Study Report
on
The Project
for
Improvement of The Equipment
for
Road Construction and Maintenance
(Phase II)
The Kingdom of Bhutan

February 1996

Japan International Cooperation Agency

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PREFACE

In response to a request from the Government of the Kingdom of Bhutan, the Government of Japan decided to conduct a basic design study on the Project for Improvement of the Equipment for Road Construction and Maintenance (Phase 2) and entrusted the Japan International Cooperation Agency (JICA) to conduct the study with the assistance of the Japan International Cooperation System (JICS).

JICA sent to Bhutan a study team from October 22 to November 15, 1995.

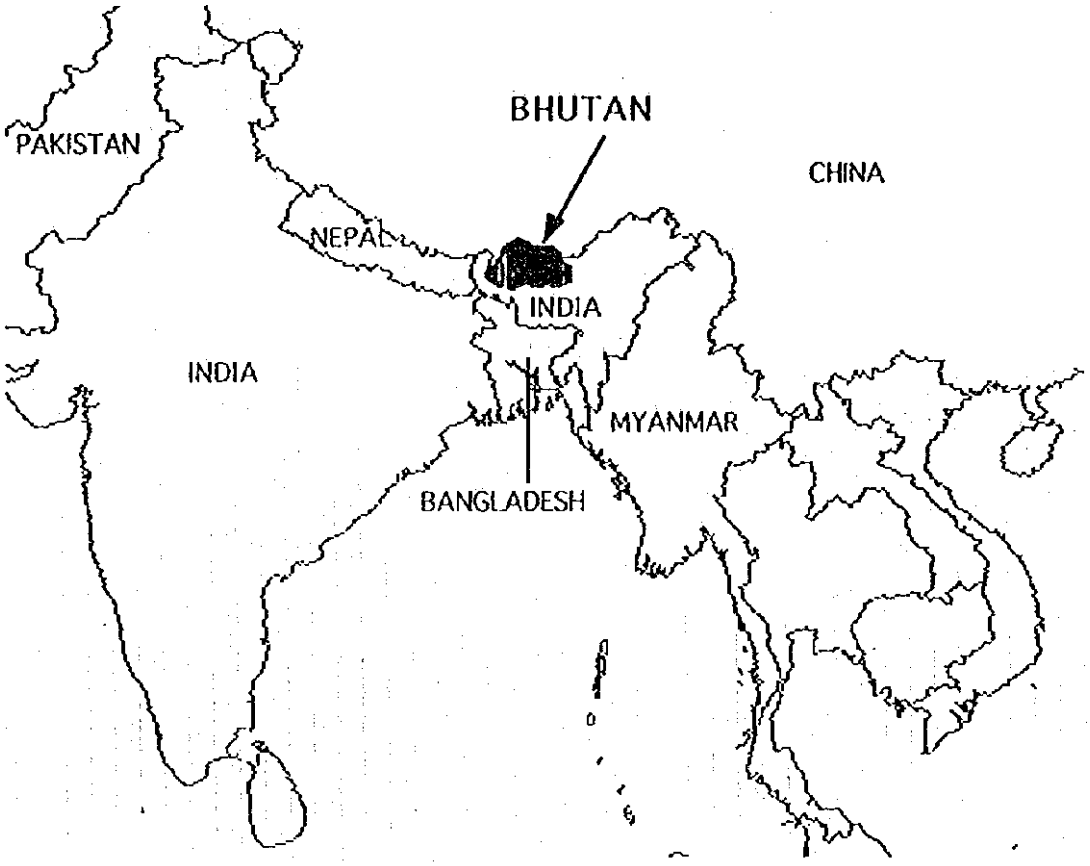
I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Kingdom of Bhutan for their close cooperation extended to the team.

February 1996

Kimio Fujita
President
Japan International Cooperation Agency

Location Map



Legend

ADB	:	ASIAN DEVELOPMENT BANK
CEC	:	COMMISSION OF THE EUROPEAN COMMUNITIES
UNDP	:	UNITED NATIONS DEVELOPMENT PROGRAMME
UNCDF	:	UNITED NATIONAL CAPITAL DEVELOPMENT FUND
WFP	:	WORLD FOOD PROGRAM
GOI	:	GOVERNMENT OF INDIA

Contents:

Chapter 1 Background of the Project

1-1 Background

Much of the Kingdom of Bhutan (national land area 47,000 km2) consists of a mountainous belt (9% farming land, 71% forest, 20% barren land), and roads here play an important role in the movement of people and materials. However, because roads only have simple paving (1,919 km of roads are asphalt paved, 53 km are gravel, and 1,051 are still unpaved), they have become increasingly prone to damage in line with the recent rapid increase in the number of vehicles (see Table 1) (*). Despite this, deterioration and absolute shortages in equipment for road repair and maintenance have meant that it has been impossible to maintain roads at satisfactory levels. The absence of guardrails on sinuous mountain roads makes such roads extremely dangerous, and many accidents are occurring simply because of the poor state of roads. Furthermore, because almost all roads have no alternative routes, the hold-ups to traffic caused by accidents and natural disasters can have a detrimental effect on the movement of people and materials.
In order to improve this situation, the Royal Government of Bhutan compiled The Project for Improvement of the Equipment for Road Construction and Maintenance (Phase II), intended to promote the repair and maintenance of the existing road network, and it requested the Government of Japan to provide grant aid for the purchase of the necessary construction and maintenance equipment.

Table 1

	1985	1986	1987	1988	1989
Vehicle	782	934	1,027	1,235	1,287
4WD Vehicle	627	810	951	1,105	1,151
Truck	826	955	1,075	1,249	1,345
Bus	57	78	99	118	140
Motor Cycle	1,513	1,883	2,281	2,882	3,222
Taxi	117	153	213	250	291
Vihicle for Dipromatic use	49	58	65	71	80
Total	3,971	4,871	5,711	6,910	7,516
Increase Rate (%)		23.0	17.0	21.0	9.0

* The average increase in vehicles between 1985 and 1989 was 17%, and it is thought that vehicular traffic will continue to increase at a steady rate in future, too.

Chapter 2 Contents of the Project

2-1 Objectives of the Project

(1) Objectives

Regarding the equipment that was procured under The Project for the Improvement of Equipment for Road Construction of 1987, more and more breakdowns have been occurring as a result of stress over time and also wear and tear.
This latest Project aims to procure for nine maintenance workshops (which were also targeted for equipment provision under the 1987 project) construction and maintenance equipment and tools, judged to be necessary based on consideration of the road conditions in each area and the state of maintenance of the currently owned equipment, and so on.

2-2 Basic Concept of the Project

The basic concept of the Project is to procure equipment needed for clearing earth from roads and that for conducting road widening, and to provide the said equipment to the same nine sites (see Figure 1) which were targeted under the above-mentioned project of 1987.
The equipment will basically consist of bulldozers, wheel loaders and hydraulic shovels for use in the aforementioned work. Because one of the districts (Lobeysa) is a major intersection point between cities and is thus important for traffic, equipment for use in the maintenance of asphalt-paved roads shall also be procured here.
Furthermore, rebuilding machines for undercarriages and attachments such as buckets, etc. shall also be procured to greatly reduce parts purchase costs and lengthen the useful life of the equipment.
The rebuilding machines requires fork lifts as supplementary support and also trailers and trucks is to be used for carrying construction machines when transferring between sites. Moreover, regarding the securing of operators to use the procured equipment, the raising of funds to cover fuel costs, and the taking of budget measures to ensure the necessary running costs are covered, and so on, as will be described later, it has been confirmed that the implementation setup will experience no problems in these areas.

2-3 Basic Design

2-3-1 Design Concept

(1) Design Concept

1) Natural Conditions

Because the sites are situated at altitudes ranging from 300 m to 3,000 m, high altitude specifications will need to be adopted for the equipment. Moreover, as many road sections are buried beneath earth and mud as a result of slope collapse caused by natural disasters, it will be necessary to permanently station earth-removing equipment at each of the sites.

2) Social Conditions

Much of the population is involved in agriculture, and most construction work is carried out using laborers from India and Tibet. However, because the Royal Government of Bhutan is trying to limit the ratio of foreign laborers working in the country, the numbers of available laborers will be restricted and it will be necessary to raise efficiency through mechanization.

3) Policy Regarding Operation and Maintenance Capability of the Implementing Agency

The implementing agency is able to conduct the necessary operation and maintenance with its current setup, and it is thought that no additional staff increases will be necessary.
As construction equipment manufactures have no agents in Bhutan, spare parts have to be purchased from surrounding countries at above-average rates, however, the operating budget has been increasing at around 12% per year and there should be no difficulties concerning the payment of parts costs (see 3-2 Operation and Maintenance Plan).

2-3-2 Basic Design

(1) Basic Design

1) Overall Plan

The Project is intended to procure road construction and maintenance equipment for the nine workshops (at Phuentsholing, Thimphu, Lobeysa, Tongsa, Lingmithang, Tashigang, Sarbhang, Shemgang, and Geylegphug) which were targeted in the 1987 project, and thus improve the operation and maintenance setup for the existing road network.
The said workshops are responsible for the maintenance of 2,360 km of roads (see Table-2), which accounts for approximately 80% of the combined extension of the existing road network in Bhutan. The equipment distribution plan is indicated in Figure-1 and Table-3. Incidentally, Figure-2 shows the main existing roads and new roads currently under construction.

Table-2 Road Rehabilitation and Maintenance Under the Responsibility of Each Division

NO	Division	Road Length (KM)
1	Phuentsholing	310
2	Thimphu	300
3	Lobeysa	330
4	Tongsa	290
5	Lingmithang	220
6	Tashigang	320
7	Sarbhang	290
8	Shemgang	300
9	Geylegphug	0

Figure-1 Equipment Distribution Plan

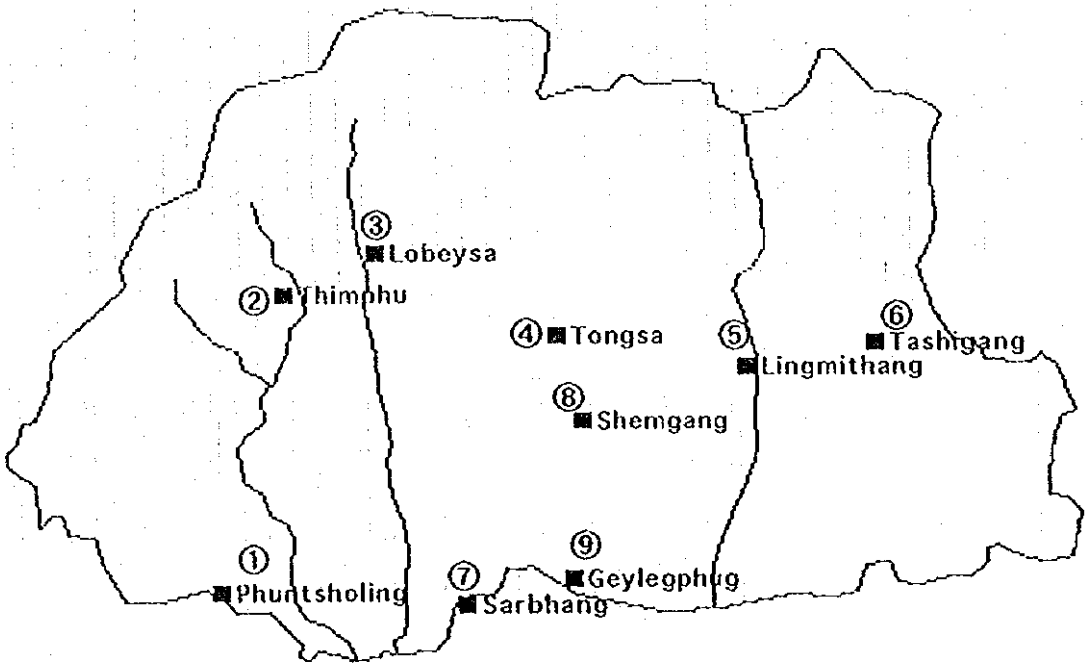
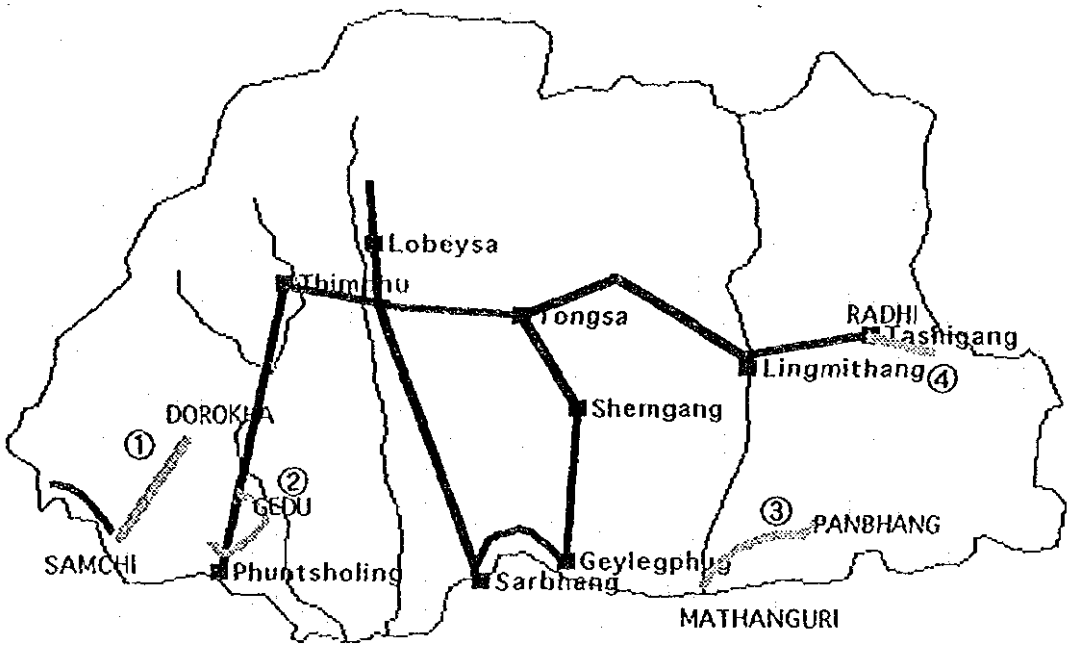


