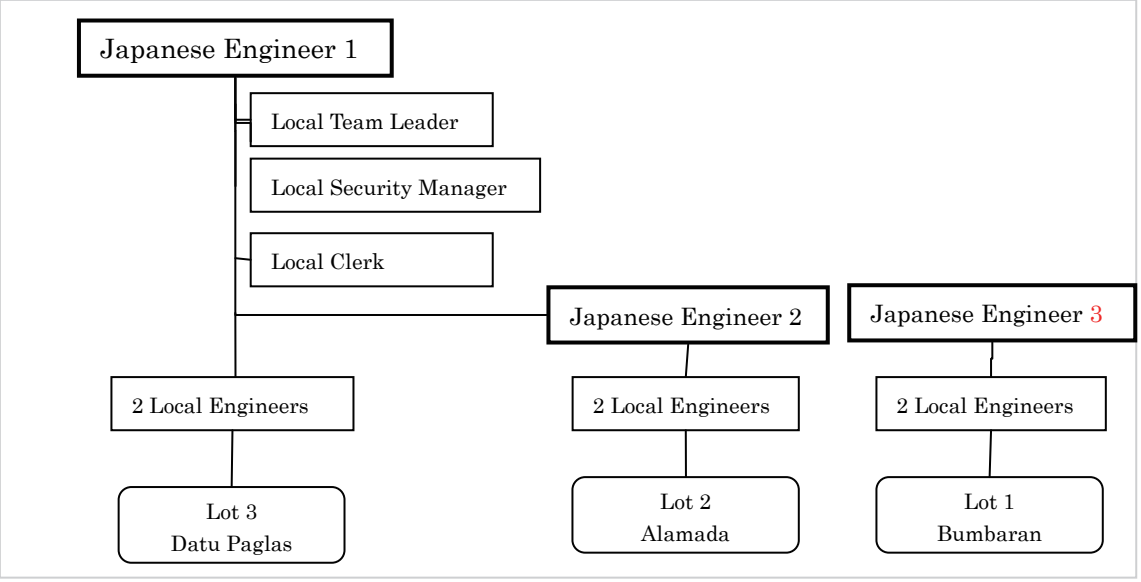


Figure 2-2-18 Implementing Structure

2-2-4-5. Quality Control Plan

Japanese Engineers shall be properly deployed and they will supervise construction while instructing local engineers to complete the works by local contractors on time. The following are points for smooth progress of the works.

(1) Japanese engineers will formulate a manual indicating key points in construction supervision of this Project. They will teach local engineers how to use the manual so that they understand and follow the key points.

(2) Before Construction

Japanese engineers shall review the overall construction management plan (including detailed work processes, deployment of engineers, procurement of construction materials, and inventory control) made by contractors and instruct about revision of plans and effective use.

(3) During Construction

Japanese and local engineers shall supervise and instruct about the following points.

1) Monitor management capacity and technological abilities of chiefs managing several construction sites, and instruct on practical measures of management
2) Check contractors' capacity for quality control of basic materials (e.g. material reservation, slump test, concrete proportioning, mortar mixture, water-cement ratio) and their technological level of each type of work, and instruct on how to improve them.
3) Check inventory control of materials and instruct how to improve it.
4) Hold regular meetings with contractors so that smooth communication and quick detection and resolution of issues are realized.

2-2-4-6. Procurement Plan

Although materials necessary for the construction include imported materials such as steel, delay of construction in terms of procurement is unlikely, since these materials are available in the Philippines at any time.

2-2-4-7. Operational Guidance Plan

As this Project is for development of roads and appurtenances, no operational guidance is necessary.

2-2-4-8. Soft Component Plan

(1) Background

This project will develop FMR from target barangays to the national road to secure annual traffic volume. It will also install bridges and box culverts for the river crossing and drainage structures.

The target areas of this project have been affected by 40 year-long armed conflict. Due to this, the poverty ratio is relatively high and the area faces lack of basic social services and deterioration of infrastructure. This project attempts to enhance agricultural development, job creation, and livelihood improvement of people by constructing/ rehabilitating FMR. Finally, the Project is expected to enhance resilience of the local community not to plunge into conflict again.

Most of the existing FMRs are unsurfaced gravel roads, which results in poor travel performance of the roads due to rainfall. In addition, gravel roads are required to do more frequent regular maintenance activity. The Government of the Philippines, therefore, recommends concreting pavement to reduce the frequency of maintenance activities.

