2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

(1) Basic Policy

1) Japan's Grant Aid Policy

Since it is planned to implement the Project with Japanese Grant Aid, the following will need to be taken into consideration:

- Local resources, including manpower and materials, should be maximized in order to promote the creation of jobs, promote technical transfer and revitalize the local economy of Ethiopia.
- It is necessary for the Ethiopian Government (the Client), the Consultant and the Contractor to stay in close with each other to ensure smooth implementation of the Project.

2) Basic Policy on Implementation of Road Rehabilitation

Road rehabilitation work should be implemented in consideration of the characteristics of the Project road and its surrounding natural conditions.

- Lane-by-lane work execution to allow traffic to pass by will be applied as there is no space to establish a temporary road.
- It is vital to consider rainfall characteristics and the timing of the rainy season, which is from mid-June to mid-September, in order to plan a construction schedule that is efficient and effective.
- Mitigation measures will be implemented to reduce potential adverse impacts in accordance with the Environmental Management Plan for the Project.
- Major materials, such as crushed stone and asphalt mixture, are to be produced on site with plants procured by the contractor, since it is difficult to purchase these materials near the site.

3) Basic Policy on New Abay Bridge

New Abay Bridge construction is to be undertaken in consideration of the characteristics the new bridge and its surrounding natural conditions.

- A temporary access road and platform for pier construction should be provided prior to all works.
- Pier work up to the estimated high water level mark has to be completed by the beginning of the rainy season. Accordingly, it is important to carefully manage the schedule for all work items in order to be completed before the rainy season.
- Parallel work for the two piers and girder construction work applying the cantilever method are required to shorten construction time. Accordingly, it is vital to procure the necessary materials, equipment, and manpower on time, as well as to ensure work safety on site.

(2) Construction Schedule

The Project consists of preparation work, earthwork, drainage work, pavement work, slope protection work, safety facility work and cleaning-up work for road rehabilitation. It is assumed that construction work will commence in September 2005 and be completed in November 2008, or a total of 39 months.

On the one hand, it is assumed that the construction of the new Abay Bridge will require approximately 39 months. In the rainy season from mid-June to mid-September, it will be difficult to continue with earthwork, pavement work and drainage work. On the other hand, stone crushing and fabrication work for pre-cast ditches and pipe culverts, as well as pier construction and cast-in-place girder fabrication work will continue.

(3) Construction Method

1) Work Flow

The overall workflow for both new Abay Bridge construction and road rehabilitation work is as shown in Figure 2.2.15.

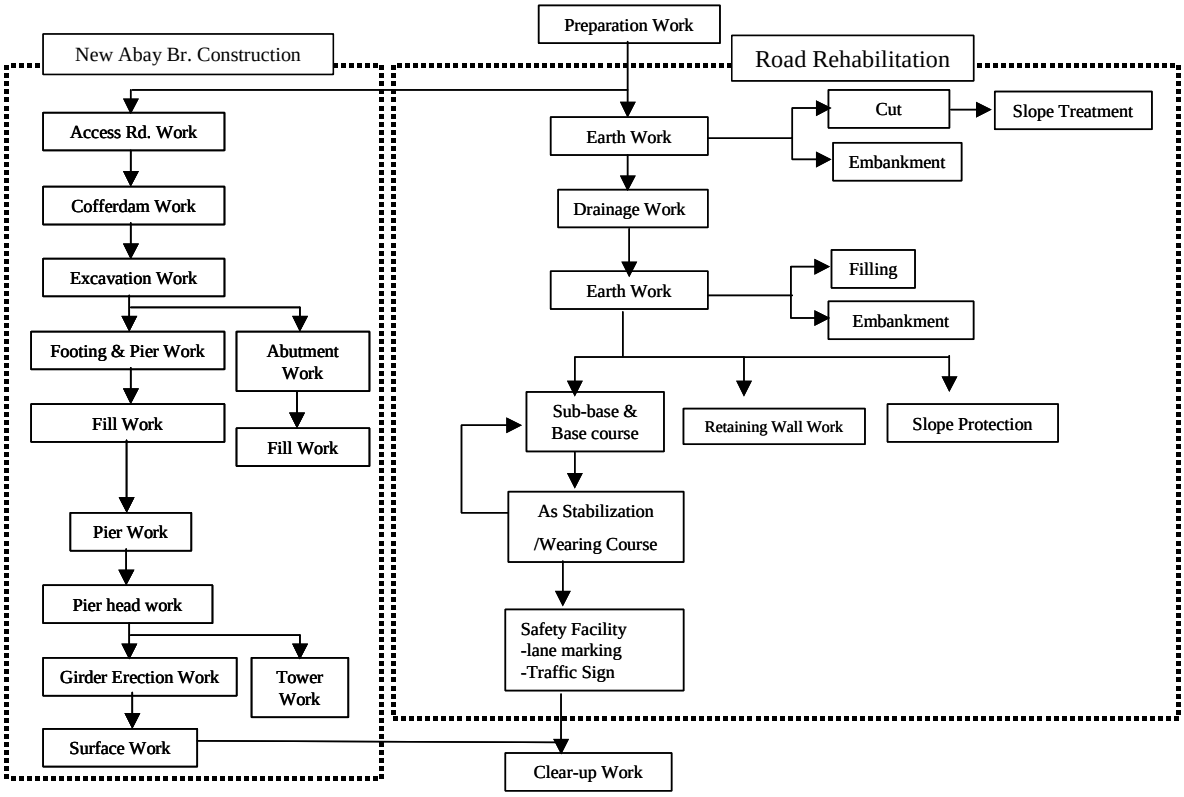


Figure 2.2.15 Whole Work Flow for Project

2) Road Rehabilitation Work

a) Earth Work

I. Cut work: Rock Excavation

It is necessary to minimize slope cutting when widening the existing road to meet the typical cross-section planned. Site investigations identified the places of both hard and soft rock excavation as shown in the table below.

	Goha Tsiyon-Abay Br.	Abay Br.- Dejen	Slope Gradient for Cut
Hard Rock	No. 2+200～No. 2+800	No.34+100～No34+800	1:0.6～0.8
Soft Rock	No.12+800～No.13+500 No.13+975～No.14+025 No.19+400～No.19+700		1:0.6～0.8

II. Embankment Work: A section improving horizontal alignment at No.3+200

The section around No.3+200 has been identified as requiring improvement to its horizontal alignment due to the existing sharp curve and occurrence of landslides. The horizontal alignment of this section was once improved. However, since the previous fill material and compaction were of low quality, all existing materials should be removed temporally and a drainage pipe installed on the original ground and the embankment re-built by careful compaction work using the old materials. Note that an upper layer for the sub-grade should be built with high quality borrow materials.

III. Improving Vertical Alignment

Cut and fill work on the existing road surface is required as a countermeasure to improve steep gradients of more than 10% and heaving surfaces. Cut materials are re-used as fill materials to improve vertical alignments.

b) Drainage Work

Pre-cast ditches and pipe culverts are to be manufactured at a temporary yard near the concrete mixing plant to ensure quality of production as well as to shorten construction time. Pre-cast drainage facilities are to be stored and transported to site as required.

Since many transverse drainage facilities are to be replaced, temporary bridge crossings over excavation points for drainage work should be provided in order to avoid adverse impacts on traffic flows.

Ditch work will start after earthwork to improve vertical alignments prior to sub-base work by installing fabricated pre-cast ditches. Ditches made of stones with concrete are planned for Dejen Town in order to maximize the usage of local materials.

c) Pavement Work

The basic policy on pavement work is as follows:

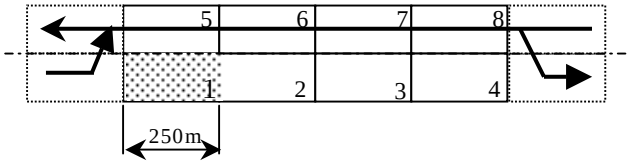
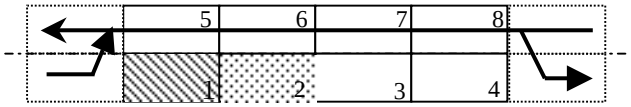
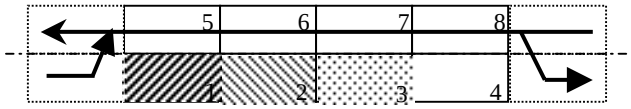
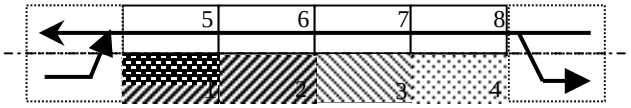
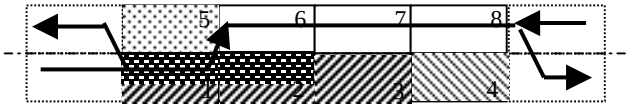
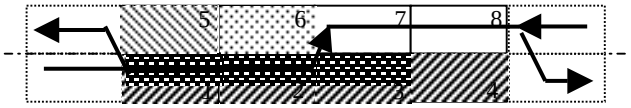
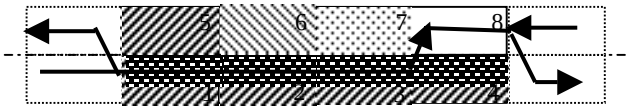
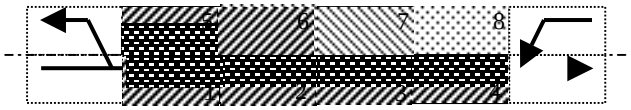
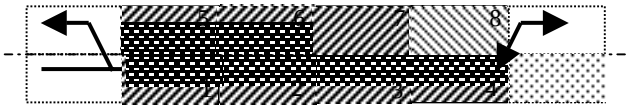
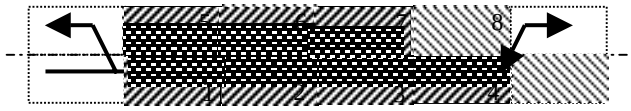
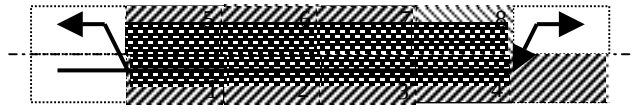
- Lane-by-lane work execution to allow traffic to pass by will be applied as there is no space to establish a temporary road.
- In Dejen Town, since a detour route can be provided at most sections, both lanes of the Project road can be reconstructed at same time with the provision of a detour route.

I. Construction Method for Straight and Gentle Curved Sections

The work procedure for pavement work is as shown in Table 2.2.40. This work procedure is efficient and considers the capacity of paving equipment, as well as ensures work safety.

- Taking into consideration the capacity of major paving equipment (i.e. leveling of sub-grade: 1580m^2/day, sub-base and base course work: 1110m^2/day, surfacing work: 1900m^2/day), the entire road length is divided into approximately 1km sections with each section divided into 8 blocks approximately 250m in length.
- One kilometer will be the maximum work length in order to appropriately control traffic flows.
- Three equipment teams (R1, R2, and R3) for sub-base and base-course work and one team (P1) for paving equipment is to created in consideration of pavement structure and work efficiency.

Table 2.2.40 Work Procedure for Paving

Step	Work Content	Conceptual Image
Step 1 (Day 1)	-1st layer work of Sub-base at BLK1 by R1 team	
Step 2 (Day 2)	-1st layer work of base course at BLK1 by R2 -Sub-base work at BLK2 by R2	
Step 3 (Day 3)	-2nd layer of BC at BLK1by R3 -1st layer of BC at BLK2 by R2 -Sub-base work at BLK3 by R1	
Step 4 (Day 4)	- As stabilization & WC at BLK1 by P1 - 2nd layer of BC at BLK2 by R3 -1st layer of BC at BLK3 by R2 -Sub-base work at BLK4 by R1	
Step 5 (Day 5)	- As stabilization & WC at BLK2 by P1 - 2nd layer of BC at BLK3 by R3 -1st layer of BC at BLK4 by R2 -Sub-base work at BLK5 by R1	
Step 6 (Day 6)	- As stabilization & WC at BLK3 by P1 - 2nd layer of BC at BLK 4 by R3 -1st layer of BC at BLK 5 by R2 -Sub-base work at BLK 6 by R1	
Step 7 (Day 7)	- As stabilization & WC at BLK4 by P1 - 2nd layer of BC at BLK 5by R3 -1st layer of BC at BLK 6 by R2 -Sub-base work at BLK 7 by R1	
Step 8 (Day 8)	- As stabilization & WC at BLK5 by P1 - 2nd layer of BC at BLK 6 by R3 -1st layer of BC at BLK7 by R2 -Sub-base work at BLK8 by R1	
Step 9 (Day 9)	- As stabilization & WC at BLK6 by P1 - 2nd layer of BC at BLK7 by R3 -1st layer of BC at BLK8 by R2 -Sub-base work at Sec 2 BLK9 by R1	
Step 10 (Day 10)	- As stabilization & WC at BLK7 by P1 - 2nd layer of BC at BLK8 by R3 -1st layer of BC at Sec2BLK by R2 -Sub-base work at Sec 2 BLK9 by R1	
Step 11 (Day 11)	- As stabilization & WC at BLK8 by P1 - 2nd layer of BC at Sec2BLK1 by R3 -1st layer of BC at Sec2BLK2 by R2 -Sub-base work at Sec 2 BLK3 by R1	

Legend

：Sub-base Work　　：First Layer of Base course Work

：Second Layer of BC Work　　：As Stabilization & Wearing Course Work

WC: Wearing Course　　BC: Base Course

：Traffic Control during Construction

II. Work Procedure at Sharp Curves

Taking into consideration the difficulty of using normal paving equipment, the following work procedure and method will be applied at sharp curves with a curvature radius of less than 50m.

- Heavy paving equipment is not applicable for sharp curves. Accordingly, paving work will be carried out manually with a vibrating roller with a 3-4 ton capacity.
- Same construction method and procedure is applied to the pavement work for the outer lane.

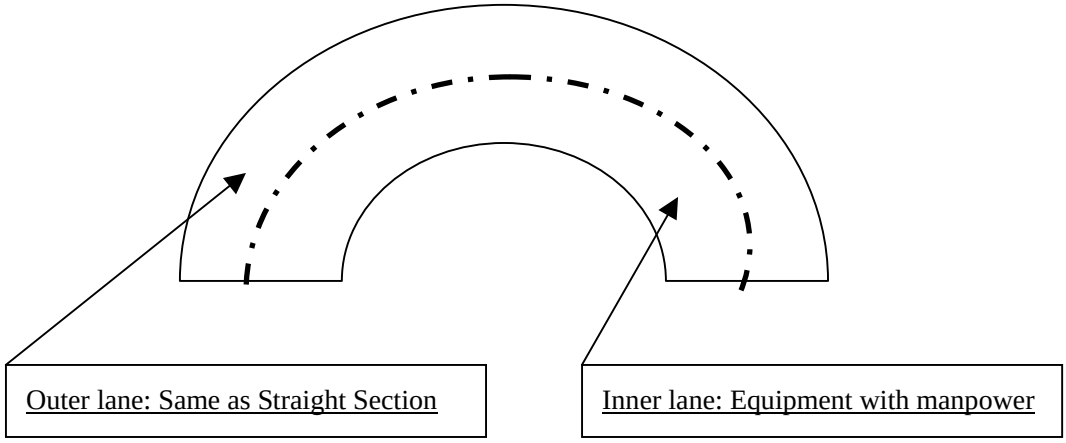


Figure 2.2.16 Construction Method for Sharp Curves

III. Shoulder Pavement

Both shoulders will be sealed with a double bituminous surface treatment to avoid erosion from rainfall and its surface flow.

d) Slope Protection Work

I. Removal of Rock

Rock identified as likely to fall in the near future shall be removed using a static crushing method. This work will be done in parallel with the earthworks.

II. Retaining Walls

A retaining wall will be built at places where there are debris flows and rock falls in order to protect the road. Retaining walls will be built with local stones and concrete.

e) Safety Facilities

After completion of pavement work, work on safety facilities work such as guard posts, traffic signs, marking lines is to be conducted. Such works should be divided into two periods, after completion of the Goha Tsiyon and Abay Bridge section and after completion of the Abay Bridge and Dejen section.

