SUPPLEMENTAL BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
CONSTRUCTION OF BUS TERMINAL
IN
KATHMANDU

THE KINGDOM OF NEPAL

APRIL 1991

JAPAN INTERNATIONAL COOPERATION AGENCY

73.5

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PREFACE

In response to a request from His Majesty's Government of Nepal, the Government of Japan has decided to conduct a Supplemental Basic Design Study on the Project for Construction of Bus Terminal in Kathmandu and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Nepal a survey team headed by Mr. Shinya Suzuki, Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs, from February 4 to February 16, 1991.

The team exchanged views with the officials concerned of the Government of Nepal and conducted a field survey in Kathmandu area. After the team returned to Japan, further studies were made and the present report was prepared.

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

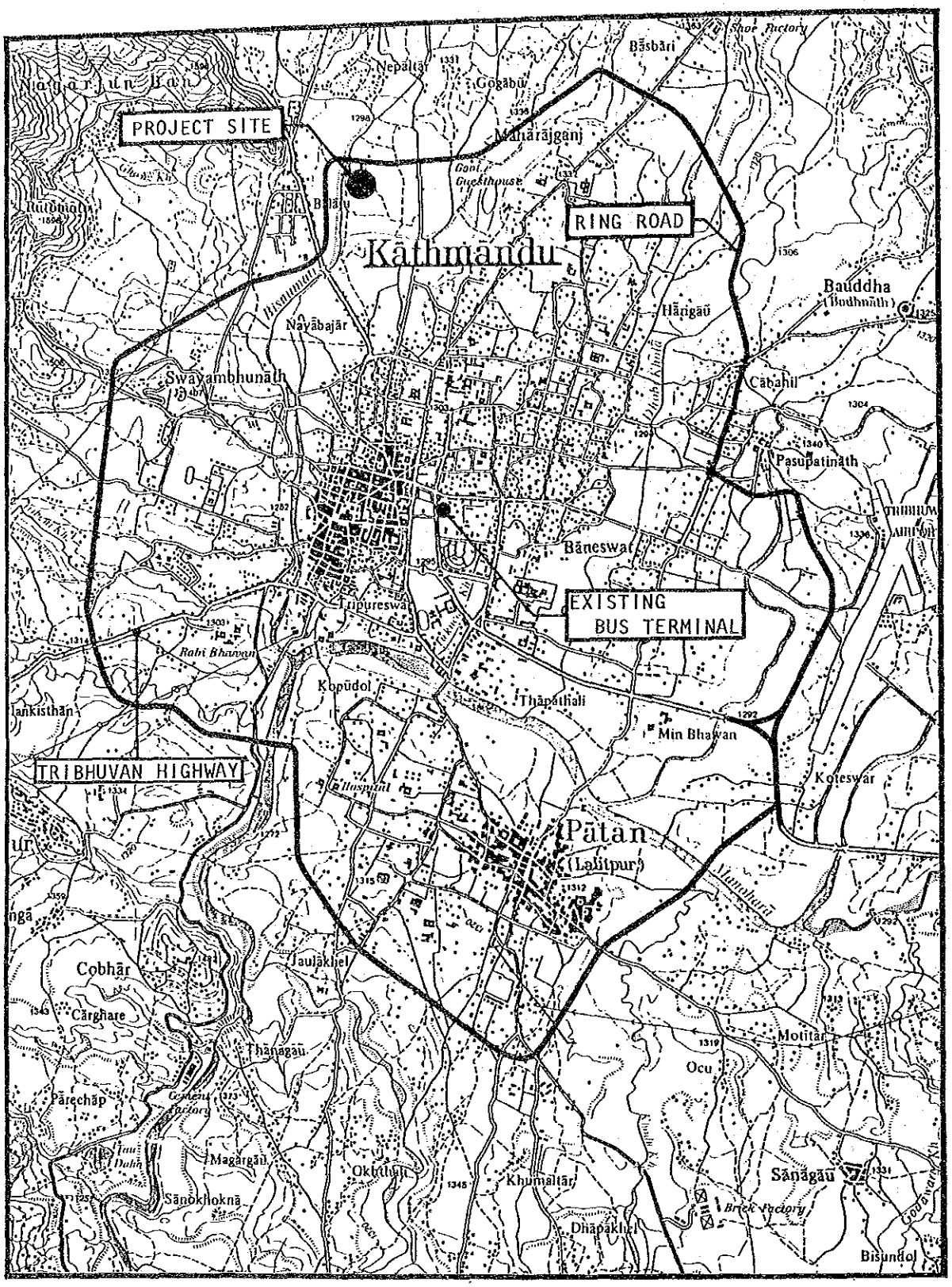
I wish to express my sincere appreciation to the officials concerned of His Majesty's Government of Nepal for their close cooperation extended to the team.

April 1991

Kensuke Yanagiya

Kensuke Yanagiya
President
Japan International Cooperation Agency


NEPAL
N
FAR WESTERN
DADELDHURA
DOTI
MAHENDRANAGAR
DHANGALHI
MID WESTERN
SURKHET
NEPALGANJ
CHINA (TIBET)
WESTERN
POKHARA
GORKA
BUTVAL
BHAIRAWA
BHARATPUR
TRISULI
KATHMANDU
KODARI
JIRI
CHARIKOT
HETAUDA
CENTRAL
BIRGANJ
KATHMANDU
BHAKTAPUR
LALITPUR
EASTERN
HILE
ILAM
DHANKUTA
JANAKPUR
JALESWAR
RAJBIRAJ
BIRATNAGAR
CHANDRAGADHI


PROJECT SITE
RING ROAD
Kāthmāndu
EXISTING
BUS TERMINAL
TRIBHUVAN HIGHWAY
Pātan
(Lalitpur)
Bāsbāri
Nepāltār
Gogabu
Mahārājganj
Bauddha
(Bodhnāth)
Hārigaū
Nayābajār
Swayambhunāth
Cābahil
Pasupatināth
Bāneswar
Tripureswar
Kopūdol
Thāpathali
Min Bhawan
Koteswar
Jankisthān
Cobhār
Cārghare
Thānagaū
Pārechāp
Magargaū
Okhuthān
Sānokhoknā
Taulākhel
Khumaltār
Dhāpakhel
Motitār
Ocu
Sānāgaū
Brick Factory
Shoe Factory
Bisundol

KATHMANDU

SUMMARY

Summary

Owing to its geological condition of high, steep mountains, the transportation system in the Kingdom of Nepal relies mainly on road transportation, supplemented by air routes.

The reliance on buses in Nepal to provide mass transportation at low fares is very high. The medium and long route bus network connecting the main cities with Kathmandu as the hub is the principal bus transportation system of the country. With the improvement of roads and the growth of the Kathmandu Metropolitan area, this network has now grown to a stage where 400 buses arrive and depart from Kathmandu daily, transporting approximately 21,000 people. Thus, the present terminal, located in the center of the city, is completely overtaxed by the congestion of buses, taxies, tempos and passengers in a passenger loading and unloading area of approximately 7,000 m^2. There are also buses that unload passengers and park along the roads, contributing heavily to the traffic congestion of the city.

In view of this condition, His Majesty's Government of Nepal requested a grand aid from the Government of Japan to construct a new bus terminal in Kathmandu to provide a more efficient medium and long route bus system, as well as to improve the general traffic condition in the city.

In response to this request, the Government of Japan decided to conduct a basic design study and the Japan International Cooperation Agency (JICA) conducted a basic design study in 1989 and prepared a basic design.

In the meantime, however, there was a change in His Majesty's Government of Nepal and the Panchayat system was discontinued. Since the former administrative agency, the

Ministry of Panchayat and Local Development was dissolved, the new Ministry of Local Development took over its responsibility and requested the continuation of this project. This change made it necessary to review the entire project, including the operation management plan, to which both governments agreed at the Annual Consultation in 1990.

In accordance with this decision, the Government of Japan decided to conduct a supplemental basic design study and JICA sent a supplemental basic design study team to Nepal.

