

2.2.4 Implementation Plan

2.2.4.1 Implementation Concept

The following are the basic conditions for implementing this project.

- This project, if approved, will be implemented in accordance with the provisions of Japan's Grant Aid Scheme after the conclusion of Exchange of Note between the Governments of Japan and Ghana.
- For this project, MRT is the responsible agency and GHA is the implementing agency.
- The detailed design, tendering and construction supervision of the Project will be undertaken by a Japanese consulting firm in accordance with an agreement between the Government of Ghana and the Consultant.
- The rehabilitation of the road will be undertaken by the successful Japanese tenderer in awarding the contract by the Government of Ghana.

The followings are the main concepts in the Implementation Plan:

- The rehabilitation of the road will be undertaken by the Japanese contractor under its direct management, employing labors and leasing available equipment from local subcontractors.
- Materials and equipment necessary for the Project will be procured in Ghana as far as available. Items unavailable locally will be procured from Japan or third countries. Third countries will be selected on the basis of cost, with the conditions that the quality and supplying capacity meet the requirements.
- The construction method and schedule of the Project are planned to reflect local conditions of climate, topography, geology, and others.
- Easy and conventional methods of construction, not needing special equipment or technology, will be adopted for the Project as much as possible.
- Organization for construction management by the contractor and construction supervision by the consultant will be proposed to meet the standardized construction management methods.
- At least one lane shall be opened to traffic during construction and necessary measures for safety shall be taken.
- Full attention shall be paid to the environmental preservation.

2.2.4.2 Implementation Conditions

The basic conditions for implementing the project are as follow:

(1) Securing Traffic Safety during Construction

- Safety measures
Enough safety measures will be provided to secure the traffic safety and control:
 - ① Warning : Road Construction
 - ② Warning : One-Way
 - ③ Guide : Detour
 - ④ Guide : Arrow Marking
 - ⑤ Guide : Safety Barricade
 - ⑥ Guide : Safety Cone (Plastic Cone)
 - ⑦ Warning : Revolving Light

Safety officers, communication systems and flagmen shall be furnished during the progress of works.

- Safety Quarrying (blasting control)
Candidate Quarries are located near the Project road. Cutting face for blasting rocks shall be directed to the opposite of the Project road to prevent the damage from blown sand caused by blasting. Candidate Quarries and Summary of Test Results are shown in Figure 2.2.4-1.

(2) Environmental Conservation

The plants (crushing plant, asphalt plant and concrete plant) which emit dust and noise will be located far apart from residential area. Construction method of low dust and noise emission shall be applied at populated areas.

Unsuitable soil, surplus soil and chipped concrete will be disposed properly (to be buried in borrow pits). Candidate Borrow pits are shown in Figure 2.2.4.2. Turbid water from the construction plants shall be drained after treatment.

(3) Tax Exemption

Main materials such as Re-bar, Cement, Fuel and Asphalts shall be procured from the industrial areas at Tema and Takoradi. Tax exemption will be applied with a certificate issued by GHA.

2.2.4.3 Scope of Works

The undertakings of both governments, Japan and Ghana are listed in Table 2.2.4-1.

Table 2.2.4-1 Undertakings of Both Governments

| Item | Contents | Undertaken by | | Remarks |
|--|--------------------------------------|---------------|-------|--|
| | | Japan | Ghana | |
| Procurement of Materials and Equipment and Repair of Transportation Road | Procurement | ◎ | | |
| | Customs Clearance | | ◎ | |
| | Repair of Inland Transport Road | | ◎ | |
| Preparation Work | Acquisition of Lots for Construction | | ◎ | Lots for site office, storage yards, plants and work shops |
| | Other works than the above | ◎ | | |
| Removal/Relocation of Existing Facilities | On-ground | | ◎ | Houses, stores, power poles, |
| | Underground | | ◎ | telephone cables, water pipes |
| Acquisition of Right-of-Way | | | ◎ | |
| Road Construction Works | | ◎ | | |

2.2.4.4 Consultant Supervision

A Japanese consulting firm will supervise the implementation of the Project on behalf of the Government of Ghana. The works to be undertaken by the consultant are as follows:

(1) Detailed Design

The major works in the detailed design stage to be carried out by the consultant are as follows:

- Supplementary site survey
- Detailed design of the road and related structures
- Preparation of drawings and specifications
- Construction planning and cost estimation
- Preparation of tender documents

As the Implementation Schedule is composed of 2 phases, the necessary time for the detailed design is 5.5 months for Phase 1 and 5.5 months for Phase 2.

(2) Assistance in Tendering

This task includes the following items:

- Tender publication
- Pre-qualification
- Tendering
- Tender evaluation
- Contract facilitation

The necessary time for assistance in tendering is 2.5 months for Phase 1 and 2.5 months for Phase 2.

(3) Construction Supervision

The main work items to be executed by the Consultant during the construction supervision stage are as follows:

- Inspection and approval of site surveys
- Review and approval of construction plan
- Quality control
- Progress control
- Measurement of work
- Inspection of safety aspects
- Final inspection and turnover

The construction period is 19 months for Phase 1 and 24 months for Phase 2. To successfully carry out the supervision, two resident engineers of the Consultant are required to be stationed on the site during the entire construction period.

One-Way Traffic may be required during construction. The Consultant will review safety and traffic management program of the Contractor to prevent any accidents.

2.2.4.5 Procurement Plan

(1) Construction Materials

All construction materials for the Project may be produced in Ghana except guardrail.

Principles on procurement of construction materials are as follows:

- Locally available materials will be used as far as their quality and quantity are acceptable.
- Imported materials which are constantly available in the local market will be procured and regarded as local items.
- Materials which are not available in the local market will be procured from Japan or third countries (South Africa or Europe). Countries of the material source will be decided by comparing quality, price and other characteristics of the materials.

The procurement plan of major construction materials is shown in Table 2.2.4-2.

Table 2.2.4-2 Material Procurement Plan

| | Procured from | | | Remarks |
|-------------------------|---------------|-------|---------------|-------------------------|
| | Ghana | Japan | Third Country | |
| Asphalts | ⊙ | | ⊙ | Takoradi (Imported) |
| Cement | ⊙ | | | Tema (Clinker Imported) |
| Re-bar D6-D25 | ⊙ | | | Tema (Mild Steel) |
| Paints | ⊙ | | | Accra (Imported) |
| Grass | ⊙ | | | Near Site |
| PVC Pipe | ⊙ | | | Accra (Imported) |
| R.C. Pipe ϕ 450-1800 | ⊙ | | | Produced at Site |
| Guard Rial | | | ⊙ | Europe |
| Gabion | ⊙ | | | Accra (Imported) |
| Lumber | ⊙ | | | |
| Plywood | ⊙ | | | |
| Sand Bug | ⊙ | | | |
| Log | ⊙ | | | |
| Welding rod | ⊙ | | | Accra (Imported) |
| Nail | ⊙ | | | |

(2) Equipment

The leasing company system for construction equipment in Ghana has not been well serviced yet. Many equipment imported to Ghana are restricted to use for the specified project. Equipment owned by local contractors and available to be leased are old and conventional types. In addition, it is the actual condition that most of the equipment in operation in Ghana are busy and not available to be leased.

Principles on procurement of construction equipment are as follows:

- Equipment which is not available in Ghana and equipment which will seriously affect the construction schedule once broken down will be procured from a third country (South Africa or Europe).

Procurement plan of major equipment is shown in Table 2.2.4-3.

Table 2.2.4-3 Equipment Procurement Plan

| Equipment | Capacity | Procured from | | | Remarks |
|---------------------|-----------------------|---------------|-------|---------------|-------------|
| | | Ghana | Japan | Third Country | |
| Backhoe | 0.1m ³ | | | ⊙ | |
| Backhoe | 0.6m ³ | | | ⊙ | |
| Backhoe | 1.0m ³ | | | ⊙ | |
| Hyd. Breaker | 1,300kg | | | ⊙ | |
| Bulldozer | 3t | | | ⊙ | |
| Bulldozer | 15t | | | ⊙ | |
| Bulldozer | 32t | | | ⊙ | with ripper |
| Dump truck | 2t | | | ⊙ | |
| Dump truck | 10t | | | ⊙ | |
| Motor grader | 3.1m | | | ⊙ | |
| Vibration Roller | 0.8-1.1t | | | ⊙ | hand guide |
| Vibration Roller | 3-4t | | | ⊙ | combined |
| Vibration Roller | 7-8.5t | | | ⊙ | |
| Road Roller | 10-12t | | | ⊙ | |
| Tire roller | 8-20t | | | ⊙ | |
| Truck Crane | 4.8-4.9t | | | ⊙ | |
| Truck Crane | 15-16t | | | ⊙ | |
| Truck Crane | 40-45t | | | ⊙ | |
| Agitator truck | 3.0-3.2m ³ | | | ⊙ | |
| Wheel Loader | 1.3-1.4m ³ | | | ⊙ | |
| Wheel Loader | 3.1-3.3m ³ | | | ⊙ | |
| Asphalt finisher | 2.4-4.5m | | | ⊙ | |
| Asphalt Distributor | 4000L | | | ⊙ | |
| Chip Spreader | Tail Gate | | | ⊙ | |
| Asphalt Sprayer | 200L | | | ⊙ | |
| Water tank truck | 6kLtr | | | ⊙ | |
| Crawler Drill | 150kg | | | ⊙ | |
| Generator | 20kVA | | | ⊙ | |
| Generator | 60kVA | | | ⊙ | |
| Generator | 100kVA | | | ⊙ | |
| Generator | 250kVA | | | ⊙ | |
| Generator | 300kVA | | | ⊙ | |
| Generator | 450kVA | | | ⊙ | |
| Crane mounted truck | 4t | | | ⊙ | |
| 4WD Car | 2,500c.c. | | | ⊙ | |
| Concrete breaker | | | | ⊙ | |
| Crane mounted truck | 2.9t Lift | | | ⊙ | |
| Crushing Plant | 155t/h | | | ⊙ | |
| Asphalt plant | 120t/h | | | ⊙ | |
| Agg. Mixing Plant | 100t/h | | | ⊙ | |
| Concrete Plant | 0.5m ³ | | | ⊙ | |
| Trailer | 30t | | | ⊙ | |
| Submersible pump | φ 150mm | | | ⊙ | |