Although introduction of concrete pavement leads to strength of surface and reduction of frequency of maintenance activities, it is still important to do road maintenance activity periodically. Barangay chiefs and municipal officers are the main counterparts in supporting routine operation and maintenance of FMR, supervised by DA regional office and central government. In order to do this, it is required to establish implementing structure for operation and maintenance, and create system to enhance capacity building of officials concerned.

BDA, responsible for socio-economic wing of MILF, is an important counterpart in this project. However, there are few specialized civil engineers and local officials with sufficient experiences, compared to the size of jurisdiction they are going to cover. In other words, the number of professionals who can devote themselves to development administration is not enough at all. As Bangsamoro government will be established in 2 years, it is urgent for them to be trained in the field of civil engineering. On the other hand, although establishment of Bangsamoro is basically welcomed by Muslim people in the target areas, the role and the significance of BDA have not been widely recognized yet. So, the Project includes special considerations on relationships among residents, municipalities/ barangays, and BDA.

Based on the background mentioned above, challenges in implementing the Project are summarized as follows;

a) Administrative capacity of LGU is weak.
b) Low level basic techniques on operation and maintenance activities at municipality and community levels
c) No culture of daily maintenance activities among residents
d) Necessity for coordination of stakeholders (Bangsamoro Transition Commission, BDA, municipalities and barangays)
e) Necessity for the capacity building of BDA
f) Necessity for the monitoring of operation and maintenance from the viewpoint of road administrative capacity development and peace-building to trace the change in the relationships among stakeholders

(2) Objective of Soft Component

With regard to the operation and maintenance activity of existing FMR, the Project will formulate soft component plan, aiming that implementing structure for operation and maintenance shall be established and necessary knowledge will be acquired for the maintenance of improved FMR, in order to realize sustainable operation and maintenance.

(3) Achievement of the Soft Component

In order to achieve objective mentioned above, the Project will attempt "capacity development in the operation and maintenance activity of FMRs", so that barangays, municipalities, DA Regional Offices, and BDA comprehend their role and perform their duties in maintenance activity.

(4) Confirmation of the Achievement

Achievement of this soft component shall be confirmed through (1) Memorandum of Agreement on the operation and maintenance by municipalities and barangays, main actors of the operation and maintenance of the road, (2) frequency of operation and maintenance activities, questionnaire on the level of understanding on the maintenance activities after the training and (3) activeness of FMR maintenance group.

(5) Activities of the Soft Component

Detailed activities of this soft component are shown in the table below.