The team conducted a local study for a period of 13 days from February 4 to February 16, 1991, and explained the revised plan to the officials of the Ministry of Local Development, the Kathmandu Town Municipality and the other government agencies of His Majesty's Government. The team also verified the operation and management organization of the bus terminal, confirmed the scope and costs to be borne by the Nepalese side, studied the bus operation schedule and surveyed the traffic load, the road conditions, the earth procurement sites, and the available construction equipment and materials. The team also confirmed the land acquisition condition of the project site, the flood level, the soil condition and studied the items to be added to the original study.

After returning to Japan, the study team reconfirmed the suitability of the project, revised the facility and the maintenance and management plans, and prepared a supplemental basic design study report.

In this plan, the bus terminal will be constructed along the ring road around the Kathmandu suburb, in the 29th Ward (Samakusi district) of Kathmandu city. All medium and long route buses are obligated to use this terminal. Passenger boarding and offboarding platforms will also be available for city buses and taxies. In addition a parking lot for medium and long route buses, a terminal building and auxiliary

facilities will also be provided for the convenience of passengers.

An outline of the facilities in this plan is provided below.

Site area of the facility: approximately 34,200 m^2

[Description]

(1) Boarding and offboarding platforms for medium and long route buses

Offboarding berths 8
Boarding berths 12
Platform with and without roof

(2) Boarding and offboarding platforms for city transport

Bus 6 berths each
Taxi 3 berths each
Taxi parking area
Car parking lot
Platform with and without roof

(3) Terminal building and pedestrian walking area

Office, driver room, operation control room, storage, ticket office, information, first aid clinic, telephone room, post office, police stand, guard room, waiting area

(4) Medium and long route bus parking lot

Space for 115 buses

(5) Auxiliary facilities

Public toilet, fee collection stand and gate, control stand and gate, terminal lighting facility, drainage, water supply facility

(6) Approach road

Approach road from the ring road to terminal facilities

The implementation schedule for this project after the signing of the E/N is expected to require 3 months for the preparation of the detailed design and 12 months for the execution of the construction work.

The Nepalese side shall provide the land preparation work, as well as the infrastructure work outside the project site boundary, and these works shall be executed in a timely manner to prevent delaying the entire project.

The execution agency of the project is the Kathmandu Town Municipality, which is under the Ministry of Local Development. The Municipality will establish both an advisory committee and a new bus terminal department to administer the terminal, including its construction, operation, and management. To assure efficiency, the bus operation is expected to be managed by the Nepal Transport Entrepreneurs Association (NTEA) which has a rich experience in this area, as well as the necessary organization. The maintenance expenses of the terminal can be covered by its operational income, so the terminal is expected to be self-supporting.

In order to execute this project efficiently and maximize its impact, it is desirable that His Majesty's Government take measures to have bus passengers realize the importance of the new bus terminal as a public transport facility. The government should also obligate all medium and long route

buses starting from Kathmandu to utilize this new terminal, and should improve road conditions as well as traffic regulations, and set up new bus operation schedules. The training of bus drivers and bus operation staff is also to be expected.

The implementation of this project should contribute greatly toward the benefit of the people of Nepal by raising the reliability of medium and long route bus operations, eliminating the congestion of the present terminal, and improving the Kathmandu Metropolitan traffic conditions by restricting the entrance of medium and long route buses into the central city and eliminating street parking. This project is most significant for implementing under grant aid and an early implementation is highly desired.

NAME AND SYMBOL OF AGENCIES

Ministry of Local Development (MLD)

Kathmandu Town Municipality (KTM)

Ministry of Works and Transport (MOWT)

Department of Transport

Department of Road

Ministry of Housing and Physical Planning

Department of Housing and Urban Development

Sajha Yatayat

Nepal Transport Entrepreneurs Association (NTEA)

Water Supply and Sewerage Corporation

Nepal Electricity Agency (NEA)

Nepal Telecommunication Corporation

Nepal Construction Corporation (NCC)

Nepal Oil Corporation

District Police Office

CONTENTS

Preface

Map

Summary

Name and Symbol of Agencies

Chapter 1. Introduction 1

Chapter 2. Background and Purpose of Supplemental Basic Design Study 5

2.1 Background 5

2.2 Purpose of the Supplemental Study 7

2.3 Scope of the Supplemental Study 8

Chapter 3. Description of the Plan 9

3.1 Executing Agency 9

3.2 Project Plan 17

3.3 Review of Facilities and Equipment 17

3.4 Review of Civil Work Plan 22

3.5 Outline of Facilities and Equipment Plan 24

Chapter 4. Basic Design 27

4.1 Basic Plan of Facilities 28

4.2 Layout Plan 32

4.3 Civil Work Plan 35

4.4 Building Plan 39

4.5 Facilities Plan 45

4.6 Basic Design Drawing 52

Chapter 5. Project Execution Plan 67

5.1 Execution Organization 67

5.2 Demarcation of Undertakings 68

5.3 Maintenance and Management 70

5.4 Project Cost Estimate 73

5.5 Project Implementation Schedule 74

5.6 Procurement Plan 76

5.7 Bus Operation Control Plan 83

Chapter 6. Benefits of the Project and Conclusion 95

6.1 Benefits of the Project 95

6.2 Conclusion 96

Appendix

CHAPTER 1
INTRODUCTION

CHAPTER 1. INTRODUCTION

In the Kingdom of Nepal, land transportation of passengers relies mainly on buses. Medium and long distance bus routes connecting the principal cities with Kathmandu as a hub serve as the trunk lines for passenger transportation. The hub of most of these bus lines is the bus terminal in the center of Kathmandu city. However, with the recent growth of the city, bus transportation has increased to such an extent that the present terminal is completely overloaded and cannot handle the increased bus traffic. Since taxies and tempos also enter the terminal, congestion is very serious and some buses are forced to park on streets. Furthermore, since city buses cannot enter the terminal, they frequently use roads for this purpose. The present terminal, therefore, cannot perform its function as a transfer point.

In view of such condition, His Majesty's Government of Nepal planned a project to construct the Kathmandu bus terminal mainly for long and medium route buses in order to provide smooth bus operation service. For the execution of this project, His Majesty's Government requested grant aid from the Government of Japan.

In response to this request, the Government of Japan decided to conduct a basic design study and the Japan International Cooperation Agency (JICA) sent a basic design study team to Nepal from January 30 to February 23, 1989, to conduct a site survey and again from July 16 to July 23, 1989, to explain the basic design study draft. The final report was submitted to His Majesty's Government in August of the same year as the Basic Design Study Report on the Project for Construction of Bus Terminal in Kathmandu, The Kingdom of Nepal.

However, in the meantime, with the change in His Majesty's Government, the former Ministry of Panchayat and Local Development was dissolved, and the new Ministry of Local Development assumed the former's responsibility and requested the continuation of this project to the Government of Japan. In the light of the changed circumstances, both governments agreed at the Annual Consultation in 1990 to a restudy of the project.

Accordingly, the Government of Japan decided to conduct a supplemental basic design study. Following a review of the original study and an analysis of the data on hand, JICA prepared a revised plan.

The Supplemental Basic Design Study Team, headed by Mr. Shinya Suzuki, Grant Aid Section, Economical Assistance Department of the Ministry of Foreign Affairs, was sent to Nepal for 13 days from February 4 to February 16, 1991, to conduct a site survey and to explain and discuss the revised plan with the officials of the Ministry of Local Development, the Kathmandu Town Municipality, and the other government agencies of His Majesty's Government. The team also verified the operation and management organization of the bus terminal, confirmed the scope, and costs to be borne by the Nepalese side, studied the bus operation schedule and surveyed the traffic load, the road conditions, the earth procurement sites, and the available construction equipment and materials. The team also confirmed the land acquisition conditions of the project site, the flood level, the soil conditions and the other supplements to the original study.

The basic items agreed to by the Nepalese side and the Japanese side were recorded in the Minutes signed by the Team Leader, Mr. Suzuki, and by the Undersecretary, Mr. Tiwari, of the Ministry of Local Development.