2.2.4.6 Quality Control

The basic Quality Control Management Criteria will be established with regards to the corresponding specifications, concept, procedures, standards and guidelines at the construction planning stage. The two main Criteria are as follows;

- Contractor's self-imposed Quality Control with periodical inspection by the Consultant
- Consultant's attendance of Quality Control

The Consultant shall supervise the Quality to meet the Specifications and relevant documents. If any default is found, the Consultant shall instruct the Contractor to rectify or improvement.

2.2.4.7 Implementation Schedule

Duration for the construction is estimated to be about 42 months (Phase 1: 19 months, Phase 2: 23 months) taking into consideration quarry permission, right of way, quantities of construction, climate condition (rainy season), safety control (one-way traffic) and economic cost.

Table 2.2.4-4 shows the proposed Implementation Schedule of this project.

2.3 Obligations of Ghanaian Side

The following necessary measures should be taken by the Government of Ghana on condition that the Grant Aid by the Government of Japan is extended to the Project:

- (1) To provide data and information necessary for the Project.
- (2) To secure the land necessary for the execution of the Project, such as the Right-of-Way, land for temporary offices, working areas, storage yards, plant facilities and others.
- (3) To make passable all roads and bridges leading to the Project sites before the commencement of inland transportation of materials and equipment.
- (4) To remove existing obstacles such as houses, stores, etc., within the right of way.
- (5) To bear commissions to the Japanese foreign exchange bank for its banking services, based upon the Banking Arrangement (B/A), namely the advising commission of the Authorization to Pay (A/P) and payment commission.
- (6) To ensure prompt unloading, tax exemption, customs clearance at the port of disembarkation in Ghana and prompt internal transportation of the materials and equipment for the project purchased under the Grant Aid.
- (7) To exempt Japanese expatriates connected with the project from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the verified contracts
- (8) To accord Japanese nationals whose services may be required in connection with the supply of products and services under the verified contract such facilities as may be necessary for their entry into Myanmar and stay therein for the performance of their work
- (9) To provide necessary permissions, license and other authorizations for implementing the project, if necessary
- (10) To maintain and use properly the improved road and its facilities
- (11) To coordinate and solve any issues related to the project which may arise from third parties or inhabitants in the project area
- (12) To bear all the expenses, other than those covered by the Japan's Grant Aid, necessary for the project.

2.4 Project Operation Plan

Maintenance of the improved road will be managed by GHA. The pavement that will be more durable under the project, can reduce the time and cost for the maintenance. It means the budget of the maintenance work can be saved.

Routine maintenance of roads and related facilities shall be executed by GHA. Routine maintenance crews shall be set up and operated under the supervision of GHA. As significant defects are found on the road during routine maintenance, GHA should formulate special maintenance projects, based upon detailed inspections.

The routine maintenance activities required for the project road are presented in Table 2.4.1-1.

Table 2.4.1-1 Routine Maintenance Activities

| Inspection | Remarks |
|--------------------------|---|
| Pavement | - settlement, crack, depress, scale, fracture |
| Shoulder | - scouring, settlement, deformation |
| Cut slope, Embankment | - slope failure, erosion, etc. |
| Side ditch (gutter, lid) | - settlement, deformation, etc. |
| Drainage pipe | - choked, etc. |
| Drain pit | - sediment, etc. |
| Outlet | - deformation, etc. |
| Others | |

The annual cost necessary for maintenance of the Project road is estimated as presented in Table 2.4.1-2.

Table 2.4.1-2 Maintenance Plan for the Project Road

(Total road length :98.2 Km)

| Facility | Inspection Item | Interval | Number of Staff | Equipment/Material | Days | Budget (US\$) | |
|---|--|-----------------------------------|-----------------|------------------------------------|---------------|---------------|----------|
| <ul style="list-style-type: none"> • Ditches • Culvert crossing road • Pavement • Cut slope • Embankment slope • Bridges • Road marking • Sign boards | Existing of mud, sand, obstacles, etc. | 12 times/year (4 days/round) | 2 persons | Measuring tape, scoop, hammer, bar | 96 persons | 1,920.00 | |
| | Existing of mud, sand, obstacles, etc. | | | | | | |
| | Crack, deformation, potholes, etc. | | | | | | |
| | Collapse, erosion, etc. | | | | | | |
| | Collapse, erosion, etc. | | | | | | |
| | Surface of deck, abutment, pier, river condition | | | | Pick-up truck | 48 units | 1,680.00 |
| | Stain, discolor | | | | | | |
| Damage, deformation, stain, discolor | | | | | Sub-total | 3,600.00 | |

2. Cleaning

| Facility | Inspection Item | Interval | Number of Staff | Equipment/Material | Days | Budget (US\$) | |
|---|---|----------------------------------|-----------------|-----------------------------|---------------|---------------|----------|
| <ul style="list-style-type: none"> • Ditches • Culvert crossing road • Pavement • Cut slope • Embankment slope • Bridges • Road marking • Sign boards | Removal of deposit of mud, sand, obstacle | 4 times/year (4 days/round) | 5 persons | Scoop, bar brooms hand tool | 80 persons | 800.00 | |
| | | | | | | | |
| | | | | | | | |
| | | | | | Pick-up truck | 16 units | 560.00 |
| | | | | | | Sub-total | 1,360.00 |

3. Repair

| Facility | Inspection Item | Interval | Number of Staff | Equipment/Material | Days | Budget (US\$) | |
|---|---|----------------------------------|-----------------|-------------------------------|-------------------------------------|--|---------------------------|
| <ul style="list-style-type: none"> • Ditches • Culvert crossing road • Pavement • Cut slope • Embankment slope • Bridges • Road marking • Sign boards | Repair of pothole | 4 times/year (21 days/round) | 4 persons | Plate tamper Pick-up truck | 336 persons 84 units 84 units | 3,360.00 420.00 2,940.00 | |
| | Removal of deposit of mud, sand, obstacle | | | | | | |
| | | | | | | | |
| | | | | | Base course Asphalts Cement | 40 m3/year 2.0t/year 15bags/year | 800.00 880.00 90.00 |
| | | | | | | Sub-total | 8,490.00 |
| | | | | | | Grand total : 13,450.00 | |

CHAPTER 3

PROJECT EVALUATION AND RECOMMENDATION

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PROJECT EVALUATION AND RECOMMENDATION

3.1 Project Effect

The road section under this project is a part of National Highway No. 1 which forms a main link in Trans-African Highway Network system that includes Trans-ECOWAS Highway Network. Sections of National Highway No. 1 are being improved to international standards of arterial highways by other donor countries and international financing institutions. The section of the road under this project does not satisfy also the international standards.

This project is to improve a length of 98.2 kilometers of the road between Kasoa and Yamoransa as a grant aid. The works include improvement of road geometry, widening of road shoulders and the provision of pavement and drainage system. The road design will consider not only the standard requirements but also traffic safety and serviceability of the people along the road.

Improvement of this road section will not only improve the living conditions and environment for local people but will largely contribute to the movement of people and goods in the country as well as the development of agricultural, tourism and economic sectors.

The major effects and benefits that will be generated, directly and indirectly, after the implementation of this project are as follows:

1. Direct Benefits

- Increase of Traffic Volume and Transport Movement

The average daily traffic, that handles both passenger and freight movements, will increase after improving the road conditions and increasing its capacity. The growth in the daily traffic volumes is forecasted as 2.85 times from year 2002 to 2020 as presented in Table 3.1-1. This high rate, which represents an annual growth rate of 6%, includes both induced and shifted traffic due to the improvement of the project road.