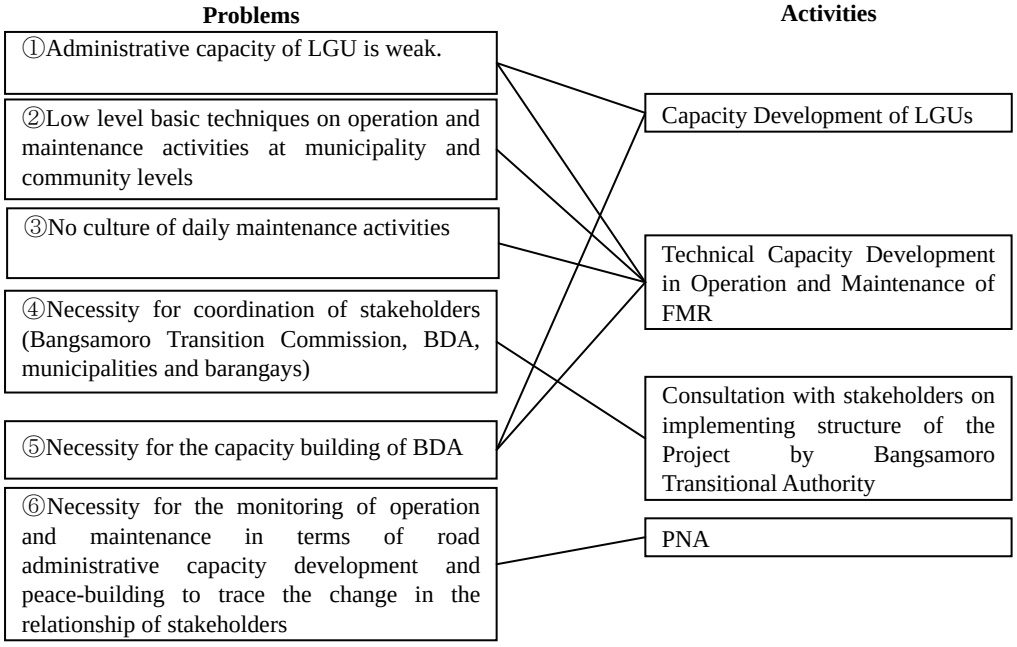


Figure 2-2-19 Correlation between the Challenges and Contents of Activities

Table 2-2-32 Contents of Activities

Items	Activities	Targets
1. Training to DA Regional Offices and DAF ARMM	(1) Briefing on contents of the soft component (2) Clarification of roles (3) Formulation of implementing schedule	Briefing with DA, DA regional office and DAF-ARMM
2. Capacity Development of Municipalities and barangays	(1) Confirmation of the training activities ・Briefing on significance of concreting pavement of FMR and the contents of training (2) Workshop on the Operation and Maintenance ・DA and DAF ARMM will convene workshop to explain operation and maintenance for municipalities and barangays ・To clarify mandate in the operation and maintenance according to the expected roles ・To enable municipalities to plan and demand budget for urgent and large-scale maintenance	(Implementers) ・DA, DA Regional Office XII, and DAF-ARMM (Targets) ・Municipality officials ・Barangay representatives ・BDA officials
	(3) Development of draft of operation and maintenance structure ・ To consider feasible operation and maintenance implementing structure (including central government) according to the roles mentioned above	
3. Training on establishing structure and acquiring techniques in operation and maintenance	(1) Establishment of road maintenance groups ・Explanation on FMR that is important as a property of residents and introduction of the good practices (e.g. planting and small cooperative shops along roads) ・Briefing on the content, system, role and importance of operation and maintenance to the target barangay residents. ・ Materialization of the contents of operation and maintenance and organization of maintenance groups ・Development of bylaw	(Implementers) ・Municipality officers under the instruction of DA, DA Regional Office XII, and DAF-ARMM (Targets) ・Barangay residents ・BDA officials
	(2) Training on the Operation and Maintenance Activities ・ On the Job Training on the cleaning and minor maintenance that residents along the proposed FMR are expected to do. Training on periodical daily maintenance and emergent fixing. ・Confirmation of the check points and procedure to report to municipalities	
	(3) Development of Manuals ・Development of operation and maintenance manual(s) for daily and urgent maintenance activities, checkpoints and reporting	(Targets) ・ Municipality, barangay representatives and BDA officials under the instruction of DA, DA Regional Office XII, and DAF-ARMM
4. Coordination with the stakeholders in forming implementing structure with BTA	(1) Preparation for the trainings ・Briefing with BDA central office, BDA local office, and MILF in 3 municipalities. Coordination among BDA and the municipalities	(Implementers) ・Consultants (Targets) ・DA, DA Regional Office XII, and DAF-ARMM, MILF Officials, and Municipality, barangay representatives
5. Consideration on conflict prevention	(1) Monitoring ・Monitoring operation and maintenance trainings and activities and the rate of participation of residents in the 3	(Implementer) Consultant

Items	Activities	Targets
	municipalities ・Analysis on the problems faced during the Project and lessons learned	

(6) Procurement of Resources for Soft Component

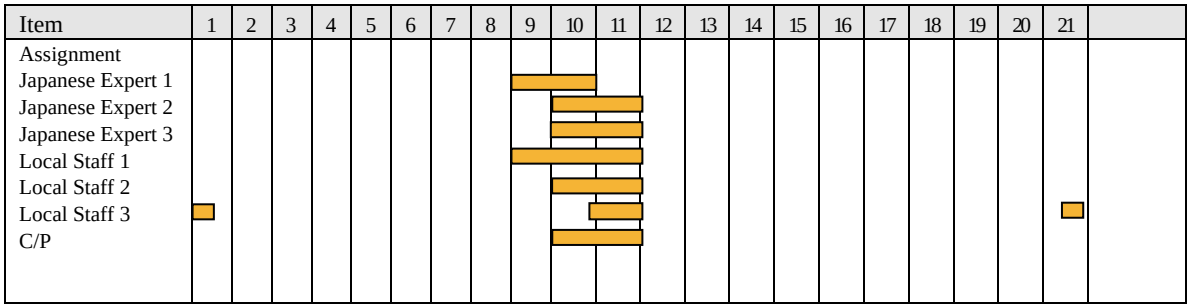
Although municipalities and barangays are mainly responsible for the maintenance activities, not only local governmental unit but also central government should recognize the roles in operation and maintenance of FMR, as it recommends concreting pavement. Therefore, this soft component shall use local human resources from the Government of Philippines. In providing training for municipalities, managerial organizations of barangay officials who are local instructor for daily maintenance activities, officers from DA and its regional offices will provide training courses in cooperation with Japanese experts.