After returning to Japan, the study team reconfirmed the suitability of the project and revised the facility and the maintenance and management plans.

This report contains the result of the supplemental basic design study, and the attached Appendix contains a list of the members of the Supplemental Basic Design Study Team, the Itineraries of the Team, a List of Persons met, and the Minutes.

CHAPTER 2

BACKGROUND AND PURPOSE OF THE SUPPLEMENTAL BASIC DESIGN STUDY

CHAPTER 2. BACKGROUND AND PURPOSE OF THE SUPPLEMENTAL BASIC DESIGN STUDY

2.1 Background

In the Kingdom of Nepal, the transportation system is mainly based on road transportation owing to its steep mountainous topography and the public transportation is mainly buses which provides mass transport at low fares. Kathmandu, the capital of Nepal, serves as the hub of the bus transportation network, and the present bus terminal, located in the center of the city, serves approximately 400 buses daily carrying about 21,000 passengers.

However, since this terminal is used not only by medium and long route buses but also by taxies and tempos, it is very congested forcing some buses to park on the road. Needless to say, this further aggravates the condition.

In view of such condition, His Majesty's Government of Nepal had the Ministry of Panchayat and Local Development to prepare a construction plan for a new bus terminal and requested a grant aid from Japan. In response to this request, the Government of Japan decided to conduct a basic design study, and the Japan International Cooperation Agency (JICA) conducted a survey in 1989 and prepared a basic design.

In the meantime, there was a change in His Majesty's Government of Nepal, and the Panchayat system, which was the basis of the old government was discontinued. As a result, the former administrative agency, the Ministry of Panchayat and Local Development, was dissolved. Under the new government, the newly created Ministry of Local Development, which became the responsible administrative agency, requested the continuation of this project to the Government of Japan.

Since this change made it necessary to review the entire project including operation management, both government agreed to conduct a restudy at the annual consultation in 1990.

The following basic policy was decided for conducting the supplemental basic design study.

(1) Basic Policy of Revised Project Plan

Due to big difference in condition since the original basic design study was conducted in 1988, the original study was restudied to comply with the changed condition as described in the following paragraphs.

1) The maintenance and operational cost will be minimized to reduce the burden on the new operational agency created in accordance with the new relation being set up between central and local government owing to the democratic movement in Nepal.

2) The utilization of local materials will be maximized in view of the difficult economic condition in Nepal caused by temporary suspension of the Nepal Indian Trade Treaty, domestic confusion due to democratic movement, high cost of oil, etc.

3) This basic design was limited to only urgent items for easing the serious condition at the present terminal, since there is a master plan for a new transportation system for Kathmandu City under the aid of the Government of Japan and it is better to coordinate future bus terminal in relation with the master plan.

4) It is more desirable to improve and expand the function of the terminal gradually to include the needs of the population as it becomes more clear with the development of democratic movement.

2.2 Purpose of the Supplemental Study

The purpose of the supplemental study is to prepare a modified basic design of the original basic design which also provides necessary and optimum content and size to qualify as grant aid after studying the effect of the project and its suitability as a grant aid project. The items studied are listed below.

(1) Explain the contents of the supplemental inception report to the concerned parties of His Majesty's Government of Nepal, review the plan prepared by JICA and confirm this plan.

(2) Confirm the cost to be borne by the Nepalese side together with its budgetary allocation and prepare an implementation program.

(3) Conduct study to supplement the original basic design.

(4) Conduct survey and deliberation with concerned agencies such as Sajha and NTEA and also clarify the relation with this project in order to assure a smooth operation.

(5) Conduct a survey on traffic load and road condition in order to study and provide consultation for setting up a bus operation plan.

(6) Confirm the operation plan and management organization for the bus terminal and provide consultation based on collected data and information.

(7) Confirm the acquisition condition of the project site as well as its flood level and soil condition, then prepare a layout plan.

(8) Conduct a survey on earth procurement site, construction equipment, material, construction cost and other items, then prepare construction budget and implementation program.

2.3 Scope of the Supplemental Study

The scope of this supplemental study is to verify the changes of plan and premises from those of the original basic design study conducted in 1989 and to supplement the original Basic Design Study Report on the Project for Construction of Bus Terminal in Kathmandu submitted to His Majesty's Government of Nepal in 1989. This supplemental study describes items which differs from the original design study, therefore, if there is any difference in expression and figures between the supplemental study and the original study, the contents of the supplemental study shall govern.

CHAPTER 3

DESCRIPTION OF THE PLAN

CHAPTER 3. DESCRIPTION OF THE PLAN

In the supplemental basic design study, it was found that there was no change in the Kathmandu city traffic condition, bus transport condition, bus operation condition and bus terminal condition, furthermore since the request of the Nepal side was also the same, the objective of this plan as well as the basic conditions such as medium, long route bus route, and number of operating buses will be the same as that of the original basic design study report. However, in accordance with the basic policy described in the preceding paragraph, the following items have been reviewed.

3.1 Executing Agency

(1) Executing Agency

The executing agency of this project is the Ministry of Local Development (MLD) and the actual implementation is carried out by the Kathmandu Town Municipality (KTM) which is under MLD. The operation of the terminal will be carried out by the newly organized Bus Terminal Section in KTM, but a large part of the operation will be entrusted to Nepal Transportation Entrepreneur Association (NTEA, refer to (3) Terminal operation organization).

In order to assure a smooth operation of the project, the section chief of the bus terminal section should be appointed prior to the signing of E/N and he shall be the coordinator of the project during construction and on completion of the terminal, he shall become the responsible manager (refer to appendix).

(2) Parties Permitted to Use the Terminal

The following parties will be permitted to use this terminal.

o Medium and long route buses

a) Private medium and long route buses operated by NTEA members

b) Medium and long route buses operated by Sajha.

o City transport agency

a) Sajha Yatayat bus (bus connecting new and present terminal and ring road bus)

b) City and short route buses operated by NTEA

c) Taxi including tempo

d) Passenger cars

(3) Terminal Operation Organization

1) KTM will establish necessary bus terminal operation policy and guideline and will also appoint an advisory board consisting of the under mentioned people to regularly review the operation of the bus terminal.

KTM	Mayor
	Deputy Mayor
MLD	Representative
NTEA	Representative
Traffic Police	Representative
Sajha Yatayat	Representative

The advisory board will be set up before the signing of E/N and will coordinate all activities during construction period.

2) The operation organization and responsibilities will be the same as that described in the original basic design report. KTM will newly set up a bus terminal department which will be managed by a Section Chief and will have the following three sub-sections.

i) Administration and Management Sub-section (KTM)

Collect terminal fee and perform administrative work

ii) Technical Sub-section (KTM)

Manage terminal facilities

iii) Bus Operation Sub-section (NTEA)

Operate bus and provide passenger service

3) Other confirmed items

i) The personal expense of employees provided by NTEA for bus operation will be borne by NTEA.

ii) Guards will be under the administration and management sub-section and not the bus operation sub-section

iii) A first-aid clinic with a nurse from KTM sanitation/public health section will be provided under the administration and management section. One telephone operator is necessary since telephone operating work cannot be entrusted to the post office.

4) The organization chart is shown in Figs. 3-1-1 and 3-1-2, and the necessary personnel are as shown below.

Section Chief	1		
Assistant Chief	1		
Administration and Management Sub-section	20	24 (KTM)	48
Technical Sub-section	2		
Bus Operation Sub-section	24	(NTEA)	

5) NTEA personnel

The NTEA personnel will be recruited from the employees of the Regional Transport Entrepreneur Association (RTEA) and their personnel expense will be included in the annual budget of NTEA.

(4) Operation of the Present Bus Terminal After Completion of the New Terminal

1) Service

This terminal will serve city buses, including buses between terminals, and short route buses. The route and time schedule will be provided in the future plans of NTEA and Sajha.

2) Management

A City Terminal Sub-section of three persons will be set up within the Construction and Planning Section of KTM to administer this bus terminal, while the operation will be jointly managed by the staff of NTEA and Sajha. The present ticket counter will become unnecessary, so it will be rented out for tea stand and shops.