3) New Abay Bridge Construction

a) Provision of Temporary Access Road

A temporary access road is to be provided for P1 and P2 pier construction on both banks of the Abay River. These temporary roads offer access to a temporary platform on the left riverbank and to a construction yard on the right riverbank. The platform and construction yard are to be used for construction work that includes foundation, pier and superstructure work. After completion of the superstructure work, the land for the access roads will be restored using filling materials to its original condition.

b) Temporary Platform and Cofferdam with Sheet Piles

Temporary platforms are to be built in parallel on both banks of the river for pier and superstructure work after completion of the access roads. A vibrating hammer with water-jet equipment is planned for installing sheet piles into soft bedrock. Since those platforms will remain during the rainy season, their height will be set higher than the high water level mark of +1,031.7m (or + 1032.0m).

c) Foundation and Substructure Work

An open excavation method will be applied to the A1 abutment and the P1 and A2 piers. Bedrock is to be excavated by hand. Since those works are not on the critical path for all work, they can proceed without consideration to other works.

Excavation and concrete work for the P2 and P3 piers will be done in a narrow and limited space within a cofferdam. Accordingly, rigorous safety and schedule control is required. The work procedure after setting the sheet piles for cofferdam is described below.

- Excavation will be by clam shell and struts and walling set down to the necessary depth.
- Place leveling concrete, fabricate and set reinforcement and formwork after cleaning up the surface of the bedrock.
- Place footing concrete and pier construction up to the high water level.
- Remove a part of the platform and re-install to another position on both the left and right riverbanks after completion of pier work up to the high water level.
- Execute pier work from high water level mark.

Rainfall information should be carefully collected, particularly in the rainy season, in order to ensure foundation and pier work safety.

d) Superstructure Work

A crawler crane will be located at the platforms on both banks in order to carry materials such as steel for temporary work for superstructure, with platform height at 12m in order to construct column heads. A pre-stressing bar for pier heads, the anchorage of bridge-staying cables, a horizontal pre-stressing wire for slab and crossbeams, and a pre-stressing wire for girders are to be procured for the pre-stressing work of the superstructure. Note that diagonal cable setting work is one of the most important tasks in superstructure construction. Cables set at the main tower are anchored at the main girders with the one-side tensioning method. After that, a polyester protection pipe is installed to cover the bridge-staying cable and grout injected into the pipe. Grouting work needs careful quality control since the structure will essentially expose the bridge-staying cables to the outside and it could affect the future quality of the bridge. The following procedures will be required for superstructure work:

- Fabrication of travelers after pier headwork to conduct girder erection work with the cantilever method.
- Building of the main towers, setting of diagonal bridge-staying cables and girder fabrication with the cantilever method.
- Closing of side span portion, center span portion and dismantling of travelers.

Bridge accessory work, including surfacing, handrail setting, and expansion joint setting, is undertaken after girder erection work.

(4) Utilization of Local Construction Industry

1) Consultants

There are only a few private consultants that possess the technical capability and human resources to implement a large-scale project. Moreover, most civil engineers are employed in the public sector in Ethiopia. It will be necessary therefore to recruit engineers with the necessary experience for the Project.

2) Contractor

As mentioned in 2-2-1 (1) 4) and 2-2-1 (2) 3), there are few local contractors who have experience with large-scale pavement work using hot mixed asphalt. On the other hand, some contractors have experience with small-scale pavement work using cold mixed asphalt. In the Phase I and II road projects, a Japanese contractor utilized local contractor only as a supplier of materials and manpower. Moreover, as for bridge projects, there has been only one large-scale project in recent years in Ethiopia and some small-scale repair work.

In keeping with the principles of Japanese Grant Aid, local human resources will be utilized in order to promote technology transfer to Ethiopian local contractors.

(5) Dispatch of Technician and Engineer from Japan

Except for hot mixed asphalt pavement work and rock excavation via blasting, the road rehabilitation portion of the Project consists of general roadwork that has been previously undertaken in Ethiopia. Accordingly, pavement engineers with experience in pavement equipment and plant operation will be dispatched from Japan in addition to an experienced blasting technician in order to ensure the safety, quality and schedule management of the Project.

On the other hand, platform work in the river and girder erection work are very

important in the bridge construction portion of the project. Technicians for such works are key personnel for ensuring the smooth implementation of the Project. These key technicians will be dispatched from Japan in order to ensure the smooth and safe progress of the Project as well as to facilitate technology transfer to Ethiopian technicians and engineers.

(6) Implementation Agency

ERA will be the implementation agency of the Project, and the Contract and Administration Division of ERA has experience with international projects and is staffed with many engineers.

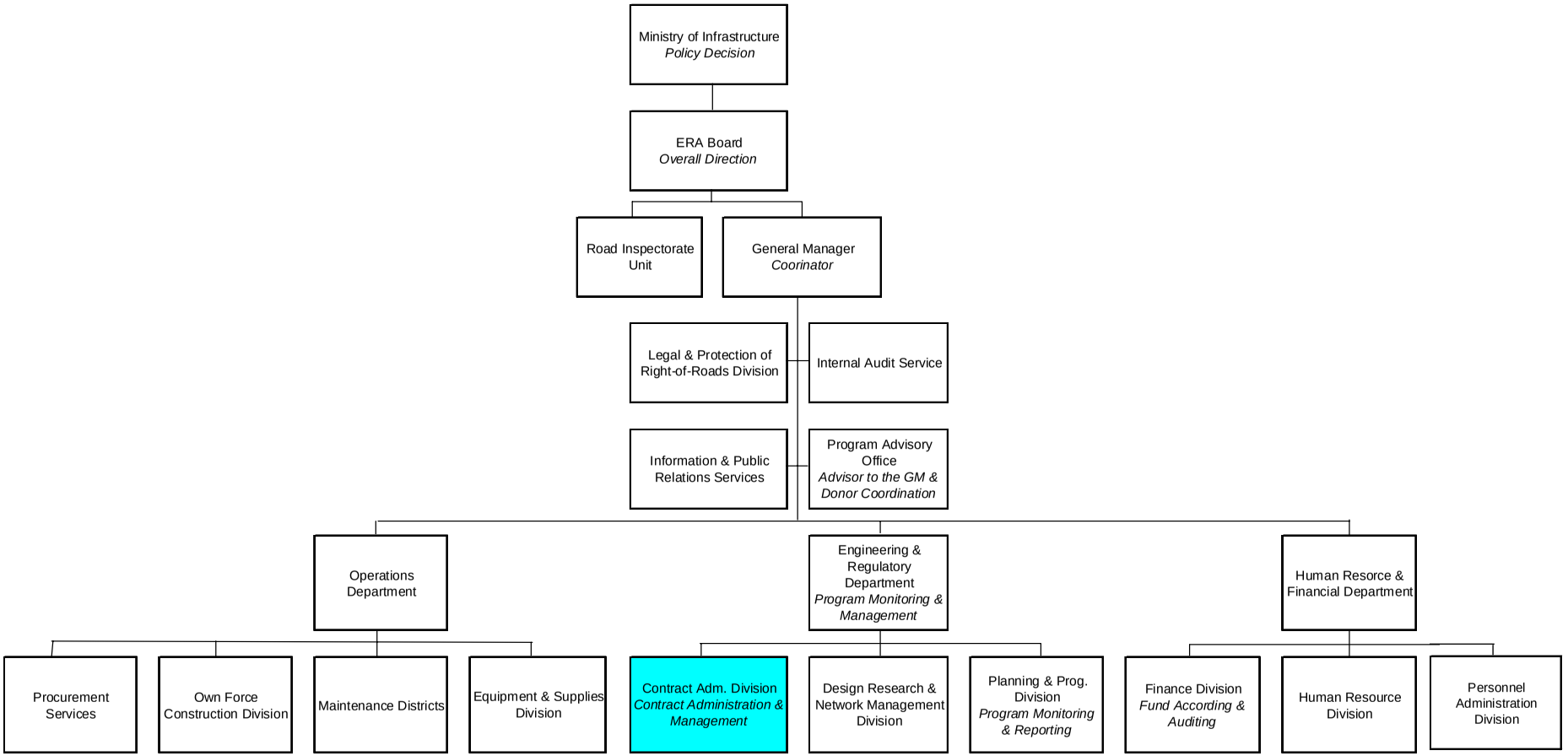


Figure 2.2.17 Organizational Chart of ERA

2-2-4-2 Implementation Conditions

(1) Timely Procurement

All materials and machinery imported from outside of the country will be transported from Djibouti over a 970 km inland route since Ethiopia is a landlocked country. Given past experience, this process takes approximately 2 months, meaning that it will require around four months for materials and machinery to be procured from Japan. Since primary machinery, equipment and plants for crushing stones, and asphalt mixing and concrete mixing equipment are planned to be procured from Japan, smooth customs clearance is required to ensure the timely implementation of the Project.

(2) The Rainy Season and Implementation Schedule

The rainy season lasts from mid-June to mid-September in the Project area. It is vital to efficiently utilize the first dry season, since the Project is to commence in September of 2005. Utilization of local resources, including equipment, is a key element for achieving this purpose. Furthermore, production of crushed stone and pre-cast pipe culverts should continue during the rainy season to facilitate the progress of the Project.

(3) Relocation of Public Facilities Affecting Project Implementation

Electric and telephone poles need to be relocated for the road rehabilitation work in Dejen Town (exclusive of the valley section). Table 2.2.41 shows the list of public facilities to be relocated.

Table 2.2.41 List of Public Facilities to be Relocated

Items	Quality	Remarks
Wall of houses	5	Set-back
Electric poles	85	Relocation
Telephone poles	36	Relocation

(4) Ensuring Construction Yards include Plants and Camp

Since this is a large-scale project comprising road rehabilitation and new bridge construction, large-construction yards are required to accommodate plants, camps and construction yards. However, it is difficult to secure the land for this due to a lack of flat lands in the valley area. Therefore, construction yards will be set up separately by purpose. Also, close cooperation with the ERA is required to obtain the consent and cooperation of local people in finding sufficient space for the construction yards. Table 2.2.42 shows the candidate places for construction yards by purpose.

Table2.2.42 Candidate Locations for Camp, Office and Construction Yards

Usage	Candidate Locations	Remarks
Camp & Site Office	Goha Tsiyon Town	
Camp for local labors	Dejen	During Abay Br. To Dejen Sec.
Yard for bridge construction	Left bank of Abay River	Concrete plant/ formwork & re-bar processing yard/stores/site office
Yard for road rehabilitation 1	Filklik village	Crushing plant/Asphalt mixing plant/ office
Yard for road rehabilitation 2	Dejen	Crushing plant

(5) Platform Level and the High Water Level Mark

Pier and superstructure work will continue during the rainy season. Note that the water level sometimes rises around 10m as compared to the dry season. Accordingly, it is important to set platform level at 1032m, including a one meter freeboard from the high water level. In addition, the structural safety of the platform should be checked after every rainy season.

(6) Consideration of Spring Water along the Study Road

Site investigations found that there are several spring water spots along the road. Local people usually use these spots, particularly in the section between the Abay Bridge and Dejen. Since water sources are limited in the valley road section, it is important that construction work not pollute spring water and should be monitored during construction.

(7) Recovery of Areas Utilized as Construction Yards

Plants and trees will be removed from around piers during construction. These areas will be restored to their original natural environment after construction.

2-2-4-3 Scope of Works

All construction works for road rehabilitation and new Abay Bridge construction will be executed by the Japanese side. The Ethiopian side has the responsibility of relocating public utilities, including telephone and electric poles and the setting back of some of the walls in Dejen town, before the commencement of the Project.

2-2-4-4 Consultant Supervision

In the detailed design consulting service contract, the consultant is to execute the road and bridge detailed design and prepare the tender documents. The road design work also includes countermeasures for pavement, drainage, landslides, etc. During construction, the consultant will dispatch two Japanese resident supervisors and two temporary staff to supervise and guide pavement/superstructure work for the New Bridge on site. The job assignments for the main staff are described below.

(1) Detailed Design and Preparation of Tender Documents

- Project manager	General affairs related to detailed design and contract documentation
- Road engineer (1)	Design of pavement, drainage and traffic safety facilities
- Road engineer (2)	Design of landslide and slope stability measures
- Bridge engineer	Design of the New Bridge including its foundation, substructure, and superstructure
- Environmental engineer	Investigation of environmental issues
- Tender documents engineer	Preparation of tender and contract documents, and execution of bidding and contracts

The detailed design contains the design drawing and quantity calculation.

(2) Supervision

- Project manager	General affairs related to bidding and supervision as a whole
- Resident engineer	Two supervision engineers will be resident on the site from commencement to completion of construction, and will be responsible for technical duties such as construction quality, procurement, process and safety management. One resident engineer will be in charge of road work and another one of bridge work.
- Pavement engineer	In charge of quality control in the initial stages of pavement work
- Bridge engineer	In charge of quality control (cable tension control and girder configuration control) and safety management in the cable erection of the new bridge

The following are important supervisory points for the Project:

- Road work	- Accuracy of road vertical curves
	- Quality of pavement
	- Securing of traffic and job safety during lane-by-lane rehabilitation work
- Bridge work	- Foundation work
	- Cantilever construction work of superstructure during erection and tensioning of PC wire and cables
	- Securing of safety during work in high places

2-2-4-5 Procurement Plan

(1) Human Resources of the Construction Industry

1) General

Since many road rehabilitation projects, including trunk and rural roads, are being carried out, there is high demand for human resources such as engineers, technicians and labors in the construction industry. Moreover, since it is difficult to employ experienced technicians such as carpenters, electricians and plasterers near the Project sites, they should be employed in Addis Ababa in addition to the foremen and

machinery operators. However, it is difficult to employ technicians in Ethiopia who have experience in bridge construction, particularly pre-stressed concrete bridge construction. These technicians can be dispatched from Japan or a third country in order to promote technological transfer.

2) Engineers

Around 250 engineers graduate from the civil engineering department of the four major universities and half of those take jobs in the public sector. Most students from these universities have already acquired basic technical skills and a high level of English language capability. Therefore, what they need most it seems is the opportunity for project and site experience.

3) Laborers from Third Countries

There are few technicians and construction laborers from third countries in Ethiopia because such labors are locally available. However, some foreign construction companies employ plant operators or foremen for large-scale projects from a third country.

4) Labor Law of Ethiopia

General employment conditions are stipulated in the Labor Proclamation enacted in 1993 and the contractor has to comply with this law in the Project.

(2) Construction Equipment and Machinery

1) General

Since 1991, only the public sector has possesses construction machinery for rehabilitation and maintenance works because major contractors were temporarily banished from the country. After the establishment of RSDP in 1997, several construction companies have been founded and started to own construction machinery and equipment. However, foreign contractors have undertaken major road rehabilitation projects and it is still difficult to procure major pavement machinery and equipment in the local market. In addition, although the local offices of ERA possess pavement machinery and equipment for maintenance purpose, most of these are out of order due

to obsolescence and the lack of spare parts.

On the other hand, the leasing business for construction machinery has grown because of the high demand for construction machinery and equipment.

2) Construction Machinery, Equipment and Plants Owned by ERA

All construction related equipment, machinery and plants have been owned by the 10 regional offices of ERA. However, this equipment and machinery is for the most part old and out of order. Accordingly, it will be difficult to have ERA lend equipment and machinery to the Project.

3) Possibility of Procuring Construction Machinery and Equipment in the Local Market

Some large domestic construction companies possess a limited number of machinery and equipment for their own work, but are not equipped to carry out asphalt pavement work with hot mixed materials and machinery for bridge construction. Moreover, since there are many road projects in Ethiopia at present, they are involved with those projects. Therefore, it will be difficult to procure machinery and equipment from these domestic companies.

The procurement of machinery and equipment is generally undertaken in compliance with lease prices set by ERA. On the other hand, the leasing business of the construction machinery has just started to grow in Ethiopia because of its infrastructure projects. A few companies such as RIES Engineering have started a repair and maintenance business. They plan to increase machinery for leasing in the near future. However, most of the equipment and machinery owned by lease companies at present is old and there is a risk of borrowing such machinery for Project work.

4) Construction Equipment and Machinery Owned by Foreign Companies

Vernaro is the only foreign contractor registered in Ethiopia and is expanding its business in architecture and civil engineering. They own construction machinery and equipment for road works and some are available for use.

