REPUBLIC DEMOCRATIC OF TIMOR LESTE
MINISTRY OF FINANCE
SOUTHERN COAST INFRASTRUCTURE DEVELOPMENT

CONSULTING SERVICES
FOR
PERLIMINARY, DETAIL DESIGN, ENVIRONMENT AND SOCIAL ECONOMIC ASSESSMENT FOR HIGHWAY ROADS
FROM SUAI TO BEACO

CONTRACT NO : 003.MPS/MED/SBH/XI/2010
DATE : 16 DECEMBER 2010

ENVIRONMENT IMPACT ASSESSMENT

12 OCTOBER 2011

PT VIRAMA KARYA ENGINEERING & MANAGEMENT CONSULTANT in association with MULTI ARCH, LDA

PROJECT LOCATION (source/reference: Ministry of Finance – MoF)

INTRODUCTION

OBJECTIVE:

The Government of Timor Leste wishes to Engage Consultant to carry out the Preliminary, Detailed Engineering Design and Environment Social Economic Assessment for Highway Road from Suai to Beaco for Southern Coast Infrastructure Development .

Highway Road Classification Project according TOR: **Expressway**

The Consultant using the AASTHO(Association of American State Highway and Transportation Official) specification :

- Design speed 100 km/hour
- Distance from Suai to Beaco:
  - Existing road 180 km
  - Design result 151.66 km (reduce 28.34 km)
- Traveling time from Suai to Beaco:
  - At this present more than 10 hour, when rainy season Delor River cannot passing
  - Design target less than 2 hour
- Design live : Pavement 20 years; Bridges 100 years
- Vehicle axle load:
  - Existing road 6 tone (under condition of maintained)
  - Design load 10 tone

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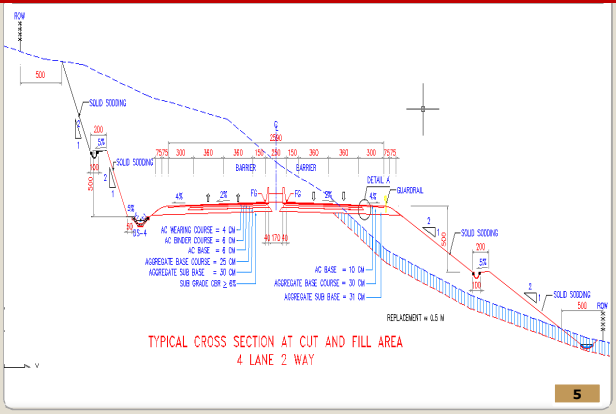
- Detailed Engineering Design work completed 20 September 2011
- **Summary work result :**
- Compiling data primary and secondary data's

1. Reconnaissance field survey and Book Report – 1 book
2. Inception Report and Route examining and presentation-1book
3. Geodetic field survey, analysis, drawing and Book Report Volume 1 to 3
4. Geotecnical field survey 76/1520 m deep bore hole, CPT 334 point and DCP 168 point, Lab. test, analysis, and Book Report Volume 1 to 5
5. Traffic Field survey, analysis and Report traffic and Road Economic-1book
6. Hydrology field survey, analysis and Hydrology Book Report- 1 book
7. Field survey and measurement air and noise, community socialization, Lab. Analysis soil, water and Book Report- 1 book
8. Preliminary Design Report-1 book
9. Structure Design calculation, analysis and Report- 31 books
10. Highway design calculation, analysis and Report-1 book
11. Drainage calculation, analysis and Report-1 book
12. Right Of Way Drawing-1 book
13. Design Drawing, 4 section – 4 books
14. Bidding Document-9 books
15. Field survey data, calculation, analysis and Construction Cost, Method and Schedule Report Book Volume1 to 3
16. Detailed Engineering Design, complete with Workshop presentation and Report- 1 book
17. Monthly Report- 1 to 8 books Report
18. Summary Report-1 book

Drawing & Report is 75 books x 6 copies totally 1 cargo box vehicle approx.>2ton weight

The Detailed Engineering Design Result already to be implemented

TYPICAL CROSS SECTION (MAIN ROAD)



TYPICAL CROSS SECTION AT CUT AND FILL AREA
4 LANE 2 WAY

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- **Based on the Expressway technical requirements and environmental considerations, the existing road are not eligible cause of :**
  - Too many horizontal and vertical to be re-alignment
  - The entire existing bridges are not eligible
  - Construction costs for the reconstruction of existing roads to expressway qualified will be greater than when new expressway construction
  - Many social problems that will arise because existing road too many through residential areas
  - Design speed 100 km / hr will not be achieved because a lot of past settlements that will be harmful to road users and residents in the settlements along the existing road.