(5) NTEA

The objective and function of NTEA are described in 3.3.1 of the original basic design study report and an organization chart and a balance sheet is included in the appendix of this report. The number of RTEA members which was reported as 26 in the original report, but it was found to be increased to 35 in this study.

The member fees collected from RTEA members are the main source of income for NTEA which has six exclusive personnel including the General Secretary. The post of Chairman and Vice Chairman is presently vacant, but will be nominated soon.

All scheduled bus operators are obligated to join NTEA and 98% of the bus operators excluding tourist bus operators are members. The total number of members including non bus operators is about 5,000.

NTEA has the rights to use all 19 ticket booths in the present terminal owned by KTM and the members are permitted to use these booths. KTM always gives NTEA first priority.

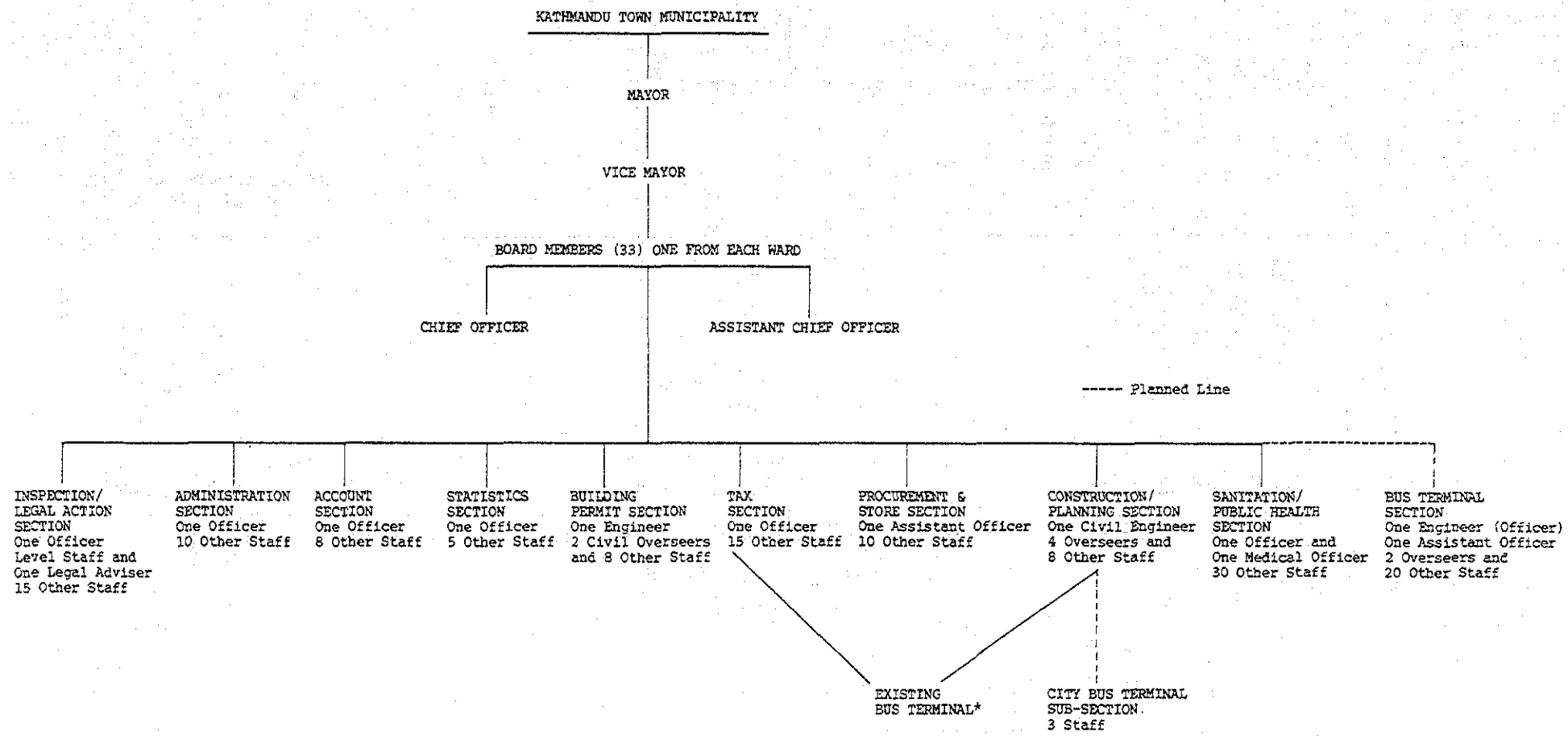
NTEA is actively supporting the bus terminal project, since it will serve to resolve the following problems.

- Resolve the congestion arising from the lack of present terminal capacity
- Resolve the inconvenience of transferring at the present terminal
- Resolve the parking space problem of long route buses (road parking)

- Resolve traffic time loss owing to traffic congestion at city center

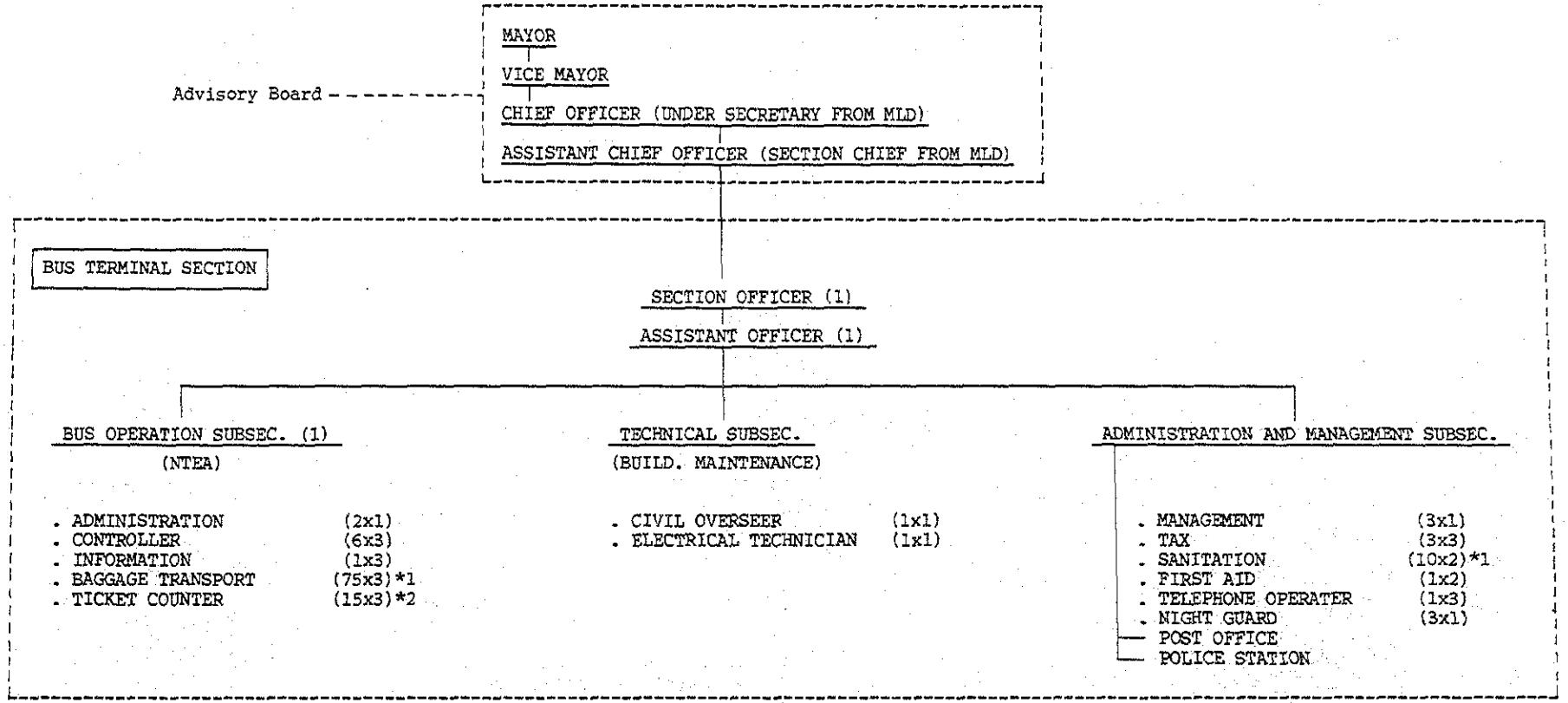
- Rationalize ticket sales and bus operation

NTEA is trying to coordinate connecting city bus schedule, but it is still being studied.