Machinery and equipment owned by foreign contractors who are engaged in road projects are subject to re-exporting such machinery and equipment from the country after completion of a project. Therefore, this machinery cannot be made available for the Project.

5) Construction Machinery and Equipment to be Procured Outside of Ethiopia

In consideration of the procurement conditions of the local market in construction machinery and equipment, several types of machinery will be procured from other countries taking into consideration quality, the construction schedule, and the quantity of procurement. The list below shows the major machinery for the Project, its candidate procurement source, and the criteria for determining the procurement source.

Table 2.2.43 Procurement List of Major Construction Machinery for the Project

Criteria to Determine Procurement Source	Type of Machinery	Procurement Source
1.Relatively easy to procure from the local market and its condition will not affect work quality and schedule	Back hoe(0.8m3/0.45m3 Dozer (21 &32ton) Tractor shovel Damp truck Wheel crane with up to 25ton	Local
2. Machinery for major work items to determine the quality and schedule of the Project	Crawler drill Grader Tire roller Load roller Vibrating roller with 3-4ton Asphalt Finisher Damp Track for crushing stone transportation Asphalt mixture plant Crushing plant Concrete mixing plant Generator for plants	Third countries or Japan
3 Difficult to procure locally	Giant Breaker for rock excavation Concrete mixing truck Crawler crane with more than 25 tons	Third country or Japan

6) Maintenance of Machinery

It is important to maintain construction machinery and equipment in good condition, since this will affect the success of the Project. Fuel and oil will be imported into

Ethiopia and a storage facility will be required on site in order to ensure a stable supply.

The availability of spare parts is also a key component to ensuring work quality and the smooth implementation of the schedule. When using leased equipment and machinery, the availability of spare parts should be confirmed.

Finally, daily maintenance is also vital for keeping machinery in good condition. Note that the altitude of the site is located 2,500m above sea level, which can result in inefficient engine operation.

(3) Construction Materials

1) General

Since the Project comprises road rehabilitation and new bridge construction, the procurement source of major materials for both works will be carefully checked to ensure sufficient quantity and quality. Table 2.2.44 shows the major materials for the Project.

2) Cement

There are two major cement factories in Ethiopia and all cement for other road projects has been locally procured. A contractor that has been involved in these road projects stated that there was a problem with quality however when producing high strength concrete of more than 35Mpa. Consequently, it is necessary to check the quality of cement at the procurement stage, particularly for pre-stressed concrete for the bridge construction. There should be no problem in terms of supply.

3) Concrete

There is no supply of ready-mixed concrete near site. A concrete mixing plant therefore has to be procured from outside of the country for the Project, particularly for bridgework.

4) Asphalt Mixture

There is no supplier of hot asphalt mixture in Ethiopia and it has been produced on a project basis. However, cold mixed asphalt has been commonly utilized for maintenance purposes in Ethiopia.

5) Bituminous Materials

Bituminous materials are imported from Middle East countries.

6) Steel Production and PC Cables

Some Ethiopian companies produce reinforcement materials. However, a contractor that was interviewed noted that there were some problems in processing thick reinforcement more than 25 mm in diameter. Cracks have sometimes been found in processed work. Accordingly, reinforcement for important structures such as girders and piers should be procured from a third country.

Other structural steel should be also be procured from a third country due to the lack of local production. Furthermore, PC cables will have to be procured from outside the country because they are not available in the local market.

7) Concrete Aggregate and Sub-base and Base Course Materials

The contractor should produce coarse aggregate, sub-base and base course materials with a crushing plant and materials should be transported from a local quarry nearby. Note that site surveys confirmed that there is a sufficient quantity of basalt stone in quarries for the captioned materials.

Sand for the fine aggregate of concrete is not available from the Abay River, since it contains very fine particles and black cotton soil that is unsuitable for fine aggregate. Accordingly, sand should be produced from sand stone available near No.17+200. That sand has been used by a local maintenance team belonging to the Aremgana Office of ERA. For this sand production, a crushing plan will be required on site.

8) Wood Materials

Wood such as plywood for formwork is expensive in Ethiopia due to its scarcity. Therefore, steel is commonly utilized for formworks in infrastructure projects.

9) Other Production and Materials

It is necessary to produce pre-cast concrete facilities such as pipe culverts on site due to the high cost of transporting these facilities from Addis Ababa.

Table 2.2.44 Procurement Sources of Major Materials

Name	Locally Procured	Procured from Japan	Procured from Third Country	Remarks
Cement	○			
Concrete admixture		○		
Reinforcement	○	○		Thick diameter type available from Japan
Pre-stressing wires & bar		○		
Staying Cable		○		
Bituminous materials			○	Middle East Country
Forms	○	○		
Formwork & scaffolding		○	○	
Expansion joints		○		
Bearings		○		

2-2-4-6 Quality Control Plan

Quality control of construction exerts considerable influence on the method of construction, safety, and durability of the structure. Therefore, adequate quality control is essential for each stage of construction.

Basically, Ethiopia has road and bridge design standards based on the AASHTO and British Standard. However, standards have not been regulated adequately concerning quality control as Ethiopian Standards. Therefore, Japanese and American control standards and testing method will be conformed in this project.

(1) Quality Control

Quality control items of major construction works are summarized below.

1) Earth Works

The section around No.3+200 has been identified as requiring improvement to its horizontal alignment. However, since the previous fill material and compaction were of low quality, all existing materials should be removed temporally and a drainage pipe installed on the original ground and the embankment re-built by careful compaction work using the old materials. Note that an upper layer for the sub-grade should be built with high quality borrow materials.

2) Pavement Works

Basically, asphalt surface course (t = 5cm) is adopted at carriageway. However, an asphalt stabilization layer shall be added on sections with a steep gradient (8% or more) and at sharp curves (R<50m). Road shoulder shall be simply paved (DBST).

3) Concrete Structures

As there is no concrete plant available in the neighborhood for the construction, a temporary concrete plant will be transported onto the site. Materials will be stored in a temporary stockyard, and an appropriate storage method must be established to prevent them from exposure from rainwater.

4) Reinforced Bars, Forms, and PC Cables

Reinforced bars (D<25mm) and materials of wooden form are available in Ethiopia. Thick bars (D>25mm), materials of metal form and PC cables shall be imported from Japan. It is essential to store this steel in adequate stockyard for protection form rusting and mud adhesion.

5) Pre-stressing of PC Cable

Supervision of pre-stressing of PC cable is an important control item to ensure the specified structural performance of PC concrete structures. PC cable must be prepared in the presence of consultant engineers. This includes the supervision of pre-stressing equipment.

6) PC Grouting

PC grouting is an important work to prevent rusting of pre-stressed steel. Thorough supervision is essential to ensure correct filling.

6) Staying Cable

The installation of staying cable to the bridge, control of tension in the cable, and grouting are important works in the construction of an extradosed type of bridge. Therefore, all of those works shall be implemented in the presence of a consulting engineer(s).

Table 2.2.45 Quality Control Method (1/2)

Type of Work	Item Concerned	Inspection, Testing, etc.	Frequency of Inspection/Testing
1) Earth Works Filling, base course, backfilling soil of structures	Material	Soil test of embankment materials - Specific gravity of soil particles - Soil water content - Particle size of soil - Liquid, plastic limits of soil - Soil compaction -Dry density - CBR test	Before implementation
	Daily Management	Embankment construction test - Control of compaction density（sand replacement method, etc.）	Immediately after implementation Once a day for each implementation layer
2) Pavement Asphalt surface course Asphalt stabilization layer DBST	Material	Test of asphalt mixture - Marshall test - Wheel tracking test Asphalt emulsifier test - Ordinary physical test (mill sheet) - Specific gravity	Before implementation
	Daily Management	Surface course/As Stabilization layer - Sieve analysis of filler - Water content test of filler - Sieve analysis if cold/hot aggregate - Temperature test of asphalt mixture - Marshall test - Content of asphalt - Grading aggregates - Wheel tracking test - Degree od compaction - in-situ permeability test Spray amount inspection - Spray amount inspection	At implementation: Once a day for each implementation layer
3) Concrete Structures	Batching Plant	Weighing equipment, mixing efficiency - Static load test - Weighing controller - Dynamic load test - Mixing efficiency	Before implementation, monthly（every three months in the case of dynamic load）
	Materials	Cement, water - Checked by means of standard certificate Fine and coarse aggregate tests - Particle size - Specific gravity - Water absorption - Unit weight - Durability - Alkali-aggregate reaction	Before implementation and after change of materials
	Concrete standard test	Test mixing made to determine the mix proportion - Slump - Air content - Temperature - Strength of test piece	Before implementation
	Daily Management	Fresh concrete - Air content - Slump - Temperature	Initial consecutive five units. Subsequently, every $50m^3$ and at preparation of sample
		Concrete casting method - Casting method - Consolidation - Order of Placing - Curing method - Curing method - Removal Laitance	Witness inspection at placement
		Concrete sample - Sample compressive strength test - Preparation of the concrete control chart	Sample to be prepared once a day seven and 28 days after placement

Table 2.2.46 Quality Control Method (2/2)

Type of Work	Item Concerned	Inspection, Testing, etc.	Frequency of Inspection/Testing
4) Reinforced bar, form, PC cable	Materials	Check reinforced bars and prestressed cable by means of the mill sheet issued by the manufacturer - Quality - Tensile test - Bending test	Before implementation
	Inspection of Works, Daily Management	The following checks should be made after assembly: - Material size - Dimensions - Layout - Lap length - Concrete cover - Fixing condition - Connection joint treatment condition	Before placement of concrete: 100% inspection of each placement area
5) Pre-stressing of PC cable	Concrete strength check	- Concrete sample compressive strength	Before pre-stressing
	Pre-stressing equipment	- Calibration of jack and pump	Before pre-stressing, Every 50 pre-stressed cables With change of pre-stressing equipment
	Pre-stressing test	- According to the pre-stressing control chart	Before final pre-stressing
	Pre-stressing control	- Control of each cable - Control of cable group - Control of transverse pre-stressed cable	At pre-stressing Pre-stressing control chart
6) PC grouting	Mixing design	- Consistency - Bleeding ratio - Expansion ratio - Strength - Total salt content	Before use
	Daily Management	- Consistency - Temperature	Once a day, every five batches
		- Bleeding ratio - Expansion ratio - Compressive strength	Once a day
7) Staying Cable	Materials	- Mill sheet issued by the manufacturer, tension test, bending test	Before implementation
	Tension device	- Calibration of jack and pump	Before tensioning
	Tension test	- In accordance with the tension control chart	Before final tensioning
	Tension control	- Control of each cable	At tensioning (tension control chart)
8) Grouting for Staying Cable	Mixing design	- Consistency - Temperature - Bleeding ratio - Expansion ratio - Compressive strength	Before use
	Daily Management	- Consistency - Temperature - Bleeding ratio - Expansion ratio - Compressive strength	At treatment with grouting

(2) Progress Control

A sample of the progress control standard for each work is shown in Table 2.2.47.

Table 2.2.47 Progress control standard

Construction	Type	Item	Standard value	Remarks
Earth work	Base-course preparation	Design height	+2 cm～-5 cm	20m interval
		Width	More than the design value	
	Granular base course	Design height	±3 cm	
		Deviation from the design height at 2 points within 20 m distance	2 cm or less	
		Finish thickness	90% of design value	
		Width	More than the design value	
Pavement work	Asphalt surface course Asphalt stabilization layer	Width	More than the design value	
		Deviation from the design finishing height	±4mm	
		Deviation from the design finishing height at random selected 2 points	4mm or less	
		Roughness	σ1<1.3mm	
		Value of skid resistance	BPN>60	
Foundation	Spread foundation	Base height	Less than the design height	4m mesh
Concrete structures	Footing	Design height	±5 cm	
		Thickness	±75 mm or ±3%	
	Piers, abutments, retaining walls	Plane position	±30 mm	
		Design height	-30 mm～+10 mm	
		Crown height, crown width	±30 mm	
		Section dimensions	-10 mm ～ +20 mm or±2%	
	Slabs	Bridge length	-25 mm ～ +30 mm	
		Width	0 ～ +20 mm	
		Slab/curb height	-25 mm～+25 mm	
		Thickness	0～+20 mm	
Pre-stressed concrete structures	Post-tensioned girders	Member length	-25 mm ～ +30 mm	
		Section dimensions	-25 mm～+25 mm	

2-2-4-7 Implementation Schedule

The Project will be implemented as shown in the schedule below (Table 2.2.48) after the conclusion of the Exchange of Notes.

(1) Detailed Design

The design drawing and tender documents will be prepared for the detailed design work after the conclusion of the consulting agreement.

(2) Tender and Contract

The contract agreement will be directly between the Government of Ethiopia and the Japanese contractor. Selection of the contractor will be based on an open tendering addressed to Japanese contractors.

The items for prequalification of contractors will be discussed beforehand with the Government of Ethiopia for approval. A consulting company on behalf of the implementing agency of the Government of Ethiopia will handle prequalification.

Opening of tenders and the determination of the successful tenderer will be done in the presence of staff from the Government of Ethiopia, the consulting company, tenderers, and witnesses representing JICA. The construction service agreement will be concluded after tender evaluation and determination of the successful tenderer.

In parallel with the conclusion of the construction service agreement, the Government of Ethiopia will conclude banking arrangements as soon as possible with a Japanese authorized foreign exchange bank in order to receive aid funds from the Government of Japan and to make payments to the Japanese contractor. The banking arrangement is the basis on which the Government of Ethiopia will issue the Authorization to Pay (A/P) necessary for the reception of aid funds from the Government of Japan and advance payment to contractors, as well as for application to obtain an export license from the Ministry of Economy, Trade and Industry (METI).

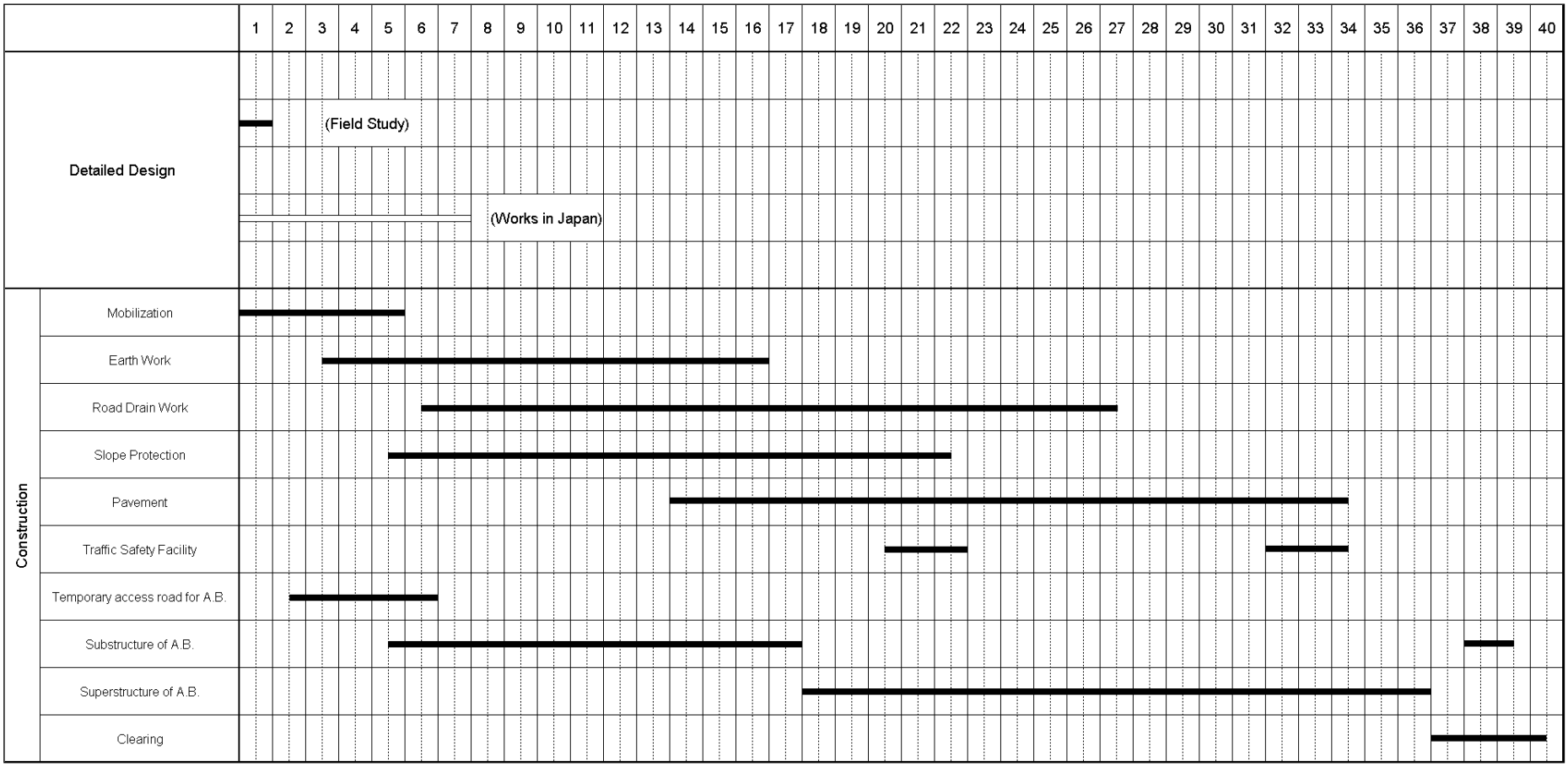
After the above, approval of the contract is then necessary. Approval means that the Japanese Government must verify the appropriateness of the contract as an object of grant aid. It is also a prerequisite for the contract to go into effect. Specifically, the

Japanese Ministry of Foreign Affairs receives the contract from the Government of Ethiopia and determines its appropriateness for approval. The Japanese contractor will implement the contract after receiving the approved contract and A/P.