Therefore require a new route expressway

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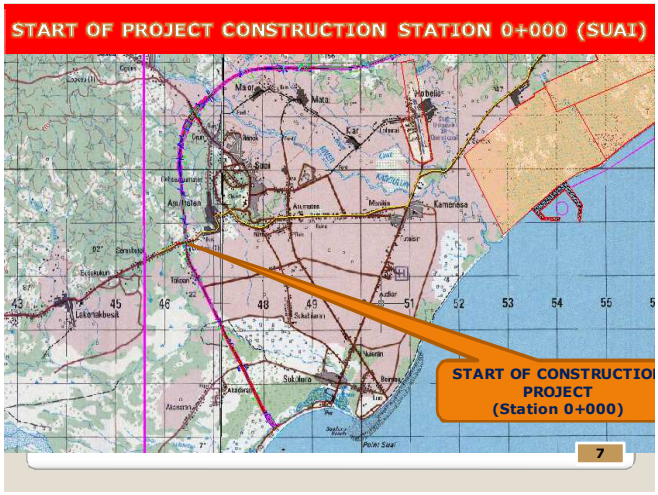
START OF PROJECT CONSTRUCTION STATION 0+000 (SUAI)
START OF CONSTRUCTIO
PROJECT
(Station 0+000)
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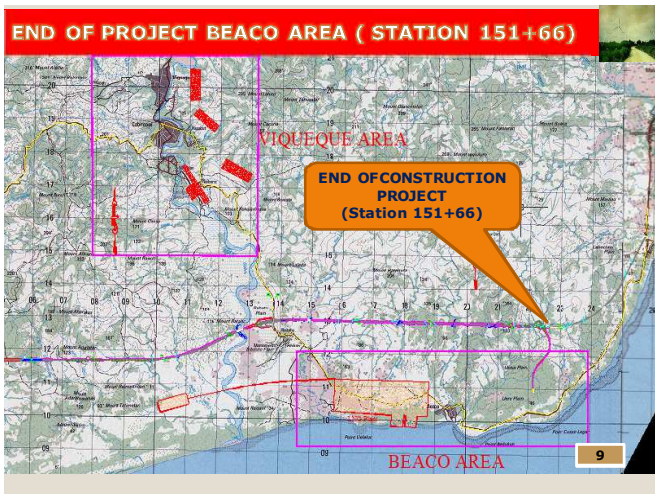
BETANO AREA (± STATION 65+000)
Nova Betano
BETANO AREA
(± Station 65+000)
8