* After completion of New Bus Terminal, this terminal will be under control of Construction/Planning Section exclusively.

Fig. 3-1-1 Kathmandu City Organization Chart



*1: DAY WAGE BASE WORKER
*2: FROM EACH BUS COMPANY

Fig. 3-1-2 Organization Chart of Bus Terminal

3.2 Project Plan

This project plan is limited to satisfy only the essential function and facility required for bus operation in accordance with the basic policy of this supplemental basic design study. Furthermore, from the view of encouraging the growth of private enterprises, bus maintenance services such as bus washing, inspection and refueling, also passenger services within the terminal building such as kiosk, tea stand, bank, and baggage services are excluded in this project plan. Other items in the project plan is the same as those in the original basic design study.

3.3 Review of Facilities and Equipment

Facilities and equipment which should be supplied as grant aid from Japan for the project were reviewed as shown below.

3.3.1 Ground Facilities

(1) Passenger Car Berth and Platform

Passenger cars shall be boarded/offboarded at the passenger parking lot, since there is little time restriction for boarding/offboarding as in taxies or buses. Therefore special berth and platform will not be provided.

(2) Offboarding Platform Roof

Offboarding passenger will not stay on the platform, but will immediately proceed to their destination or transfer to buses or taxies. Since they will stay only a short time on the platform, a roofless platform should not be so inconvenient. Therefore roof will not be provided.

3.3.2 Building

3.3.2 Building

(1) Terminal Building

1) Electric room

In the original basic design study, an electric room was necessary for sub-station equipment since power had to be received from a 11 kV power line, but in this study, the Nepal Electricity Agency (NEA) informed us that they could supply power from a 440 V line, so an electric room will not be needed.

2) Operation control room

Since operation control will be conducted at the terminal, an operation control room will be necessary.

3) Guard room

A guard room became necessary, since it was found that guards could not use the police stand since they belong to different agency.

4) Kiosk, tea stand, bank, baggage service

The necessity of these facilities as a basic function of a bus terminal is quite small. Therefore these facilities are not provided, however it may be desirable to make necessary arrangement with private enterprises in Nepal.

3.3.3 Facilities

(1) Deep Well Water Facilities

Deep well water facilities were deleted since bus washing facility will not be provided. It now became necessary to review the city water supply planned in the original basic design study which provided for a daily supply of 10 m^3, whereas the necessary daily supply increased to about 20 m^3. The Water Supply and Sewerage Corporation promised that they will supply a daily 20 m^3 of water.

Since there is a 400 mm diameter main pipe running along the Balaju - Nayabazar road from the Balaju water reservoir (4,500 m^3) located about 1.5 km west of the bus terminal, an 80 mm diameter pipe can be installed from this pipeline to the terminal. The distance is about 1.5 km and this pipeline installation will be performed by the Nepalese side (refer to appendix).

3.3.4 Equipment and Related Facility

(1) Signal Light

A signal light was planned to be installed where the approach road branches off from the ring road, but since this location is completely outside the terminal site and would not be included within the terminal operation, it will be excluded from this plan. The necessity of a signal should be studied by a person who is responsible for road or traffic management after the terminal comes into operation.

(2) Bus Washing Equipment and High Pressure Washing Equipment

A survey on bus corporations showed that buses were mostly washed at the final destination or gasoline stands along the route, with the exception of buses washed by owners. Therefore, these facilities were excluded from this plan as bus operation is not expected to be affected greatly.

(3) Inspection Pit

The survey on bus corporations shows that with the exception of buses inspected and repaired by owners or buses inspected and repaired at the final destination, buses could be repaired at the Balaju Auto Works located in the Balaju industrial park located on the Vishumati river opposite to the bus terminal and the small workshops located along the road north of the ropeway station located in the southwest of the city. Therefore the necessity for buses to enter the city center will be small (refer to appendix). These small workshops are expected to be relocated near the bus terminal once it starts operation.

(4) Fuel Supply Equipment

After surveying three companies servicing the long distance bus routes from Kathmandu to southeast, south and west via Thankot, it was found that buses were fueled as shown below.

	Route	Fueling point
a)	Kathmandu - Kakarvitta	Hetauda (9.8 Rs/*l*)
	Kathmandu - Dharan	Kakarvitta (9.8 Rs/*l*)
		Dharan (9.9 Rs/*l*)
b)	Kathmandu - Biratnagar	Hetauda
	Kathmandu - Sindhuli	Narayanghat (9.8 Rs/*l*)
	Kathmandu - Dharan	Final destination
	Kathmandu - Surkhet	
c)	Kathmandu - Dharan	Hetauda
		Malekhu (9.9 Rs/*l*)

This survey shows that fuel is not supplied at Kathmandu but is supplied at fuel stands along the route or at final destination. This is mainly because diesel fuel price, according to the Nepal Oil Corporation, in Kathmandu is 10 Rs/*l* higher and the price tends to be lower as the south Indian boarder becomes nearer (refer to appendix).

Furthermore, for the Pokhara route with the most heavy operation, the diesel fuel price at Pokhara is 10 Rs/*l*, the same as Kathmandu, while the fuel price is (9.85 Rs/*l*) at Mugling, the main junction along the route. Therefore, buses seem to mostly refuel here. Buses serving the southeast, south and west routes do not seem to be refueling in Kathmandu, therefore less than 13% of buses or those serving the east and north routes where diesel fuel prices are high are refueling in Kathmandu.

There are six fuel stands between Thankot and the new bus terminal supplying diesel fuel at 10 Rs/*l*, so buses serving the route from Kathmandu via Thankot can refuel at these stands. Furthermore, buses serving the north or east route can refuel at fuel stands along the ring road or its vicinity (refer to Appendix).

Owing to such condition, fuel supply equipment is not included in this project.

3.4 Review of Civil Work Plan

3.4.1 Verification of High Water Level (H.W.L.)

On questioning the residents near the project site, it was found that the project site was not flooded recently, and the following condition was found in this study.

(1) On the Vishumati river west of the project site, there is a bank about 50 cm higher than the project ground level. This seems to be the reason why the area is not flooded recently, but since the bank is not firm and solid it may fail during heavy flood.

(2) The flood water level mark on the buttress of the bridge along the ring road near the project site shows that it is a bit higher than the project site ground level when observed visually. This shows that water reaches this mark each monsoon season, but the H.W.L. is expected to be higher. The H.W.L. could not be confirmed but from the information of residents, the height of the dike seems to be close to the H.W.L. Therefore, the H.W.L. is considered to be not more than 1,296.5 m (above sea level) as reported in the original basic design study report.

3.4.2 Terminal Pavement Level and Built-up Land Level

The terminal pavement level will be H.W.L. +0.5 m or roughly 1.0 m higher than the present site ground level. This built-up height is considered to be suitable from the view-point of flood protection and pavement construction.

3.4.3 Ground Build-up (Sub-grade)

As the built-up ground will be the sub-grade, a CBR[1)] of 10 or more was selected for the design. However, the soil at the procurement site contains clay, so good quality soil must be selected when excavating soil for building up the ground level.

3.4.4 Pavement

During the supplemental basic design study, the Nepalese side expressed their desire to change the pavement from asphalt to concrete since concrete pavement will not require much maintenance. Some roads are concrete pavement since maintenance is not required, but the majority of the roads are of asphalt pavement. Furthermore, concrete pavement has the following disadvantages, therefore it was decided to apply asphalt pavement for this project.

Disadvantages of concrete pavement

(1) Concrete pavement construction cost is 30% to 40% higher than asphalt pavement construction cost.