(7) Implementing Schedule for Soft Component

Soft component will be implemented at the timing when the road and bridges is being constructed, as it is vital for trainers to learn how to do maintenance activities with actual facilities. Trainings shall be given in Datu Paglas, convening those who are concerned from Alamada and Bumbaran as well.

Table 2-2-33 Schedule for Soft Component Activities and Assignment of Experts and Local Staffs

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
Schedule of the Works Execution period																						Grant offered
Bridge 1																						
1. Training to DA Regional Offices and DAF ARMM																						
2.Capacity Development of Municipalities and barangays																						
3.Training on establishing structure and acquiring techniques in operation and maintenance																						
4. Coordination with the stakeholders in forming implementing structure with BTA																						
5. Monitoring of the activities																						



Japanese Expert 1: Organization Reinforcement/ Coordination of Authorities Concerned
Japanese Expert 2: Social Survey/ PNA
Japanese Expert 3: Operation and Maintenance (FMR and bridge)
Local Staff 1(Local Consultant): Training and Human Development
Local Staff 2(Local Consultant): Road and Bridge Engineer
Local Staff 3(Local Consultant): Social Survey
Counter Part (C/P): including DA Regional Office and BDA

(8) Output of the Soft Component

As an output of the soft component, the project team will organize soft component completion report and manuals on operation and maintenance. In formulating the manuals, the Project will include C/P, municipalities, barangays and other stakeholders, so as to develop independence.

(9) Responsibility of the Philippines Side

It is imperative to maintain FMR in order to use it sustainably. This soft component targets at municipalities and barangays and attempts to develop capacity of local officials in the maintenance and management of FMR through training activities. In order to secure sustainability of the maintenance system and to maintain other FMRs other than the ones in the Project, DA and its regional offices are responsible for supervising and assisting municipalities. Counterparts (including DAF ARMM and DA Regional Office), will be in charge of the contents of training to municipalities and barangays.

2-2-4-9. Implementation Schedule

(1) Implementation Schedule

Construction period shall reflect rainy days. As the proposed FMR will be paved by concrete, it is feasible to continue construction even in the rainy season[2], according to the interview from local contractors. On the other hand, construction of river-crossing structures will avoid the rainy season as it uses support; consequently, the schedule of construction of them will include at least 1 dry season. 1 dry season is needed for Bumbaran and Alamada, 2 dry seasons for Datu Paglas.

Basic ideas in construction works are shown below.

[2] Rainy Season: May-October, Dry Season: November-April

1) Bumbaran

1. The Project trims trees, remove routes, and level road surface to secure traffic of vehicles.
2. Construction work shall be implemented from both the starting point and the end point of the proposed FMR.
3. Soon after the roads for construction arrived at the planned location for the structure, construction shall start.

2) Alamada

1. The Project will rehabilitate 2 separate sites of a FMR. Geologically, river sediment can be easily found around this area and some deteriorated drainage pipes are found.
2. Construction work shall be launched in 2 sites (6km and 2km) at the same time. Accesses to the sites will be secured through temporary roads made of gravel carried through shallow parts of the Libungan River in the dry season. Although access road to the national road is available in the south of the proposed site, it is suitable only for carrying small construction equipments.

3) Datu Paglas

1. It is difficult to complete construction works with 1 dry season, considering the length of the proposed FMR (approximately 9km). The Project will install tentative drainage in parallel with tree trimming and removing roots of trees.

2. Given that there will be new road construction, roads for construction which will be installed prior to the main works will be part of completed FMR. Soon after the roads for construction reached the location for a structure, works for the structure shall begin.
3. Temporary bridges and bypath roads will be constructed prior to the main bridge construction.