Table 3.1-1 Present and Future Traffic Volumes

| Year | Average Daily Traffic (ADT) | | | Growth Rate (2002) |
|------|-----------------------------|------------------------|--------------------------|-----------------------|
| | Kasoa ~ Winneba | Winneba ~ Mankessim | Mankessim ~ Yamoransa | |
| 2002 | 8,948 | 4,943 | 4,123 | 1.00 |
| 2007 | 11,974 | 6,615 | 5,518 | 1.34 |
| 2010 | 14,262 | 7,878 | 6,571 | 1.59 |
| 2015 | 19,085 | 10,543 | 8,794 | 2.13 |
| 2020 | 25,541 | 14,109 | 11,768 | 2.85 |

- Savings in Transport Cost

The International Roughness Index (IRI) is proposed by The World Bank as a standard roughness statistic in m/km to express the road condition. Better road conditions with low values of IRI greatly reduce the VOC (vehicle operating cost), and consequently the transport cost, for all vehicle categories as shown in Figure 3.1-1.

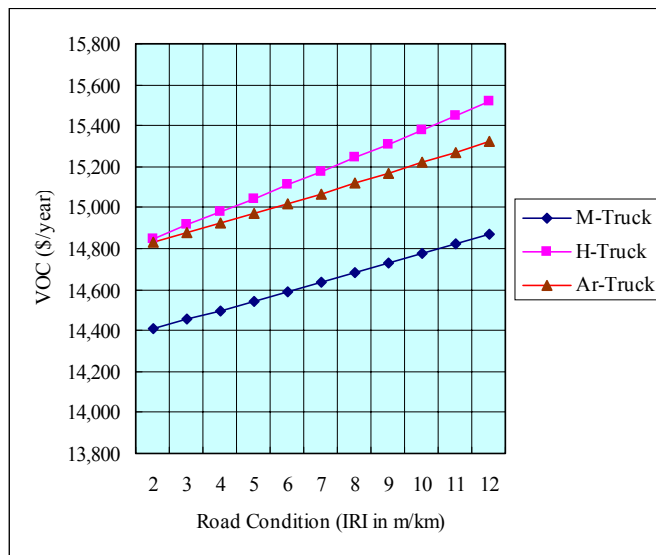
The two figures, for both commercial and passenger vehicles, are based on results of applying the Highway Development and Management Model (HDM-4) developed by the World Bank to estimate VOC on paved roads in Ghana. The deteriorated condition of the road surface shows an IRI of more than 8 at present, while it is expected to be ranging between 2 and 4 after implementing the Project.

- Savings against Road Closure due to Flooding

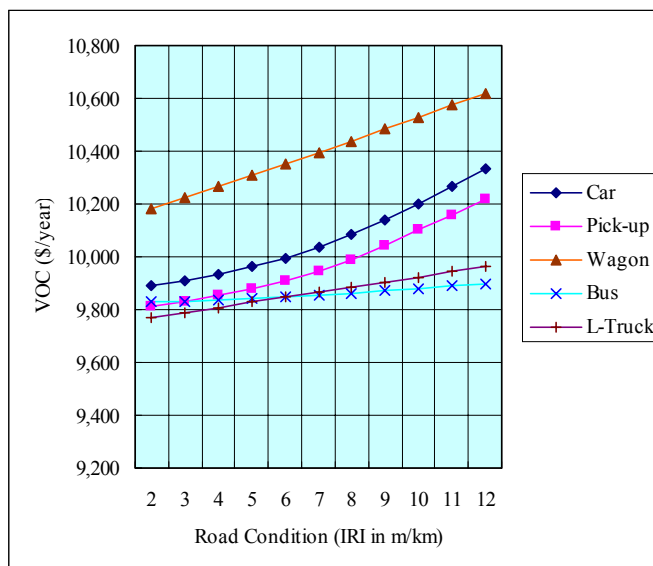
The closure of low sections of the road due to flooding will cause huge losses in VOC and travel time either for passengers or commodities due to the use of detour roads or delay in travel. Improvement works of the road include rising the carriageway level at such low locations in order to avoid this situation of road closure and interruption of traffic.

- Less Maintenance Cost

The improved road with durable pavement will require less maintenance cost than the existing road that is in a very bad condition with deteriorated surface. In addition, road rehabilitation works will be deferred until the life of the new pavement. Based on past experiences, it is expected that routine maintenance will decrease by about 25% and periodic maintenance by about 50% after implementing the Project.



– Commercial Vehicles –



– Passenger Vehicles –

Figure 3.1-1 Vehicle Operating Cost by Vehicle Category

2. Indirect Benefits

- Increase in Land Development

A recent study for National Feeder Roads Rehabilitation and Maintenance Program (NFRMP) that was conducted in Ghana by the Department of Feeder Roads (DFR) for feeder roads development estimated the increase in

land development as 20 – 40% depending on the location and characteristics of land. As for the project road, which is a national road in the Central Region and connected to Accra Metropolitan Area, the land development through the road improvement project is expected to have higher rate.

- Benefits for Local Population
 - a) Improved quality and quantity of fields through prompt and cheaper delivery for agricultural products
 - b) Better accessibility to schools and health care facilities
 - c) Improved bargaining position vis-à-vis truckers, traders and merchants and thereby higher net prices for farm products
 - d) More efficient use of existing agricultural fields and facilities with possible increase in employment opportunities
 - e) Lower transport costs for passengers and freight; and
 - f) Improved personal travel
 - g) Safety and comfort of traffic

3.2 Recommendation

The Project will greatly contribute to improving the transport and traffic conditions along the road, which is a main link in Trans-ECOWAS highway network, activating national, regional and local socioeconomic development and support agricultural and tourism activities. In addition, it will improve the living standards of local people and accessibility to schools and healthcare facilities as well as providing better traffic safety conditions to decrease the number of accidents along the road. It is expected that improving this important road will promote development not only on national level but it will generate direct benefits to local people along the road as well, as it will activate and contribute to regional and local economy and improve living conditions of local inhabitants.

Therefore, this project is evaluated as appropriate to be implemented under Japan's Grant Aid. The Government of Ghana, however, has to carry out the land acquisition procedures and secure the required land in accordance with the implementation schedule.

After completion of the Project, maintenance of the improved road will be carried out by GHA. GHA will be fully responsible for all the required works of inspection, repair, maintenance, rehabilitation and management to keep the project road in good condition for safe and efficient use.

APPENDICES

APPENDIX 1

MEMBER LIST OF THE STUDY TEAM

Appendix-1 Member List of the Study Team

1. Field Survey in Ghana

| | | |
|-----------------------|---------------------------------------|---|
| Mr. KURASHINA Yoshiro | Leader | Deputy Director, Third Project Management Division, Grant Aid Management Department, JICA |
| Mr. MIURA Minoru | Chief Consultant / Road Planner | Katahira & Engineers International |
| Dr. HANI Abdel-Halim | Road Designer - I | Katahira & Engineers International |
| Mr. SAGARA Hidetaka | Road Designer - II | Katahira & Engineers International |
| Mr. HIRAOKA Kazuyuki | Road Designer - III | Katahira & Engineers International |
| Mr. SATO Tadashi | Construction Planner / Cost Estimator | Katahira & Engineers International |
| Mr. TOYODA Kozo | Topographic Surveyor | Katahira & Engineers International |
| Mr. MURAKAMI Keiichi | Geotechnical Engineer | Katahira & Engineers International |

2. Supplemental Field Study in Ghana

| | | |
|------------------|---------------------------------------|------------------------------------|
| Mr. MIURA Minoru | Chief Consultant / Road Planner | Katahira & Engineers International |
| Mr. SATO Tadashi | Construction Planner / Cost Estimator | Katahira & Engineers International |

3. Presentation of Draft Final Report in Ghana

| | | |
|-----------------------|---------------------------------|--|
| Mr. KOMORI Katsutoshi | Leader | Third Project Management Division, Grant Aid Management Department, JICA |
| Mr. MIURA Minoru | Chief Consultant / Road Planner | Katahira & Engineers International |
| Dr. HANI Abdel-Halim | Road Designer - I | Katahira & Engineers International |

Mr. SAGARA Hidetaka Road Designer - II Katahira & Engineers International

Mr. SATO Tadashi Construction Planner /
Cost Estimator Katahira & Engineers International