(3) Construction Work

Construction work begins with mobilization and is divided into work on road rehabilitation and construction of the new Abay Bridge. Road rehabilitation consists of earthworks, pavement work, drainage facility work, and traffic safety facility work. Bridge construction includes work on the temporary cofferdam, foundation work, and substructure/superstructure work.

Table 2.2.48 Implementation Schedule



Note : A.B. : New Abay Bridge

2-3 Obligations of Recipient Country

2-3-1 Obligations of Government of Ethiopia

In order to implement the Project, the Ethiopian Government is required to undertake the measures and obligations indicated in the table below.

No.	Item	Contents	Cost
1	Land for Project Implementation	• Land for Project implementation is to be government property • Compensation to be paid for expanding road width in Filiklik, Kurar and Dejen and for the church beside Abay Bridge	
2	Temporary sites for offices, accommodations, and plants	• Office and accommodations: Goha Tsyon 3.2 million m^2 • Crusher plant: Filiklik & Dejen 1.0million m^2 X 2 • Asphalt plant: Filiklik & Dejen 0.6million m^2 • Concrete plant: beside Abay Bridge 0.75million m^2	Land rent
3	Construction material site	• Aggregate: Filiklik, Dejen • Sand: No.16+300 • Borrow pit: Specific site is selected by contractor	
4	Temporary roads for new bridge construction	• Left bank access road length: 880m • Right bank access road length: 520m • Will be restored after bridge completion	446,500 Birr
5	River flow velocity measurement facility	Remove	38,500 Birr
6	Relocation of public facilities	In Dejen: electric cables, telephone lines, and water pipes	269,400 Birr
Total			754,400 Birr

2-3-2 Requests to the Government of Ethiopia

The Project road runs from Goha Tsyon to Dejen through the escarpment of Abay Gorge. Because of the lack of a detour road, rehabilitation work will be carried out lane by lane to ensure traffic flows. To implement construction safely, ERA is requested to inform the police and concerned organizations around Abay Gorge of the construction and traffic management plans.

(1) Traffic regulations

- Obey the instructions of traffic conductors in the construction work zone
- Obey the posted speed limits

(2) No entry into Abay Gorge in the night during construction

- The Project road will be closed to traffic at night during construction because of dangerous conditions
- The road will be closed from sunset to sunrise (6pm-6am) from 2006.9-2007.6 and 2007.9-2008.6

(3) No entry of trailers into Abay Gorge during construction work on hairpin sections

- The passage of trailers on hairpin sections will be forbidden due to insufficient road width.
- However, contractors will make all efforts to carry out the above work in the shortest time possible as the freight transported by trailer trucks is recognized to be significant. Work on such a section will require a few days and relevant authorities and organizations will be informed a couple of weeks in advance.

(4) No entry into Abay Gorge during removal of loose rock on cliffs

- There is some loose rock in Abay Gorge that could fall at anytime. Such rock will be removed before the commencement of road rehabilitation work.
- Some road sections will be closed to traffic for a couple of hours during the removal of the above-mentioned rock. The relevant authorities and organizations will be informed a few weeks in advance of this work being carried out, which is scheduled for 2005.9-2006.6

2-4 Project Operation Plan

2-4-1 Maintenance Method

(1) Road

The principles for inspection and repair work of the Project road are described below.

1) Dry Season

In the dry season (September-June), inspection, cleaning and repair of pavement, shoulders, drainage and retaining walls shall be carried out.	
(1) Pavement of road	Potholes, if their size are more than 20cm in diameter, shall be repaired by hot (or cold)- mix method.
(2) Shoulders	Damaged shoulders results in damage to asphalt due to water flow via the broken shoulder during the rainy season. Damaged shoulders shall therefore be repaired by DBST.
(3) Drainage (drain ditch, culvert)	Soil and stones deposited inside drainage facilities (roadside drain and culverts) shall be cleaned and damage repaired.
(4) Landslides	Two parts where are anticipated to be effected of landslide will be restored with installation of drainpipes. Inspection of out flow from drain pipes and deformation/settlement of road surface shall be periodically carried out and recorded.
(5) Traffic safety facilities	Damaged safety posts, traffic signs and lane marks shall be repaired.

2) Cleaning of drainage facilities in the rainy season

Overflows from road drainage facilities clogged by soil and stone damage road pavement and erode slopes. Therefore, the inspection and cleaning of drainage facilities shall be executed to ensure smooth drainage flows.

(2) New Abay Bridge

In accordance with the inspection manual to be provided when the Abay Bridge is completed, periodical inspection shall be carried out. Before the rainy season, drainpipes on the bridge and at the gaps of the expansion joints shall be cleaned. The drain well on the bridge can effectively sustain the structure's soundness. After the rainy season, an overall inspection of the bridge, including the scouring situation around the piers, should be carried out.

2-4-2 Maintenance System

Presently, the road of the Abay Gorge is maintained by the Filiklik branch of ERA (i.e. the Alemgena District Office). The branch chief there understands the situation of the road and its structures (including drainage) well and makes efforts to keep the road in good condition by spreading crusher-run on the road surface before and during the rainy season.

(1) Road

The main maintenance activity of the Project road at present is to spread crushed stone in order to sustain current traffic volumes. However, other sections of the road require the maintaining of paved road.

1) Repair system of road pavement and DBST of shoulders

Equipment for pavement repair work is not usually based at the Fliklik Branch. However, the ERA Alemgena District Office shall secure working teams with the necessary equipment and budget for this work, which will be carried out before the rainy season.

2) Organization of cleaning deposit inside drainage ; collaboration with residents

To keep drainage facilities clear is very important for preventing water from overflowing onto the surface of roads and slopes. During the rainy season, clogged drains should be cleaned immediately. However, the number of staff at District Offices is insufficient to deal with this. Therefore, the idea below, which will require the collaboration of local residents, is proposed.

The entire road will be divided up so that local residents who live along the road can be put in charge of keeping drainage facilities in their area clear. Naturally, residents that cooperate should be paid. This methodwill both raise the consciousness of residents of the importance of maintaining their road and provide them a chance to obtain cash. Therefore, part of ERA's maintenance budget for the Alemgena Office should be appropriated for this purpose and will not amount to much. In fact, the benefits should greatly outweigh costs and be an effective maintenance methodology.

3) Control of overloaded vehicles

Overloaded vehicles cause great damage to pavement and bridge structures. Most overloaded vehicles will probably be trucks transporting freight to Addis Ababa. Therefore, it is recommended that a weight station be located at the Debre Markos or Dejen District Office to maintain the soundness of the road and bridge.

(2) New Abay Bridge

The new Abay Bridge will have the longest central span length in Ethiopia. Given this, it is recommended that inspection and maintenance be conducted by the Bridge Management Branch of ERA Headquarters in collaboration with the Alemgena District Office.

2-4-3 Project Costs Estimation

(1) Project Cost

1) Cost Estimate

The total cost of the Project by the Japanese Grant Aid is summarized in Table 2.4.1. This cost estimate is provisional and will be further examined by the Government of Japan for the approval of Grant. In addition, this approximate project costs will not be quoted as the Maximum Amount of Japanese Grant Aid in the Exchange of Notes immediately just as they are.

Approximate Project Costs : Japanese Yen 5,075 million

Table 2.4.1 Approximate Project Costs

Item			Approximate Amount (million Japanese Yen)
Facilities	Road	2,683	4,637
	New Abay Bridge	1,954	
Detailed design and Construction supervision		438	

2) Condition of Estimation

- Time of estimate	December 2003
- Exchange rate	1US$ = JPY116.11 (at the above-mentioned time) 1Birr = JPY12.99 (at the above-mentioned time)
- Implementation period	Detailed design and construction period are shown in the Implementation schedule (i.e. 39.5 months excluding tendering stage).
- Others	On Condition that the Project is implemented under the Japan's Grant Aid Scheme The above-mentioned exchange rate is to be reviewed by Japanese Government

3) Cost Borne by Ethiopian Government Side

Approximate costs required for the undertaking of Ethiopian Government side are shown in Table 2.4.2. This cost estimate is provisional.

Table 2.4.2 Approximate Costs to be borne by Ethiopian Government Side

Items	Cost (Birr)
Temporary roads for new bridge construction	446,500
Removal of river flow velocity measurement facility	38,500
Relocation cost of public utilities including telephone and electric poles and setback	269,400
Total Amount	754,400

(2) Operation and Maintenance Cost

Operation and maintenance costs after the start of operation are shown in Table 2.4.3, 2.4.4.

Project Road Length : 40.6km
Carriageway Width : 7.0m (Asphalt Pavement)
Shoulder Width : 1.5m x 2 (DBST)

It is assumed that routine maintenance will be executed every year and periodic maintenance every 8^{th} year after the start of operation.

Table 2.4.3 Operation & Maintenance for Project Road

		Specification	Unit Price (Birr)	Unit	Quantity	Years	Total (Birr)
Routine Maintenance (every year)	Patching *	0.2% of total area per year	11	M2	580	10	63,800
	Base course repair	0.2% of total area per year	48	M2	580	10	278,400
	Shoulder repair	0.2% of total area per year	11	M2	248	10	27,280
	Cleaning ditch	All ditches	2.5	M	42000	10	1,050,000
	Cleaning culvert	All culverts	33	piece	170	10	56,100
	Sub-total						1,475,600
Periodic Maintenance (8th year)							
	Base course repair	2% of total area	48	m2	5780	1	277,400
	Overlay	All paved area	55	m2	16000	1	880,000
	Shoulder repair	5% of total area	11	m2	6200	1	682,000
	Ditch repair	5% of total length	330	M	2100	1	693,000
	Sub-total						2,532,400
Operation Cost		10% of the sub-total				1	253,200
Total							4,230,700
Average cost per year							423,000

Table 2.4.4 Operation & Maintenance Costs for Abay Bridge

		Specification	Unit Price (Birr)	Unit	Quantity	Years	Total (Birr)
Routine Maintenance (every year)	Repair of revetment	2% of total area /year	89	M^2	34.2	9	27,400
	Sub-total						27,400 (2,740/year)
Periodic Maintenance (8th year)	Repair of revetment	20% of total area	89	M^2	342	1	30,400
	Repair of pavement	1% of total area	95	M^2	28	1	2,660
	Railing & curve	1% of total length	2,340	M	6	1	14,040
	Drainage & expansion Joint	2% of total length	7,550	piece	0.68	1	5,130
	Sub-total						52,230
Operation Cost		10% of the sub-total				1	5,220
Total							84,850
Average cost per year							8,480

The average annual maintenance cost for the Project road and bridge is estimated at 431,480 Birr and accounts for approximately 1.5 % of the total budget of the Alemgana Office. This amount is lower than the current maintenance cost for the same road section and therefore should not be a heavy burden on ERA.

CHAPTER 3

PROJECT EVALUATION & RECOMMENDATIONS

CHAPTER 3 PROJECT EVALUATION AND RECOMMENDATIONS

3-1 Project Effects

The Project road is a part of the Northwest Trunk Road, which has been targeted for rehabilitation under the RSDP program. The Project includes the following components in order to achieve its objective as well as the goals of the RSDP:

- Construction of a new Abay Bridge.
- Rehabilitation of the road section between Goha Tsiyon and Dejen using asphalt pavement.

(1) Direct Effects

Direct effects expected within the Project area are summarized in Table 3.1.1.

Table 3.1.1 Direct Project Effects

Present status & issues	Proposed countermeasures	Expected effects & degree of improvement
1) Only 1 vehicle can use the existing Abay Bridge one at a time because it is superannuated.	New bridge to be constructed away from the existing bridge on the upstream side. Existing bridge will be utilized for pedestrians.	New bridge will eliminate traffic bottleneck.
2) Narrow width, steep gradient & sharp curves of the existing road restrict the flow of traffic.	Improvement of road alignment & widening will be implemented. Concrete guard post shall be installed on the valley side.	Traffic accidents will be greatly reduced. Travel time will be shortened.
3) Road structure is easily damaged because of DBST or cold asphalt paving.	Hot asphalt pavement (with an asphalt stabilization layer for high priority trouble spots) will be adopted for the carriageway. Shoulder shall be simply paved (DBST) to protect road structure against erosion from surface runoff.	Strengthening of pavement structure will ensure smooth traffic flows & access throughout the year.
4) Road structure is damaged by malfunctioning or inadequate drainage facilities (e.g. facilities too small or clogged)	New facilities with adequate scale & easy to maintain to be installed to prevent flowing of rainwater onto road structure.	Proper treatment of rainwater flows on slopes & road surface to minimize damage to road structure.
5) Rock falls, avalanches, slope failures block road frequently.	Loose rocks will be removed. Groundwater drain holes will be installed to accelerate groundwater drainage.	Safe travel & access throughout the year will be secured.

(2) Indirect Effects

Indirect effects expected within the Project area are summarized in Table 3.1.2.

Table 3.1.2 Indirect Project Effects

Present status & issues	Proposed countermeasure	Expected effects & degree of improvement
1) The number of freight trucks is limited due to the bad condition of the existing road & long travel time.	Project road to be improved using the same specifications for the road sections being improved on either end of the Project road.	This trunk road is a part of the East African Highway. Therefore, the Project will not only impact Ethiopia but also neighboring countries.
2) Access to education, job opportunities and medical care is difficult. Therefore, illiteracy & death rates are high.	Improvement of road & replacement of the Abay Bridge will be implemented.	Easy & safe access to education facilities & medical care will improve the lives of residents.
3) The lack of jobs is chronic.	Consider possibility of employing local residents in implementing simple tasks for the Project road improvement works.	Creation of an income generation opportunity for local residents.

3-2 Recommendations

The Ethiopian Government should undertake adequate maintenance work of the Project road and bridge after they are open to the public in order to ensure that these structures produce the maximum intended benefits. Especially, efficient implementation of routine maintenance work (i.e., daily inspection and light repairs of pavement, shoulders, drainage facilities, cut slopes and traffic safety facilities) is important to maximize the life of a road structure. Note that the cooperation of local residents in carrying out this work is important. Also, the regulation of overloaded vehicles should be strengthened, since such vehicles seriously damage the pavement structure.

Regarding the new Abay Bridge, it should not experience any damage or problems in the near future. However, routine maintenance work such as the daily inspection and cleaning of drainage facilities and expansion joints should be carried out. Furthermore, inspection of the whole bridge structure, including the stone masonry around piers and partial repairs, should be executed at the end of each rainy season. This work is effective for maximizing the life of the bridge. Note that the use of inspection manuals and inspection sheets will also promote the efficiency and quality of maintenance work.

In conclusion, because significant benefits can be expected from the Project, it is highly recommended that it be implemented under the Japan Grand Aid Cooperation Program. Furthermore, in regards to management and maintenance, the Ethiopian Government seems able to secure the necessary personal and financial resources therefore ensuring sustainability. However, it is important for the Ethiopian Government to consider the matters listed below in order to implement the Project in a more effective manner.