END OF PROJECT BEACO AREA (STATION 151+66)
VIQUEQUE AREA
END OFCONSTRUCTION
PROJECT
(Station 151+66)
BEACO AREA
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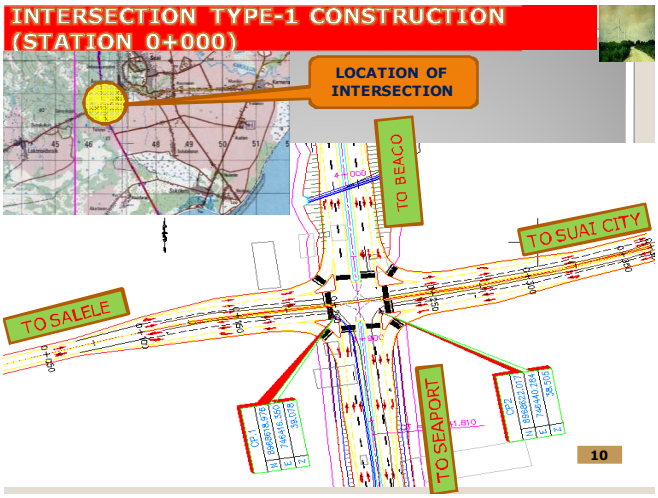
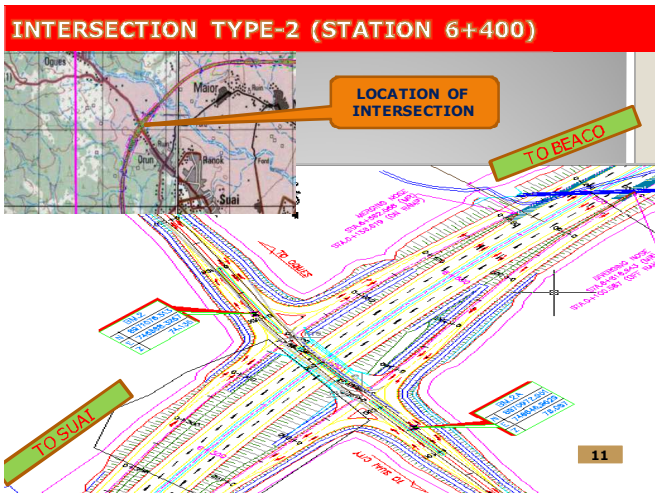
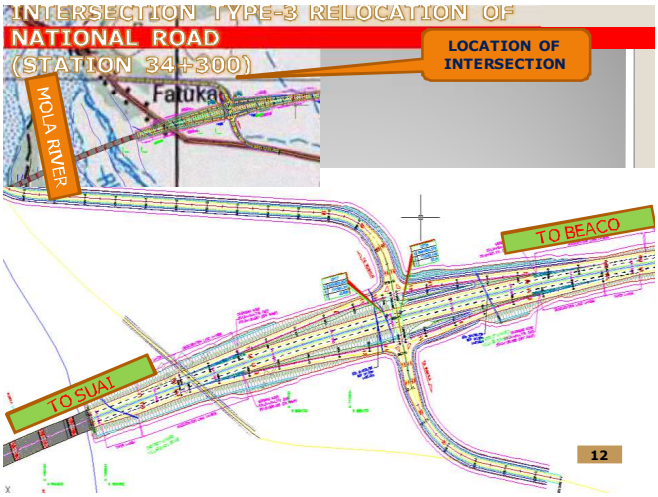

INTERSECTION TYPE-1 CONSTRUCTION (STATION 0+000)
LOCATION OF INTERSECTION
TO BEACO
TO SUAI CITY
TO SALELE
TO SEAPORT
10


INTERSECTION TYPE-2 (STATION 6+400)
LOCATION OF INTERSECTION
TO BEACO
TO SUAI
11


INTERSECTION TYPE-3 RELOCATION OF NATIONAL ROAD (STATION 34+300)
LOCATION OF INTERSECTION
MOLA RIVER
TO BEACO
TO SUAI
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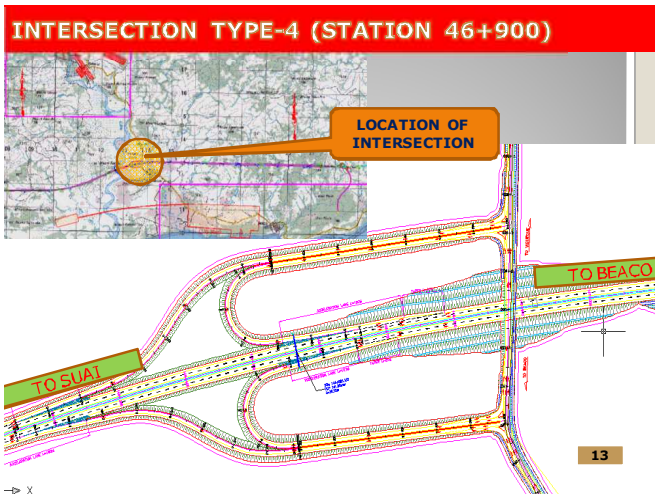

Concrete Bridge Elements :

1. Superstructure : Composite Prestressed Concrete I-Girder
2. Substructure : Concrete Pier and Wall Abutment
3. Foundation : Bored Pile D-80cm, D-120cm

Type of Substructures :

a. Type-1 Bridge : Cantilevered Pier for more than 4 spans bridges
b. Type-2 Bridge : Portal Pier for 4 spans bridges or less
c. Type-3 Bridge : Hollow Column Pier for tall piers