4. Supplemental Technical Assistance for Land Acquisition in Ghana

Mr. HIRAOKA Kazuyuki Road Designer - III Katahira & Engineers International

APPENDIX 2

STUDY SCHEDULE

Appendix-2 Study Schedule

1. Field Survey (May 12, 2002 ~ June 15, 2002)

| No. | Date | Activities |
|-----|---------------|--|
| 1 | May 12 (Sun) | Left Tokyo and arrived at London |
| 2 | May 13 (Mon) | Left London and arrived at Accra |
| 3 | May 14 (Tue) | Discussion at Embassy of Japan Courtesy call on Ministry of Finance and MRT |
| 4 | May 15 (Wed) | Discussion with GHA |
| 5 | May 16 (Thu) | Discussion with MRT |
| 6 | May 17 (Fri) | Site condition survey (till June 5) |
| 7 | May 18 (Sat) | Site condition survey |
| 8 | May 19 (Sun) | Preparation of Minute of Discussions (M/D) |
| 9 | May 20 (Mon) | Discussion and signing of M/D |
| 10 | May 21 (Tue) | Report to Embassy of Japan and JICA Ghana Office |
| 11 | May 22 (Wed) | Discussion with GHA Natural condition survey (till June 10) |
| 12 | May 23 (Thu) | Discussion with GHA |
| 13 | May 24 (Fri) | Site survey on eastern part of National Road No.1 |
| 14 | May 25 (Sat) | Site condition survey, etc. |
| 15 | May 26 (Sun) | Site condition survey, etc. |
| 16 | May 27 (Mon) | Discussion with GHA |
| 17 | May 28 (Tue) | Site condition survey, etc. |
| 18 | May 29 (Wed) | Preparation of traffic survey |
| 19 | May 30 (Thu) | Traffic survey (1 st Day) |
| 20 | May 31 (Fri) | Traffic survey (2 nd Day) |
| 21 | June 1 (Sat) | Site condition survey, etc. |
| 22 | June 2 (Sun) | Site condition survey, etc. |
| 23 | June 3 (Mon) | Discussion with GHA |
| 24 | June 4 (Tue) | Site condition survey, etc. |
| 25 | June 5 (Wed) | Site condition survey, etc. |
| 26 | June 6 (Thu) | Natural condition survey |
| 27 | June 7 (Fri) | Site survey on western part of National Road No.1 |
| 28 | June 8 (Sat) | Data collection |
| 29 | June 9 (Sun) | Data collection |
| 30 | June 10 (Mon) | Discussion with GHA |
| 31 | June 11 (Tue) | Discussion with MRT |
| 32 | June 12 (Wed) | Internal meeting |
| 33 | June 13 (Thu) | Report to Embassy of Japan Left Accra |
| 34 | June 14 (Fri) | Left London |
| 35 | June 15 (Sat) | Arrived at Tokyo |

2. Supplemental Field Survey (July 8, 2002 ~ August 8, 2002)

| No. | Date | Activities |
|-----|----------------|--|
| 1 | July. 28 (Sun) | Left Tokyo and arrived at London |
| 2 | July. 29 (Mon) | Left London and arrived at Accra |
| 3 | July. 30 (Tue) | Discussion at Embassy of Japan, JICA Ghana Office and GHA |
| 4 | July. 31 (Wed) | Discussion with MRT and GHA |
| 5 | Aug. 1 (Thu) | Discussion with GHA |
| 6 | Aug. 2 (Fri) | Discussion with GHA |
| 7 | Aug. 3 (Sat) | Site survey |
| 8 | Aug. 4 (Sun) | Data collection |
| 9 | Aug. 5 (Mon) | Report to Embassy of Japan and JICA Ghana Office Left Accra |
| 10 | Aug. 6 (Tue) | Arrived at London |
| 11 | Aug. 7 (Wed) | Left London |
| 12 | Aug. 8 (Thu) | Arrived at Tokyo |

3. Presentation of Draft Final Report (September 1, 2002 ~ September 10, 2002)

| No. | Date | Activities |
|-----|---------------|---|
| 1 | Sep. 1 (Sun) | Left Narita and arrived at London |
| 2 | Sep. 2 (Mon) | Left London and arrived at Accra |
| 3 | Sep. 3 (Tue) | Courtesy Call to EOJ, JICA Office, MRH, GHA |
| 4 | Sep. 4 (Wed) | Discussion with MRT and GHA |
| 5 | Sep. 5 (Thu) | Discussion with MRT and GHA |
| 6 | Sep. 6 (Fri) | Signing of M/D Report to EOJ & JICA Office |
| 7 | Sep. 7 (Sat) | Site survey |
| 8 | Sep. 8 (Sun) | Document Arrangement Left Accra |
| 9 | Sep. 9 (Mon) | Arrived at London Left London |
| 10 | Sep. 10 (Tue) | Arrived at Narita |

4. Technical Assistance for Land Acquisition (September 30, 2002~October 15, 2002)

| No. | Date | Activities |
|-----|------------------------------------|--|
| 1 | Sep. 30 (Mon) | Left Amsterdam and arrived at Accra |
| 2 | Oct. 1 (Tue) | Meeting at JICA Ghana Office |
| 3 | Oct. 2 (Wed) ↓ Oct. 11 (Fri) | Investigation at the Site |
| 4 | Oct. 12 (Sat) | Data Arrangement |
| 5 | Oct. 13 (Sun) | Data Arrangement |
| 6 | Oct. 14 (Mon) | Meeting with GHA |
| 7 | Oct. 15 (Tue) | Meeting with GHA and Submission of the Report Leave Accra for Amsterdam |

APPENDIX 3

**LIST OF PARTIES
CONCERNED IN GHANA**

Appendix -3 List of Parties Concerned in Ghana

| | |
|---------------------------------------|--|
| Mr. John Kufour | President |
| <u>Ministry of Foreign Affairs</u> | |
| Mr. Ousu Ajeman | Minister |
| <u>Ministry of Trade and Industry</u> | |
| Mr. Aburaku | Minister |
| <u>Ministry of Finance</u> | |
| Mr. M.A.Quist-Therson | Director, External Resource Mobilization (ERM) |
| Mr. G.D.Apatu | Head, ERM |
| <u>M R T</u> | |
| Dr. Richard Anane | Minister |
| Mr. J.Osei Asamoal | Chief Director |
| Mr. E.Oduro-Konadu | Deputy Chief Executive |
| Mr. E.A.Kawakye | Director, Policy & Planning |
| Mr. A.T.Essikie | Director, Human Resources |
| Mr. K.Abbey Sam | Advisor |
| <u>G H A</u> | |
| Mr. A.K.Hammond | Chief Executive |
| Mr. Eric Oduro-Konadu | Deputy Chief Executive |
| Mr. K.Asare-Awuiey | Deputy Chief Executive |
| Mr. Samuel Swanzy-Baffoe | Director of Contract |
| Mr. Francis Atta-Affram | Chief Valuer |
| Mr. Sintim-Aboagye Dolittle | Director of Survey & Design |
| Mr. E.A. Mills | Location Manager |
| Mr. B.A. Eklemet | Senior Engineer |

APPENDIX 4

MINUTES OF DISCUSSIONS

Minutes of Discussions
On the Basic Design Study
On the Project for Rehabilitation of Trunk Road
In the Republic of Ghana

Based on the result of the Preparatory Study Team from November 26, 2001 to December 5, 2001, the Government of Japan decided to conduct a Basic Design Study on the Project for Rehabilitation of Trunk Road (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to the Republic of Ghana (hereinafter referred to as "Ghana") the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Yoshiro Kurashina, a Deputy Director of the Third Project Management Division, the Grant Aid Management Department, JICA, and is scheduled to stay in the country from May 13 to June 13, 2002.

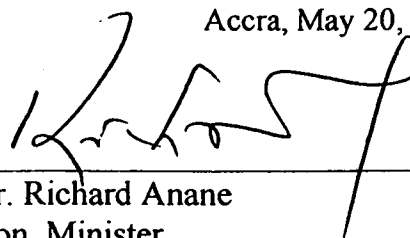
The Team held discussions with relevant officials of the Government of Ghana and conducted a field survey at the study area.

In the course of discussions and field survey, both sides confirmed the main items described on the attached sheets. The Team will proceed with further works and prepare the Basic Design Study Report.

Accra, May 20, 2002



Yoshiro Kurashina
Leader
Basic Design Study Team
JICA



Dr. Richard Anane
Hon. Minister
Ministry of Roads and Transport



M. A. Quist-Therson
Director
External Resource Mobilization
(Bilateral)
Ministry of Finance



A.K. HAMMOND
Chief Executive
Ghana Highway Authority

ATTACHMENT

1. Objective of the Project

The objective of the Project is to improve road transportation between Accra and Cape Coast by the rehabilitation of the existing trunk road as part of Trans-ECOWAS Highway.

2. Project coverage

The Project coverage is shown in Annex-1.

3. Responsible and Implementing Organizations

3-1. The responsible ministry is the Ministry of Roads and Transport (MRT).

3-2. The executing agency is the Ghana Highway Authority (GHA).

3-3. The organization charts of MRT and GHA are shown in Annexes 2-1 and 2-2.

4. Items requested by the Government of Ghana

The following components were finally confirmed as the request by the Ghanaian side after discussions with the Team;

- (1) Rehabilitation of the existing trunk road between Kasoa (Sta.18+000) and Yamoransa (Sta.116+200)
- (2) Rehabilitation of four bridges located in the above-mentioned trunk road
- (3) Adoption of the design standard of the Trans-ECOWAS Highway.