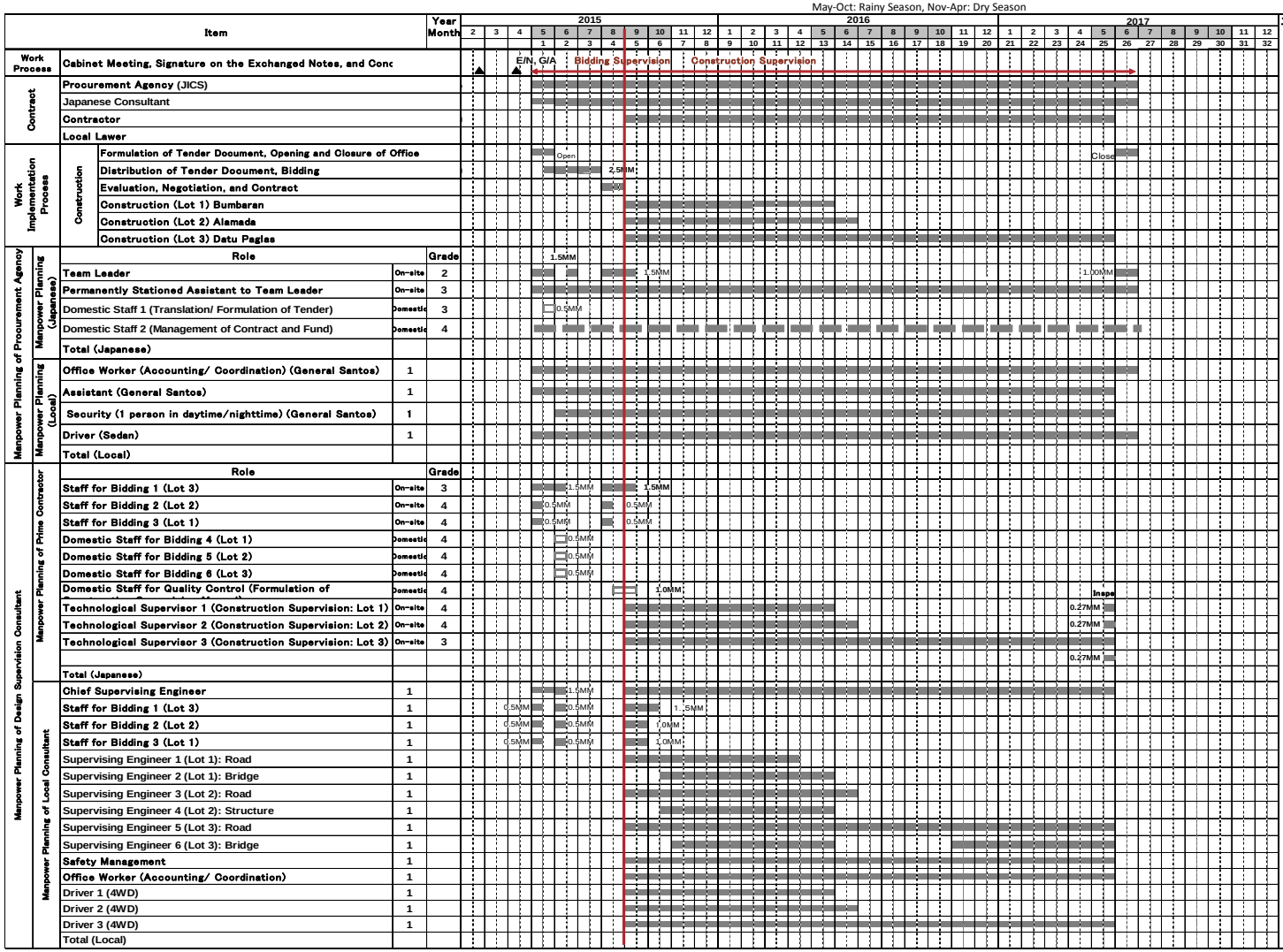
Table 2-2-34 Work Implementation Process

Work Implementation Process (Civil Engineering Project)

Country: The Republic of the Philippines

Project Title: THE PREPARATORY SURVEY ON THE PROJECT FOR ROADS IMPROVEMENT IN BANGSAMORO FOR INCLUSIVE REGIONAL DEVELOPMENT IN THE REPUBLIC OF THE PHILIPPINES

May-Oct: Rainy Season, Nov-Apr: Dry Season



Outline of the Work
- Span of the Roads : 22km (Concrete Pavement)
  Lot 1 (Bumbaran) 4.7km, Lot 2 (Alamada) 8.6km, Lot 3 (Datu Paglas) 8.7km
- River-crossing Structure
  Lot 1: 1 Bridge, 1 Box Culvert, 1 Spillway
  Lot 2: 0 Bridge, 4 Box Culverts
  Lot 3: 4 Bridges、2 Box Culverts