Maximum effective span 50 m

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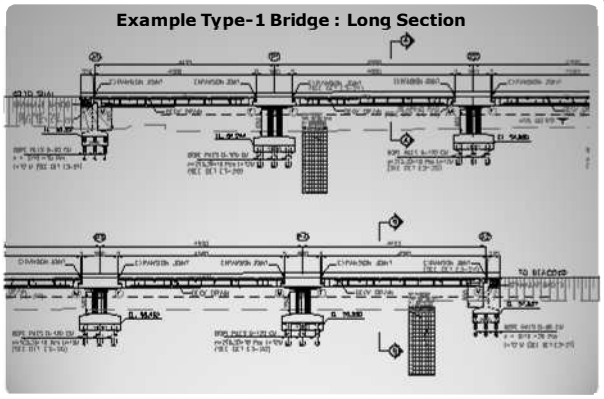
Example Type-1 Bridge : Long Section



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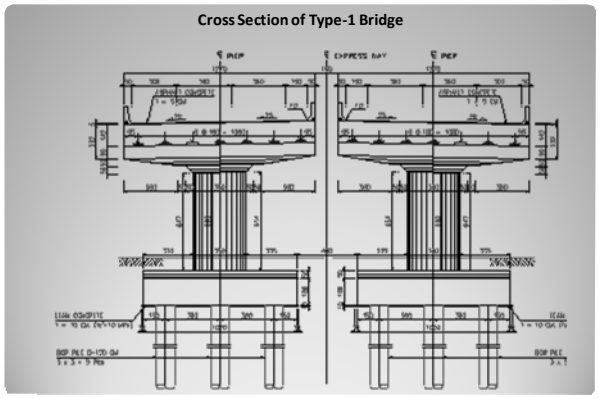
Cross Section of Type-1 Bridge



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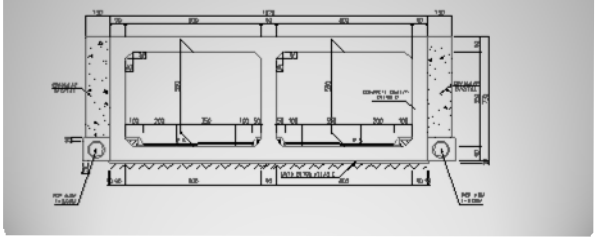
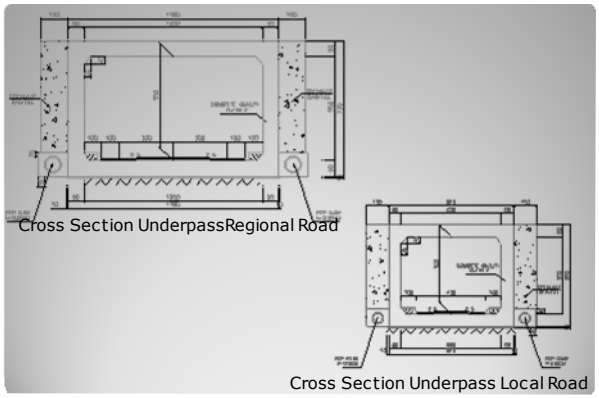
Cross Section Underpass National Road

Type of Culvert for Underpass :

1. National Road : 2x (8x5.5)
2. Regional Road : (10x5.5)
3. Local Road : 6.5x5)





List of Structures

NO	TYPE OF STRUCTURE	NO. OF STRUCTURE	MATERIAL	WIDE (M)	LENGTH (M)
1	RIVERBRIDGE TYPE 1	9	PPCI GIRDER	2 X 12.70	SPAN 25
2	RIVER BRIDGE TYPE 2	19	PPCI GIRDER	2 X 12.70	SPAN 25 TO 150
3	RIVER BRIDGE TYPE 3	2	PPCI GIRDER	2 X 12.70	SPAN 150 TO 700
4	BOX TUNEL UNDERPASS, NATIONAL ROAD CROSSING	10	CONCRETE	2 X 8	30
5	BOX TUNEL UNDERPASS, REGIONAL ROAD CROSSING	12	CONCRETE	10	30
6	BOX TUNEL UNDERPASS, LOCAL ROAD CROSSING	31	CONCRETE	6.50	30
7	BOX CULVERT DRAINAGE & PEDESTRIAN CROSSING	64	CONCRETE	2 TO 4	> 30