Table-3 Equipment to be Allocated to Each Site

NO	Division	Equipment to be procured											
		Bull Dozer	Wheel Loder	Excavator	Asphalt Paver	Bitumen heating kettle	Bitumen Distributor	Service Truck with Crane	Double Cabin Pick Up	Rebuildings machine on Undercarri	Rebuilding Machine on Bucket	Folk Lift	Truck Tractor & Trailer
1	P/LING		1					1					1
2	THIMPHU		1	1					1				
3	LOBEYSA	1	1	1	1	1	1	1	1				
4	TONGSA	1	1										
5	L/THANG	1	1					1	1				
6	T/GANO	1	1	1									
7	SARPANG	1	1	1									
8	SHEMGANG	1	1						1				
9	GELEPHU							1	1	1	1	2	
	Total	6	8	4	1	1	1	4	5	1	1	2	1

Figure - 2 Bhutan Main Road and Under Construction Road



*NOT SCALED

Legend : Main Road

Under Construction

Note: The roads shown in Figure-2 are simplified. For the exact network of roads, see the Map of Main Roads in Bhutan at the start of the report.

2) Equipment Plan

The equipment contents and quantities scheduled to be procured to each division are as indicated in Table-4.

Table-4 Equipment List

NO.	Item	Specification	Nos	Purpose for use
1	Bull Dozer	Weight 10t Output 95HP	6	Rehabilitation and maintenance for Road
2	Wheel Loader	Volume1.6m Weight , 9.5t Output, 110HP	8	Rehabilitation and maintenance for Road
3	Excavator with Braker	Volume0.4m, Weight 11.5t, Output 80HP Weight 800KG Blow 600/min	4	Rehabilitation and maintenance for Road
4	Asphalt Paver	Weight 5.5t, Output 32HP, Center Screed1.7m	1	Rehabilitation and maintenance for Road
5	Bitumen Heating Kettle	Tank Capacity 600litre, Output 5.5HP	1	Rehabilitation and maintenance for Road
6	Bitumen Distributor	Tank Capacity 3000litre, Output 11HP	1	Rehabilitation and maintenance for Road
7	Service Truck with Crane	3t with Crane, Pay load 4t	4	Transportation
8	Double Cabin Pick Up	Double Cabin 5 persons, Pay load 0.5t	6	Transportation
9	Rebuilding Machine on Undercarriage	Rrebuild for Bull Dozer, Excavator,ete	1	Maintenance for Equipment
10	Rebuilding Machine on BucketRebuild for attachment		1	Maintenance for Equipment
11	Folk Lift	Load Capacity 3t, Max lift height 3m, Output 50HP	2	Supplement for Rebuilding Machine
12	Truck Tractor & Trailer	GVW11t, Output 240P, Winch	1	Transportation for Equipment

Moreover, Table-5 shows the plan of procurement to each division. This is based on the equipment procured plan put forward by the Bhutan side and, taking into consideration existing equipment and the environments of use, etc., it has been compiled to ensure that each division has more or less the same working capacity regarding road maintenance.

The equipment is largely divided into earth removing and road widening equipment such as bulldozers and hydraulic shovels, paved surface repair and maintenance equipment, and rebuilding equipment. In selecting the types of equipment, consideration was given to complementing the operation and maintenance capacity of each workshop centered around the construction equipment (bulldozers, wheel loaders, hydraulic shovels) required in earth removal and road widening work. The equipment to be procured to each division was balanced with the currently owned equipment to ensure that the maintenance capacity of each would be uniform. It is expected that the workshops will put the permanently stationed equipment to good use in conducting the removal of earth and mud that has resulted from the collapse of slopes.

Comparatively small-scale equipment has been selected to enable passage along narrow roads that are only 3 m wide on average. In the case of new road construction, work loads are expressed in terms of the amount of earth to be excavated, banked or moved, however, as the Project equipment is to be used for road maintenance purposes, the work loads have been expressed in terms of the combined extension of roads (kilometers) under the responsibility of each division.

The rebuilding machines will be used at the central workshop with overhead traveling crane at Geylegphug. Forklifts will be used to carry materials and hold parts in position so that they are easy to

repair. The workshop at Geylegphug is the largest in Bhutan, and it is anticipated that the introduction of rebuilding equipment here will expand its functions even more.
Regarding the workshop at Lobeysa, because this is situated at an important junction within the road network, asphalt repair equipment shall be provided to enable the said workshop to keep the vital roads in the area in good condition.
Furthermore, by introducing trucks and trailers, it will become possible to transfer machines and equipment between each site and thus greatly raise the efficiency of construction and maintenance work. Also, by carrying broken-down equipment to workshops, the overall equipment operating rate will increase. Work vehicles will be used to convey messages and transfer equipment between the sites and workshops.

Table 5 Equipment and Work Loads at Each Division Following Equipment to be Procured

NO	Division	Road Length (KM)	Equipment to be procured	Existing Equipment
1	Phuentsholing	310	Wheel Loader/Service Truck with Crane /Double CabinPick up/Folk Lift	Bull Dozer/Excavator/Road Roller/
2	Thimphu	300	Wheel Loader/Excavator	Road Roller/Vibratory Roller
3	Lobeysa	330	Bull Dozer/Wheel Loader/ Excavator/Asphalt Paver/Bitumen Distributor/Double Cabin/Bitumen Heating Kettle/Service Truck with Crane	Vibratory Roller/Motor Grader/Stone Crusher/Water Truck
4	Tongsa	290	Bull Dozer/Wheel Loader	Motor Grader/Road Roller
5	Lingmithang	220	Bull Dozer/Wheel Loader Service Truck with Crane/Double Cabin Pick Up	Road Roller/Stone Crucher
6	Tashigang	320	Bull Dozer/Wheel Loader Excavator	Concrete Plant/Road Roller/Stone Crucher
7	Sarbhang	290	Bull Dozer/Wheel Loader Excavator	Road Roller/Vibratory Roller
8	Shemgang	300	Bull dozer /Wheel Loader Double Cabin Pick Up	Vibratory Roller/Road Roller
9	Geylegphug	0	Service Truck with Crane/Double Cabin Pick Up/Rebuilding Machine on Undercarriage/Rebuilding Machine on Bucket/Folk Lift/Truck Tractor & Trailer	Bull Dozer/Excavator/Wheel Loader/Water Truck/Double Cabin Pick Up

Note: For quantities of existing equipment, refer to the list of reference materials.

The following paragraphs proceed to explain in detail the ways in which each item of equipment will be used.

a. Bulldozer

Being a major item of civil engineering machines, the bulldozer has a wide range of uses. It can be used for excavating, compacting, ground clearing, leveling and earth collecting. In view of the need

to frequently change blade angle because of the local conditions of use, bulldozers that possess the power angle tilt function, which allows adjustments to be made by hydraulic control, shall be selected.
Engines shall be diesel and fitted with turbo chargers in order to cope with usage at high altitudes. The bulldozers shall also be fitted with ROPS cabins to protect operators in the event of rock falls or overturning.

b. Wheel Loader

The wheel loaders are to be mainly used for loading gravel and earth onto dump trucks and removing earth and mud from roads. As the dump trucks used in the joint work have a capacity of 6 m3, wheel loaders in the 1.6-2.0 m3 class that have standard buckets fitted with claws shall be selected.
Engines shall be diesel and fitted with turbo chargers in order to cope with usage at high altitudes, and ROPS cabins shall again be fitted to protect operators at times of rock fall or overturning.

c. Excavator

Excavators are able to excavate ground at lower levels than where they stand and can also dig underwater. Moreover, their long reach enables them to work on high areas.
Excavators here shall be used for loading earth onto dump trucks, removing mud and earth from roads, excavating side gutters and drainage channels, laying drainage pipes, forming banking and cutting slopes, and generally shaping land.
Engines shall be diesel and fitted with turbo chargers in order to cope with usage at high altitudes.

d. Breaker

Breakers shall be fitted as attachments to hydraulic shovels and be used to break up rock and concrete, etc. by utilizing the hydraulic pressure of the shovels to which they are attached.
These shall be used for smashing and excavating rock beds, breaking boulders, breaking up rocks and boulders at stone quarries, and breaking up old asphalt roads, and so on.

e. Asphalt Paver

An asphalt paver is used in paving work to smoothly lay heated asphalt compound over roads. An asphalt paver can run on either crawlers or rubber tire wheels. Asphalt compound is supplied from a truck into the front hopper, and this is passed to the rear of the paver through the bar feeder at the bottom of the hopper. The compound is then fed through gates at the rear, which evenly distribute it between left and right, and a screw leader ensures

uniformity in the laying. The laid compound is compacted and heated by screwed structure dampers, and final compacting is ensured through the application of vibration by means of an iron. The paver carries out this work while slowly advancing along the road.
As roads in Bhutan are narrow, small-size pavers for paving widths of 1.7 m to 3.5 m are suitable, and light oil shall be used as the material for heating the dampers.

f. Bitumen Heating Kettle

Asphalt in the kettle tank is heated and melted with a burner, pressure is applied by means of a gear pump driven by a small engine, and the melted asphalt is forced out manually through a nozzle so that it covers and sinks into fine stones that have been scattered beforehand on the road. The bitumen heating kettle has to be pulled by road roller or tractor, etc.
This simple paving device is to be used for repairing and paving isolated road sections.

g. Bitumen Distributor

This specialized vehicle, which evenly distributes liquid asphalt, is required when conducting medium to large-scale paving work. The vehicle consists of a truck chassis, upon which are installed an asphalt tank heating device, pressure pump, liquid pressure-feed piping and, to the rear, distributor nozzles and a cleaning device, etc.
The distributor can uniformly distribute asphalt at widths of between 2-3 m by means of 20-30 nozzles, and it greatly raises the ease and efficiency of paving work.
Distributors with a tank capacity of around 3,000 liters and a distribution capacity of 300 liters per minute are suitable here.

h. Service Truck with Crane

A 3-ton crane shall be placed on the flat body of an ordinary truck. In order to prevent tilting and thus raise the safety of lifting work, hydraulic outrigger jacks shall be placed to the left and right.
The load platform shall be flat-bodied and able to hold a maximum load of 4,000 kg. The specifications were selected to allow the carrying of small-scale construction machines and crane work involving loads of three tons or less. In consideration of the environment of use, total vehicle weight has been set at 10 tons, making it a mid-class vehicle.

i. Double Cabin Pickup

Pickups that possess rear carrying platforms able to carry loads of up to 500 kg have been selected in order to enable the on-site

repairs of construction machines and the carrying of fuel and oil, etc. Double cabin pickups were selected to make the transfer of people possible.

j. Rebuilding Machine on Undercarriage

The undercarriage of construction machines is the area that is subjected to the worst wear and tear and thus requires the highest maintenance costs. Only a certain number of undercarriage parts are subject to abrasion, and it is possible to restore such parts to full functioning order by simply performing buildup welding on the worn areas. The rebuilding machines means that only a small number of parts need to be replaced, and also enables repairs to be made on all undercarriage types.
Main items of rebuilding machines include shoe bolt impact trenches, track link presses, track rollers, track link automatic welders, and flux automatic circulation systems, etc.

k. Rebuilding Machine on Bucket

The front attachments of construction equipment are subject to extremely severe use and consequent deformation caused by abrasion. These attachments are also very expensive, and much effort needs to be put in to their maintenance.
The front attachment is the central part of any construction machine, and the steel plate of such attachments is apt to become worn and damaged due to repeated use in excavation, loading, scraping, earth moving and other work. The buckets and blades of wheel loaders and hydraulic shovels, etc. can be renewed by replacing worn areas of steel plate.
By providing a bending roll with steel plate bending capability, it will become possible to renew (rebuild) the buckets of all kinds of construction machines.

l. Fork Lift

The fork lift is a materials handling vehicle that possesses a fork (including attachments) and a mast upon which the fork moves up and down.
In view of the environment of use and the nature of the work, outdoor-type fork lifts possessing a loading capacity of 3 tons and a fork vertical movement range of 3 m are considered suitable. The fork lifts shall be used transferring parts and carrying work when construction machines is being repaired and as a supplement to rebuilding machines.

m. Truck Tractor and Trailer

Long trailers, suited to carrying medium and large-size construction machines, shall be provided. Moreover, because the carrying of

construction equipment will be the main use of truck tractors and trailers, low trailers shall be used in order to improve running stability by keeping the center of gravity of loads low and to make the loading of heavy objects easier.
Tractors shall be fitted with 10-ton winches to enable the loading of broken-down vehicles, and the maximum loading capacity shall be 25 tons.