JICA will assess the appropriateness of the request and will recommend to the Government of Japan for approval.

5. Japan's Grant Aid Scheme

5-1. The Ghanaian side understands the Japan's Grant Aid scheme explained by the Team, as described in Annex-3.

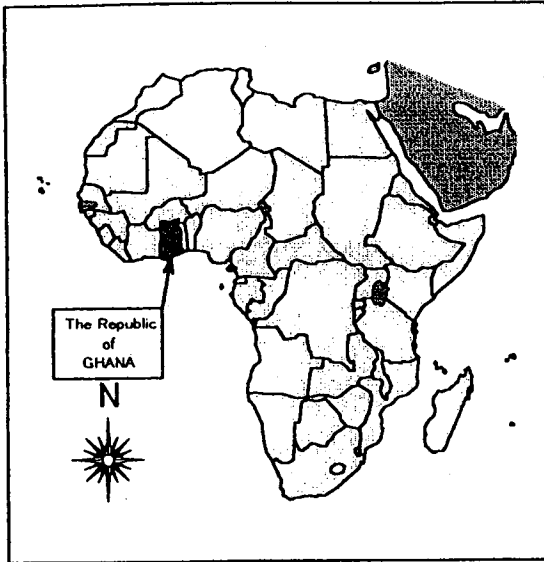
5-2. The Ghanaian side will take the necessary measures, as described in Annex-4, for smooth implementation of the Project as a condition for the Japan's Grant Aid to be used.

6. Schedule of the Study

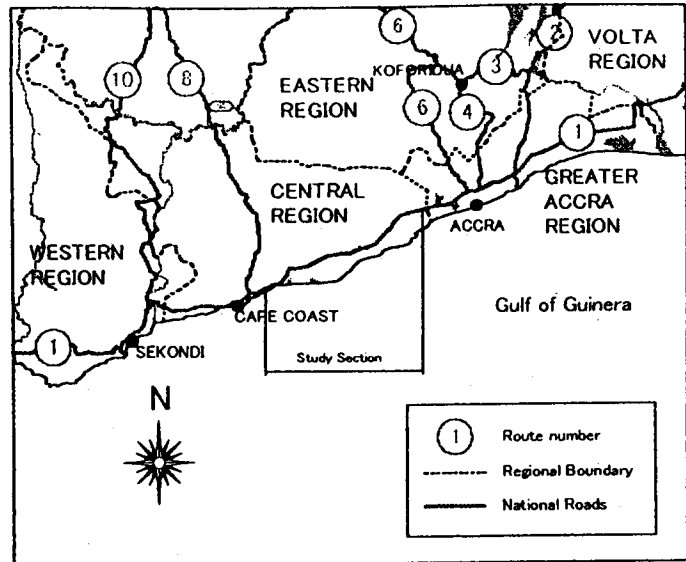
- 6-1. The consultant will proceed with further studies in Ghana until June 13, 2002.
- 6-2. JICA will prepare the draft final report in order to explain its contents at the end of August, 2002.
- 6-3. In case that the contents of the report are accepted in principle by the Government of Ghana, JICA will complete the final report and send it to the Government of Ghana by December, 2002.

7. Other Relevant Issues

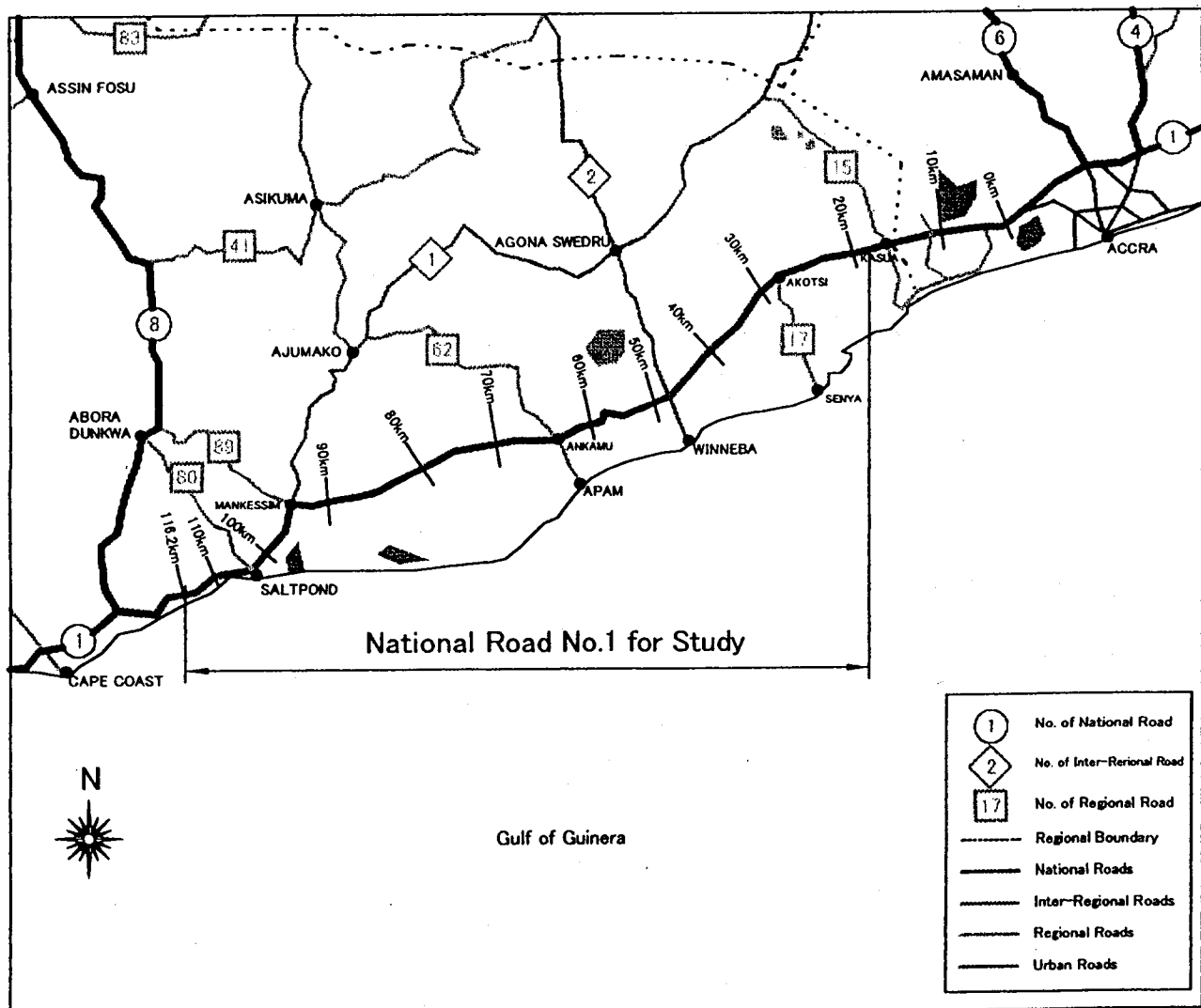
- 7-1. The Ghanaian side will provide necessary data and information for the study.
- 7-2. The Ghanaian side will secure necessary budget and land acquisition for the Project.
- 7-3. The Ghanaian side will take all possible measures to secure safety of the concerned people during the study and implementation of the Project on condition that the Japan's Grant Aid is extended to the Project.
- 7-4. Both sides agreed that the Project should be basically designed in accordance with the design standard of the Trans-ECOWAS Highway.
- 7-5. Both sides agreed that the main concept of the Project should consist of transparency, accountability, present demand, minimum requirement, cost effectiveness and sustainability.