INTERSECTION / INTERCHANGE WITH ON AND OFF RAMP : 10 LOCATION
REST AREA/SERVICE AREA LOCATION: 2 LEFT SIDE, 2 RIGHT SIDE

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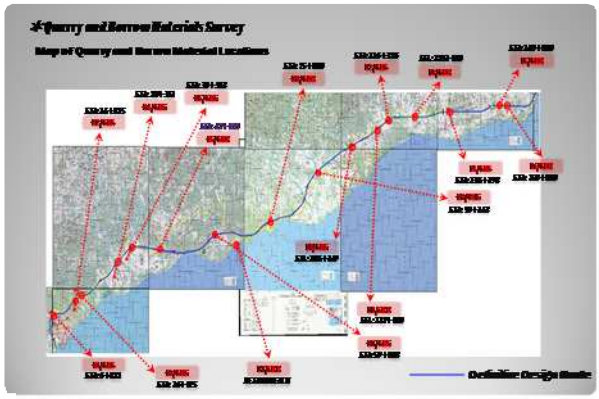

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ENVIRONMENT IMPACT ASSESSMENT

BACKGROUND AND RATIONALE FOR EIA:

1) SOCIO-ECONOMIC DEVELOPMENT DEPENDENT ON EFFICIENT ROAD TRANSPORT INFRASTRUCTURE;
2) DEVELOPMENT A NEW ROAD AND/OR IMPROVEMENT OF EXISTING FACILITIES HAVE POTENTIAL IMPACTS → POSITIVE AND NEGATIVE;
3) POSITIVE IMPACTS CAN BE MANAGED TO INCREASE ITS BENEFIT AND NEGATIVE IMPACTS CAN BE MITIGATED TO DECREASE ITS EFFECTS.

INTRODUCTION

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STUDY OBJECTIVE AND SCOPE:

1) THE MAIN OBJECTIVE OF THE STUDY IS TO PROVIDE THE GOVERNMENT OF RDTL WITH SUFFICIENT INFORMATION ON HOW THE SERVICE LEVEL OF HIGHWAY ROADS CAN BE ENHANCED TO OBTAIN A SUSTAINABLE SAFE ROADS WHICH FACILITATES ECONOMIC GROWTH AND IMPROVES LIVING STANDARDS IN THE REGION TRANSVERSED BY THE HIGHWAY ROADS AND THE COUNTRY IN LARGE CONTEXT.
2) THE NEED OF THE PROPOSED HIGHWAY ROADS IS EVIDENT AS IT IS BRING POSITIVE CHANGES TO THE COMMUNITIES LIVING ALONG IT.

INTRODUCTION

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STUDY APPROACH AND METHODOLOGY:

1) AN INTEGRATED APPROACH USED WHERE DATA AND EVALUATION, FIELD INVESTIGATION, CONSULTATION AMONG TEAM OF EXPERTS, INTERVIEW AND DISCUSSION WITH STAKEHOLDERS AND AFFECTED PARTIES WERE UNDERTAKE AT THE SAME TIME;
2) COMPONENT OF ENVIRONMENT FOCUSED ON PHYSICS-CHEMICAL (AIR CONDITION AND NOISE LEVEL, DUST CONTENT, SOILS FEATURE, AND WATER QUALITY), BIOLOGICAL (FLORA AND FAUNA), AND SOCIO-ECONOMIC OF THE COMMUNITY;
3) INFORMATION GATHERING WAS CONDUCTED THROUGH SITE WALK ASSESSMENT SURVEY;
4) SOCIO-ECONOMIC IMPACT ASSESSMENT FORUMS WERE HELD AT THE DISTRICT AND DIVISIONAL LEVELS.

SCOPE AND CONTENT OF PROJECT:
THE PROJECT ASSESSMENT INVOLVED INVESTIGATION AND ANALYSIS OF THE ANTICIPATED ENVIRONMENTAL IMPACTS OF THE DEVELOPMENT IN LINE WITH THE EIA

INTRODUCTION

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PROJECT DESCRIPTION

DESCRIPTION OF THE PROJECT'S PRE-CONSTRUCTION ACTIVITIES:

1) SURVEY AND FIELD MEASUREMENTS;
2) PROJECT SOCIALIZATION AND PUBLIC CONSULTATION;
3) LAND OWNERSHIP.