4) High Altitude Measures

Diesel engines heat inhaled air by means of compressed heat, cause self-ignition by injecting fuel, and generate motive power by creating fuel gas pressure. Consequently, as altitude increases and air pressure falls, engine output will also decrease. In order for the Project equipment to operate efficiently in the high altitude atmosphere of the Project sites, it is necessary to attach turbo chargers and altitude compensational stoppers.
The standard atmospheric data originally developed by the International Civil Aviation Organization (ICAO) in 1964 is currently used as the international standard in this area. This shows the relationship between standard air height and air pressure and temperature. Because the rate of depressurization of the air pressure at an altitude of approximately 5,500 m accelerates, this altitude is regarded as the limit of use for construction equipment that relies on diesel engines.
The rates of decrease in the output of diesel engines used in construction equipment and vehicles, etc. according to altitude are as shown below.

1. Ordinary (without turbo charger, etc.) diesel engines - 10% decrease with every 1,000 m
2. Turbo charger-fitted diesel engines - 5-7% decrease with every 1,000 m
3. Turbo charger and inter cooler-fitted diesel engines - 5% decrease with every 1,000 m

Because an altitude of 3,000 m has been assumed in the design environment of use for the construction equipment, the altitude specifications described below shall be adopted.

a. Turbo Charger

By forcibly feeding air into the cylinders, turbo chargers utilize the exhaust gases of engines to raise engine output and reduce fuel consumption. The exhaust gas emitted from the cylinders causes the turbine wheel to rotate at high speed. In line with rotation of the compressor wheel, which is on the same axis as the turbine wheel, air is forced into the engine cylinders, thus causing an equivalent amount of fuel to be burned and raising output.

b. Inter Cooler System

The inter cooler system is an air-operated system of heat exchange that makes use of a corrugated fin heat exchanger fitted to the front of the radiator. Compression of the air results in increased temperature. If this air is then fed into the cylinders after first raising its density by cooling, an even higher engine output can be obtained and the turbo effect can be raised.
In this system, the inhaled air that is compressed and heated (approximately 150 C) by the turbo charger is cooled (to approximately 50 C) as a result of conducting heat exchange with the outside air. In this way, the density and thus quantity of the inhaled air is increased, and the fuel consumption and output are improved because the increased air raises the scale of the fuel injection and improves the combustion efficiency.

c. Altitude Compensational Stopper

As was mentioned earlier, air pressure will drop the higher the altitude becomes. The maximum torque and output of a diesel engine are generally determined by the injection quantity close to the point where black exhaust fumes occur (i.e., the point close to the theoretical air-fuel ratio).
At high altitude, compared with the case of engine use at low altitude, the low air density means that the air-fuel ratio is lower if the injection quantity is the same, and this makes the engine more likely to generate black exhaust smoke.
Thus, compensational injection is required in line with the lower air density. The air density and injection quantity are determined by an automatic adjusting device. Moreover, there are also cases where a spark advance system is necessary in order to hurry the injection period.

Chapter 3 Implementation Plan

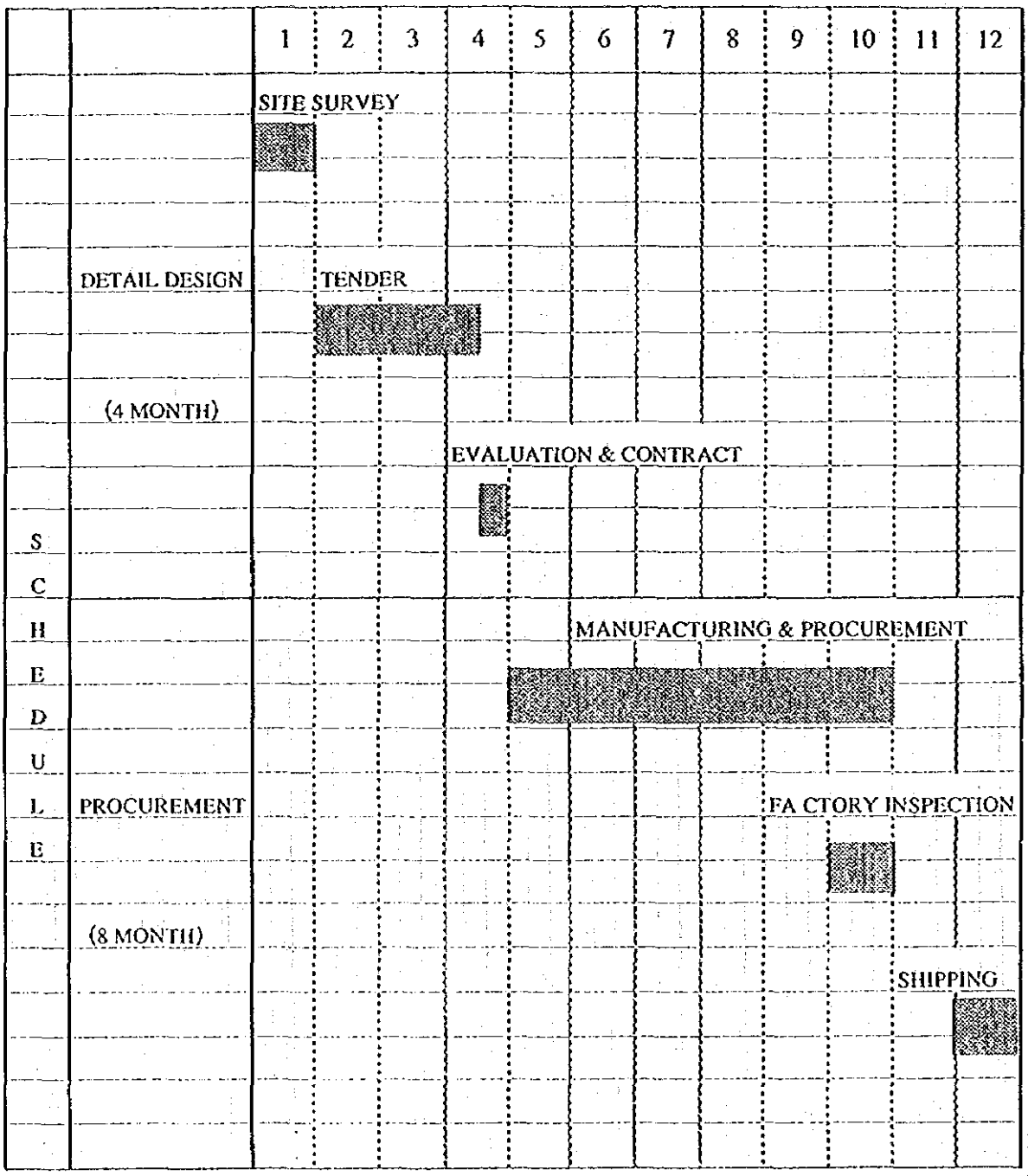
3-1 Implementation Plan

3-1-1 Implementation Schedule

(1) Budget accounting period: Single year
(2) Implementation Schedule

a) Overall implementation period (from E/N to handing over): 12 months
b) From E/N to supplier contract : 4 months
c) Supply (from supplier contract to handing over) : 8 months

Table - 6 Project Schedule



3－1－2 Obligations of recipient country

1) to conduct the inland transportation for every equipment purchased under the Grant in.Bhutan, and installation work of Rebuilding Machines at Geylegphug.

2) to open an account in the name of the Royal Government of Bhutan in an authorized foreign exchange bank of Japan designated by the Royal Government of Bhutan or its designated authority.

3) to ensure prompt unloading and customs clearance at ports of disembarkation in the Kingdom of Bhutan.and internal transportation therein of the products purchased under the Grant.

4) to exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the Kingdom of Bhutan.with respect to the supply of the products and services under the Verified Contracts.

5) 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 Kingdom of Bhutan and stay therein for the performance of their work.

6) to ensure that the Facilities rehabilitated and the products purchased under the Grant be maintained and used properly and effectively for the execution of the Project,and
7) to bear all the expense, other than those covered by the Grant,necessary for the execution of the Project.

3-2 Operation and Maintenance Plan

(1) Operation and Maintenance Costs

The total budget expenditure of the Roads Department of the Public Works Bureau was 350,310,000 NU, and of this 74,180,000 NU or 21.2% was devoted to running costs for the purpose of operation and maintenance (see Table-7).
The budget set aside for operation and maintenance in 1996 is 140,300,000 NU, which is almost twice that of the previous year. In view of the falling operating rates of badly deteriorated existing equipment and the phased process of equipment scrapping, it is estimated that the actual number of operating machines and equipment will remain the same or fall even after the new equipment is introduced. It is thus considered that the new equipment will not bring about any increase in operation and maintenance costs. Furthermore, when one takes into account money carried over from

previous years, budget distribution adjustments, and revenue obtained from leasing construction machines to other ministries and departments, there will be no problem in handling the operation and maintenance costs. Operating funds have shown a steady average increase of 13% over the past three years (see Table-8), and major savings are expected to be made on parts purchase costs due to the introduction of rebuilding machines. With respect to personnel expenses, too, there will be no extra burden because the current staffing levels will remain unchanged.
In consideration of the above-mentioned factors, it is judged that the funds for covering operation and maintenance costs can be secured without any great difficulty.

Table 7 Running Cost of Operation and Maintenance

	Title of Budget Line	Expenditure 94/95
1	Personal Emolument	11.998
2	Travel	2.645
3	Utilities-telephone	0.165
4	Utilities- Electricity etc	0.045
5	Rental of properties	0.009
6	Office Supply	0.237
7	Maintenance of Property	16.39
8	Operating Expenses	0.008
9	Tax,Duties ,Handle Charge	0.178
10	Transportation	0.059
11	Contributions Provident Fund	0.489
12	Retirement Benefits	0.165
	TOTAL	32.38

Unit: 1,000,000 NU (1 NU = 3 Yen)

Table 8 Operating Funds

Operating Cost and Budget (Actual result)			
Item or Expenditure	1993	1994	1995
CIVIL	20.5	34.4	41.8
MECHANICAL	25.7	23.56	32.38
TOTAL	46.2	57.96	74.18

(2) Maintenance and Repair

The maintenance and repair work is to be divided into the following areas.

* Site: In addition to breakdowns and repairs that arise during work, the results of periodic inspections will also be necessary. Partial dismantling and maintenance, parts replacement, and other

work that only requires the use of simple equipment shall be carried out.

* Workshops: Serious breakdowns shall be handled using the rebuilding machines that is scheduled to be procured under the Project.

(3) Operation and Maintenance Plan

The Project equipment will first be collected together at Phuentsholing (15,000 m2 in area, see the list of reference materials) on the Indian border, from where it will be distributed to each of the target workshops.
Parts and materials stores are kept in good order, and all parts and materials destined for workshops in Bhutan are controlled en bloc by computer.
Regarding the price of construction machines attachments and undercarriage parts, a single bucket newly bought will cost around US$14,000, and undercarriage parts will cost around US$45,000,- US$55,000, (FOB price at port in Japan). However, if the aforementioned rebuilding equipment are used to repair the areas most vulnerable to wear and deformation, it will be possible to ensure additional operating times of approximately 4,000 hours. When one considers that the annual operating time of equipment in Bhutan is approximately 1,000 hours, it is judged that the useful service life of equipment can be extended by roughly four years.
If all the existing equipment were to be rebuilt, the resulting increase in overall operating time efficiency and reduction in spare parts purchase costs would have an immense beneficial effect on the operation and maintenance setup.
With respect to the operation and maintenance organization, as was described in detail in the section on the implementation setup in Chapter 3, it is considered that the current organization is well able to handle the new equipment.

Chapter 4 Project Effect and Evaluation

4-1 Project Effect

As road vehicles are the dominant means of transport in Bhutan, improving the road network will naturally stabilize the movement of people and goods within the country, and the effects of doing this would benefit almost every member of the population of 1,780,000. As the maintenance of roads has been raised as one of the important issues within the Seventh National Development Plan, which is currently in progress in Bhutan, implementation of the Project will contribute to the country achieving one of its medium to long-term development plan objectives.

Because almost all the roads in Bhutan have no alternative diversion routes, road interruptions caused by natural disasters or accidents, etc. can sometimes last for months, and such interruptions will continue to occur into the future. The urgency of the need for Project implementation is heightened even more when one considers that existing road maintenance equipment is badly deteriorated. In addition to bulldozers, wheel loaders, and asphalt paving and repair equipment, etc., which is usually the main equipment procured in projects such as this, it is also planned to provide rebuilding machines for undercarriages and rebuilding machines for attachments. The introduction of such machines will greatly reduce spare parts purchase costs and encourage the internal manufacture of parts, as well as making it possible to extend the useful life of all existing equipment. Furthermore, in terms of the environment, because the Project only aims to improve the daily maintenance of existing paved roads and does not involve the construction of any new roads, there will be no negative impact.