Map of Africa



Map for Study Area



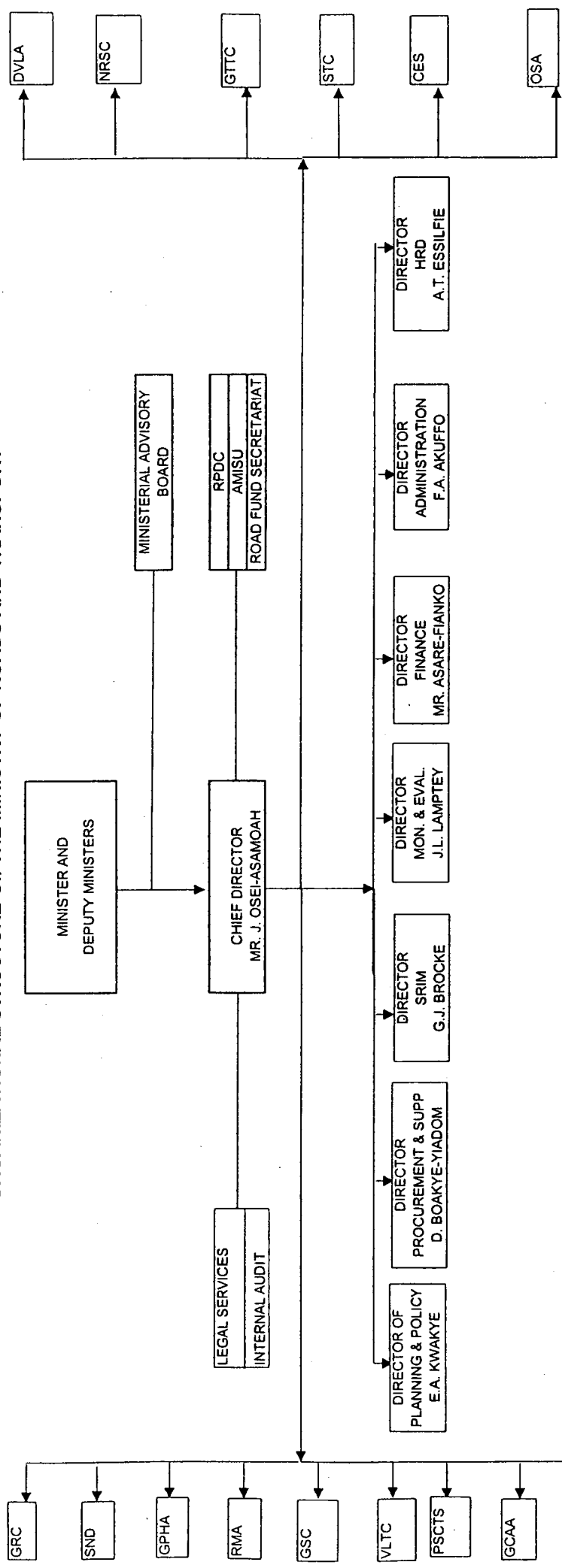
Road for Study

Map for Study Area

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ANNEX 2-1:

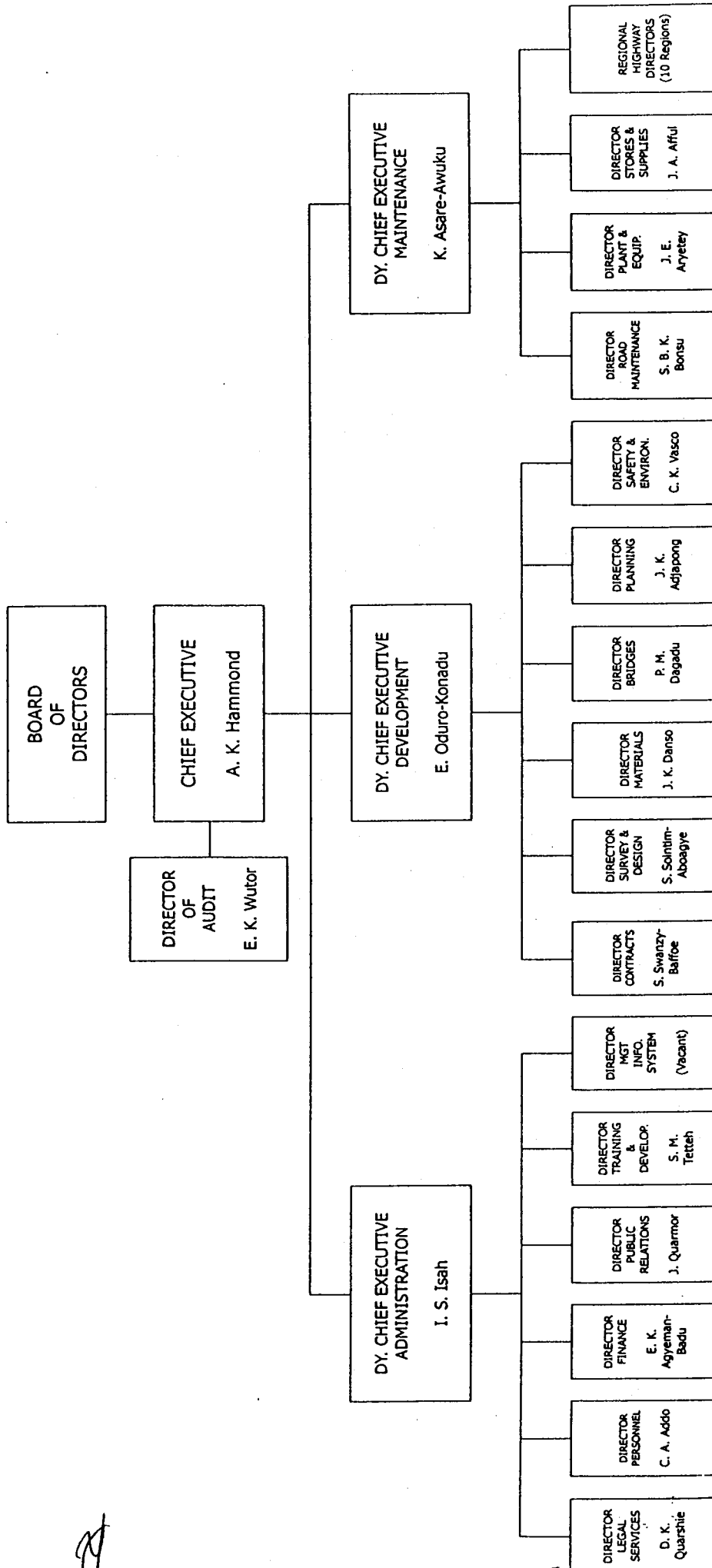
ORGANIZATIONAL STRUCTURE OF THE MINISTRY OF ROADS AND TRANSPORT



et *et* *et*

R. J.

ORGANIZATIONAL STRUCTURE OF GHANA HIGHWAY AUTHORITY



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Japan's Grant Aid Scheme

The Grant Aid scheme provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

Japan's Grant Aid scheme is executed through the following procedures.

| | |
|---------------------------------|--|
| Application | (Request made by a recipient country) |
| Study | (Basic Design Study conducted by JICA) |
| Appraisal & Approval | (Appraisal by the Government of Japan and Approval by Cabinet) |
| Determination of Implementation | (The Notes exchanged between the Governments of Japan and the recipient country) |

Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA (Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study), using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid scheme, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes (E/N) signed by the Governments of Japan and the recipient country.

Finally, for the smooth implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

2. Basic Design Study

1) Contents of the Study

The aim of the Basic Design Study (hereinafter referred to as "the Study"), conducted by JICA

on a requested project (hereinafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows:

- Confirmation of the background, objectives, and benefits of the requested project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid scheme from a technical, social and economic point of view
- Confirmation of items agreed upon by both parties concerning the basic concept of the Project
- Preparation of a basic design of the Project
- Estimation of costs of the Project

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of Japan's Grant Aid scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consultant firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA.

The consulting firm(s) used for the Study is(are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency.

3. Japan's Grant Aid Scheme

1) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

- 2) "The period of the Grant Aid" means the one fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consulting firm(s) and (a) contractor(s) and final payment to them must be completed.

However in case of delays in delivery, installation or construction due to unforeseen factors such as natural disaster, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

- 3) Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However, the prime contractors, namely, consulting, contracting and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

- 4) Necessity of "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

- 5) Undertakings required of the Government of the Recipient Country

In the implementation of the Grant Aid project, the recipient country is required to undertake such necessary measures as the following:

- a) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction.
- b) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites.
- c) To secure buildings prior to the procurement in case the installation of the equipment.
- d) To ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid.
- e) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts.
- f) To accord Japanese nationals, whose services may be required in connection with the supply of the products and services under the Verified Contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

- 6) "Proper Use"

The recipient country is required to operate and maintain the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

7) "Re-export"

The products purchased under the Grant Aid should not be re-exported from the recipient country.

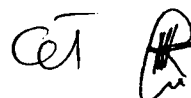
8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay (A/P) issued by the Government of the recipient country or its designated authority.

9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and Payment commissions to the Bank.



Major Undertaking to be taken by Each Government

| No. | Items | To be covered by Grant Aid | To be covered by Ghanaian Side |
|-----|--|----------------------------|--------------------------------|
| 1 | To secure land. | | ● |
| 2 | To clear, level and reclaim the site when needed. | | ● |
| 3 | To construct gates and fences in and around the site. | | ● |
| 4 | To bear the following commissions to the Japanese bank for banking services based upon The B/A. | | |
| | 1) Advising commission of A/P | | ● |
| | 2) Payment commission | | ● |
| 5 | To ensure unloading and customs clearance at port of disembarkation in recipient country. | | |
| | 1) Marine transportation of the products from Japan to the port of the recipient country | ● | |
| | 2) Tax exemption and custom clearance of the products at the port of disembarkation | | ● |
| | 3) Internal transportation from port of disembarkation to the project site | (●) | (●) |
| 6 | To accord Japanese nationals, whose service may be required in connection with the supply of the products and the services under the verified contract, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work. | | ● |
| 7 | To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imported into the recipient country with respect to the supply of the products and services under the verified contracts. | | ● |
| 8 | To maintain and use properly and effectively the facilities installed and equipment provided under the Grant Aid. | | ● |
| 9 | To bear all the expenses, other than those to be borne by the Grant Aid, necessary for the installation of the facilities as well as for the transportation of the equipment. | | ● |

(B/A: Banking Arrangement, A/P: Authorization to Pay)

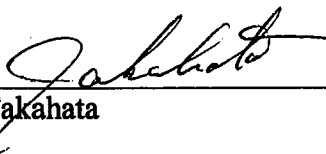
**Minutes of Discussions
on the Basic Design Study
on the Project for Rural Electrification
in the Republic of Ghana
(EXPLANATION ON DRAFT FINAL REPORT)**

In February 2002, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Basic Design Study Team on the project for Rural Electrification (hereinafter referred to as "the Project") to the Republic of Ghana (hereinafter referred to as "Ghana"), and through discussions, field survey, and technical examination of the results in Japan, JICA prepared a draft final report of the study.