(1) Establishment of the constant system to clean up roads drainage equipments

Accumulated sediment in drains such as side gutters and ditches will cause water to overflow onto road surfaces that will speed-up of deterioration of pavement. Thus, the cleaning of roads drainage facilities is very important for preventing pavement deterioration. On the other hand, it is difficult for only the staff of the Ethiopian Roads Authority to undertake all of the drainage cleaning work for the 40km Project road. Therefore, it is advisory to take the following actions:

Drainage cleaning should be implemented with the cooperation and participation of local residents along the Project road. As for section demarcation, those sections with large residential populations shall have drainage cleaned by the local residents, while the Ethiopian Roads Authority would handle drainage for the other sections. It is advisory to allocate part of the maintenance budget for remuneration to engage local residents. This would also promote income generation opportunities for local residents.

(2) Regulation against overloaded vehicles

One major cause of pavement and structure deterioration is overloaded vehicles. Therefore, it is necessary for the Alemgena Local Road Authority to install a facility for weighing vehicles and to carefully regulate heavy vehicles.

APPENDICES

1. MEMBER LIST OF THE STUDY TEAM
2. STUDY SCHEDULE
3. LIST OF PARTIES CONCERNED IN ETHIOPIA
4. MINUTES OF DISCUSSIONS
5. COST ESTIMATION BORNE BY ETHIOPIA
6. GEOLOGICAL DATA

Appendix 1. Member List of the Study Team

THE PROJECT FOR

REHABILITATION OF TRUNK ROAD PHASE III

IN

THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

1-1 For the Study

No.	Name	Job Title	Occupation
1	Mr. Kazuhisa ARAI	Leader	Deputy Director, Third Project management Division, Grant Aid Management Department, JICA
2	Dr. Masaaki TATSUMI	Chief consultant / Road planner	Oriental Consultants Co., LTD
3	Mr. Keigo KONNO	Bridge designer	
4	Mr. Hisashi MUTO	Road designer	Japan Engineering Consultants Co., LTD
5	Mr. Nobuyuki OKABE	Hydrology surveyor	
6	Dr. Atsutoshi SAKATA	Natural condition surveyor (Topography / Geography)	Oriental Consultants Co., LTD
7	Mr. Satoshi MIZUNO	Environmental and social consideration	Japan Engineering Consultants Co., LTD
8	Mr. Yoshiki MIYAZAKI	Construction and procurement planner / Cost estimator	Oriental Consultants Co., LTD

1-2 For Explanation of Draft Final Report

No.	Name	Job Title	Occupation
1	Mr. Kimiaki JIN	Leader	Deputy Residential Representative, JICA Ethiopia Office
2	Dr. Masaaki TATSUMI	Chief consultant / Road planner	Oriental Consultants Co., LTD
3	Mr. Keigo KONNO	Bridge designer	
4	Mr. Hisashi MUTO	Road designer	Japan Engineering Consultants Co., LTD

Appendix 2. Study Schedule of the Study

2-1 Schedule of the Survey

No	Date		Arai	Tatsumi	Konno	Muto	Miyazaki	Sakata	Mizuno	Okabe
1	10.26	Sun		Narita(13:00)-Frankfurt(17:00) ＜JL407＞						
2	27	Mon		Frankfurt(10:20)-Addis Ababa(21:20) ＜LH590＞						
3	28	Tue		Visit JICA Ethiopia Office & ERA				Narita(13:00)-Frankfurt(17:00) ＜JL407＞		
4	29	Wed		Site Survey				Frankfurt(10:20)-Addis Ababa(21:20) ＜LH590＞		
5	30	Thu						Site Survey		
6	31	Fri								
7	11.1	Sat								
8	2	Sun								
9	3	Mon								
10	4	Tue								
11	5	Wed								
12	6	Thu								
13	7	Fri								
14	8	Sat								
15	9	Sun								
16	10	Mon								
17	11	Tue	Narita(9:50)-Frankfurt (14:35) ＜LH711＞							
18	12	Wed	Frankfurt (13:50)-Addis Ababa (21:45) ＜LH590＞							
19	13	Thu	Courtesy Call to JICA Ethiopia Office, Embassy of Japan (EOJ), MOFED, MOFA & ERA							
20	14	Fri	Addis Ababa-GohaTsiyon-Debre Markos							
21	15	Sat	Debre Markos-Abay Bridge-Dejen							
22	16	Sun	Dejen-Goha Tsiyon-Addis Ababa							
23	17	Mon	Discussion with ERA							
24	18	Tue								
25	19	Wed	Signing of M/D, Report to JICA& EOJ / Addis Ababa(23:45)- ＜LH591＞							
26	20	Thu	→Frankfurt→							
27	21	Fri	→Narita							
28	22	Sat								
29	23	Sun								
30	24	Mon								Addis Ababa(22:50) ＜LH590＞
31	25	Tue								→Frankfurt(20:20) ＜JL408＞→
32	26	Wed								→Narita(15:40)
33	27	Thu								
34	28	Fri						Addis Ababa(22:50) ＜LH590＞		
35	29	Sat		Site Survey				→Frankfurt(20:20) ＜JL408＞→		
36	30	Sun						→Narita(15:40)		
37	12.1	Mon								
38	2	Tue								
39	3	水				Addis Ababa (22:50) ＜LH590＞				
40	4	木				→Frankfurt(20:20) ＜JL408＞→				
41	5	金				→Narita(15:40)				
42	6	土								
43	7	日		Addis Ababa (05:45) ＜BA6566＞						
44	8	月		→London (19:00) ＜JL402＞→	Addis Ababa (22:50) ＜LH590＞					
45	9	火		→Narita(15:50)	→Frankfurt (20:20) ＜JL408＞→					
46	10	水			→Narita(15:40)					

2-2 Study Schedule of the Explanation of Draft Final Report

No	Date		Jin	Tatsumi	Konno	Muto
1	5.16	日		Narita(13:00)-Frankfurt(18:00) ＜JL407＞		
2	17	月		Frankfurt(13:40)-Addis Ababa(21:40) ＜LH590＞		
3	18	火	Courtesy Call to JICA Ethiopia Office, Embassy of Japan (EOJ), MOFED, MOFA & ERA Submission of the Draft Basic Design report			
4	19	水	Explanation of the Draft Basic Design report to ERA, and discussion of the contents with ERA			
5	20	木				
6	21	金		Site Survey		
7	22	土				
8	23	日				
9	24	月	Discussion of the Draft Basic Design report with ERA			
10	25	火	AM: Discussion of the Draft Basic Design report with ERA PM: Signing of M/D			
11	26	水	AM: Report to EOJ PM: Report to JICA, MoFA, MoFED			
12	27	木		Addis Ababa(7:00)-London(14:50) ＜BA6566＞→	Confirmation for Detailed Design to ERA	
13	28	金		→London(14:50) - Narita(16:45) ＜JL404＞	Addis Ababa(7:00)-London(14:50) ＜BA6566＞→	
14	29	土			→London(14:50) - Narita(16:45) ＜JL404＞	

Appendix 3. List of Parties Concerned in Ethiopia

Ethiopian Roads Authority (ERA)	
Mr. Zaid Wolde Gebriel	General Manager
Mr. Bekele Negussie	Head of Planning & Program Management Branch
Mr. Dereje Kidane	Head of Contract Implementation Branch
Mr. Girma Worku	Head of Bridge Management Branch
Mr. Yemane Shiferaw	Head of Design & Research Branch
Mr. Abdesse Megersa	Assistant Head of Environmental Monitoring & Safety Branch
Mr. Tadesse W. Rufael	Project Engineer, Contract & Administration Branch
Mr. Wondesossen Girma	Bridge Engineer, Bridge Management Branch
Ms. Hiwot Mosisa	Counterpart Engineer, Contract & Administration Branch
Mr. Haddis Tesfaya	Genral Manager, Debre Markos Office
Mr. Andargacheu Angan	Dirtrict Engineer, Alemgena Office
Mr. Masahiro Hayashi	JICA Expert, Bridge Management Branch
Mr. Ryo Yamane	JICA Expert, Alemgena Training Center
Mr. David J Entwistle	Team Leader, ERA District Maintenance Organizations Capacity Building Project funded by DFID (Scott Wilson)
Ministry of Financial & Economical Development (MFED)	
Mr. Hailemichael Kinfu	Head of Bilateral Cooperation Department
Ministry of Foreign Affairs (MOFA)	
Mr. Addis Dilnessa	Director General, Asia, Austral-Asia, and Middle East Directorate
Road Fund Office	
Mr. Alemayehu Teferi	Head of Planning, Programming & Budget Department
Environmental Protection Authority (EPA)	
Mr. Solomon Kebede	Head of Impact Assessment Service
Mr. Ermyas Haile	Acting Head, Civil Service Reform Program Office
Mr. Mohammed Ari	Acting Head,
World bank Ethiopia Office	
Mr. Johe D. Riverson	Lead Highway Engineer, Transport Unit、African Region
Local Contractors	
Mr. Alberto Varnero	Manager, Varnero
Mr.Samuel Tafese	General Manager, Sunshine Construction Pvt.Ltd, Co
Mr. Tedla Alemayehu	Genral Manager, Bule Nile Construction
Mr. Yoshito Nitta	Project Manger, Kajima Corporation
Mr. Shiferaw Lakew	Rental Manager, Ries Engineering
Mr. Luelkal Kassie	General Manager, Transport Construction Design S. Co.
Mr. Anteneh Negash	Business Developer, Addis Ababa Ring Road Project, PARKMAN

NGO	
Mr. Alemayehu Konde	Country Director, Canadian Physicians for Aid & Relief
Mr. Yewubdar Hailu	Program Director, CPAR
Mr. Gizachew Sisay	Agriculture & Natural Resource Program Coordinator, CPAR
Mr. Aman Shibisa	Agriculture Expert & Gender Expert, LUPO
Embassy of Japan	
Mr. Kenjiro IZUMI	Ambassador
Mr. Motoyoshi NORO	Counselor
Mr. Hiroyuki OGINO	First Secretary
Mr. Yoshiyuki MIHOKI	Second Secretary
JICA Ethiopia Office	
Naoki SAITO	Resident Representative
Kimiaki JIN	Deputy Resident Representative
Yujiro YABE	Assistant Resident Representative
Hiromu INOUE	Assistant Resident Representative

Appendix 4. Minutes of Discussions (M/D)

4-1 Site Survey

Minutes of Discussions
on the Basic Design Study
on the Project for the Rehabilitation of Trunk Road Phase III
in the Federal Democratic Republic of Ethiopia

In response to the request from the Government of the Federal Democratic Republic of Ethiopia (hereinafter referred to as "Ethiopia"), the Government of Japan decided to conduct a Basic Design Study on the Project for the Rehabilitation of Trunk Road Phase III (hereinafter referred to as "the Project"), and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Ethiopia the Basic Design Study Team (hereinafter referred to as "the Team"), headed by Mr. Kazuhisa Arai, a Deputy Director, Third Project Management Division, Grant Aid Management Department, JICA, and was scheduled to stay in the country from October 27 to December 8, 2003.

The Team held a series of discussions with the officials concerned of the Government of Ethiopia and conducted a field survey in the study area.

In the course of the discussions and the field survey, both sides confirmed the main items described in the attached sheets.

Addis Ababa, November 19, 2003

新井 和久

Kazuhisa Arai
Leader
Basic Design Study Team
Japan International Cooperation Agency

Zaid Wolde Gebriel
General Manager
Ethiopian Roads Authority (ERA)
Federal Democratic Republic of Ethiopia

Witnessed by

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Hailemichael Kinfu
Ministry of Finance and Economic Development
Federal Democratic Republic of Ethiopia

ATTACHMENT

1. Objective of the Project

The objective of the Project is to rehabilitate the Goha Tsiyon - Debre Markos section of the Northwest Trunk Road.

2. Project Site

The Project site is as shown in Annex-1.

3. Responsible and Implementing Organizations

The counterpart ministry is the Ministry of Infrastructure.

The implementing organization is the Ethiopian Roads Authority (ERA).

The organization chart of the implementing organization is shown in Annex-2.

4. Components of the Project

The Team proposed the followings as the components of the Project, which were formulated based on the results of the Preparatory Study in March, 2003.

1) Rehabilitation of the road between Goha Tsiyon and Dejen,

2) Reconstruction of Abay Bridge,

3) Rehabilitation of a part of the road between Dejen and Debre Markos,

- Inundated section of the road located in the Yeda River area
- Soft-ground section of the road located at approximately 14km away from Dejen
- Reconstruction of eight (8) existing old bridges on the road

4) Procurement of machinery and equipment for road maintenance between Dejen and Debre Markos.

In response to the proposal by the Team, the Ethiopian side requested as follows:

1) Rehabilitation of the road between Goha Tsiyon and Dejen,

2) Reconstruction of Abay Bridge,

3) Rehabilitation of the road between Dejen and Debre Markos (Entire road and bridges)

Through a series of the discussion, the Team and the Ethiopian side reached an agreement on the first and second component but not agreed on the third and fourth component proposed by the Team.

Concerning the components for the road between Dejen and Debre Markos, the Team explained to the Ethiopian side that the Japanese side considered it very cautiously whether the entire rehabilitation should be done by the Project because the road condition of the section is observed rather better than that of other sections. In response to it, the Ethiopian side again requested the entire rehabilitation of the section according to the understanding reached in the high level meeting between Japanese and Ethiopian officials during the TICAD III in Tokyo. Then, the Japanese side requested the supporting documents for it. Moreover, the Ethiopian side gave

a view to the Team that the road might look in better condition because of the recent intervention of minor maintenance works to keep the road passable, and that, however, it would deteriorate within a few years. Accordingly, the Team will convey the request by the Ethiopian side to the Government of Japan.

Concerning the appropriateness for the Japan's Grant Aid scheme, JICA will assess the request and will report to the Government of Japan.

5. Japan's Grant Aid Scheme

1) The Ethiopian side understands the standard Japan's Grant Aid scheme explained by the Team, as described in Annex-3.
2) The Ethiopian side will take the necessary measures described in Annex-4 for smooth implementation of the Project, on condition that the Grant Aid assistance by the Government of Japan is extended to the Project.

6. Further Schedule of the Study

The consultant members of the Team will proceed with further studies in Ethiopia until December 8, 2003.

JICA will prepare the Draft Basic Design Study Report in English and dispatch a mission to Ethiopia in order to explain its contents in February 2004.

In case the contents of the Report are accepted in principle by the Government of Ethiopia including comments by ERA, JICA will complete the Final Report and send it to the Ethiopian side by the end of April 2004.

7. Other Relevant Issues

1) Responsibility of the EIA Study and Compensation

The Ethiopian side agreed that the EIA study would be implemented by own expense before the end of May, 2004 based on the result of the Basic Design Study. The implementation procedure of the EIA shall be presented to the Team by the end of the Field Survey of the Basic Design Study after confirmation with the Environmental Protection Authority. The compensation for the affected people and property by the Project is implemented by the Ethiopian side with own budget.