The political situation in Bhutan is stable, and the implementing agency is cooperative. Moreover, because there are ample mechanics and operators and the necessary operation and maintenance budget is assured, it has been confirmed that the Bhutan side is well able to handle the operation and maintenance setup following Project implementation.

For the reasons described above, the Project is deemed to be appropriate for implementation under the Grant Aid System of the Government of Japan.

4-2 Recommendation

As described above, because it is considered that the Project is expected to have a huge effect and widely contribute to the improved living standard of the citizenry in Bhutan, its appropriateness as being a Project worthy of implementation under the Grant Aid System of the Government of Japan has been confirmed.

It has also been said that the Bhutan side should have no problems in terms of staff and funds regarding the Project running and operation, however, it is considered that, if the following points

could be improved on, Project implementation will go more smoothly and effectively.

1) Training and Securing of Human Resources
   The current setup is able to conduct proper operation and maintenance, however, the building of a setup that is always able to accept new technology is desired. In the current situation, engineers are either invited from neighboring India, or technical aid from other countries and international agencies is relied on. The technical training body of note in Bhutan is the Royal Technical Institute, however, the German technical guidance and support which the Royal Technical Institute has received up until now is scheduled to be suspended from 1996. Judging from current conditions in Bhutan, the dispatch of medium-term and long-term specialists is considered to be desirable.

2) The implementing agency should regularly teach operators how to properly use the equipment, either by itself or with the help of manufacturers' agents. Moreover, it is thought that technical guidance into equipment maintenance techniques will regularly need to be given to site foremen and workshop staff members.

3) Personnel management needs to be effectively carried out, to ensure that talented staff members within the operation and maintenance setup are not lured away to the private sector.

(Appendices)

1.Member List of the Survey

Name	Position	Institute
Mr.Toru Takagi	Equipment & Procurement Planner (Road Construction Planning)	Japan International Cooperation System
Mr.Naokichi Kawamura	Equipment & Procurement Planner (Procurement & Estimation)	Japan International Cooperation System

2. survey Schedule

BHUTAN

THE PROJECT FOR REHABILITATION AND MAINTENANCE OF THE ROADS

NO	DATE		TIME	PLAN	STAY
1	22-Oct	SUN		NARITA LV 12:20 - AI 301 - DELHI AR17:25	DELHI
2	23-Oct	MON		DELHI LV 11:45 - KB 108 - PARO AR 15:55	THIMPHU
3	24-Oct	TUE		VISIT JOCV OFFICE MEETING MIN. OF COMMUNICATIONS MEETING PUBLIC WORKS DIV.	THIMPHU
4	25-Oct	WED		MEETING FOREIGN AFFAIRS MINISTRY OF FINANCE NATIONAL BUDGET & AID COORDINATION DIV. MEETING PWD	THIMPHU
5	26-Oct	THU		MEETING PWD	THIMPHU
6	27-Oct	FRI		SITE SURVEY/EQUIPMENT GRANTED BY JAPANESE GOVT./PRIVATE WORKSHOP AND AVILABILITY OF PARTS. MOVE TO LOBEYSA	LOBEYSA
7	28-Oct	SAT		INSPECTION OF MACHINERIES	LOBEYSA
8	29-Oct	SUN		SITE VISIT OF PROPOSED NEW ROAD FROM TASHITHANG	LOBEYSA
9	30-Oct	MON		MOVE TO GELEPHU	GELEPHU
10	31-Oct	TUE		INSPECTION OF WORKSHOP AND SARPANG	GELEPHU
11	1-Nov	WED		MOVE TO PHUNTSHOLING	PHUNTSHOLING
12	2-Nov	THU		INSPECTION OF MACHINERIES OF P/LING MTC.DVN.	PHUNTSHOLING
13	3-Nov	FRI		INSPECTION OF SPARES IN STORE	PHUNTSHOLING
14	4-Nov	SAT		MOVE TO THIMPHU	THIMPHU
15	5-Nov	SUN		IN-HOUSE MEETING	THIMPHU
16	6-Nov	MON		MEETING DEP. ROADS	THIMPHU
17	7-Nov	TUE		MEETING DEP. ROADS	THIMPHU
18	8-Nov	WED		MEETING DEP. ROADS	THIMPHU
19	9-Nov	THU		MEETING DEP. ROADS	THIMPHU
20	10-Nov	FRI		SIGNING OF THE MINUTES OF MEETING REPORT TO JOCV OFFICE	THIMPHU
21	11-Nov	SAT		IN-HOUSE MEETING	THIMPHU
22	12-Nov	SUN		PROCEED TO PARO	PARO
23	13-Nov	MON		PARO LV 07:30 -KB 107 -DELHI AR10:45 MEETING EMBASSY OF JAPAN / JICA OFFICE	DELHI
24	14-Nov	TUE		DELHI LV 18:30 - AI 302	FLIGHT
25	15-Nov	WED		- AR 09:10 AR NARITA	JAPAN

3. List of Party Concerned in the Recipient country

1 Dasho Leki Dorji, Deputy Minister, Ministry of Communications.

2 Dasho Dorji Tenzin, Secretary,Public Works Division

3 Dasho Yeshey Zimba, Secretary, Ministry of Finance.

4 Mr, wangdi Norbu, Director,National Budget & Aid Coordination Division.

5 Mr. Tshering Dorji, Director, Public Works Division.

6 Mr.Akio Yamamoto Coordinator , JOCV

7 Ms. Keiko Obata, Coordinator, JOCV.

8 Mr.Leki Dorji ,Deputy Secretary (MOC)

9 Mr.Daw Tenzin, Deputy Director (PPD),Ministry of Communications

10 Mr. G.W Lama, Joint Director,Public Works Division.

11 Ms.Sangay Zangamo Deputy Chief Finance Officer (MOC)

12 Mr, Pem Tshewang, Resource Officer, National Budget & Aid Coordination Division.

13 Mr.Padam Tamang Finance Office (Mechanical)

14 Ms.Naoko Takahashi, staff ,JOCV.

15 Mr. Samdrup K, Thinley, Asstt.Engineer, Public Works Division.

16 Mr. Parsuram Sharma,Asstt Engineer ,Public Works Division.

4.Minutes of Discussions

Minutes of Discussions
on
the Study on the Project
for
Rehabilitation and Maintenance of the Roads
in
The Kingdom of BHUTAN

In response to a request from the Royal Government of Bhutan, the Government of Japan has decided to conduct a Study on the Project for Rehabilitation and Maintenance of the Roads (herein after referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA)

JICA sent to Bhutan a study team which is scheduled to stay in the country from October 23 to November 13, 1995.

The team held a series of discussions with the concerned officials of the Royal Government of Bhutan, and conducted a field survey at the study area.

As a result of discussions and field survey, both sides agreed to recommend the main items described in the attached sheets to the respective governments.

Thimphu, November 10,1995

TORU TAKAGI
The Government of Japan
Study team
JAPAN INTERNATIONAL
COOPERATION AGENCY

DASHO LEKI DORJI
The Royal Government of Bhutan
Honorable Deputy Minister
MINISTRY OF COMMUNICATION

ATTACHMENT

1.OBJECTIVE

The objective of the Project is to provide appropriate road maintenance equipment which are essential for paved road maintenance activities in order to sustain the road condition, hence to contribute to socio-economical development in the Project area.

2. PROJECT IMPLEMENTING AGENCY

Public Works Division
Ministry of Communication

3. PROJECT SITE

The proposed delivery sites of the equipment are shown in Annex-1.

4. MAJOR ITEMS REQUESTED BY THE BHUTAN SIDE

As a result of the series of discussions, the items shown in Annex-2 are requested by the Bhutan side.

However, the final component of the Project will be decided after further studies,

5. JAPANESE GRANT AID PROGRAMME

The Bhutan side has understood the system of Japanese Grant Aid Programme Explained in Annex-3.

6.FURTHER SCHEDULE OF THE STUDY

The team will proceed to further studies in Japan.

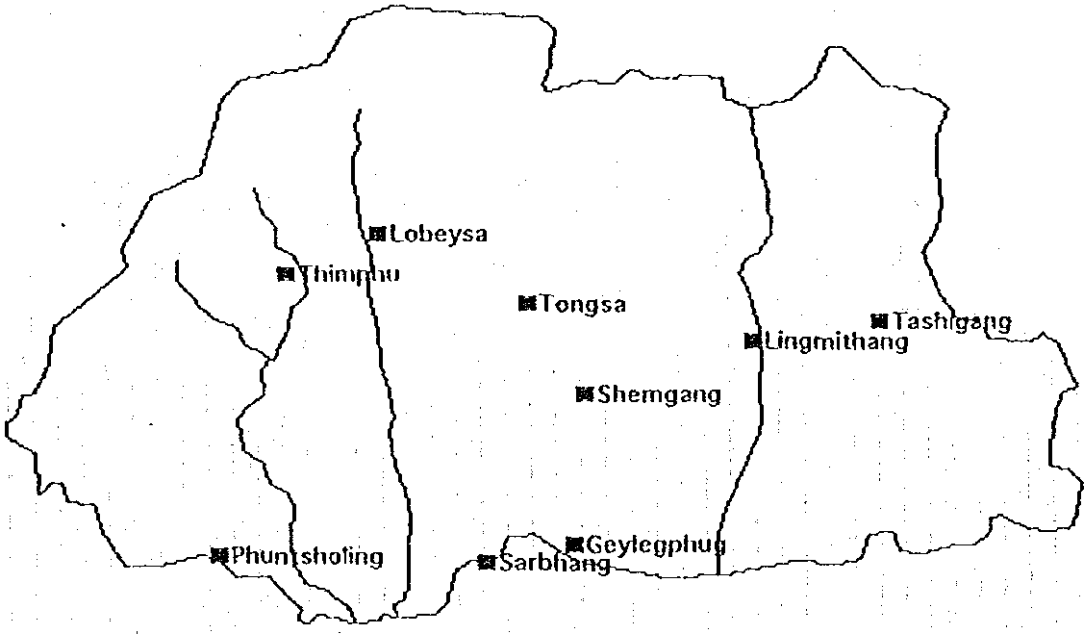
7. OTHER RELEVANT ISSUES

1) The Bhutan side will allocate the necessary budget and personnel for execution of the Project.

2) The Bhutan side will maintain and use the equipment purchased under the Grant Aid properly and effectively, and to assign the necessary staff members for operation and maintenance of them as well as to bear all the expenses other than those to be borne by the Grant Aid.

Annex--1

The proposed delivery sites of the equipment are shown as below



Annex-2

The items are listed in priority order.

	ITEM	Q'TY
1.	BULL DOZER	6 NOS
2.	WHEEL LOADER	8 NOS
3.	EXCAVATOR W/BREAKER	2 NOS
4.	ASPHALT PAVER	1 NO
5.	BITUMEN DISTRIBUTOR	1 NO
6.	BITUMEN HEATING KETTLE	1 NO
7.	DOUBLE CABIN PICKUP	2 NOS
8.	20% SPARE PARTS	1 LOT
9.	SPARE PART FOR EXISTING EQUIPMENTS	1 LOT
10.	SERVICE TRUCK W/CRANE	4 NOS
11.	DOUBLE CABIN PICK UP	4 NOS
12.	EXCAVATOR W/BREAKER	2 NOS
13.	SKY JACKER W/BUCKET	1 NO
14.	ROAD SWEEPING MACHINE	1 NO

Annex-3

J A P A N ' S G R A N T A I D P R O G R A M

1. Japan's Grant Aid Procedures

(1)The Japan's Grant Aid Program is executed by the following procedures:

- **Application** (request made by a recipient country)
- **Study** (Preliminary Study and Basic Design Study conducted by JICA)
- **Appraisal & Approval** (Appraisal by the Government of Japan and Approval by the Cabinet of Japanese Government)
- **Determination of Implementation** (Exchange of Notes between the both Governments)
- **Implementation** (Implementation of the Project)

(2) Firstly, an application or a request for a project made by the recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to see whether or not it is suitable for Japan's Grant Aid. If the request is deemed suitable, the Government of Japan entrusts a study on the request to JICA (Japan International Cooperation Agency)

Secondly, JICA conducts the Study (Basic Design Study), using a Japanese consulting firm. If the background and objective of the requested Project are not clear, a Preliminary Study is conducted prior to Basic Design Study.

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

Fourthly, the Project approved by the Cabinet becomes official when pledged by the Exchange of Notes signed by both Governments.

Finally, for the implementation of the Project, JICA assists the recipient country in preparing contracts and so on.

2. Contents of the Study

(1) Contents of the Study

The purpose of the Study (Preliminary Study/Basic Design Study) conducted on a project requested by JICA is to provide a basic document necessary for appraisal of the Project by the Japanese Government. The contents of the Study are as follows:

- to confirm background, objectives, benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for project implementation,
- to evaluate appropriateness of the Project for the Grant Aid Scheme from a technical, social and economical point of view,
- to confirm items agreed on by both parties concerning a basic concept of the project,
- to prepare a basic design of the Project,
- to estimate cost involved in the Project.

Final project components are subject to approval by the Government of Japan and therefore may differ from an original request.

Implementing the Project, the Government of Japan requests the recipient country to take necessary measures involved which are itemized in Exchange of Notes.