Table of Person-Months

Item		Grade	Table of Person-Months: Domestic M/M	Table of Person-Months: On-site M/M	Table of Person-Months: On-site No. of Flight	Table of Person-Months: Total M/M	Detail: Bidding Supervision M/M	Detail: Construction Supervision M/M
Work Process: Cabinet Meeting, Signature on the Exchanged Notes, and Conc								
Contract: Procurement Agency (JICS)								
Contract: Japanese Consultant								
Contract: Contractor								
Contract: Local Lawer								
Work Implementation Process: Construction: Formulation of Tender Document, Opening and Closure of Office								
Work Implementation Process: Construction: Distribution of Tender Document, Bidding								
Work Implementation Process: Construction: Evaluation, Negotiation, and Contract								
Work Implementation Process: Construction: Construction (Lot 1) Bumbaran								
Work Implementation Process: Construction: Construction (Lot 2) Alamada								
Work Implementation Process: Construction: Construction (Lot 3) Datu Paglas								
Manpower Planning of Procurement Agency: Manpower Planning (Japanese): Role		Grade						
Team Leader	On-site	2	0.00	4.00	4.00	4.00	3.00	1.00
Permanently Stationed Assistant to Team Leader	On-site	3	0.00	26.00	2.00	26.00	4.00	22.00
Domestic Staff 1 (Translation/ Formulation of Tender)	Domestic	3	0.50	0.00	0.00	0.50	0.50	0.00
Domestic Staff 2 (Management of Contract and Fund)	Domestic	4	4.33	0.00	0.00	4.33	0.67	3.66
Total (Japanese)			4.83	30.00	6.00	34.83	8.17	26.66
Manpower Planning (Local)								
Office Worker (Accounting/ Coordination) (General Santos)		1	0.00	26.00	0.00	26.00	4.00	22.00
Assistant (General Santos)		1	0.00	25.00	0.00	25.00	4.00	21.00
Security (1 person in daytime/nighttime) (General Santos)		1	0.00	24.00	0.00	24.00	3.00	21.00
Driver (Sedan)		1	0.00	26.00	0.00	26.00	4.00	22.00
Total (Local)			0.00	101.00	0.00	101.00	15.00	86.00
Manpower Planning of Design Supervision Consultant: Manpower Planning of Prime Contractor: Role		Grade						
Staff for Bidding 1 (Lot 3)	On-site	3	0.00	3.00	2.00	3.00	3.00	0.00
Staff for Bidding 2 (Lot 2)	On-site	4	0.00	1.00	2.00	1.00	1.00	0.00
Staff for Bidding 3 (Lot 1)	On-site	4	0.00	1.00	2.00	1.00	1.00	0.00
Domestic Staff for Bidding 4 (Lot 1)	Domestic	4	0.50	0.00	0.00	0.50	0.50	0.00
Domestic Staff for Bidding 5 (Lot 2)	Domestic	4	0.50	0.00	0.00	0.50	0.50	0.00
Domestic Staff for Bidding 6 (Lot 3)	Domestic	4	0.50	0.00	0.00	0.50	0.50	0.00
Domestic Staff for Quality Control (Formulation of	Domestic	4	1.00	0.00	0.00	1.00	0.00	1.00
Technological Supervisor 1 (Construction Supervision: Lot 1)	On-site	4	0.00	9.27	2.00	9.27	0.00	9.27
Technological Supervisor 2 (Construction Supervision: Lot 2)	On-site	4	0.00	10.27	2.00	10.27	0.00	10.27
Technological Supervisor 3 (Construction Supervision: Lot 3)	On-site	3	0.00	21.27	3.00	21.27	0.00	21.27
Total (Japanese)			2.50	45.81	13.00	48.31	6.50	41.81
Manpower Planning of Local Consultant: Chief Supervising Engineer		1	0.00	22.50	0.00	22.50	1.50	21.00
Staff for Bidding 1 (Lot 3)		1	0.00	2.50	0.00	2.50	2.50	0.00
Staff for Bidding 2 (Lot 2)		1	0.00	2.00	0.00	2.00	2.00	0.00
Staff for Bidding 3 (Lot 1)		1	0.00	2.00	0.00	2.00	2.00	0.00
Supervising Engineer 1 (Lot 1): Road		1	0.00	7.50	0.00	7.50	0.00	7.50
Supervising Engineer 2 (Lot 1): Bridge		1	0.00	7.50	0.00	7.50	0.00	7.50
Supervising Engineer 3 (Lot 2): Road		1	0.00	10.00	0.00	10.00	0.00	10.00
Supervising Engineer 4 (Lot 2): Structure		1	0.00	7.50	0.00	7.50	0.00	7.50
Supervising Engineer 5 (Lot 3): Road		1	0.00	21.00	0.00	21.00	0.00	21.00
Supervising Engineer 6 (Lot 3): Bridge		1	0.00	14.00	0.00	14.00	0.00	14.00
Safety Management		1	0.00	21.00	0.00	21.00	0.00	21.00
Office Worker (Accounting/ Coordination)		1	0.00	21.00	0.00	21.00	0.00	21.00
Driver 1 (4WD)		1	0.00	9.00	0.00	9.00	0.00	9.00
Driver 2 (4WD)		1	0.00	10.00	0.00	10.00	0.00	10.00
Driver 3 (4WD)		1	0.00	21.00	0.00	21.00	0.00	21.00
Total (Local)			0.00	178.50	0.00	178.50	8.00	170.50