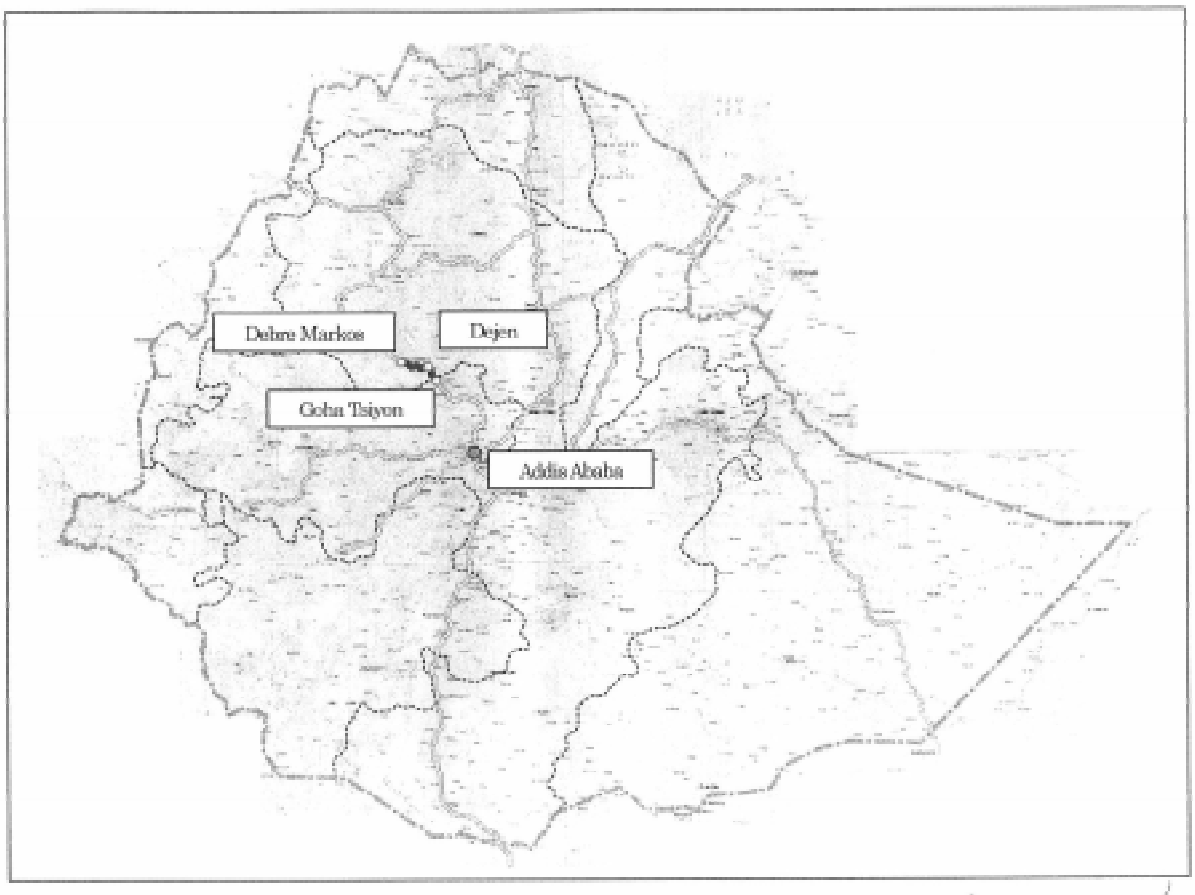
2) Bridge Plan for New Abay Bridge

The bridge type of the new Abay Bridge will be determined principally based on structural suitability to the required span length and economic aspect in consideration of principle of Japan's Grant Aid scheme.

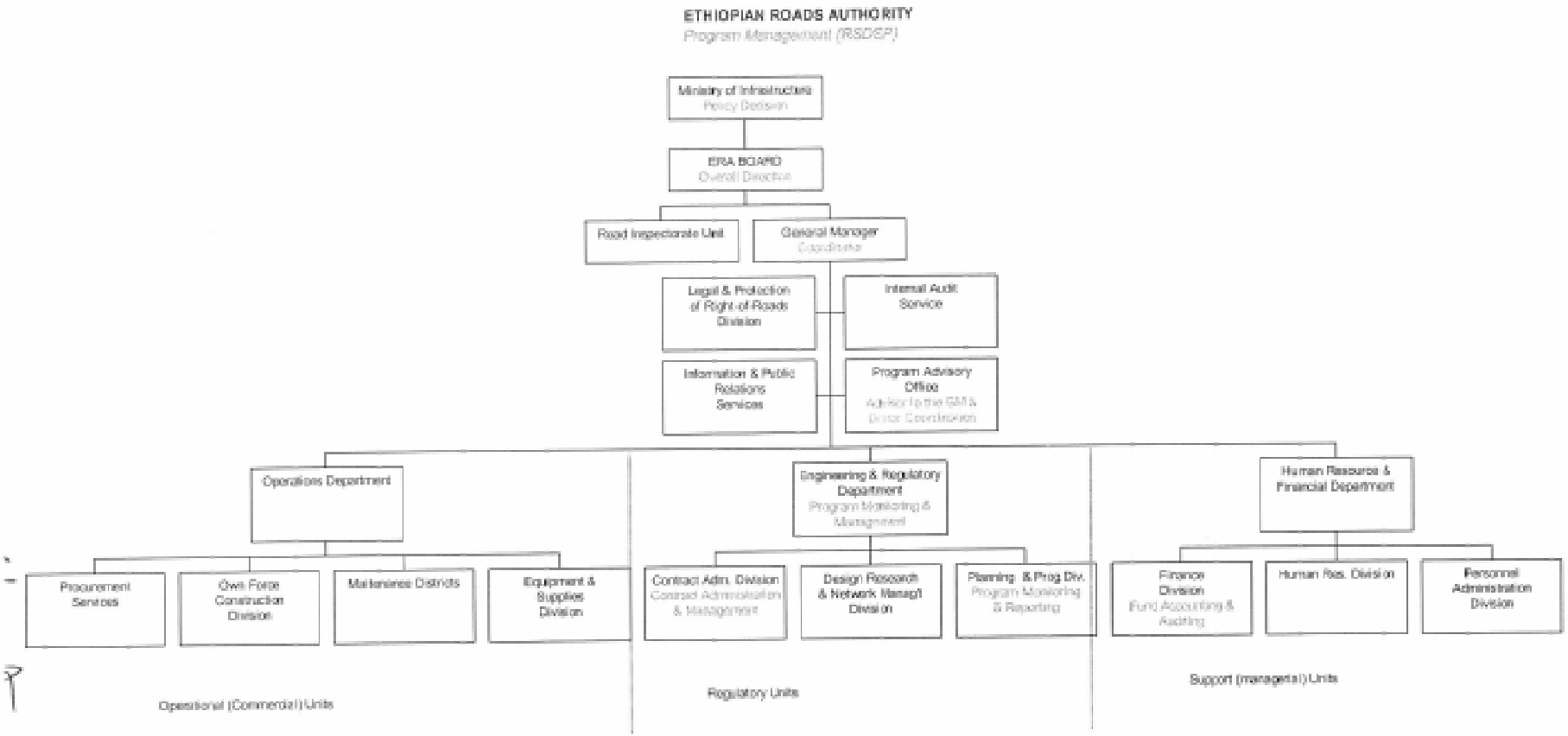
3) Treatment of Preparatory Study Report

ERA informs the Team that it was not aware of the Preparatory Study Report in March, 2003 and has not commented on it. Then, the Team explained to ERA that such kind of report was for Japanese official's internal use only.

Project Site



The Organization Charts



JAPAN'S GRANT AID

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 the recipient country)
Study	(Basic Design Study conducted by JICA)
Appraisal &Approval	(Appraisal by the Government of Japan and Approval by the Cabinet)
Determination of Implementation	(The Note exchanged between the Governments of Japan and 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 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 (hereafter referred to as "the Study") conducted by JICA on a requested project (hereafter 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 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 on 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 the 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 consulting 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 consultant 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) consultant 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 national 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, constructing 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 excursion 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 maintain and use the facilities constructed and the 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.

(end)

Annex-4

Undertakings to be Taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient 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 construct the parking lot	●	
5	To construct roads		
	1) Within the site	●	
	2) Outside the site		●
6	To construct the buildings	●	
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	1) Electricity		
	a. The distributing line to the site		●
	b. The drop wiring and internal wiring within the site	●	
	c. The main circuit breaker and transformer	●	
	2) Water Supply		
	a. The city water distribution main to the site		●
	b. The supply system within the site (receiving and elevated tanks)	●	
	3) Drainage		
	a. The city drainage main (for storm, sewer and others to the site)		●
	b. The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	●	
	4) Telephone System		
	a. The telephone trunk line to the main distribution frame/panel (MDF) of the building		●
	b. The MDF and the extension after the frame/panel	●	
	5) Furniture and Equipment		
	a. General furniture		●
	b. Project equipment	●	
8	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		●
9	To ensure unloading and customs clearance at port of disembarkation in recipient country		
	1) Marine (Air) transportation of the products from Japan the recipient	●	
	2) Tax exemption and custom clearance of the products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	●	
10	To accord Japanese nationals whose service may be required in connection with the supply of the products and the services under the verified contact, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.		●
11	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts		●
12	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
13	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment		●

The undertakings to be taken by each government can be the subject to be discussed based on a result of the further study and previous experience of the Road Rehabilitation Project between Addis Ababa and Goha Tsiyon by Japan's Grant Aid

Minutes of Discussions
on the Basic Design Study
on the Project for the Rehabilitation of Trunk Road Phase III
in the Federal Democratic Republic of Ethiopia
(Explanation on Draft Report)

In November 2003, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Basic Design Study Team on the Project for the Rehabilitation of Trunk Road Phase III (hereinafter referred to as "the Project") to the Federal Democratic Republic of Ethiopia (hereinafter referred to as "Ethiopia"), and through discussion, field survey, and technical examination of the study results in Japan, JICA prepared a draft final report of the study.

In order to explain and to consult the Ethiopian side on the components of the draft final report, JICA sent the Basic Design Explanation Team (hereinafter referred to as "the Team") to Ethiopia, which is headed by Mr. Kimiaki Jin, JICA Ethiopia Office, from May 17, 2004 to May 28, 2004.

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

Addis Ababa May 25, 2004

Kimiaki Jin
Leader
Basic Design Explanation Team
Japan International Cooperation Agency

Zaid Wolde Gebriel
General Manager
Ethiopian Roads Authority
Federal Democratic Republic of Ethiopia

Witnessed by

Hailemichael Kinfu
Ministry of Finance and Economic Development
Federal Democratic Republic of Ethiopia

ATTACHMENT

1. Components of the Draft Report

The Ethiopian side has agreed and accepted in principle the components of the draft report explained by the Team except the minor technical issues as shown in ANNEX-1. The Team will conduct to review on the requested issues during the Detailed Design.

2. Japan's Grant Aid Scheme

The Ethiopian side understood the Japan's Grant Aid Scheme and necessary measures to be taken by the Government of Ethiopia explained by the Team, described in Annex-3 and Annex-4 of the Minutes of Discussions signed by the both parties on November 19, 2003.

3. Schedule of the Study

The Team will complete the final report of the Basic Design Study in accordance with the discussion on the draft report and send it to the Ethiopian side around July 2004.

4. Other Relevant Issues

4-1. Implementation Schedule

The Team explained to Ethiopian Roads Authority (ERA) that the detailed design of the Project would be commenced in August 2004 and the construction work of the Project would start in August 2005 as shown in ANNEX-2. ERA agreed the technical appropriateness of the implementation schedule.

4-2. Personnel and Budget Allocation

ERA will allocate sufficient budget and qualified staff to appropriately maintain the constructed facilities after completion of the Project.

4-3. Works Covered by the Ethiopian Side

The Ethiopian side assured to carry out the following works and to timely inform commencement and completion of works to the Japanese side.

1) The draft report of Environmental Impact Assessment (EIA) by the end of June 2004 and the final report of EIA by the end of December 2004.
2) Resettlement/ land acquisition and electric/ telephone lines transfer by the end of March 2005 based on the drawings of the affected properties on the detailed design prepared by the end of December 2004.
3) Routine maintenance including measures against overloaded vehicles and periodic maintenance based on the Road Sector Development Program Phase-II.

4-4. Necessary Arrangement for Construction of the Bridge and the Road

ERA agreed to carry out the following arrangements in accordance with the schedule of the Project:

1) To ensure necessary arrangement of construction permit and any other authorization required for construction of the Bridge and the Road.

2) To pay tax and customs on behalf of the contractor(s) and the consultant(s) and also to carry out an arrangement of custom clearance upon importation of necessary materials and equipments.

4-5. Value Added Tax (VAT) for Local Purchase

The Team explained to the Ethiopian side that any taxes and fiscal levies including VAT concerning local purchase under the Project should be reimbursed to the contractor(s) and the consultant(s). It is not able to implement the Project under the Japan's Grant Aid without reimbursement of any taxes and fiscal levies for the local purchase.

ERA emphasized that any payment of taxes and fiscal levies including VAT to the contractor(s) and the consultant(s) concerning local purchase would contravene the usual practice. ERA further pointed out that payment for any taxes by the government, on behalf of the contractor(s) and consultant(s) should be limited to the items imported directly by the contractor(s) and consultant(s).

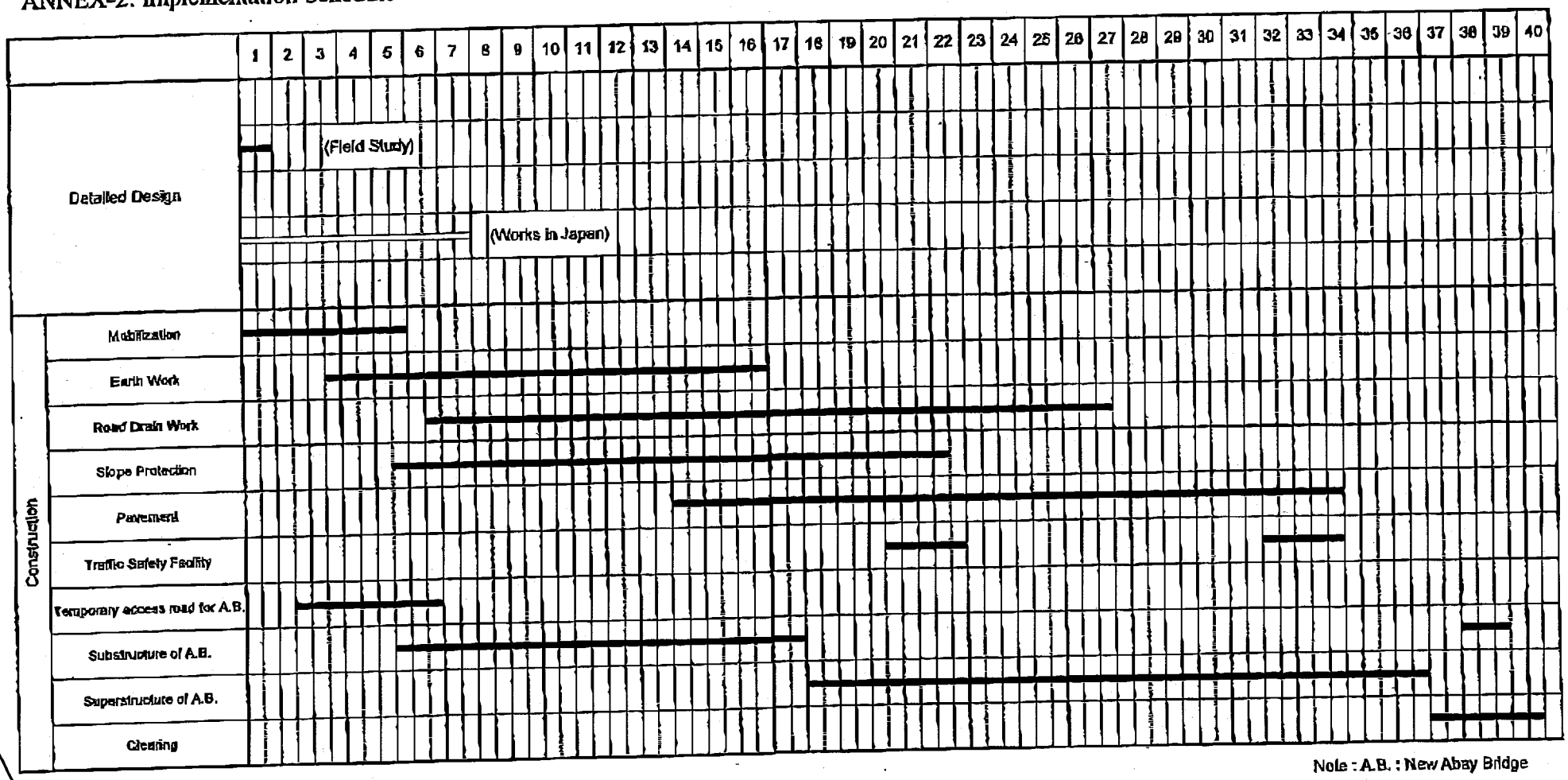
Although under such situation, the Team encouraged ERA to resolve this issue for smooth implementation of the Project. Therefore ERA agreed to notify Japanese side the decision of the Ethiopian side on this matter in written form before June 8, 2004 through JICA Ethiopia Office.