(2) Quality control for concrete pavement is difficult and construction period is long.

(3) When concrete pavement is applied to the parking lot, it is difficult to remove for any extension. Parking lot only could be paved with asphalt, but a concrete plant and an asphalt plant will both be necessary.

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1) California Bearing Ratio

3.5 Outline of Facilities and Equipment Plan

After restudying the original plan, the plan described in the following paragraphs was considered to be most suitable.

(1) Land Reclamation

Ground build up is necessary for securing necessary gradient for discharging water and for providing protection against flood as well as securing necessary road subgrade strength. The terminal pavement level constructed on top of the built-up ground shall be about 1 meter higher than the present ground level.

(2) Road Facilities

1) Approach road

Approach road from the ring road to terminal facilities.

2) Long/medium route bus facilities

Offboarding area
    Offboarding berth and platform
Boarding area
    Boarding berth and platform with roof
Parking area
    Mainly for night buses waiting during daytime

3) Connecting vehicle facilities

City bus offboarding area
    Offboarding berth and platform
City bus boarding area
    Boarding berth and platform with roof
Taxi offboarding and boarding area
    Offboarding and boarding berth and platform

Tax waiting area

Pool for taxies waiting for passengers

Passenger car parking area

Passenger cars for meeting or sending off passengers

(3) Buildings

1) Terminal Building

Room	Usage
Office	Administration of terminal
Manager's office	Supervise the administration
Bus driver's rest room	Driver supervision
Storage room	Store supplies and equipment
Ticket counter	Sell bus tickets and baggage claim tags
First aid clinic	Provide first aid for passangers
Information counter	Provide terminal and bus schedule information
Post office	Provide mail services
Telephone room	Provide telephone services through operator
Police stand	Provide traffic guidance and terminal security
Guard room	Provide security and theft prevention
Operation control room	Provide office bus operation control
Waiting area	Space for passengers waiting for departure or people welcoming passengers

2) Auxiliary Buildings

Public toilet	A separate building is provided for the convenience of bus passengers
Fee collection stand	Collect fee from long/medium route buses. A gate is provided.
Control stand	Traffic control is provided for vehicles entering the terminal. A gate is provided.

(4) Other Facilities

Water drainage facilities (storm water)	Water is drained through concrete gutters into the pit at the boundary of the terminal.
Terminal lighting	Lights are provided for nighttime buses and passengers.
City water supply facilities	Water is supplied for drinking, washing, toilet and spraying.
Building drainage	Drainage facilities for sewage through septic tank and for ordinary waste water are provided.
Carts for baggages	Carts are provided at the terminal and porters shall use them to transport baggages in order to reduce confusion at boarding and offboarding platform.

CHAPTER 4

BASIC DESIGN

CHAPTER 4. BASIC DESIGN

The supplemental basic design study was conducted to design a bus terminal of a size, facility and equipment which could be readily operated and managed by the KTM, while observing the basic design condition of the bus terminal determined in the original basic design study such as its function, traffic, circulation of passengers, number of medium and long route bus berths, number of berths for city bus, taxi, and passenger cars. In this study the following points were carefully studied.

(1) The most basic facilities for operating the terminal will be provided while considering the function of the present bus terminal.

(2) Provide a design which will avoid excessive expense by minimizing the management and operation cost.

(3) Provide a design which will minimize construction period in order to resolve the present problems as early as possible.

(4) Since the grant aid of Japan is based on mutual cooperation between Nepal and Japan, activities which can be provided by the Nepalese side will rely on the Nepalese side effort.

(5) Local materials will be applied wherever possible.

(6) Commercial facilities which are not within the scope of the Japanese grant aid will be installed by the Nepalese side with the cooperation of the private sector.

4.1 Basic Plan of Facilities

4.1.1 Arrangement of Facilities

(1) Medium/Long Route Bus Parking Lot

Parking lot for 115 buses is provided since a majority of night buses are expected to be parked here. Night buses return to the terminal in the morning and is parked until it leaves in the evening, therefore if parking lot is insufficient, buses will be parked on roads. The parking lot space was determined to cover the night bus requirement.

In the supplemental basic design study, 10% of the long route buses operating between Kathmandu and local cities was found to be owned by local owners, while 60% was operated by owners located inside the ring road, and less than 10% of the buses have their own parking space.

Therefore, from the viewpoint of preventing traffic congestion, it is necessary to provide a parking lot for all the above 70%. The owner for the remaining 30% of buses are located in Kathmandu Metropolitan or along the ring road, and if one half of these buses are estimated to require parking space, 85% of night buses or 124 x 0.85 = 105 buses will require parking space, and if temporary parking is estimated for day buses another 10 bus space would be necessary totalling 115 bus space.

4.1.2 Building

(1) Terminal Building

The terminal building plan was reviewed by comprehensively studying functions of all the facilities in the terminal.

The necessary waiting area for passenger provided by terminal building and platform shed will be sufficient. Storehouse which was planned separately in the original basic design has been incorporated in terminal building. The area for office was calculated in accordance with the manning plan of the revised project plan and bus operation control room was newly provided.

For the purpose of utilizing local materials as far as possible, main structure was changed from wide span steel roof frame to reinforced concrete structure with steel roof beam in part.

Total floor area: 1,008 m^2 [2,025 m^2]

Note: The figure in parenthesis is the floor area of the original design.

1) Manager's office
   Floor area 27 m^2

2) Office room
   Floor area 144 m^2

171 m^2 [210 m^2]

Calculation of floor area
(refer to the original basic design report)

Manager office	1 x 25	= 25 m^2
Assistant manager office	1 x 18	= 18 m^2
Section chief	3 x 8.5	= 25.5 m^2
Staff	15 x 7	= 105 m^2
Total		173.5 m^2

3) Bus driver room
Floor area 45 m^2 [45 m^2]

4) Ticket counter
Floor area 72 m^2 [54 m^2]
includes hallway

5) First aid clinic
Floor area 12 m^2 [20 m^2]
1 bed, first aid kit
1 nurse

6) Storage
Floor area 72 m^2 [70 m^2]

7) Information counter
Floor area 18 m^2 [22 m^2]

8) Post office
Floor area 10.5 m^2 [10 m^2]
2 persons at counter window

9) Telephone room
Floor area 15.0 m^2 [20 m^2]
3 booths and waiting space

10) Police stand
Floor area 7.5 m^2 [11 m^2]
1 policeman

11) Guard room
Floor area 10.5 m^2 --
3 guards

12) Operation control room

Floor area 10.5 m^2 --

2 persons will be stationed to control bus operation at the platform.

13) Waiting area

Floor area 504 m^2 [1,373 m^2]

Since a platform shed area of 900 m^2 is provided as waiting space for bus passengers, the above floor area was determined.

14) Others

Floor area	lobby reception	}	33 m^2
	toilet		18 m^2
	corridor		9 m^2

(2) Other Facilities

1) Roof on platform

A roof is provided on the boarding platform for medium/long route bus and city bus, but no roof is provided on the offboarding platform since passengers will not spend much time here. The roof width is determined at 3 m which is quite sufficient.

Roof area	900 m^2	[2,640 m^2]
Roof width	3 m	[5 m]

2) Public toilet

The facilities in the toilet are the same as those in the original design, but the floor area was reduced by providing a compact design.

Floor area	148 m^2	[185 m^2]

3) Storage space for rubbish container

After studying the present condition and discussing with KTM, it was decided to provide only rubbish container storage instead of a rubbish treatment facility. The Solid Waste Management Project of the Ministry of Housing and Physical Planning is responsible for collecting rubbish so they will provide containers and the party utilizing this service only need to provide space for the containers. This service is free of charge. The size of a container is 3.1 m x 1.2 m and the containers will be stored at the east and west ends of the medium/long route bus parking lot.

4) Control stand and fee collection stand

Control stand and fee collection stand will be provided at the approach entrance and the exit of medium/long route bus. The floor area is 4 m^2 x 2.