2-3. Obligation of Recipient Country

The following table shows the obligation of the Government of the Philippines to smoothly implement this project.

Table 2-3-1 The Philippines Obligation

	Items	Details
1	Preparation of necessary sites	The Government of Philippines assures construction sites by acquiring necessary sites for the Project.
2	Exemption of taxes in procurement of construction materials	Customs, customs clearance fee, and value added taxes that are imposed on products and services provided for this project will be exempted. Or, responsible institutions will pay them instead of Japanese companies, corporations, and individuals.
3	Exemption of taxes for Japanese and/ or other counties' companies, corporations, and individuals	Domestic taxes such as customs and value added taxes that are imposed on products and services provided for this Project will be exempted. Or, responsible institutions will pay them instead of Japanese and/ or other countries' companies, corporations, and individuals.
4	Provision of conveniences for entry into and stay at the Philippines to Japanese and/ or other counties' companies, corporations, and individuals	The Philippines provide necessary conveniences for entry into and stay at the Philippines to this Project's relevant individuals and corporations, based on Procurement Agency Agreement and contracts between the Philippines and procurement agencies.
5	Proper use of facilities	The Philippines properly use and maintain facilities and materials procured through this Grant Aid Project for the Philippines.
6	Payment of necessary expenses other than the Grant Aid	The Philippines pay expenditures (including VAT) other than expenses covered in this Project.
7	Notification of Bank Agreement and Blanket Disbursement Authorization (BDA), and Payment of Service Charge and VAT	The Philippines conclude the Bank Agreement, notify issuance of the Blanket Disbursement Authorization, and pay for the service charges and VAT so as to make payments to Japanese procurement agencies.
8	Environmental assessment	Following the Philippines' standards, implement environmental assessment that satisfies EMB, if necessary.
9	Securing budget	The Philippines secure budget essential for the above mentioned preparation of sites, bank charges, provision of conveniences, and tax exemptions and so on.

Of the items above, "1, Preparation of necessary sites" is as follows.

No resettlement of residents involved in the development of the roads. Basically, there will not be new land acquisition of site other than Datu Paglas, as the works are rehabilitation of the existing roads in the other 2 sites.

2-4. Project Operation Plan

Municipalities are supposed to manage and maintain FMR and municipality/ barangay roads alike, and they will allocate budget for development (approximately 20% of the whole budget) for it. When it comes to new development, they will submit proposals to the departments

relevant to road development (e.g. DPWH, DA, and DAR) to ask them to secure budget. The following is each municipality's budget for roads.

Table 2-4-1 Each Municipality's Budget for Road Development and Maintenance

Item	2012	2013	2014	2015	2016
Bumbaran					
Budget for Road Construction	N/A	14,162,244	11,329,795	12,037,907	12,746,019
Budget for Road Maintenance	N/A	9,205,458	6,231,387	6,620,849	7,010,310
Alamada					
Budget for Road Construction	12,946,268	19,995,000	12,546,462	11,310,000	To be confirmed
Budget for Road Maintenance	11,926,268	8,685,000	5,700,000	7,460,000	To be confirmed
Datu Paglas					
Budget for Road Construction	5,289,248	16,313,929	3,000,000	2,500,000	1,500,000
Budget for Road Maintenance	6,843,982	5,743,685	4,500,000	3,000,000	2,000,000

Source: Interviews with municipalities

The reason why maintenance budget of Datu Paglas tends to decrease is that a municipality's policy of shifting the maintenance body to barangays was reflected. At the time of project implementation, responsibilities on maintenance of both municipality and barangays will be clarified. It is supposed to provide assist through the soft component to ensure the budget required for maintenance.