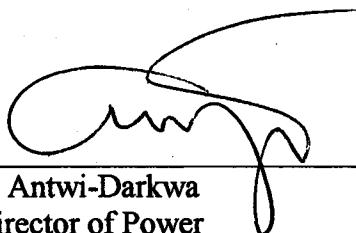
In order to explain and to consult with the officials concerned of the Government of Ghana on the components of the draft final report, JICA sent to Ghana the Basic Design Explanation Team (hereinafter referred to as "the Team"), which was headed by Mr. Tsuneo Takahata, Resident Representative of the JICA Ghana Office, from June 2 to 12, 2002.

As a result of discussions, both sides confirmed the main items described on the attached sheets.

Accra, June 11, 2002



Tsuneo Takahata
Leader
Basic Design Explanation Team
Japan International Cooperation Agency



E. Antwi-Darkwa
Director of Power
Ministry of Energy
Republic of Ghana



M. A. Quist-Therson
Director
External Resource Mobilization (Bilateral)
Ministry of Finance
Republic of Ghana



Stephen Akuoko
Director of Engineering
Electricity Company of Ghana
Republic of Ghana



ATTACHMENT

1. Components of the Draft Report

The Government of Ghana agreed and accepted in principle the components of the draft final report explained by the Team.

2. Japan's Grant Aid Scheme

The Ghanaian side understands the Japan's Grant Aid scheme and the necessary measures to be taken by the Government of Ghana as explained by the Team and described in ANNEX-3 and ANNEX-4 of the Minutes of Discussions signed by both sides on February 14, 2002.

3. Schedule of the Study

JICA will complete the final report in accordance with the confirmed items and send it to the Government of Ghana by September, 2002.

4. Other Relevant Issues

4-1. The Ghanaian side will secure personnel and budget necessary for the Project on condition that the Japan's Grant Aid is extended.

4-2. The Ghanaian side will take all possible measures to secure safety of the concerned people during the study and implementation of the Project on condition that the Japan's Grant Aid is extended.

4-3. The Ghanaian side will take necessary procedures for the land acquisition before the commencement of construction work on condition that the Japan's Grant Aid is extended.

4-4. Both sides agreed with the demarcation of the works as follows, on condition that the Japan's Grant Aid is extended;

(1) the Japanese side

a) Procurement and installation of the equipment and materials for 33kV transmission lines including electrical poles,

b) Procurement of the equipment and materials for 415V/240V distribution lines,

c) Procurement of service drop wires, kWh meters and MCCBs.

(2) the Ghanaian side

a) Procurement of service drop wires, kWh meters and MCCBs.

b) Installation of 415V/240V distribution lines including service drop wires, kWh meters and MCCBs,

c) Procurement and installation of the electrical poles for the distribution lines.

Concerning the above-mentioned service drop wires, kWh meters and MCCBs, the half of the necessary quantity for the target households will be procured in the Japan's Grant Aid and the rest half will be procured by the Ghanaian side.

5. Request by Ghanaian Side

The Ghanaian side requested that electrification in the Amansie West District, which was mentioned in the Draft Report, should be included in the Project, if possible.

APPENDIX 5

**COST ESTIMATION BORNE
BY GHANAIAN SIDE**

Cost Estimation Borne by Ghanian Side (Maintenance Plan for Project Road)

(Total road length :98.2 Km)

1. Routine Inspection

| Facility | Inspection Item | Interval | Number of Staff | Equipment/Material | Days | Budget (US\$) | |
|---|--|-----------------------------------|-----------------|------------------------------------|---------------|---------------|----------|
| <ul style="list-style-type: none"> • Ditches • Culvert crossing road • Pavement • Cut slope • Embankment slope • Bridges • Road marking • Sign boards | Existing of mud, sand, obstacles, etc. | 12 times/year (4 days/round) | 2 persons | Measuring tape, scoop, hammer, bar | 96 persons | 1,920.00 | |
| | Existing of mud, sand, obstacles, etc. | | | | | | |
| | Crack, deformation, potholes, etc. | | | | | | |
| | Collapse, erosion, etc. | | | | | | |
| | Collapse, erosion, etc. | | | | | | |
| | Surface of deck, abutment, pier, river condition | | | | Pick-up truck | 48 units | 1,680.00 |
| | Stain, discolor | | | | | | |
| Damage, deformation, stain, discolor | | | | | Sub-total | 3,600.00 | |

2. Cleaning

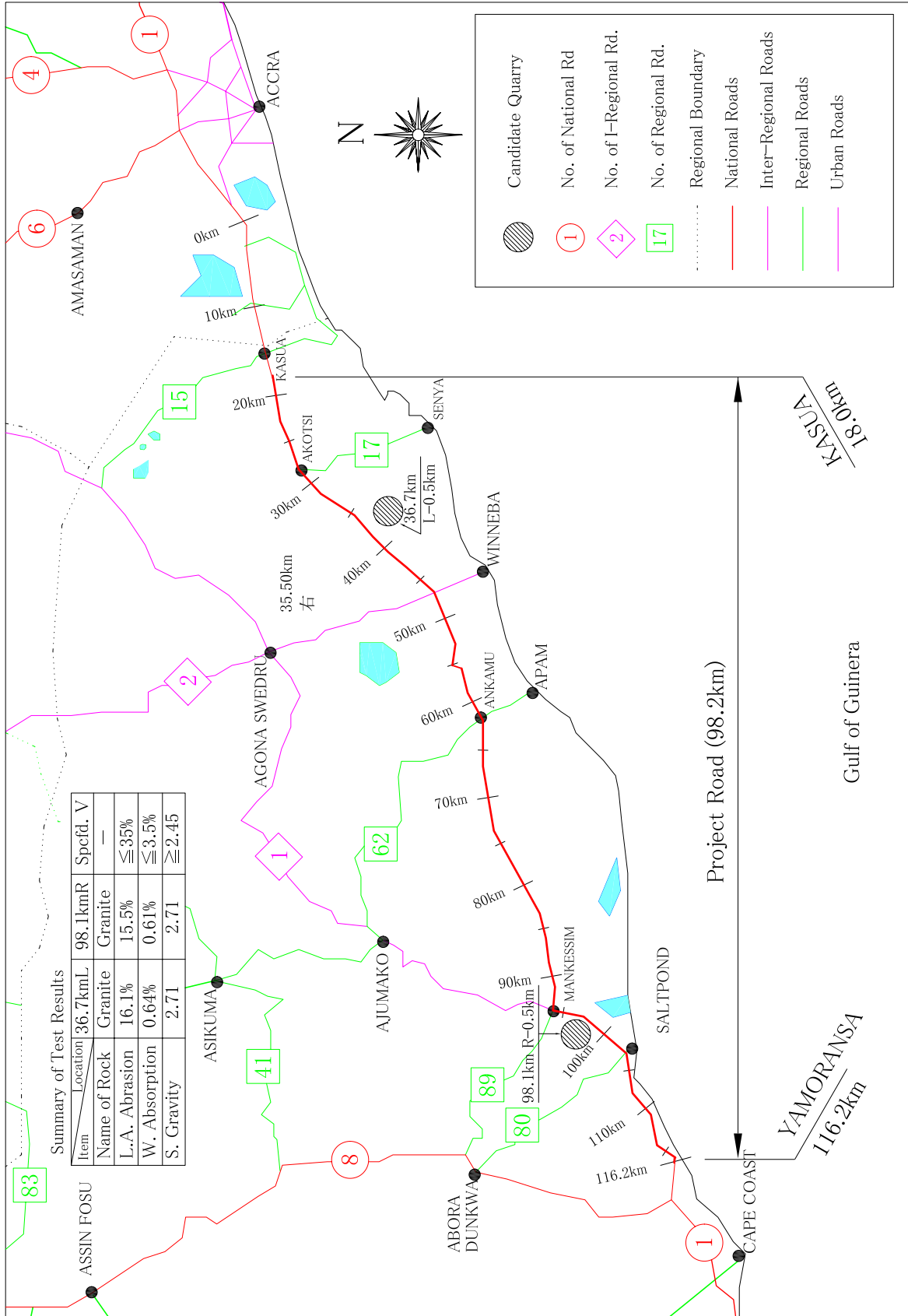
| Facility | Inspection Item | Interval | Number of Staff | Equipment/Material | Days | Budget (US\$) | |
|---|---|----------------------------------|-----------------|-----------------------------|---------------|---------------|----------|
| <ul style="list-style-type: none"> • Ditches • Culvert crossing road • Pavement • Cut slope • Embankment slope • Bridges • Road marking • Sign boards | Removal of deposit of mud, sand, obstacle | 4 times/year (4 days/round) | 5 persons | Scoop, bar brooms hand tool | 80 persons | 800.00 | |
| | | | | | | | |
| | | | | | Pick-up truck | 16 units | 560.00 |
| | | | | | | | |
| | | | | | | Sub-total | 1,360.00 |