(2) Selecting (a) Consulting Firm(s)

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

The consulting firm(s) used for the study is (are) recommended by JICA to a recipient country after Exchange of Notes, in order to maintain technical consistency and also to avoid possible undue delay in implementation caused if a new selection process is proceeded.

(3) Status of a Preliminary Study in the Grant Aid Program

A Preliminary Study is conducted during the second step of project formulation & preparation as mentioned above.

A result of the Study will be utilized in Japan to decide if the Project is to be suitable for a Basic Design Study.

Based on the result of the Basic Design Study, the Government would proceed to the stage of decision making process (appraisal and approval).

It should be noted that at the stage of Preliminary Study, neither the Government of Japan, nor JICA, nor the Study team make any commitment concerning the realization of the Project in the scheme of Grant Aid Program.

3. Japan's Grant Aid Scheme

(1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non-reimbursable funds needed to procure facilities, equipment and services for economic and social development of the country under the following principles in accordance with relevant laws and regulations of Japan. The Grant Aid is not in a form of donation or such.

(2) Exchange of Notes (E/N)

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

(3) "The period of the Grant Aid" means one Japanese fiscal year which the Cabinet approves the Project for. Within a single fiscal year, all procedures such as Exchange of Notes, concluding a contract with (a) consulting firm(s) and (a) contractor(s) , and making final payments to them must be completed.

(4) Under the Grant, in principle, goods and services to be purchased should be of origins of Japan or the recipient country.

When the two Governments deem it necessary, the Grant may be used for the purchase of goods, services, or both from a third country(ies).

However, the prime contractors, namely, consulting, contractor and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means Japanese physical persons or Japanese juridical persons controlled by Japanese physical persons.)

(5) Necessity of the "Verification"

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

(6) Undertakings required to the Government of the recipient country

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

A. to secure land necessary for the sites of the Project and to clear and level the land prior to commencement of the construction work,

B. to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,

C. to secure buildings prior to the installation work in case the Project is providing equipment,

D. to ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and inland transportation of the products purchase 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 goods and services under the Verified Contracts,

F. to accord Japanese nationals whose services may be required in connection with the supply of the goods 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.

(7) Proper Use

The recipient country is required to maintain and use facilities constructed and equipment purchase under the Grant Aid properly and effectively and to assign staff necessary for their operation and maintenance as well as to bear all expenses other than those to be borne by the Grant Aid.

(8) Re-export

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

(9) Banking Arrangement (B/A)

The Government of the recipient country or its designated authority shall open an account in the name of the Government of the recipient country in an authorized foreign exchange 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 Government of the recipient country or its designated authority under the contracts verified.

The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay issued by the Government of the recipient country or its designated authority.

5.Equipment/Machineries Under Each Division

EQUIPMENT / MACHINERIES UNDER
SARPANG RAOO DIVISION

SL NO	EQPT.TYPE	DEPT.NO.	ENGINE NO.	CHASSIS NO.	DRIVER/OPT.	STATUS	REMARKS
1	BATTERY CHARGER	BCAH				WC	
2	BATTERY CHARGER					WC	
3	BULL DOZER TD-12	TD-12/40	46V1CZU 194643	423900SU400685	MAKAR BDR. CHETRI	BD	
4	BULL DOZER TD-8	TD-8/34	239D06195	009027	JIT BDR. RAI	BD	UR AT CW
5	ROAD ROLLER AJ	AJ/27	447915	J10295	SANTA BIR RAI	WC	
6	ROAD ROLLER AJ	AJ/26	480383	J10233	C.S BOSS	WC	
7	VIBRATORY ROLLER	NO.46	2815840145225		UGYEN DUKPA	WC	
8	WHEEL/PAY LOADER	CAT-926/16	45V72327	8171B01632	KARMA DORJI	WC	TR TO P'KHA
9	WHEEL/PAY LOADER	CAT-910/34	43V81347	41Y03132	SANGAY DORJI	WC	
10	CONCERET MIXER	WEL-MIX / 16				BD	UR AT CW
11	CONCERET MIXER	WEL-MIX / 15				BD	UR AT CW
12	CONCERET MIXER	WEL-MIX / 12				BD	UR AT CW
13	CONCERET MIXER	WEL-MIX / 13				WC	
14	CONCERET MIXER	WEL-MIX / 10				WC	
15	HAND DRIVEN MIXER					BD	
16	CONCERET VIB.					BD	
17	TATA TRUCK	BG-3-0021	692D01208554	344092201066	MEGRAJ MOKTEN	BD	SINCE 29.9.94
18	TATA TRUCK	BG-1-0125	078301	344092200633	YESHEY JAMPHEL	WC	
19	TATA TRUCK	BG-1-0126	288313	278613	CHENCHP GYELTSHEN	BD	UR AT CW
20	TATA TRUCK	BG-1-0127		344092200462	PADMAY KAMI	WC	
21	TATA TRUCK	BG 2-0033	692D0155430	3449772776	HAMGAY DUKPA(JR)	WC	
22	WORKSHOP VAN					WC	
23	DIESEL TANKER	BG-1-0024	078259	344073073647	BUDHIRAM UROAN	WC	
24	TIPPER(CANTER)	BG-3-0022	190104531	4EC00112098	K.B RAI	WC	
25	TIPPER(CANTER)	BG-3-0023	190104417	4EC00112026	KARMA CHOPHEL	WC	
26	TIPPER(CANTER)	BG-1-0171	[illegible]807317	4EC00814919	TENZIN WANGCHUCK	BD	SINCE 16.9.04
27	NISSAN PICKUP	BG-3-0036				WC	
28	MARUTI GYPSY	BG-3-0038				BD	SINCE JULY 94'
29	MARUTI GYPSY	BG-2-0159				WC	
30	M&M JEEP	BG-3-0037	PM3123	PM3123	SANGAY NORBU	WC	
31	WATER PUMP	NO.14	RK 125G3602			BD	UR R AT CW
32	WATER PUMP	NO.13	RR125G26923			WC	
33	PIONJAR MACHINE	431945				WC	
34	PIONJAR MACHINE	432433				WC	
35	JACK HAMMER	PNA05697A				BD	
36	JACK HAMMER	PNA03424A				BD	
37	JACK HAMMER	PNA2556-A				WC	
38	JACK HAMMER	PNA01569A				BD	
39	CRAWLER DRILL					BD	UR AT CW
40	WELDING MACHINE	NO.12				WC	
41	PNUEMATIC GRINDER					WC	
42	PILLAR DRILL					BD	
43	GENERATOR					BD	
44	HONDA GENERATOR					BD	
45	HIGH SPEED GRINDER					UR	UR AT CW
46	ANGLE GRINDER					BD	
47	ELECTRIC BLOWER					BD	UR AT CW
48	BENCH GRINDER					BD	UR AT CW
49	BAND SAW MACHINE					BD	UR AT CW
50	DRILLING MACHINE					WC	
51	THREAD CUTTING CO.						
52	OLING MACHINE					WC	
53	TYRE REMOVER					WC	
54	HAND DRIVEN BLOWER M/C						UR AT CW
55	NISSAN PICK UP	BG-1-0358				BD	UR AT CW
56	M&M JEEP	BCG-0342				BD	UR AT CW

EQUIPMENTS/MACHINERIES UNDER
THIMPHU MTC. DIVISION

SL. NO.	EQPT. TYPE	DEPT.NO.	ENGINE NO.	CHASSIS NO.	DRIVER / OPT.	STATUS	REMARKS
1	BATTERY CHARGER	BC/13	SL.NO.16792			WC	
2	EXACAVATOR	PC60/05	294925	22753	GYELTSHEN	WC	
3	WHEEL LOADER	CAT-926/13	1H5V72323	6HB01628	SRIGAY NAMGAY	WC	
4	VIB. ROLLER	CS551/37	96N70V29	6701980	BIR BDR. RAI	WC	
5	ROAD ROLLER JESSOP	VR752/53	21125B1926	139	TASHI	WC	
6	ROAD ROLLER AJ	AJ/20	4545293	16107	TEK BDR. RAI	BD	
7	ROAD ROLLER AJ	BWH 0154				WC	
8	USHA ROLLER	UA/04	SL.NO.4A691852			BD	
9	HINO TRUCK	BWH 0230	EH700193474	10886	JIGME	WC	
10	T/TRUCK	BWH 0186	69001913305	3440918B8	DHENDUP	WC	
11	TRUCK	BG-2-0032	692D0155381	3440772619	KARMA JIGME	BD	
12	LAND CRUISER	BG-1-0055	2H2-0061473	HZJ80-0011269	SONAM TSHERING	WC	
13	LAND CRUISER	BG-1-0034	2H-1210600	HJ60-050388		WC	
14	LAND CRUISER	BG-4-0049	B2977CC	B.40*60003	TSHERING	WC	
15	NISSAN PICK UP	BG-1-0035	TD27-047995	4BHD21-305317		WC	
16	TOYOTA HILUX	BG-1-0017	3486561	0099130		WC	W.F.P
17	TOYOTA HILUX	BG-1-0033	3150594	0079188	KUNGA NAMGAY	WC	
18	MARUTI GYPSY	BG-1-0032	162621	146473	LHAKPA TAMANG	WC	
19	MARUTI GYPSY	BG-1-0053	123202	125884	KUNGA	WC	
20	M&M JEEP	BG-1-0468	PJ3349	PJ3349	MAN BDR. CHETRI	WC	
21	M&M JEEP	BG-2-0185	PM3219	PM3219	M.S TAMANG	WC	AE(M)
22	SCOOTER (VESPA)	BG-1-0175	451467	453221		WC	CHIMI
23	WELDING SET		SL.NO. 3/76980			WC	
24	PIONJAR M/C	494637					
25	PIONJAR M/C	456516					
26	PIONJAR M/C	494642					
27	JACK HAMMER	PNA1037cA					TR TO PRD
28	JACK HAMMER	PNA13116A					TR TO PRD
29	CONCRETE MIXER	CM/11	1031			BD	
30	AIR COMPRESSOR	CPS-400/61	25158-100	3417012		BD	
31	GARAGE AIR COMPRESSOR					WC	TR TO P'KHA
32	VIBRATOR MACHINE		SL.NO. 5266				
33	ELECTRICAL WATER PUMP		SL.NO. 800923				
34	ELECTRICAL WATER PUMP		SL.NO. 800917				

EQUIPMENTS / MACHINERIES UNDER
LONGSA MTC DIVISION

SL. NO.	EQPT. TYPE	DEPT. NO.	ENGINE NO.	CHASSIS NO.	STATUS	DRIVER / OPT.	REMARKS
1	BULL DOZER	BG-1-0155	--	--	WC	--	
2	PAY LOADER 920/35	CAT920/35	SL.NO.3204-15V8077	92[illegible]6N01645	WC	--	
3	PAY LOADER 916	CAT916/28	45V8[illegible]06	9KG[illegible]	BD	--	UR AT CW
4	WHEEL LOADER 'JI'	BG-1-0099	2661[illegible]3/21	336[illegible]01879	BD	--	UR AT CW
5	ROAD ROLLER	AJ-30	--	--	WC	--	
6	AIR COMPRESSOR	VT250/28	3501327166	6[illegible]368056	WC	--	
7	AIR COMPRESSOR	VT250/39	--	--	BD	--	UR AT CW
8	TATA TRUCK	BG-2-0134	6920[illegible]156426	3449772605	WC	--	
9	TATA TRUCK	BG-2-0153	6920[illegible]442106	3449734260[illegible]4	WC	--	
10	TATA TIPPER	BG-1-0159	6920[illegible]292799	3449[illegible]284874	WC	--	
11	TATA TIPPER	BG-2-0150	--	--	WC	--	
12	TATA TIPPER	BG-1-0153	692091-395141	3449[illegible]362979	WC	--	
13	TATA TIPPER	BG-1-0152	--	--	WC	--	
14	TATA TIPPER	BWH-0120	286319	278615	OFFROAD	--	UR AT CW
15	TATA DUMPER	BG-2-0154	--	3449[illegible]A3795	OFFROAD	--	
16	CANTER	BG-1-0149	1[illegible]5[illegible]6100	4EC[illegible]513691	OFFROAD	--	UR AT CW
17	HINO TRUCK	BG-3-0030	EH700[illegible]1424	1[illegible]685	WC	--	
18	WORKSHOP VAN	BG-2-0152	466318	3[illegible]98	WC	--	
19	M & M JEEP	BG-1-0301	--	--	WC	--	
20	M & M JEEP	BG-3-0026	--	--	OFFROAD	--	UR AT CW
21	TOYOTA HILUX	BG-2-0161	SL1817939	LH[illegible]5[illegible]7[illegible]705	WC	--	
22	TOYOTA LC/RUSHER	BG-2-0128	--	--	OFFROAD	--	UR AT CW
23	MARUTI GYPSY	BG-1-0299	123423	123123	WC	--	
24	MOTOR GRADER	MG-130/46	07223397	74V02434	WC	--	
25	MOTOR GRADER	MIT MG33/74	6D16-T5S9267	30A[illegible]009	WC		
26	SPOT MIX PLANT	HM-2	--	--	WC	--	NOT REQUIRED
27	CONCRETE MIXER	MIX-05	--	--	WC	--	
28	ELEC. GENERATOR SET	NO. 2	--	--	WC	--	
29	ROAD BROOM	TD-84/63	SL.NO. 914179	--	WC	--	
30	BATTERY CHARGER	--	--	--	WC	--	
31	FUEL SKID TANK	MEDICO/20	--	--	WC	--	
32	PIONJOR MACHINE	432429	--	--	WC	--	
33	PIONJOR MACHINE	456543	--	--	BD	--	UR AT CW
34	PIONJOR MACHINE	43243	--	--	BD	--	UR AT CW
35	JACK HAMMER	PNA 05394A	--	--	WC	--	
36	JACK HAMMER	PNA-11699A	--	--	BD	--	UR AT CW
37	JACK HAMMER	PNA-10436A5L	--	--	BD	--	UR AT CW
38	JACK HAMMER	PNA-16397A5L	--	--	BD	--	UR AT CW
39	JACK HAMMER	PNA-01527A5L	--	--	BD	--	UR AT CW
40	AIR COMPRESSOR	CPS-400/07					UR AT CW
41	POWER SAW	PS/03					UR AT CW