DESCRIPTION OF THE PROJECT'S CONSTRUCTION ACTIVITIES:

1) PRE-CONSTRUCTION INVESTIGATIONS;
2) SITTING AND DEVELOPMENT OF SITE BASE CAMP
3) SOURCING AND TRANSPORTATION OF BUILDING MATERIALS;
4) STORAGE OF MATERIALS;
5) EXCAVTION FOR DRAINAGE WORKS
6) EARTH WORKS CLEARING, EXCAVATION AND EMBANKMENT;
7) PROCESSING RAW MATERIAL FOR AGGREGATE AND CONCRETE
8) PAVEMENT, CONCRETE WORK AND RELATED ACTIVITIES;
9) DRILLING OF BOREHOLE STRUCTURE WORKS
10) SODDING, LANDSCAPING.

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PROJECT DESCRIPTION

DESCRIPTION OF THE PROJECT'S OPERATIONAL ACTIVITIES:
1) OCCUPANCY;
2) SOLID WASTE AND WASTE WATER MANAGEMENT;
3) CLEANING;
4) GENERAL REPAIRS AND MAINTENANCE.

DESCRIPTION OF THE PROJECT'S DECOMMISSIONING ACTIVITIES:
1) DEMOLITION WORKS;
2) DISMANTLING OF EQUIPMENT AND FIXTURES;
3) SITE RESTORATION;
4) CONSTRUCTION MATERIALS AND ENERGY USED;
5) SOLID WASTE GENERATED;
6) LIQUID EFFLUENTS GENERATED.

ANALYSIS OF PROJECT ALTERNATIVES
1) NO PROJECT ALTERNATIVES;
2) ANALYSIS OF ALTERNATIVE CONST MATERIALS AND TECHNOLOGY;
3) SOLID WASTE MANAGEMENT ALTERNATIVES.

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PUBLIC PARTICIPATION

OBJECTIVES OF PUBLIC PARTICIPATION

METHODOLOGY AND DATA COLLECTION

DEDUCTION ON INFORMATION GATHERED DURING PUBLIC PARTICIPATION

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POTENTIAL ENVIRONMENTAL IMPACTS

Symbol	Type of Impact	Symbol	Type of Impact
++	Major positive impact	+	Minor positive impact
--	Major negative impact	-	Minor negative impact
O	Negligible or zero impact	Ne	No change
Sp	Specific or localized	W	Wide spread
R	Reversible	Ir	Irreversible
St	Short term	Lt	Long term
T	Temporary	P	Permanent
Y	Mitigation of negative impact or enhancement of positive ones is possible	N	Mitigation of negative impact or enhancement of positive ones is not possible

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POTENTIAL ENVIRONMENTAL IMPACTS

ANALYSIS OF ANTICIPATED NEGATIVE ENVIRONMENTAL IMPACT OF PRE-CONSTRUCTION

THE IMPORTANT CASE IS **ABOUT LAND OWNERSHIP.** Generally, the community supported to the project implementation and need a fair substitute to their lands, farms, crops, paddy lands, houses, etc from the contractors or government.

ANALYSIS OF ANTICIPATED NEGATIVE ENVIRONMENTAL IMPACT OF CONSTRUCTION

EXTRACTION AND USE OF MATERIALS; DUST EMISSIONS; EXHAUST EMISSIONS; NOISE AND VIBRATION; RISKS OF ACCIDENTS AND IJURIES TO WORKERS; CLEARANCE OF VEGETATION; INCREASED SOIL EROSION; WASTE GENERATION; ENERGY CONSUMPTION; CONTAMINATION OF ENVIRONMENT; INCREASED DEMAND OF SANITARY FACILITIES; REPAIRS AND MAITENANCE OF VEHICLES AND MACHINERY; WATER USE; INTERFERENCE WITH BUSINESS AND DAILY ACTIVITIES DURING DEMOLITION; AND INTERFERENCE WITH WILDLIFE.