3. Repair

| Facility | Inspection Item | Interval | Number of Staff | Equipment/Material | Days | Budget (US\$) | |
|---|---|----------------------------------|-----------------|-------------------------------|-------------------------------------|--|---------------------------|
| <ul style="list-style-type: none"> • Ditches • Culvert crossing road • Pavement • Cut slope • Embankment slope • Bridges • Road marking • Sign boards | Repair of pothole | 4 times/year (21 days/round) | 4 persons | Plate tamper Pick-up truck | 336 persons 84 units 84 units | 3,360.00 420.00 2,940.00 | |
| | Removal of deposit of mud, sand, obstacle | | | | | | |
| | | | | | Base course Asphalts Cement | 40 m3/year 2.0t/year 15bags/year | 800.00 880.00 90.00 |
| | | | | | | | |
| | | | | | | Sub-total | 8,490.00 |
| | | | | | | Grand total : | 13,450.00 |

APPENDIX 6

**SUBGRADE TEST &
MATERIAL INVESTIGATION**



Candidate Quarry & Summary of Test Results

Subgrade Test & Material Investigation

| Chainage | Depth (m) | Material Description | NMC (%) | Specific Gravity (kg/m ³) | Percentage Passing Sieve | | | | | | | Atterberg Limits | | | AASHTO CLASSIFICATION | | Compaction | | Soaked CBR Compactive Effort 95% |
|----------|-----------|----------------------|---------|---------------------------------------|--------------------------|-------|---------|---------|---------|----------|----------|------------------|--------|--------|-----------------------|-------|--------------------------|---------|----------------------------------|
| | | | | | 75 mm | 53 mm | 26.5 mm | 4.75 mm | 2.00 mm | 0.425 mm | 0.075 mm | LL (%) | PL (%) | PI (%) | Group | Index | MDD (Kg/m ³) | OMC (%) | |
| 18+000L | 0.5-1.0 | Silty SAND | 5.2 | 2482 | 100 | 100 | 100 | 96 | 86 | 41 | 9 | 26 | 14 | 12 | A-2-6 | 0 | 2111 | 7.6 | 12 |
| 20+100R | 0.5-1.0 | Silty SAND | 5.9 | 2490 | 100 | 100 | 100 | 94 | 77 | 39 | 22 | 34 | 18 | 16 | A-2-6 | 0 | 2104 | 7.6 | 16 |
| 25+750L | 0.5-1.0 | Silty SAND | 9.6 | 2455 | 100 | 100 | 98 | 88 | 71 | 40 | 21 | 37 | 15 | 22 | A-2-6 | 0 | 2100 | 7.5 | 10 |
| 30+000R | 0.5-1.0 | Gravelly SAND | 4.3 | 2473 | 100 | 96 | 85 | 52 | 35 | 17 | 10 | 36 | 18 | 18 | A-2-6 | 0 | 2100 | 7.8 | 10 |
| 34+750L | 0.5-1.0 | Silty SAND | 7.0 | 2438 | 100 | 100 | 98 | 91 | 77 | 53 | 27 | 26 | 12 | 14 | A-2-6 | 0 | 2170 | 6.1 | 12 |
| 40+000R | 0.5-1.0 | Sandy GRAVEL | 3.4 | 2464 | 100 | 100 | 98 | 78 | 54 | 30 | 13 | 23 | 9 | 14 | A-2-6 | 0 | 2194 | 6.3 | 12 |
| 43+700L | 0.5-1.0 | Silty SAND | 3.6 | 2418 | 100 | 100 | 99 | 95 | 91 | 57 | 24 | 24 | 12 | 12 | A-2-6 | 0 | 2120 | 8.0 | 14 |
| 51+100R | 0.5-1.0 | Silty CLAY | 20.2 | 2260 | 100 | 100 | 100 | 96 | 94 | 92 | 83 | 75 | 21 | 54 | A-6 | 10 | 1722 | 16.8 | 9 |
| 55+000L | 0.5-1.0 | Silty SAND | 7.2 | 2503 | 100 | 97 | 90 | 79 | 72 | 52 | 28 | 34 | 19 | 15 | A-2-6 | 0 | 2166 | 7.8 | 12 |
| 60+000R | 0.5-1.0 | Sandy SILT | 12.9 | 2427 | 100 | 100 | 100 | 87 | 80 | 71 | 55 | 40 | 19 | 21 | A-6 | 8 | 1970 | 9.1 | 12 |
| 64+950L | 0.5-1.0 | Sandy SILT | 8.9 | 2387 | 100 | 99 | 98 | 84 | 78 | 65 | 45 | 39 | 17 | 22 | A-6 | 6 | 2000 | 8.9 | 9 |
| 68+000R | 0.5-1.0 | Sandy SILT | 4.6 | 2421 | 100 | 100 | 99 | 96 | 93 | 82 | 47 | 26 | 12 | 14 | A-6 | 6 | 2010 | 9.2 | 9 |
| 71+100L | 0.5-1.0 | Sandy SILT | 8.5 | 2336 | 100 | 100 | 98 | 91 | 86 | 78 | 49 | 45 | 27 | 18 | A-7-6 | 6 | 1771 | 15.5 | 10 |
| 75+000R | 0.5-1.0 | Sandy SILT | 5.6 | 2432 | 100 | 100 | 99 | 91 | 88 | 79 | 51 | 24 | 13 | 11 | A-6 | 2 | 2020 | 8.5 | 15 |
| 80+000L | 0.5-1.0 | Silty SAND | 8.5 | 2421 | 100 | 100 | 100 | 99 | 98 | 75 | 39 | 33 | 12 | 21 | A-6 | 3 | 2000 | 8.5 | 11 |
| 82+200R | 0.5-1.0 | Silty SAND | 13.1 | 2374 | 100 | 100 | 100 | 95 | 90 | 83 | 75 | 44 | 24 | 20 | A-7-5 | 15 | 1860 | 11 | 9 |
| 85+000L | 0.5-1.0 | Sandy SILT | 12.4 | 2404 | 100 | 100 | 100 | 96 | 95 | 86 | 57 | 33 | 17 | 16 | A-6 | 6 | 2009 | 8.9 | 12 |
| 90+400R | 0.5-1.0 | Sandy SILT | 4.0 | 2461 | 100 | 99 | 94 | 74 | 64 | 55 | 35 | 27 | 11 | 16 | A-2-6 | 1 | 2168 | 8.0 | 10 |
| 95+000L | 0.5-1.0 | Sandy SILT | 17.7 | 2345 | 100 | 100 | 99 | 82 | 75 | 68 | 50 | 53 | 28 | 25 | A-7-5 | 9 | 1883 | 11.0 | 13 |
| 96+200R | 0.5-1.0 | Sandy SILT | 6.0 | 2409 | 100 | 100 | 98 | 83 | 73 | 64 | 37 | 27 | 12 | 15 | A-6 | 1 | 2028 | 8.5 | 9 |
| 99+750L | 0.5-1.0 | Sandy SILT | 12.0 | 2312 | 100 | 100 | 99 | 91 | 87 | 82 | 63 | 52 | 27 | 25 | A-7-6 | 14 | 1780 | 15.0 | 11 |
| 104+500R | 0.5-1.0 | Sandy SILT | 15.8 | 2387 | 100 | 100 | 97 | 75 | 64 | 56 | 38 | 42 | 22 | 20 | A-7-5 | 3 | 1860 | 11.5 | 11 |
| 109+500L | 0.5-1.0 | Sandy SILT | 6.1 | 2366 | 100 | 100 | 95 | 73 | 60 | 49 | 39 | 45 | 23 | 22 | A-7-5 | 4 | 1875 | 12.0 | 13 |
| 113+950R | 0.5-1.0 | Sandy SILT | 10.5 | 2400 | 100 | 100 | 100 | 96 | 95 | 83 | 32 | 67 | 22 | 45 | A-2-7 | 6 | 1940 | 10.5 | 9 |
| 116+100L | 0.5-1.0 | Silty SAND | 12.2 | 2406 | 100 | 100 | 98 | 78 | 48 | 34 | 25 | 51 | 23 | 28 | A-2-7 | 0 | 1956 | 10.6 | 11 |