EQUIPMENTS/MACHINERIES UNDER
STORES DIVISION, PLING

SL. NO.	EQPT. TYPE	DEPT.NO.	ENGINE NO.	CHASSIS NO.	DRIVER / OPT.	STATUS	REMARKS
1	KATO CRANE	BG-2-0010	6D14-9839	KR250-5038	K.B.PRADHAN	WC	
2	COLES CRANES	BG-2-0012	AL8E-4156	A2HE9059		BD	
3	TRAILOR ISUZU	BG-2-0013	6RB1-113397	JALCXZ16M3000090	KARCHUNG	WC	
4	TRAILOR ISUZU	BG-2-0014	102559	CXM16N-1969989		BD	
5	TRAILOR TATA	BG-2-0011	697-2-736569	516-41-73594		BD	UR AT CW
6	CANTER TIPPER	BG-2-0008	911-003550	4EC-911-1110	P.B.MONGAR	WC	
7	CANTER TIPPER	BG-2-0156			TASHI DORJI	WC	
8	GYPSY MARUTI	BG-2-0009	F10A IH161993	SJ41-IH-146109	D.B.MOKTAN	WC	
9	LANDCRUSER	BWG-0774	13-3576217.7	HJ45-018105		BD	
10	WATER PUMP		2899/D15-9	140668-97			KIRLOSKAR
11	WATER PUMP		HADH54	891/91-16			KIRLOSKAR
12	WATER PUMP (ELECTRICALLY OPERATED)			91-094			KIRLOSKAR

EQUIPMENTS/MACHINERIES UNDER
ZHEMGANG MTC.DIVISION.

SL. NO.	EQPT. TYPE	DEPT.NO.	ENGINE NO.	CHASSIS NO.	DRIVER / OPT.	STATUS	REMARKS
1	GENERATOR	GEN / 07				WC	
2	BATTERY CHARGER	BC / 10				WC	
3	EARTH REAMER	VE20 / 04				WC.	
4	AIR COMPRESSOR	VT-250 / 41			BAL BDR. CHETRI	WC	
5	CONCRETE MIXER	CM-WELL / 20				WC	
6	BULL DOZER TD-20	TD-20 / 22	416-0045 UD32646	V80-1C2-U005959	CHADO DUKPA	BD	
7	ROAD ROLLER AJ	AJ / 39			LEKIPENJOR	BD	
8	VIB. ROAD ROLLER, SAKAI	SV-91 / 41	6BG1-5021-46	SV91-30361	MANIRAJ SUBBA	WC	
9	VIB. ROAD ROLLER	VR-752 / 54				BD	
10	ROAD ROLLER	AJ / 23				WC	
11	TATA TIPPER	BG-3-0068			CHUNKEY MOKTAN	WC	TR TO P'KHA
12	TATA TIPPER	BG-4-0008			KARMA GYELTSHEN	WC	
13	TATA TIPPER	BG-4-0053			LOBZANG DORJI	WC	TR TO P'KHA
14	TATA TIPPER	BG-1-0200			GEM DORJI	WC	
15	TATA TIPPER	BG-1-0199			GYAN BDR. MONGAR	WC	
16	TATA TIPPER	BG-1-0198			PRADIP BISWAKARMA	WC	
17	CANTER	BG-2-0107			PURNA BDR. RAI	WC	
18	TATA TRUCK	BG-2-0029			HARKA BDR. CHHETRI	WC	
19	TRACTOR	BG-4-0010				WC	
20	MARUTI GYPSY	BG-1-0402			JIGME TSHERING	WC	AE(M)
21	MARUTI GYPSY	BG-3-0021			KINLEY GYLTSHEN	WC	
22	MARUTI GYPSY	BG-3-0022			KELZANG DORJI	WC	
23	MARUTI GYPSY	BG-3-0023			TENZIN DUKPA	WC	
24	TOYOTA HILUX	BG-3-0013	3L-1804038	LN106-0005619	KALU TAMANG	WC	
25	PAY / WHEEL LOADER	CAT-416 / 19			CHIMI DORJI (SR)	BD	
26	PAY / WHEEL LOADER	CAT-416 / 20			THINLAY DUKPA	WC	
27	PAY / WHEEL LOADER	CAT-910 / 26	45V00764	5KC01358	KINLAY WANGCHUCK	WC	
28	PAY / WHEEL LOADER	CAT-910 29	45V00608	41Y0317		WC	
29	JACK HAMMER	PNA 1242A				WC	
30	JACK HAMMER	PNA 05609A				WC	
31	JACK HAMMER	PNA 05900A				WC	
32	JACK HAMMER	PNA 05308A			- - -	WC	
33	JACK HAMMER	PNA 05697A				WC	
34	PIONJAR MACHINE	432431				WC	
35	PIONJAR MACHINE	444339				WC	
36	WELDING SET					WC	
37	ASHOK LEYLAND	BG-2-0162					TR FROM LOMD
38	CRAWLER DRILL	CD-02					TR FROM WRD

EQUIPMENTS / MACHINERIES UNDER
LOBEY'S A MTC. DIVISION

SL. NO.	EQPT. TYPE	DEPT. NO.	ENGINE NO.	CHASSIS NO.	STATUS	DRIVER / OPT. LOCATION	REMARKS
114	TATA TRUCK	BG-2-0037	692D9154756	344973664			
115	TATA TRUCK	BG 2-0028					
116	TATA TRUCK	BG-2-0059					
117	TAVID ROLLER				WC		BCU-II
118	TIPPER COMET	BG-2-0160	ALEK-50866	ALAK 05307	BD		UR AT CW (BCU-I
119	TIPPER COMET	BG-2-0161	ALEK-50980	ALAK-05352	BD		UR AT CW (BCU-I
120	TIPPER COMET	BG-2-0100	ALEK-51049	ALAK-05416	BD		UR AT CW (BCU-I
121	TIPPER COMET	BG-2-0151	ALEK-50849	ALAK-05305	WC		BCU-II
122	TIPPER COMMET	BG-2-0159			BD	SINCE MAY 94'	BSU
123	TRACK LOADER	CAT-963701	69Z04229	7YA**383	BD		UR AT CW(BCU-II
124	TRACTOR	BG-3-0050	NXC07*891	NXB7*445			FCU-II
125	TRACTOR	BG-2-0160	NXB063519	NXC063989	BD	SINCE 1.12.02	FCU-II
126	TRACTOR	BG-1-0113	NXC-117650	PX-117083			BSU
127	TRACTOR	BG-1-0072	NEC07911(NX007901)	B9W070654	BD		H / THANKA
128	TRUCK LUB. VAN	BG-1-0078	463376	HIS11G-3000101	BD		FCU-II
129	TRUCK, ASPHALT DIST.	BG-1-0112	JUE-145770	FUE-14776			BSU
130	TRUCK, ASPHALT DIST.	BG-1-0111	JUE-285644	FUE-145323			BSU
131	W / SHOP VAN	BG-3-0027	468424	HIS11G3000103	WC		
132	WATER PUMP	WP-KBT-02					H / THANKA
133	WATER TANKER	BG-3-0024	NE60031591	CPB-12E16672			BSU
134	WATER TANKER	BG-1-0147	NE60031631	CPB12E-16671	WC		BCU-II
135	WELDING MACHINE						H / THANKA
136	WELDING MACHINE (DIE.)	WELD / 03	124921527	79-5AC-13			BSU
137	WELDING MACHINE (PET).	WELD / 11					BSU
138	WORKSHOP VAN	BG-2-0155	468421	3**0103	WC		BCU-II

EQUIPMENTS / MACHINERIES UNDER
LOBEYSA MTC DIVISION

SL. NO.	EQPT. TYPE	DEPT. NO.	ENGINE NO	CHASSIS NO	STATUS	DRIVER / OPT. LOCATION	REMARKS
53	FUEL TANKER	BG-1-0151	NE6002271	CPB12E 16784	WC		BCU-II
54	GARAGE AIR COMPR.						H / THANKA
55	GENERATOR SET	GN / 03					
56	GENERATOR(DIESEL)	GN / 04					BSU
57	GYPSY	BG-2-0158	123466	120097			FCU-II
58	GYPSY	BG-2-0157					H / THANKA
59	HINO	BG-3-0032	EH700194533	FF172KD100687			FCU-II
60	HINO	BG-3-0028	EH700194695	FF172KD100688	BD		FCU-II
61	HOT MIX PLANT	HM / 05					
62	HOT MIX PLANT	HM / 03					
63	ISUZU TROPPER	BG-1-0029					
64	JACK HAMMER	PNA09897A					BSU
65	JACK HAMMER	PNA12656A					BSU
66	JACK HAMMER	PNA05593A					BSU
67	JACK HAMMER	PNA16065A					BSU
68	JACK HAMMER	PNA09201A					BSU
69	JACK HAMMER						BSU
70	JACK HAMMER	PNA13251A					BSU
71	M & M JEEP	BG-1-0300	PM3127	3127	BD		UR AT CW(BCU-II)
72	MARUTY GYPSY	BG-3-0054					
73	MARUTY GYPSY	BG-1-0070					
74	MOTOR GRADER	MG/05	0772396	74002433			BSU
75	MOTOR GRADER	MG330/04	559267	3GA00099	BD	SINCE 16.9.94	BCU-II
76	M&M JEEP	BG-1-0170	PM3136	PM3136			H / THANKA AE(M)
77	M&M JEEP	BG-2-0164			WC		BSU, AE(M)
78	NISSAN TRUCK	BG-1-0075	NE6003251T	CPB-12E 16773	BD	SINCE 25.5.94	FCU-II
79	NISSAN TRUCK	BG-1-0071	NE6003248T	CPB-12E 16774			BSU
80	NISSAN TRUCK	BG-1-0107	NE6003230T	CPB-12E 16770			BSU
81	NISSAN TRUCK	BG-1-0109	NE6003239T	CPB-12E 16771			BSU
82	NISSAN TRUCK	BG-1-0110	NE6003243T	CPB-12E 16772	BD		BSU
83	PAY / WHEEL LOADER	CAT-916 / 25	45V80705	5KC01357	BD		
84	PAY / WHEEL LOADER	CAT-916-24	45V60702	5KC01356			
85	PAY / WHEEL LOADER	H-510 / 42					
86	PAY / WHEEL LOADER	CAT-963 / 01					
87	PAY / WHEEL LOADER	CAT-939 / 05	40V08466	7HO2885	BD		BCU-II
88	PAY/WHEEL LOADER	CAT-919 / 31	91PZ 3204	2WT486			
89	PAY/WHEEL LOADER	CAT-926 / 16	45V73161	8NB01637	BD		
90	PAY/WHEEL LOADER	CAT-910/34	445V81347	41Y03132	WC		
91	PION JAR MACHINE						
92	PION JAR MACHINE	404634					FCU-II
93	POWER SAW	PS / 02					
94	ROAD BROOM	TD 64 / 01			BD		BSU
95	ROAD ROLLER	CAT-CS551 / 39	99N10293	67D00183	BD		BCU-II
96	ROAD ROLLER	CAT-CS551 / 35	99N70320	67D00182	WC		BCU-II
97	ROAD ROLLER	UA / 49					
98	ROAD ROLLER	VR / 47					
99	ROAD ROLLER	SV91 / 40	6DG1-692539	SV91-30366			
100	ROAD ROLLER AT	AT / 29					
101	ROAD ROLLER VIB.	CAT-CS551 / 36	99N70444	67D00187	BD		
102	ROAD ROLLER, PNEUMATIC	IAMM / 21					
103	ROAD ROLLER PNEUMATIC	CAT PF 200 / 33	7342187	1RD00044			
104	STONE CRUSHER	SC / 09	3600003HL-6A009	29823			BSU
105	STONE CRUSHER	SC / 06			BD	UR AT CW	BSU
106	STONE CRUSHER	SC / 04			BD		BSU
107	TATA TIPPER	BG-1-0022					
108	TATA TIPPER	BG-1-0021					
109	TATA TIPPER	BG-2-0148	692D0119527	32344062 87	BD		
110	TATA TIPPER	BG-4-0029	692D01168557	31409144018	BD		UR AT CW
111	TATA TIPPER	BG-4-0030	692D01181064	323440 91-173151	WC		
112	TATA TIPPER	BG-1-0077	692D01181123	323440 91-173153	BD		UR AT CW
113	TATA TIPPER	BG 3-0035					