ANNEX-1 Technical Issues requested by ERA

1. To provide concrete pavement for bus bay in Filiklik and parking lane in Dejen.

2. To improve the pipe size from ϕ 90 cm to ϕ 100 cm for practical maintenance.

ANNEX-2: Implementation Schedule



Note : A.B. : New Abay Bridge

Appendix 5. Cost Estimation Borne by Ethiopia

5-1 Project Cost

In order to implement the Project, the Ethiopian Government is required to undertake the measures and obligations indicated in the table below.

No.	Item	Contents	Cost
1	Land for Project Implementation	• Land for Project implementation is to be government property • Compensation to be paid for expanding road width in Filiklik, Kurar and Dejen and for the church beside Abay Bridge	
2	Temporary sites for offices, accommodations, and plants	• Office and accommodations: Goha Tsyon 3.2 million m^2 • Crusher plant: Filiklik & Dejen 1.0million m^2 X 2 • Asphalt plant: Filiklik & Dejen 0.6million m^2 • Concrete plant: beside Abay Bridge 0.75million m^2	Land rent
3	Construction material site	• Aggregate: Filiklik, Dejen • Sand: No.16+300 • Borrow pit: Specific site is selected by contractor	
4	Temporary roads for new bridge construction	• Left bank access road length: 880m • Right bank access road length: 520m • Will be restored after bridge completion	446,500 Birr
5	River flow velocity measurement facility	Remove	38,500 Birr
6	Relocation of public facilities	In Dejen: electric cables, telephone lines, and water pipes	269,400 Birr
Total			754,400 Birr

5-2 Operation and Maintenance Cost

Operation and maintenance costs after the start of operation are shown in below.

It is assumed that routine maintenance will be executed every year and periodic maintenance every 8^{th} year after the start of operation.

Operation & Maintenance for Project Road

		Specification	Unit Price (Birr)	Unit	Quantity	Years	Total (Birr)
Routine Maintenance (every year)	Patching *	0.2% of total area per year	11	M2	580	10	63,800
	Base course repair	0.2% of total area per year	48	M2	580	10	278,400
	Shoulder repair	0.2% of total area per year	11	M2	248	10	27,280
	Cleaning ditch	All ditches	2.5	M	42000	10	1,050,000
	Cleaning culvert	All culverts	33	piece	170	10	56,100
	Sub-total						1,475,600
Periodic Maintenance (8^{th} year)							
	Base course repair	2% of total area	48	m2	5780	1	277,400
	Overlay	All paved area	55	m2	16000	1	880,000
	Shoulder repair	5% of total area	11	m2	6200	1	682,000
	Ditch repair	5% of total length	330	M	2100	1	693,000
	Sub-total						2,532,400
Operation Cost		10% of the sub-total				1	253,200
Total							4,230,700
Average cost per year							423,000

Operation & Maintenance Costs for Abay Bridge

		Specification	Unit Price (Birr)	Unit	Quantity	Years	Total (Birr)
Routine Maintenance (every year)	Repair of revetment	2% of total area /year	89	M^2	34.2	9	27,400
	Sub-total						27,400 (2,740/year)
Periodic Maintenance (8^{th} year)	Repair of revetment	20% of total area	89	M^2	342	1	30,400
	Repair of pavement	1% of total area	95	M^2	28	1	2,660
	Railing & curve	1% of total length	2,340	M	6	1	14,040
	Drainage & expansion Joint	2% of total length	7,550	piece	0.68	1	5,130
	Sub-total						52,230
Operation Cost		10% of the sub-total				1	5,220
Total							84,850
Average cost per year							8,480

Estimation Conditions

- Time of estimate: December 2003
- Exchange rate: 1US$ = JPY116.11
  1Birr = JPY12.99
- Implementation period: Detailed design and construction period are shown in the Implementation schedule.
- Others: The Project will be implemented according to the Grant Aid system of the Japanese Government.

PROJECT: GOHATSION - DEJEN - D/MARKOS ROAD PROJECT
METHOD OF DRILLING : Wash boring
LOGGED BY : Mesfin A.
LOCATION : 32km from Gohatsion on the Lt side abutment
B.H. DIAMETER : 96mm
DATE STARTED : 23/11/03
BOREHOLE No.: 8(Landslide area)
B.H. DEPTH : 9.15m
DATE COMPLEED : 23/11/03

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	ROCK TCR(%)	ROCK RQD(%)	ROCK SCR(%)	SPT Depth(m)	SPT N-VALUE	SHELBY Depth(m)	SPT REC.(%)	Remarks
0.00										
1		Mixture of gravels,boulders and clay with sand	27	0	2	1.5-1.95	8/2/3		44	
2		Gravels and boulders of basalt with black clay								
3		Boulders of basalt mixed with black clay	27	0	2					
4			27			3 - 3.45	8/8/8		51	
5			28	17	11	4.5 -4.95	3/9/14		42	
6		Boulders of basalt(fresh and fine grained)	43							
7		Boulders of basalt mixed with dark gray clay and fine gravels	44							
8										
9		Dark gray fine grained boulders of basalt	56	41	19					
9.15										

PROJECT: GOHATSION - DEJEN - D/MARKOS ROAD PROJECT
LOCATION : 28km from Gohatsion on the Lt side
BOREHOLE No.: 6(Landslide area)

METHOD OF DRILLING : Wash boring
B.H. DIAMETER : 96mm
B.H. DEPTH : 12.0m

LOGGED BY : Mesfin A.
DATE STARTED : 20/11/03
DATE COMPLEED : 21/11/03

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	ROCK TCR (%)	ROCK RQD (%)	ROCK SCR (%)	SPT Depth(m)	SPT N-VALUE	SHELBY Depth(m)	SPT REC.(%)	Remarks
0.00		Clay mixed with gravel(Deposit)	13							
1										
		Crushed gravel of Limestone	50							
2		white slightly weathered Limestone(Boulder)				1.5-1.95	15/43/24		60	
3										
4			31							
						4.45-4.90	19/21/12		27	
5		Crushed gravels of Limestone mixed with sandy silty clay	22							
6		Debris flow or deposit with boulders of basalt and Limestone mixed with fine gravels and cemented by silty and sticky clay								
7										
8										
9			52							
10		Debris deposit with dominant crushed gravels of basalt mixed with clay and fine gravels	48							
11										
		Dark gray fine grained boulders of basalt	48							
12										

PROJECT: GOHATSION - DEJEN - D/MARKOS ROAD PROJECT
LOCATION : 31km from Gohatsion on the Lt side Abutment
BOREHOLE No.: 7(Landslide area)

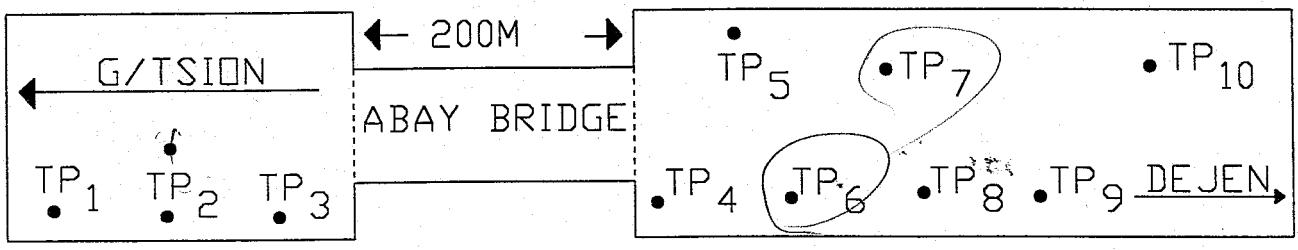
METHOD OF DRILLING : Wash boring
B.H. DIAMETER : 96mm
B.H. DEPTH : 9.35m

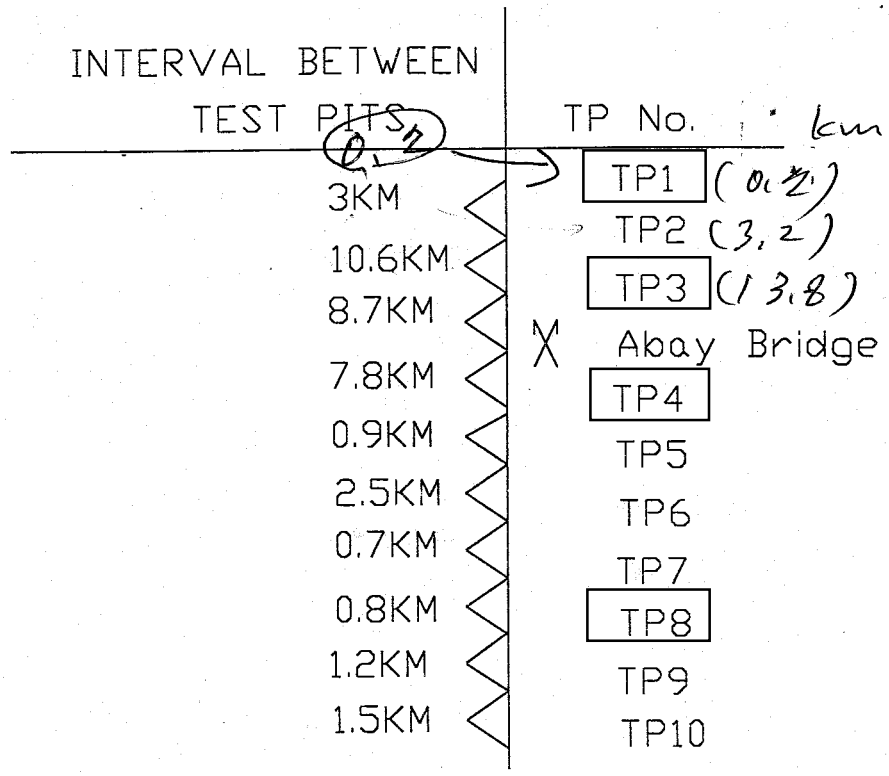
LOGGED BY : Mesfin A.
DATE STARTED : 21/11/03
DATE COMPLEED : 22/11/03

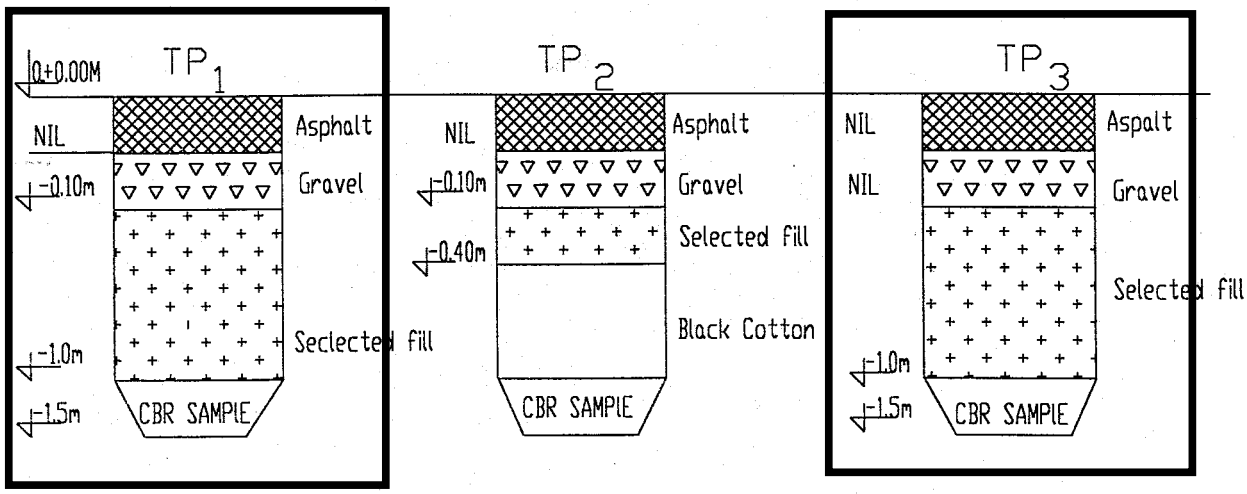
DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	ROCK TCR (%)	ROCK RQD(%)	ROCK SCR (%)	SPT Depth(m)	SPT N-VALUE	SHELBY Depth(m)	SPT REC.(%)	Remarks
0.00										
1		Light gray fine grained fresh boulders of basalt	48	29	29					
2		Crushed gravels of basalt with locally thin layer of clay along the joint surface	29							
3		Boulders of light gray fine grained fresh basalt mixed with some gravels and silty clay along the joint surface								
4				21	15					
5				51	26					
6			65							
7		Mixture of crushed gravels,boulders and sandy and sticky clay	60							
8	R R R R	Dark gray fine grained basalt with thin clay on joint white slightly to moderately weathered boulders of Limestone mixed with boulders of dark coloured fine grained basalt	64	47	36					
9										
9.35			20	17	13					