There are 3 types of road maintenance according to the timing to be implemented, and different bodies are in charge of the 3 cases. Barangays themselves mow grasses along roads, which is the lightest job.

Table 2-4-2 Details of Maintenance

	Contents of Maintenance	Implementing Body
1. Daily Light Works throughout a Year (Daily Maintenance)	・Lawn mowing of shoulders and surfaces of roads ・Removal of sediments of drainage facilities ・Cleaning up of surfaces of pavements, Etc.	①Relevant barangays shall implement when necessary.
2. Light Rehabilitation Works with Materials (Periodical Maintenance)	・Rehabilitate locally eroded shoulders and surfaces of roads by using gravel. ・Light rehabilitation of concretes	②Relevant barangays shall implement while relevant municipalities pay development expenses.
3. Urgent Rehabilitation Works with Materials (Light Rehabilitation)	・Rehabilitation of concreted structure ・A change of concrete pavement	③A relevant municipality, as an implementing body, either directly implement the tasks or entrusts agents with them

According to interviews with DA, the maintenance expenses for concrete-paved roads and

graveled roads are as follows.

・Concrete-paved Roads: PhP 75,000 per km

・Graveled Roads: PhP 100,000 per km

Although an expenditure per work for a concrete road can be expensive when they involve rehabilitation works, maintenance expenses for graveled roads will eventually be more expensive because graveled roads need maintaining more often than concrete roads.

2-5. Project Cost Estimation

2-5-1. Initial Cost Estimation

According to estimation condition indicated below, the expenditures of Philippines are as follows. This amount, however, does not indicate a limit of Grant on the Exchange of Notes.

(1) Philippines Side's Cost

The Philippines is responsible for payment for counterparts' travel expenses/ allowances and bank service charges.

Table 2-5-1 The Philippines' Expenditure (million yen)

Item	The Philippines' Payment	Application
1) Value-added Tax	91.0	
2) Soft Component	1.0	
3) Bank Service Charge	1.0	0.1% of E/N
Total	93.0	

Rate: 1 Peso = 2.46 Yen

(2) Estimation Conditions

Estimation date: June 2014 (The month when site surveys finished)

Exchange rate: 1 US$=103.23 yen

1 Php=2.46 yen

Construction period: As shown in Work Implementation Process (Refer to table 2-2-34)

Estimate conditions: The guideline used in the Philippines was used.

2-5-2. Operation and Maintenance Cost

The daily maintenance, such as grass mowing along roads and removal of sediments of drainage facilities, will be implemented by residents around the target sites under the control of each barangay captains.

The target municipalities shall pay for regular maintenance and light rehabilitation works. The following table shows the details and expenses for expected maintenance.

Table 2-5-2 Annual Expenses for Regular Maintenance and Light Rehabilitation

Item	Bumbaran (4.7km)	Alamada (8.6km)	Datu Pagulas (8.7km)
①Patching of Concrete Pavement, Rehabilitation of Crack-Joint	27,870,000Php × (0.025km/ 4.7km) =148,000Php	39,673,000Php × (0.025km/ 8.6km) = 115,000Php	39,664,000Php × (0.025km/ 8.7km) =114,000Php
② Rehabilitation of Gutters	13,436,000Php × (0.025km/ 4.7km) = 71,000Php	20,228,000Php × (0.025km/ 8.6km) = 59,000Php	17,479,000Php × (0.025km/ 8.7km) =50,000Php
③ Rehabilitation of Eroded Parts	77,000Php × (0.025km/ 4.7km) =400Php	243,000Php × (0.025km/ 8.6km) =700Php	1,397,000Php × (0.025km/ 8.7km) =4,000Php
Total	Approx. 220,000Php	Approx. 175,000Php	Approx. 168,000Php
Whole Budget for Maintenance	6,620,000Php	7,460,000Php	3,000,000Php
Percentage of FMR Maintenance and Rehabilitation	3%	4%	10%

The above calculations assume that 25 m of each item will be rehabilitated every year, and (0.025km/ the span) × (each item's expense) was calculated. The frequency of maintenance needs using to estimate maintenance expenses while improving accuracy of values by gaining experiences at each municipality.