EQUIPMENTS / MACHINERIES UNDER PHUNTSHOLING ROAD DIVISION

SL. NO.	EQPT. TYPE	DEPT. NO.	ENGINE NO.	CHASSIS NO.	STATUS	DRIVER / OPT.	REMARKS
1	BULL DOZER	ID-20736	800TCO2400680	44600654037878	WC	CHABILAL MONHAR	
2	BULL DOZER	ID 2045	804TCZ4609529	446010P050671	WC	GOMCHEN	TR TO P'KHA
3	ROAD ROLLER	J/15	43517	J10320	WC	KUL BDR. DARJEE	
4	ROAD ROLLER, VIB.	SV-91/42	6BG1502049	3V91-30362	WC	SHYAM Kr. TAMANG	TR TO P'KHA
5	ROAD ROLLER, VIB.	VR-78252	155	–	WC	WITHOUT OPERATOR	
6	WHEEL LOADER	CAT-91030	45V80570	41Y03128	WC	JIT BDR. TAMANG	
7	WHEEL LOADER	CAT 9303			WC	SONAM	TR TO P'KHA
8	PAY LOADER	UH-510B/7	280HZO05600	335-01350001862	WC		TR TO P'KHA
9	EXCAVATOR	H-64002	–	–	BD		UR AT CW
10	EXCAVATOR	H-64003			WC	H. B. THATAL	TR TO P'KHA
11	AIR COMPRESSOR	VT-25020	354S10026	601357715	WC	MIGMA DUKPA	
12	AIR COMPRESSOR	CPS-40006	25158408	9596002	UNDER REPAIR	K.L. DHITAL	
13	AIR COMPRESSOR	CPS-40061	25159406	3417015	WC	D.K. CHHETRI	
14	TATA TIPPER	BG 2-0062	692D01194,726'6920119	34409210716A	WC	B.B. DARNAL	UR AT CW
1[illegible]	TATA TIPPER	BG 2-0181	3440911732/7	692D91181136	WC	GAJAY DUKPA	
16	TATA TRUCK	BG 2-0027	692D01454553	34407343650 7	WC	RONEY PRADHAN	
17	CANTER	BG-1-0099	100104565	4EC00112110	WC	TENZIN THINLEY	
18	CANTER	BG-1-0068	190501048	4EC90509191	WC	CHENCHO DUKPA	
19	CANTER	BG-2-0156	–	–	WC	TASHI DORJI	
20	CANTER	BG 1-0128	191200319	4CC01211659			
21	ASHOK LEYLAND (COMET)	BG 2-0061	50287	05359	WC	A.B. TAMANG	UR AT CW
22	M & M JEEP	BG 2-0067	3121	3121	WC	NAMGAY DUKPA	
23	M & M JEEP	BG 4-0068	PM3045	PM3045	WC	JURMI	
24	GYPSY	BG-1-0134	119809	122472	WC	KUMAR CHHETRI	
25	FORD TRACTOR	BG2-0060	64792	64617	WC	CHITRAKAR CHAPAGAI	
26	TRACTOR TAILER	BG-2-0065			WC	–	
27	TRACTOR TAILER	BG-2-0066	–	–	OFFROAD	–	
28	JACK HAMMER	PNA-11889A		–	WC	–	
29	JACK HAMMER	PNA-17677A		–	do	–	
30	JACK HAMMER	P0007880 A		–	do	–	
31	JACK HAMMER	P0007921 A		–	do	–	
32	JACK HAMMER	NUMBER LESS		–	do	–	
33	JACK HAMMER	PNA-13116 A		–	do	–	
34	JACK HAMMER	PNA-10370 A		–	do	–	
35	JACK HAMMER	652071		–	–	–	UR AT CW
36	WATER PUMP	NO. 15	48-1208,80209	1400089043	–	–	
37	WATER PUMP	WP/6	611203-81604	–	WC	–	
38	FUEL SKID TANK	MEDICO 701	–	–	WC	–	
39	WATER TANK TAILER	NO. I	–	–	WC	–	
[illegible]	NISSAN WATER TANKER	BG-3-0014	–	–	WC	–	
4[illegible]	ASHOK CONCRETE MIXER	NO. 17	1610500650	–	OFFROAD	–	
42	CONCRETE MIXER	CM-WELI/5	1971	–	WC	–	TR TO P'KHA
43	CONCRETE MIXER	CM-WELI/14	–	–	WC	–	TR TO P'KHA
44	CONCRETE MIXER	CM-WELI/02			BD		UR AT CW
45	CRAWLER ROCK DRILL	CD/1	SL. NO.RCC402A 01	BRC 16P04A	OFFROAD	–	UR AT CW
46	DRILL ROAD GRINDER	M.C NO. 4[illegible]	–	–	WC	–	
47	POWER SAW P7C	1 NO.	–	–	OUT OF ORDER	–	
48	PNUEMATIC VIBRATOR		–	–	OUT OF ORDER	–	
49	PNUEMATIC VIBRATOR						
50	LUBRICATING VAN	BWH-5417	6B11463425	11T511G3900104	OFFROAD	–	UR AT CW
51	ELECTRIC BATT. CHARGER	BC/16	–	–	OFFROAD	–	
52	ELECTRIC BATT. CHARGER	M/C NO. 483853	–	–	OUT OF ORDER	–	
53	PIONJOR MACHINE	BMH32433		–	OFFROAD	–	
54	PIONJOR MACHINE	BMH31944		–	do	–	
55	PIONJOR MACHINE	BMH31943		–	do	–	
56	DIESEL WELDING SET	WELD 7/01	85024492	–	WC	TASHI MINJUR	

EQUIPMENTS/MACHINERIES UNDER EASTERN FEEDER ROAD DIVISION

SL. NO.	EQUIPMENT NAME	DEPARTMENTAL NO.	ENGINE NO.	CHASSIS NO.	DRIVER / OPT.	STATUS	REMARKS
1	WHEEL LOADER	CAT 910/32	45V61344	41Y03139		WC	
2	WHEEL LOADER	CAT-916/27	45V60795	5KC01359	R.L. GHALAY	WC	
3	WHEEL LOADER	CAT-926/17	45V72326	6NB01635	KHEM RAJ GHALAY	BD	HEAD GASKET NEEDED
4	AIR COMPRESSOR	CPS 400/59	25156401	3417619	R.B. GHALLEY	WC	TRANSFERED TO SRD
5	AIR COMPRESSOR	PWD/1985/ V1-056	25146364	60277426	BHIM RAJ THAPA	WC	TRANSFERED TO CFR PRO
6	AIR COMPRESSOR	CPS 400/62	114906	72937648	BARKA BDR. RAI	BD	SENT TO CW FOR REPAIR
7	AIR COMPRESSOR	CPS 400/60	25156398	3417611	BHOLA POKHREL	BD	SENT TO CW FOR REPAIR
8	BATTERY CHARGER	PWD/1992/ BC/19				WC	
9	BATTERY CHARGER	PWD/1992/ BC/11				WC	
10	BITUMEN HEATER					BD	
11	BITUMEN HEATER					BD	
12	BULL DOZER	TD 20/44	6661C2H069350	4460010P050670	PEMA THENDUP	BD	UR AT CW
13	BULL DOZER	PWD/1989/ TD 12/39	4671C24104596	4233005000	TSHERING DUKPA	BD	SENDING TO CW
14	BULL DOZER	CAT D/G 17	40Z15797	65V07090		WC	
15	CANTER	BG-2-0179	--	--	B. B. GURUNG	BD	SENT TO CW
16	CANTER	BG-1-0202	--	--	PEM LETTO	WC	
17	CONCRETE MIXER	ASHOK	--	--	--	BD	READY TO SEND TO CW
18	CONCRETE MIXER	WEL MIX/02	--	--	--	WC	TRANSFERING TO PRD
19	GENERATOR (BIRLA YAMAH	PWD/1992/ GEN/05				WC	
20	GENERATOR(KIRLOSKAR)					BD	UR AT CW
21	JACK HAMMER	PNA/5200-A				WC	TR TO PROJ.
22	JACK HAMMER						
23	JACK HAMMER	100026565					
24	JACK HAMMER	PNA11572-A				WC	TR TO PROJ.
25	M & M JEEP	PWD/1989/ BG-1-0007	PM3946	PM3946	NETEN DUKPA	BD	
26	MARUTI GYPSY	PWD/1990/ BG-2-0161	123010	125696	NO DRIVER	WC	
27	PAY LOADER	515/11				BD	UR AT CW
28	PAY LOADER	PWD/1988/ CAT-925/14				WC	TR.TO PUNAKHA PROJECT
29	PAY LOADER	515/12				BD	UR AT CW
30	ROAD ROLLER	A1726	4548662	J10490	NORBU TSHERING	WC	
31	ROAD ROLLER	A1731	4553101	J10769	DAWA NORBU	WC	
32	ROAD ROLLER	SAKAI SV91/13	6BG1-50-549	SV0130363			
33	STONE CRUSHER	KUR FJ2910019		J58583		WC	
34	TATA TIPPER	PWD/1985/ BG-2-0162	208126 7	34409270041	TSHERING DORJI(B)	WC	
35	TATA TIPPER	BEH-0003	692D01207606	344092200442	NO DRIVER	WC	
36	TATA TIPPER	PWD/1981/ BG-4-0044	692D01161117	34401173066	DHENDUP	BD	
37	TATA TIPPER	BG-4-0043	692D01191879	34402187793	KARCHUNG (B)	BD	
38	TOYOTA HILUX	BG-2-0063	2L-181131	LN106-0004076		WC	
39	WATER PUMP(KUBOTO)	SR/16				BD	
40	WELDING SET(PORTABLE)		1158192	134996			
41	WORKSHOP GEN. SET					BD	UR AT CW
42	WORKSHOP VAN (MERDS)	BG-4-0005	35300315315772	35390010652249	NO DRIVER	--	TRANSFERING TO SMD
43	WORKSHOP VAN (RUSSIAN)	PWD/1981/ BEH-0077	157077	367347	--	BD	READY TO SEND TO CW

EQUIPMENTS / MACHINERIES UNDER
LODEYSA MTC. DIVISION

SL. NO.	EQPT. TYPE	DEPT. NO.	ENGINE NO.	CHASSIS NO	STATUS	DRIVER / OPT. LOCATION	REMARKS
1	AIR COMPRESSOR	VT-250 / 10	354-S-27913	60 / 367701	BD		
2	AIR COMPRESSOR	VT-250 / 33	354-S-27512	60 / 368018	BD		SINCE 23.9.93
3	AIR COMPRESSOR	KG / 73					
4	AIR COMPRESSOR	VT-6/51			BD		UR AT CW
5	AIR COMPRESSOR	VT-6/52			BD		UR AT CW
6	AIR COMPRESSOR	VT-6 / 54	H4951-25144939	60 / 277416			
7	AIR COMPRESSOR	VT-6 / 58	25146363			PURNA BDR.	
8	AIR COMPRESSOR	VT-250 / 22	60 / 367721	NOT VISIBLE	BD		BCU-II
9	AIR COMPRESSOR	VT-250 / 32	354-S-27539	60 / 368059	BD		SINCE 1.3.92
10	AIR COMPRESSOR	CPS-400 / 65	25158402	9598001	BD		
11	AIR COMPRESSOR	VT-250 / 70	354530374	60 / 368715	BD		
12	AIR COMPRESSOR	CPS-400 / 63	25158407	7417014	BD		UR AT CW
13	AIR COMPRESSOR	CPS-400 / 68	25158465	9598001	BD		SINCE 22.6.93
14	AIR COMPRESSOR	VT-250 / 23	3673041	NOT VISIBLE	WC		BCU-II
15	ASPHALT KETTLE	AK/01					BSU
16	BATTERY CHARGER	BC / 04					
17	BATTERY CHARGER	BC / 03					
18	BATTERY CHARGER	BC / 17					
19	BATTERY CHARGER				BD		
20	BULL DOZER	D4H / 49					
21	BULL DOZER	TD 8E / 17					
22	BULL DOZER D7G	D7G / 34	10207127	65V05002			
23	BULL DOZER D7G	D7G / 31	3306-4124058	65V04407 / 3Y5677	WC		
24	BULL DOZER D80A	D80 / 24	N1220-0125432487	D80A-12707	BD		TR. TO RTI, KHARG/
25	BULL DOZER TD-20	TD-20 / 18	V800TC2-V009891	448-0005-U031309			
26	BULL DOZER TD-20	TD-20 / 21	V800TC2-V008882	446-0005-U032650	BD		
27	CANTER	BG-1-0165			BD	UR AT CW	
28	CANTER	BG-1-0019			BD	UR AT CW	
29	CANTER	BG-1-0026			BD	UR AT CW	
30	CANTER	BG-1-0178			BD	UR AT CW	
31	CANTER	BG-3-0036			BD	UR AT CW	
32	CANTER	BG-1-0074	100405808	4FC00413940			H / THANKA
33	CANTER	BG-1-0073	100405821	4FC00413111			H / THANKA
34	CANTER	BG-1-0165	100405909	4LC00413579			H / THANKA
35	CANTER	BG-1-0029			BD	UR AT CW	
36	CONCERET MIXER	WELL MIX / 14	1050	775CU FT1104	BD		
37	CONCERET MIXER	WELL MIX / 8	1074	775CU FT1108	BD		
38	CONCERET MIXER	WELL MIX / 10	1067	775CU FT1110	BD		
39	CONCERET MIXER	WELL MIX / 19					
40	CONCRETE VIB.	CV-CMK5 / 05					
41	CONCRETE VIB.	CV-CMK5 / 01					
42	CONCRETE VIB.	CV-CMK5 / 06					
43	CONCRETE VIB.	CV-CMK5 / 03					
44	CONCRETE VIB.	CV-CMK5 / 02					
45	CONCRETE VIB.	CV-MK5 / 01					
46	ELECTRIC ARC WELDING	WELD / 05					
47	FUEL SKID TANK	MEDICO / 01		00801			FCU-II
48	FUEL SKID TANK	MEDICO / 17		00817			FCU-II
49	FUEL SKID TANK	MEDICO / 16		00816			FCU-II
50	FUEL SKID TANK	MEDICO / 09					
51	FUEL SKID TANK	MEDICO / 07					
52	FUEL TANKER	BG-3-0031	GE6003210T	CPB-17E16781			BSU