4.2 Layout Plan

Facility zone was deleted owing to changes in the facility plan, but the other zones and circulation plan are the same as those in the original design (refer to Figs. 4-2-1 and 4-2-2).

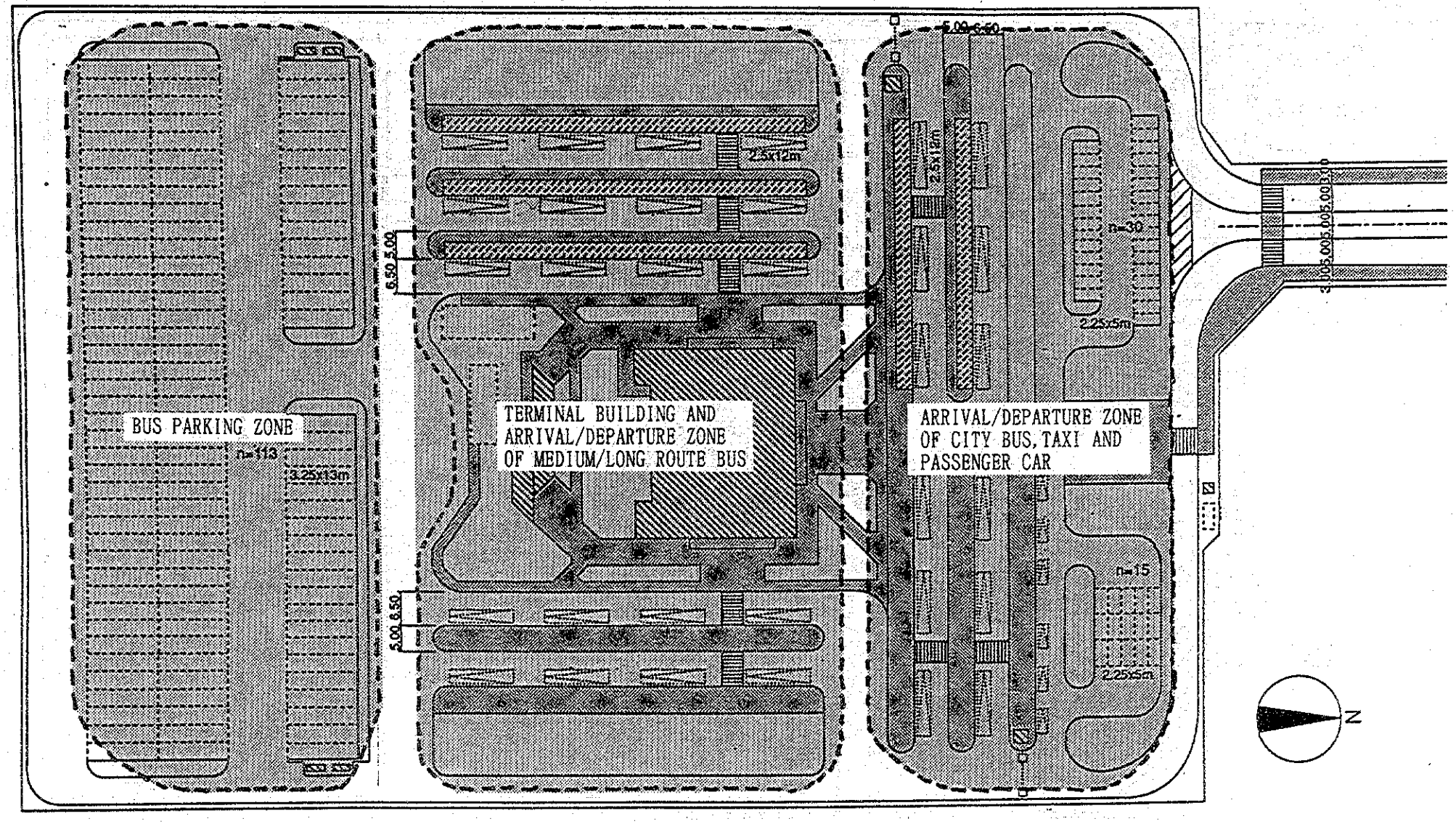


Fig. 4-2-1 Layout (Zoning)

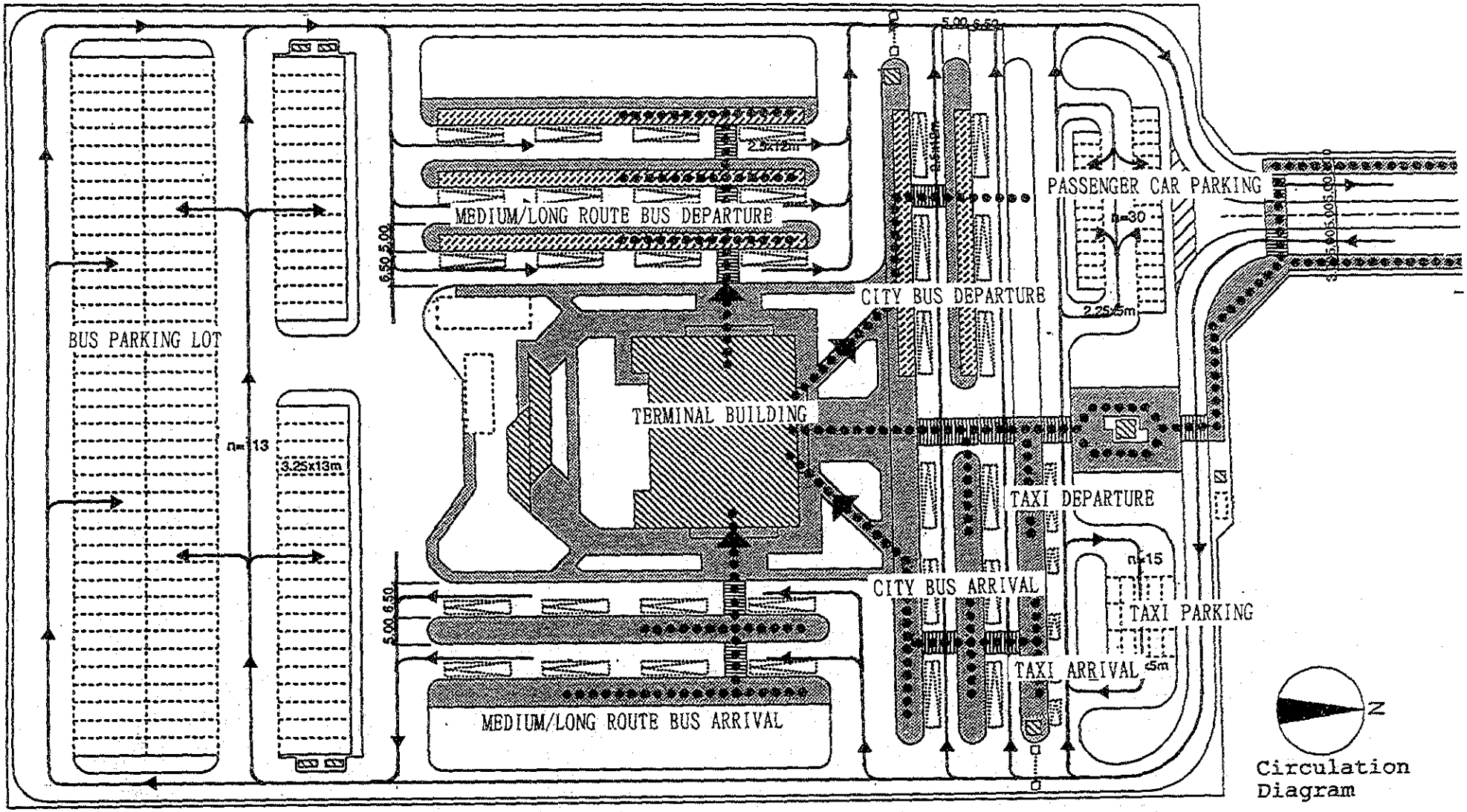


Fig. 4-2-2 Circulation Diagram

4.3 Civil Work Plan

Civil work plan consists of reclamation, pavement, road, bus boarding/offboarding area, storm water drainage, and safety facilities.