TEST PIT LOG

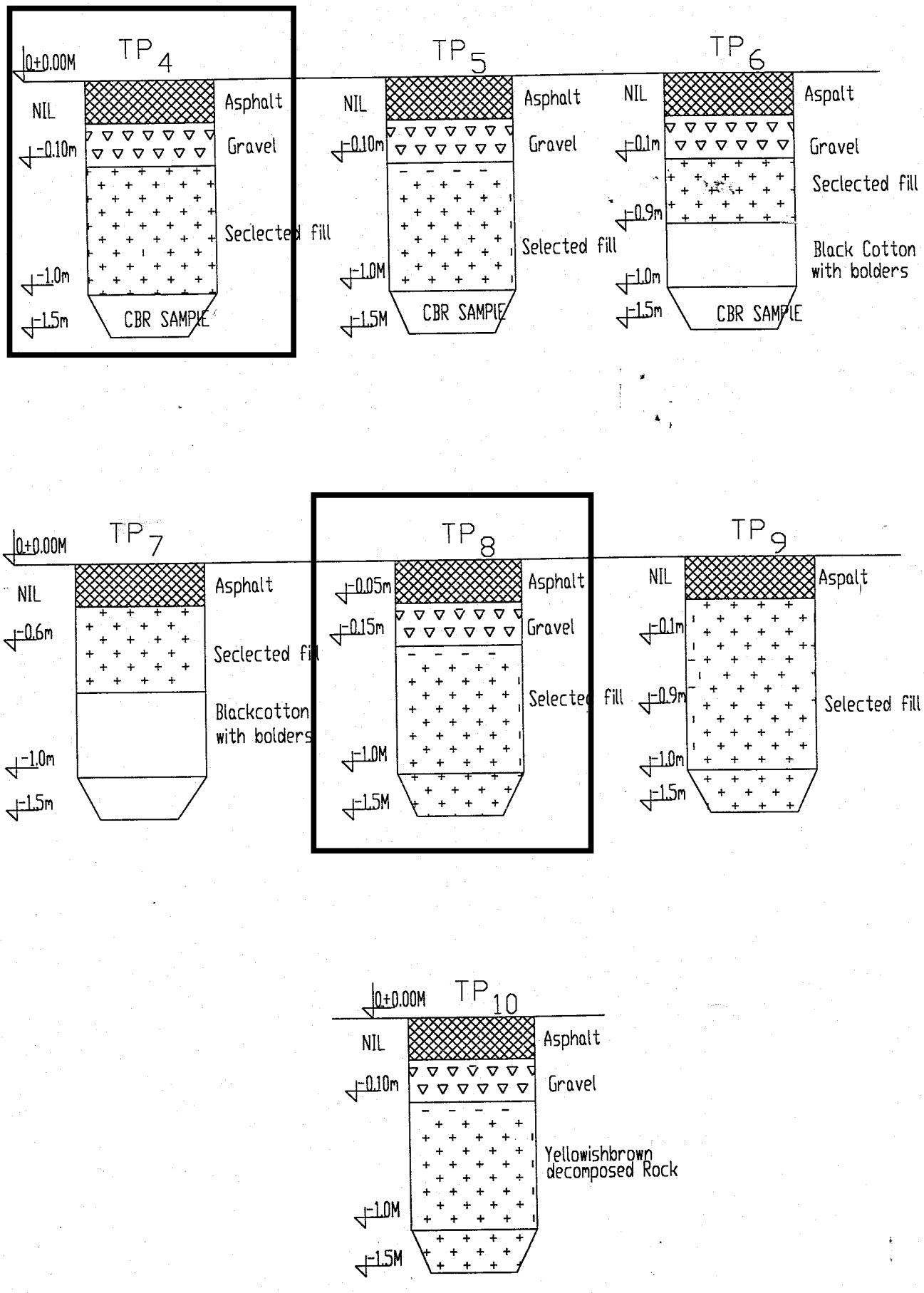
PROJECT:- GOHATSION - DEJEN







GOHATSION - DEJEN SECTION



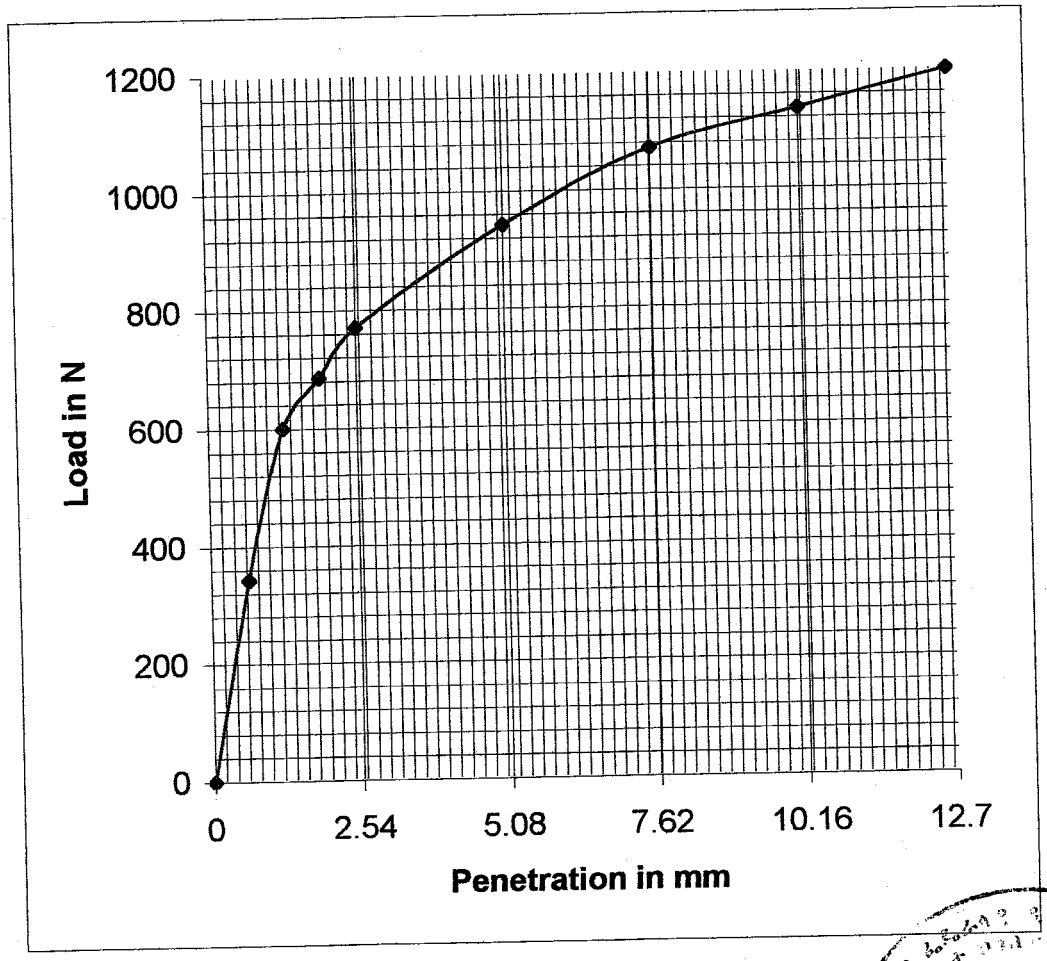
TCDSCo. Materials Laboratory
Calofornia Bearing Ratio Test

Project: **G/Tsion - Deien**
Station: **TP 1**
Depth: **100 cm**
Material Type: **Subgrade**

Method of Test: **AASHTO T - 180**
Date Tested: **28/11/03**
Reported To: **Oriental Consultants Co. Ltd.**

Bottom			
Pent. in mm	Dial Reading	Load (N)	C.B.R (%)
0	0	0	
0.635	8	342.64	
1.270	14	599.62	
1.905	16	685.28	
2.540	18	770.94	6
5.080	22	942.26	5
7.620	25	1070.75	
10.160	26.5	1134.995	
12.700	28	1199.24	

Swell : 6.72%



Reported By: _____ for
Section Head

Checked By: _____
Materials Engineer

Approved By: _____
BIRUK T.HAIMANOT
Design Project Manager

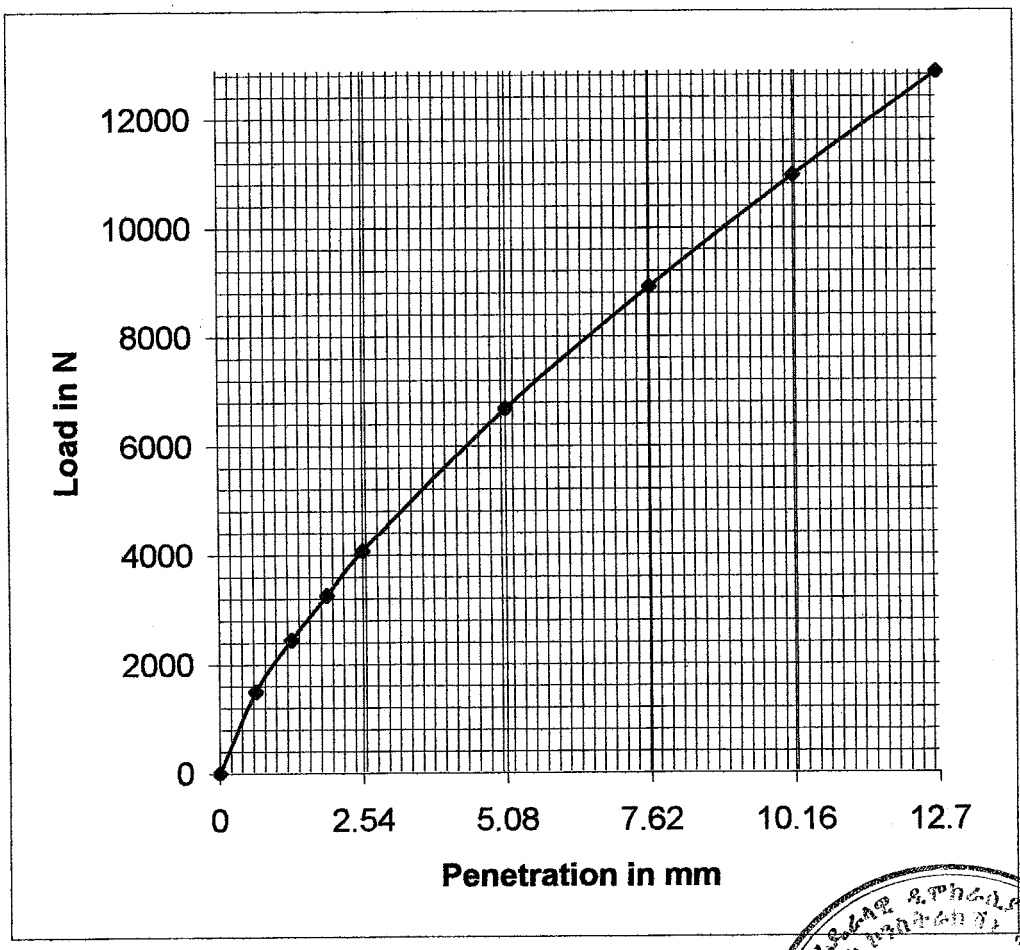
TCDSCo. Materials Laboratory
Calofornia Bearing Ratio Test

Project: **G/Tsion - Dejen**
Station: **TP 3**
Depth: **100 cm**
Material Type: **Subgrade**

Method of Test: **AASHTO T - 180**
Date Tested: **27/11/03**
Reported To: **Oriental Consultants Co. Ltd.**

Bottom			
Pent. in mm	Dial Reading	Load (N)	C.B.R (%)
0	0	0	
0.635	35	1499.05	
1.270	57	2441.31	
1.905	76	3255.08	
2.540	95	4068.85	31
5.080	156	6681.48	33
7.620	208	8908.64	
10.160	256	10964.48	
12.700	300	12849	

Swell : 0.7%



Reported By: _____ Section Head

Checked By: _____ Materials Engineer

Approved By: _____ SIRUK THAIMANOT Project Manager

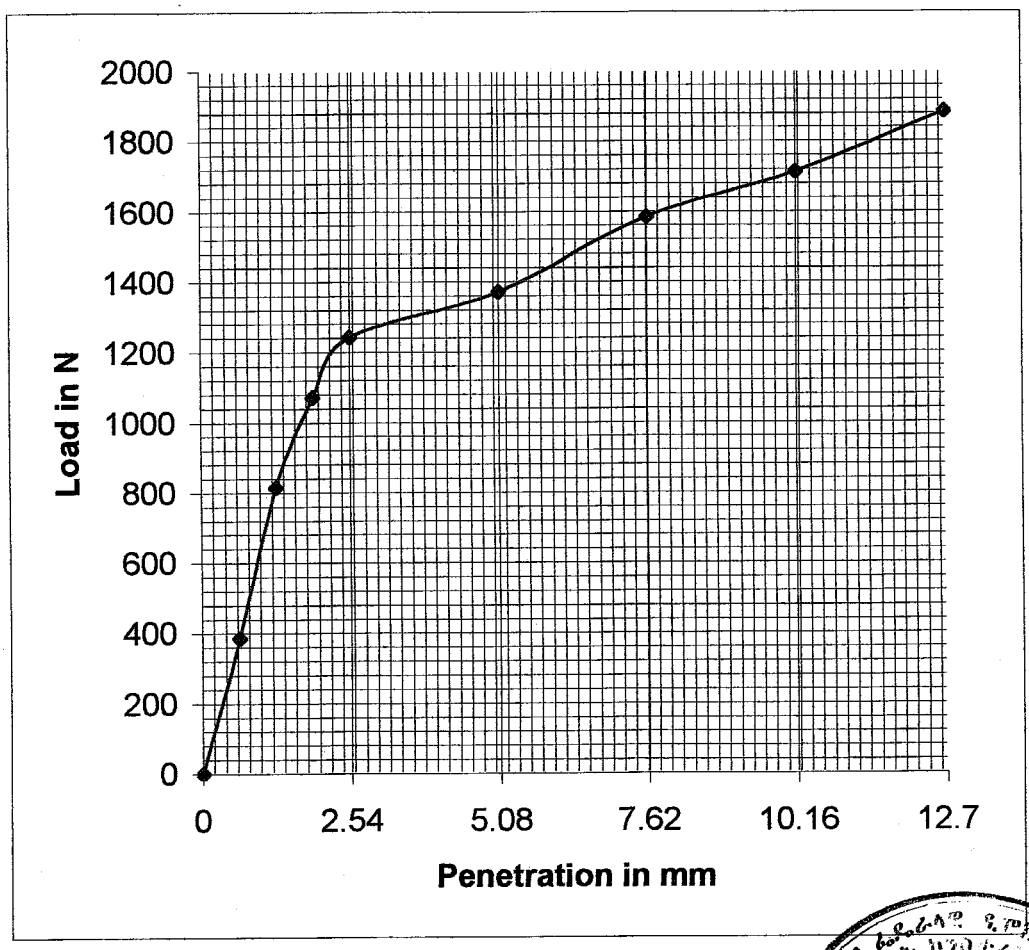
TCDSCo. Materials Laboratory
Calofornia Bearing Ratio Test

Project: **G/Tsion - Dejen**
Station: **TP 4**
Depth: **100 cm**
Material Type; **Subgrade**

Method of Test: **AASHTO T - 180**
Date Tested: **28/11/03**
Reported To: **Oriental Consultants Co. Ltd.**

Bottom			
Pent. in mm	Dial Reading	Load (N)	C.B.R (%)
0	0	0	
0.635	9	385.47	
1.270	19	813.77	
1.905	25	1070.75	
2.540	29	1242.07	9
5.080	32	1370.56	7
7.620	37	1584.71	
10.160	40	1713.2	
12.700	44	1884.52	

Swell : 3.06%



Reported By: _____ Section Head

Checked By: _____ Materials Engineer

Approved By: _____
ZIRUK T.HAIMANOT
Design Project Manager

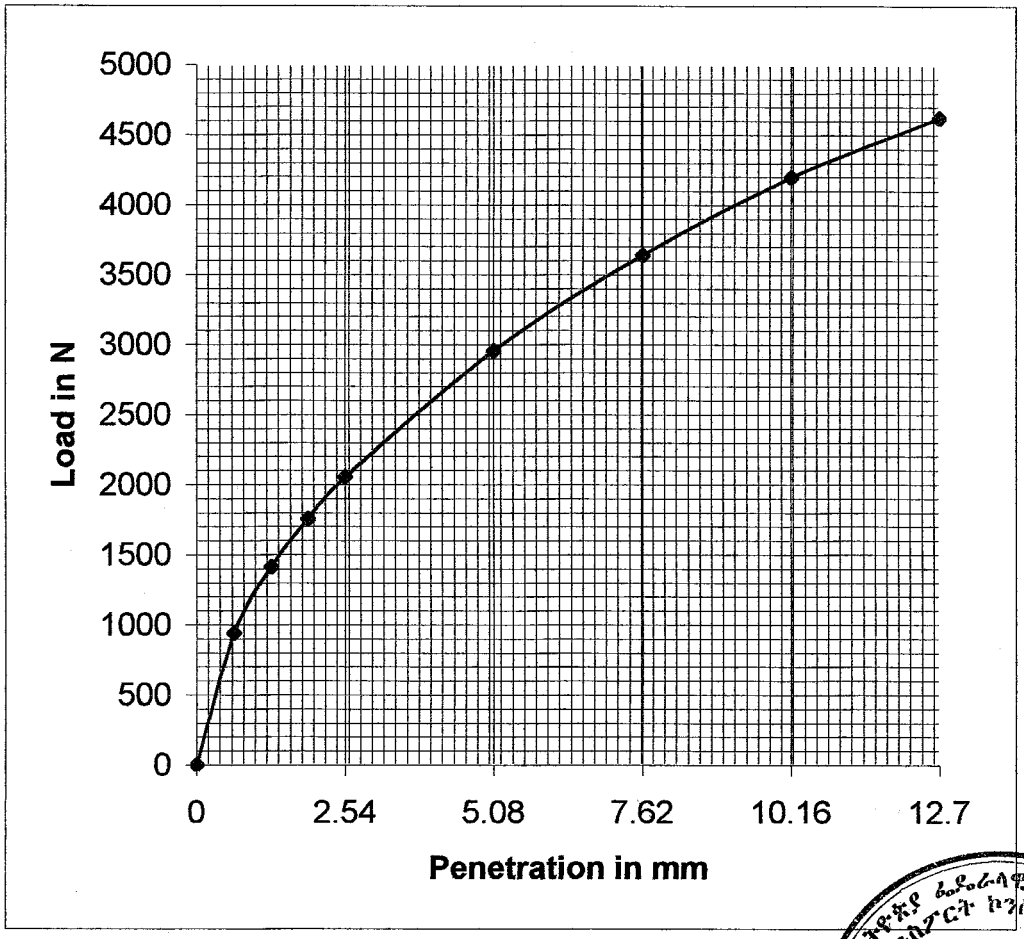
TCDSCo. Materials Laboratory
Calofornia Bearing Ratio Test

Project: **G/Tsion - Dejen**
Station: **TP 8**
Depth: **100 cm**
Material Type: **Subgrade**

Method of Teste: **AASHTO T - 180**
Date Tested: **27/11/03**
Reported To: **Oriental Consultants Co. Ltd.**

Bottom			
Pent. in mm	Dial Reading	Load (N)	C.B.R (%)
0	0	0	
0.635	22	942.26	
1.270	33	1413.39	
1.905	41	1756.03	
2.540	48	2055.84	16
5.080	69	2955.27	15
7.620	85	3640.55	
10.160	98	4197.34	
12.700	108	4625.64	

Swell : 0.7%



Reported By: _____ Section Head

Checked By: _____ Materials Engineer

Approved By: _____ BIRUK T.HAIMANOT Design Project Manager


JICA