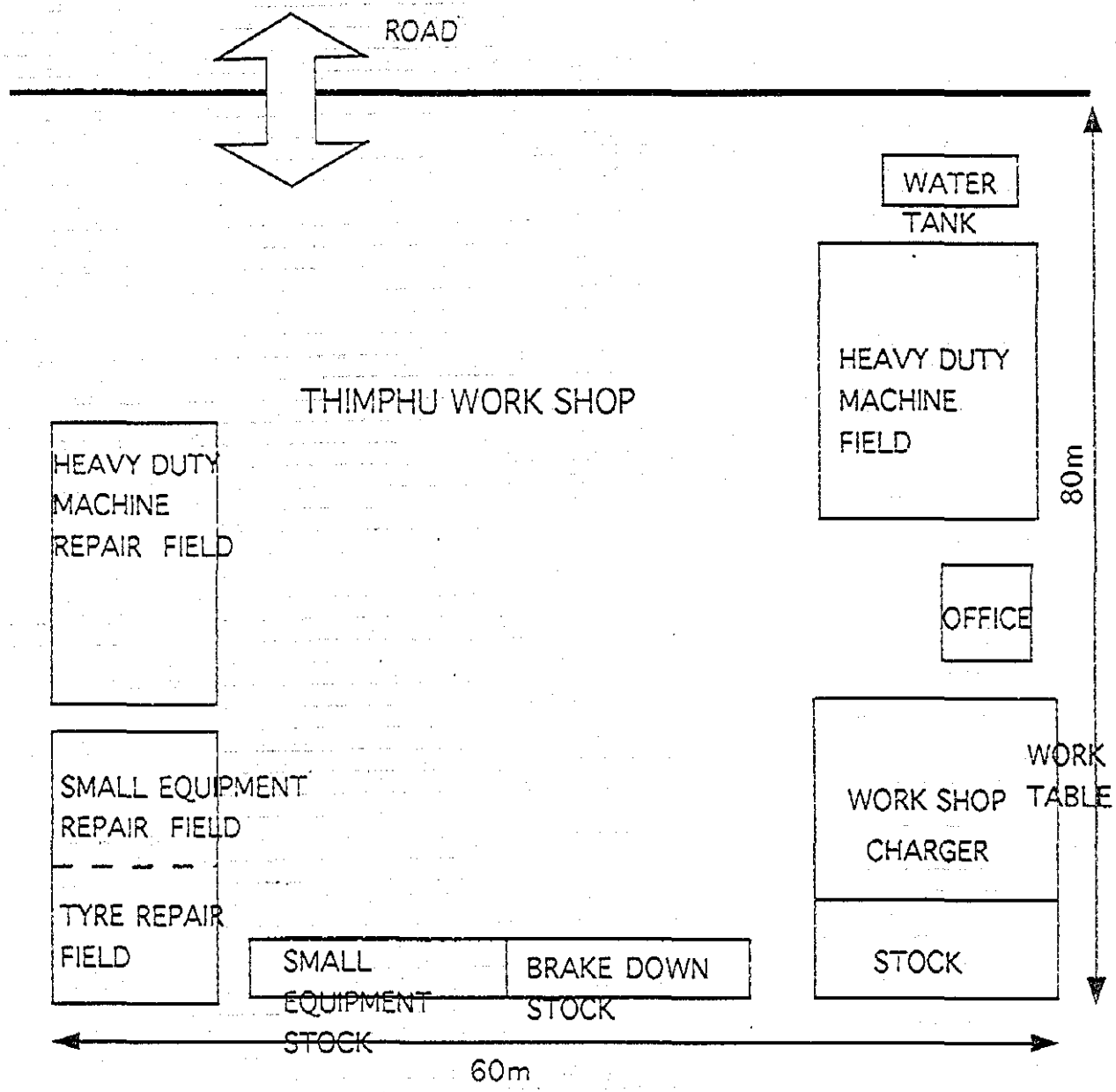
EQUIPMENTS/MACHINERIES UNDER
LIMITHANG MEC DIVISION

SL. NO.	EQPT. TYPE	DEPT. NO.	ENGINE NO.	CHASSIS NO.	STATUS	DRIVER/OPT.	REMARKS
1	AIR COMPRESSOR	KG/72	ALV37/031	--	WC	SONAM CHHEL	
2	AIR COMPRESSOR	NO.31	354927629	143767	WC	TEJ BDR. PRADHAN	
3	ASPHALT HEATING	AK/04					
4	ASPHALT HEATING	AK/03	--	--	--	--	
5	BATTERY CHARGER	BC/12	--	--	WC	--	
6	BULL DOZER CAT-D4H	CAT-D4H/51	45V6-618	8PB03263	WC	KINLEY DUKPA	
7	CANTER	BG-4-0036	100405815	4LC0-413495	WC	RIMALLA	
8	CANTER	BG-4-0034	19110364	4600111421	WC	KARMA JANGCHU	
9	CANTER	BG-2-0171	10004424	4EC0-11978	WC	KINLAY DRIVER	
10	CANTER	BG-4-0035	101204778	4000121 1662	WC	UGYEN THINLAY	
11	GENERATOR (YAMAHA)	--		--	--	--	
12	GRANULATOR	SISCO-G/17	65010008	121	WC	RINZIN DORJI	
13	JACK HAMMER	PNA-23379A		--	--	--	
14	JACK HAMMER	PNA-23361A		--	--	--	
15	JACK HAMMER	PNA-23368A		--	--	--	
16	JACK HAMMER	PNA 23365A		--	--	--	
17	JACK HAMMER	729820001		--	--	--	
18	JACK HAMMER	7299V041		--	--	--	
19	MARUTI GYPSY	BG-4-0043	123198	125686	BD	KEZANG DORJI	UR AT RABTEN W/SH(
20	MARUTI GYPSY	BG-4-0051	123416	126122	WC	RINDU DORJI	
21	MARUTI GYPSY	BG-2-0174	123196	125826	BD	LINGPA	UR AT C/W
22	NISSAN D/T	BG-4-0176	VE6003281T	CPB12E16777	WC	TSHERING	
23	N. TANKER	BG-4-0007	NE-6003212T	CPB 12E1678	WC	--	
24	PAY LOADER 910	CAT-910/33	45V81346	41403131	OFFROAD	L.B. THAPA	BUCKET NEEDED
25	PAY LOADER 916	CAT-916/23	45V89701	5KC01355	OFFROAD	KUENGA	INJECTOR NEEDED
26	PAY LOADER 5108	IH-5108/08	268DW2D005726	3144694R3	WC	I.B. GURUNG	
27	PAY LOADER 930	CAT-930/03	46V09438	7HH02883	BD	SHERAB TENZIN	UR AT C/W
28	PIONJOR MACHINE	432432		--	--	--	
29	PIONJOR MACHINE	432439		--	--	--	
30	PIONJOR MACHINE	BN145611		--	--	--	
31	PIONJOR MACHINE	404615		--	--	--	
32	ROAD BROOM	HD-84/02	914171	--	WC	--	
33	ROAD ROLLER, NO. 25	25	4548146	316195	WC	TENZIN DUPCHU	
34	SPOT MIXER	HM/01	4513219	--	WC	RINCHENLA (MR)	
35	STONE CRUSHER	SCB-12/07	28W05H164099	29822	WC	--	
36	STONE CRUSHER	SISCO-C/19	6591152	1653	WC	RINZIN DORJI	
37	TATA LONG BODY	BG-2-0031	692D0164943	344073615	BD	CHHIMILA	ACCIDENT
38	TATA LONG BODY	BG-2-0172	692D0144149	344073425495	WC	GEM TSHERING	
39	TATA TIPPER	BG-4-0032	692D01923651	344-011-8365	WC	PEM DORJI (B)	
40	TATA TIPPER	BG-4-0033	692D01923362	344-011-8369	WC	PEM DORJI (A)	
41	TATA TIPPER	BG-2-0175	162806	344011/4939	WC	DAWA DUKPA	
42	TOYOTA HILUX	BG-1-0298	3L2779C/3L1812236	LM106-0005797	WC	--	
43	WEL MIX PLANT	CM WEL/16	1645	--	WC	--	
44	WELDING MACHINE	WELD/02	--	--	WC	--	

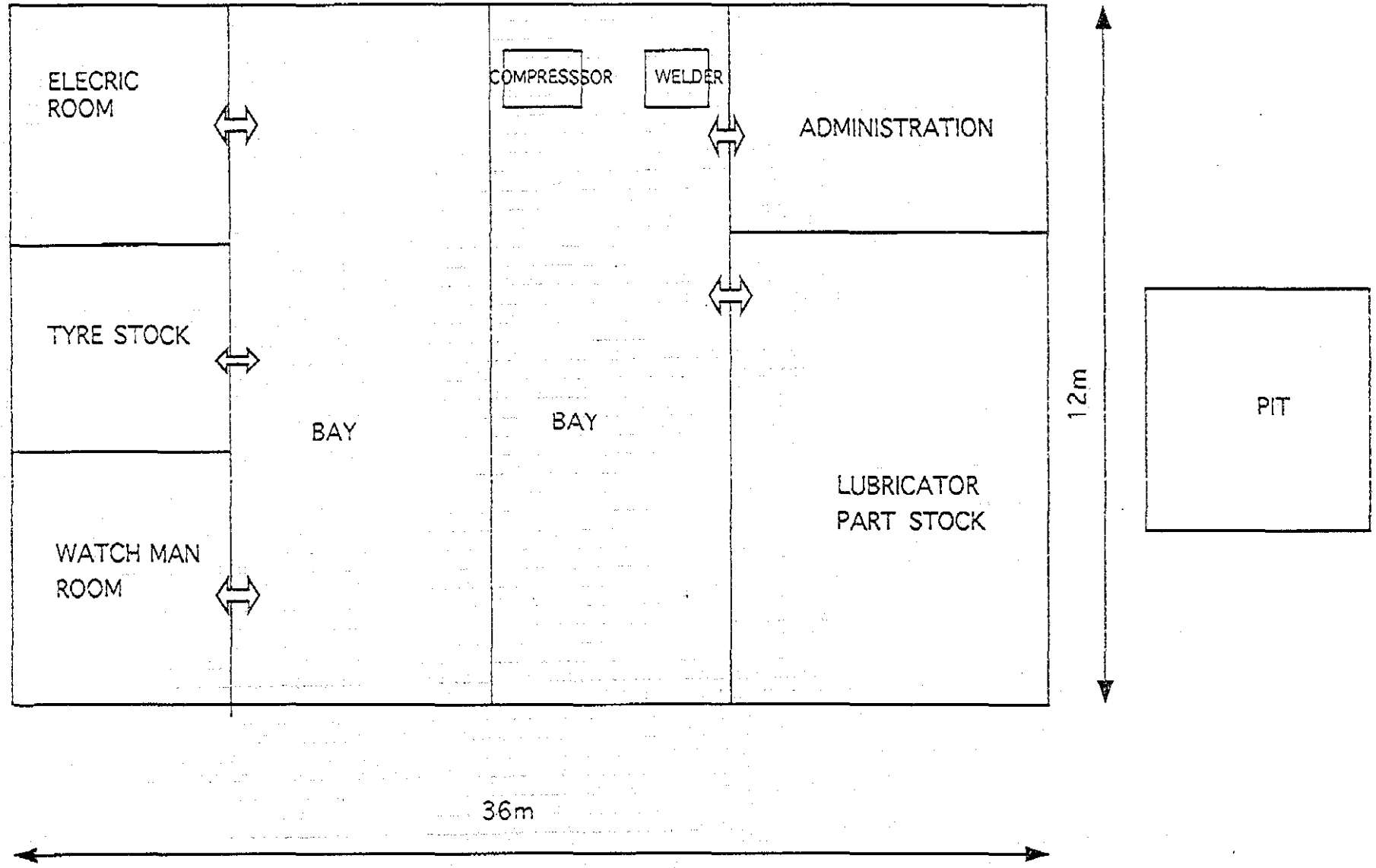
6. Work Shop Map

PHUENTSHOLING WORK SHOP

THIMPHU WORK SHOP



LOBEYSA WORKSHOP



GEYLEGPHUG
CENTRAL WORK SHOP