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POTENTIAL ENVIRONMENTAL IMPACTS

POSITIVE ENVIRONMENTAL IMPACT OF CONSTRUCTION ACTIVITIES

- Increased Security in the Area
- Creation of Employment Opportunities
- Provision of Market for Supply of Materials
- Reduce Costs of Inland Transportation
- Improved Drainage and Road Safety
- Increased Business Opportunities

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POTENTIAL ENVIRONMENTAL IMPACTS

NEGATIVE ENVIRONMENTAL IMPACT OF CONSTRUCTION, OPERATIONAL AND MAINTENANCE ACTIVITIES

- **Immigration of Workers**
- **Solid Waste Generation**
- **Increased Storm Water Flow**
- **Increased Demand for Sanitation**
- **Energy Consumption**
- **Water Use**
- **Increased Informal Settlement**
- **Increased pressure in the area**
- **Interference with Traffic Flow during construction**

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POSITIVE ENVIRONMENTAL IMPACT OF OPERATIONAL AND MAINTENANCE ACTIVITIES

- **Provision of markets to local goods**
- **Revenue to National and Local Governments**
- **Reduction in Poverty**
- **Improved Security**

POTENTIAL ENVIRONMENTAL IMPACTS

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Negative Environmental Impacts of Decommissioning Activities

- Solid Waste
- Dust
- Interference with Road Users
- Noise and Vibration
- Increased Waste Water

Positive Environmental Impacts of Decommissioning Activities

- Rehabilitation
- Employment Opportunities → Several employment opportunities will be created for demolition staff.

POTENTIAL ENVIRONMENTAL IMPACTS

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Mitigation of Construction Phase Impacts

- Efficient Sourcing and Use of Raw Materials
- Minimization of Vegetation Disturbance
- Minimization of Run-off and Soil Erosion
- Minimization of Construction Waste
- Reduction of Dust Generation and Emission
- Minimization of Exhaust Emissions
- Minimization of Noise and Vibration
- Occupational Health and Safety
- Reduction of Energy Consumption

IMPACT MITIGATION AND MONITORING

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Mitigation of Construction Phase Impacts

- Minimization of Water Use and Pollution of Water Causes
- Provision of Sanitary Facilities
- Development of the Garages and Waste Oil Handling Facilities
- Rehabilitating and Mending up Activates
- Waste Water and Effluent Management
- Minimization of Forest Biodiversity Disturbance and Vehicle-Animal
- Minimization of accidents along the road
- Continuous Monitoring and Consultation

IMPACT MITIGATION AND MONITORING

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Mitigation of Operation Phase Impacts

- Social Impact
- Ensuring Efficient Solid Waste Management
- Minimization of Sewage Release
- Ensure Efficient Energy Consumption
- Ensure Efficient Water Use
- Environmental Pollution and Contamination
- Health and Safety
- Social and Economic Impacts
- Road Drainage

Mitigation of Decommissioning Phase Impacts

- Efficient Solid Waste Management
- Reduction of Dust Concentration
- Minimization of Noise and Vibration

IMPACT MITIGATION AND MONITORING

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- **Appendix 5 for Air Quality,**
- **Appendix 6 for Soils,**
- **Appendix 7 for Water Quality,**
- **Appendix 8 for Flora**
- **Appendix 9 for Fauna**

ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

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Capacity Building and Training

- Programs to train the project engineers and proponent in the process of the EIA to enable them participate fully in the implementation of the EMMP;
- Programs to enhance transport management.
- Organizational practices;
- Project management;
- Public awareness and community education especially on HIV/AIDs and other related social impacts;
- Financial management;
- Operation and maintenance of road infrastructure.

CAPACITY BUILDING

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Monitoring Guidelines

- Continuous observation;
- Monitoring parameters or indicators;
- Frequency of monitoring;
- Methods of record keeping;
- Availability of calibrated and maintained equipment;
- Existence of baseline information;
- Data analysis and review.

CONSTRUCTION COST AND SCHEDULE

Construction cost : US $ 1.39 Billion (Main road)
Average per kilometer : US $ 9.2 million, the comparison similar condition construction in Indonesia is:
1. Cileunyi-Sumedang-Dawuhan Toll Road, total length 60.42 km, total cost US $ 693,567,250 average cost per km US $ 11,479,100
2.Ciawi-Sukabumi Toll Road, total length 7.70, total cost US$ 83,960,923 average cost per km US$ 10, 904,000
Project execution Period :
Preparation (Land acquisition, Consultant and Contractor procurement), 1 year
Construction stage :
- Suai-Betano-Beaco (151.66 km) 5 years
- Total execution period 6 years

THANKS TO ALL PARTICIPANTS

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