4.3.1 Land Reclamation

The designed ground level is flood level +0.5 m or higher and building up the present ground level by at least 1.0 m should be sufficient for flood protection and drainage.

Since the project site is an area with high water table and rather soft soil, a new subgrade will be prepared by building up the ground with good quality earth and pavement will be constructed on top of this new subgrade. The thickness of road subgrade will be 85 cm based on an assumption that CBR value of top subgrade material is at least 10 and that of bottom subgrade (sand mat) is at least 4 respectively. However, if 0.2 m of the present ground soil is replaced with good soil, the build-up height of 0.65 m would be sufficient. The built-up height will be as shown below.

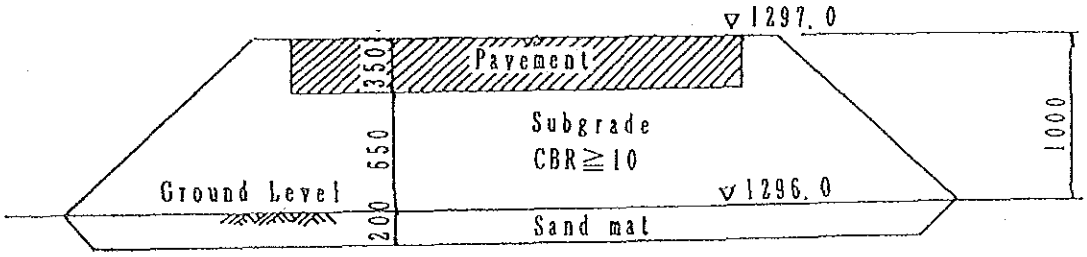


Fig. 4-3-1

4.3.2 Road Width

Since the traffic within the terminal is designed for one way traffic, the road width will be designed as 5.0 m. This width will permit bus to pass any bus parked on the side of the road because of breakdown and the road width between boarding/offboarding berths will be designed as 6.5 m referring to standards of the Japan Road Association and the Architectural Institute of Japan.

4.3.3 Pavement

(1) Pavement

Pavement design follows the Asphalt Pavement Specification of the Japan Road Association which specifies pavement specification for the following classes of roads.

Classification	Large vehicle traffic (buses/day•direction)
A traffic	100 - 250
B traffic	250 - 1000

In this terminal, the daily, one direction traffic was estimated as shown below.

Area	Large vehicle traffic (buses/day•direction)	Classification
Approach road for medium/long route bus and city bus	400 or more	B traffic
Berth area for medium/long route bus and city bus	200 or more	A traffic
Parking lot	100 or more	A traffic

Since taxi and passenger parking area is limited and they are not large vehicles, "A" traffic pavement will be applied.

(2) Pavement Cross Section

The thickness of road subgrade is designed to consist of 65 cm CBR 10 top road subgrade and 20 cm CBR 4 bottom road subgrade (sand mat). On top of this road subgrade, an asphalt pavement of the following standard in accordance with the Asphalt Pavement Specification of the Japan Road Association will be applied.

a) Top pavement: Asphalt concrete pavement
b) Base course: Graded crushed gravel CBR > 80
c) Sub-base course: Crusher run CBR > 30

Pavement of different area of the terminal is shown in the following figure.

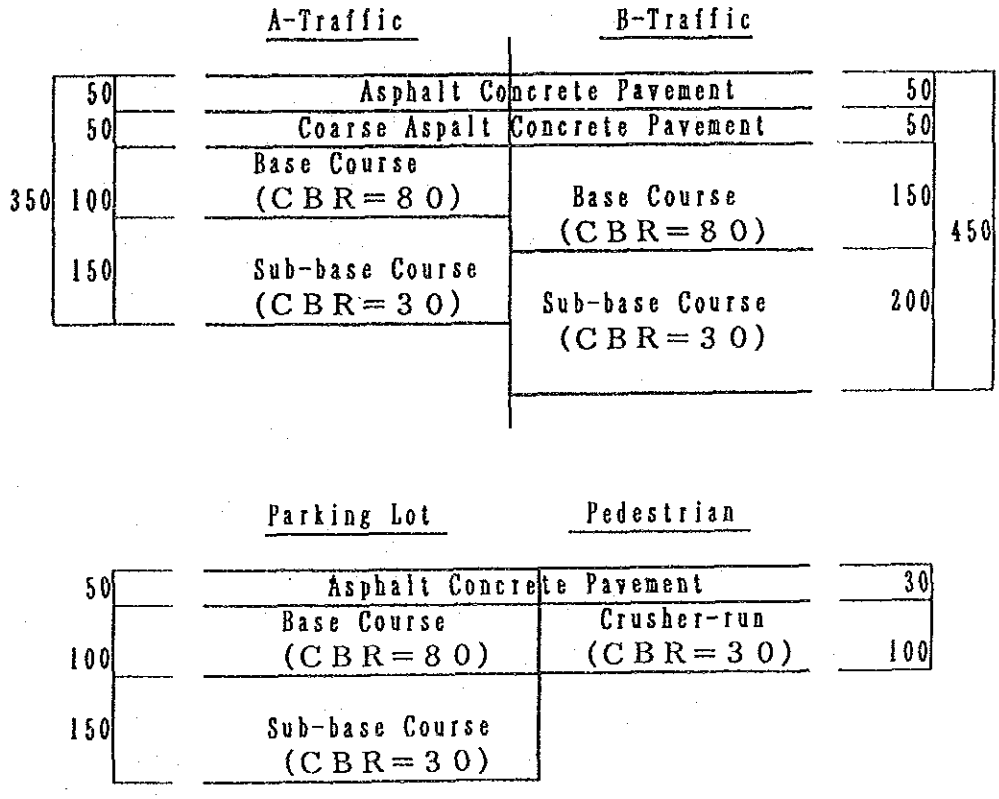


Fig. 4-3-2

However, since the weight of buses at the parking lot is greatly reduced, because there are no passengers, the "A" traffic pavement could be reduced, so only one layer of asphalt will be paved.

(3) Drainage

The storm water on pavement will be drained through U type concrete gutter, L type concrete gutter and rolled gutter. The drained water will be collected in a drainage located at the end of the terminal to be discharged into the Vishmati river. The drainage from the end of the terminal to the Vishmati river will be constructed by the Nepalese side. The minimum incline at the terminal pavement surface is 0.2% and the drain gutters will not affect either passenger or road traffic.

4.4 Building Plan

(1) Basic Design

1) Local construction material, equipment and method were applied as much as possible.

2) Simple structure, finish and equipment were selected to provide facilities easy to maintain at low cost.

3) Outdoor facilities were designed to be easily accessible from the terminal building.

4) A compact layout was selected.

(2) Outline of Main Facilities

1) Terminal building

The terminal building is the control center of bus operation and also the service center for passengers. Therefore the terminal building must be easily accessible by passengers, especially passengers transferring from city transport to medium/long route buses.

The building is separated into closed spaces housing the office, service facilities and storehouse, and a space open on one side. The open space is for passenger and waiting area as well as outside concourse are located, while the closed space is for the operators of the terminal and at the interface, passenger service facilities are located facing the waiting area and outside concourse. The service facilities consists of ticket counter, telephone room, post office, information counter, first aid clinic and police stand.

2) Public toilet

This is absolutely necessary for passengers taking a long journey. The toilet is an independent type with sufficient ventilation.

(3) Finish

1) Basic plan

- Materials which match the building, do not dirty easily, is durable and easy to maintain are selected.
- The characteristics of structural materials and other materials will be fully utilized.
- Local materials will be used as much as possible.

2) Exterior finish

Exterior finish for terminal building[1], public toilet[2], fee collecting stand[3] and control stand[4] are as follows:

i) Exterior wall
   ① Brick pointing joint finish

ii) Roof
   ① Color corrugate steel sheets[1]
   ② Asphalt waterproof finish on top of reinforced concrete[1),2),3),4)]

3) Interior finish

i) Type A

Floor:	Terrazzo
Skirt:	Terrazzo
Wall:	Mortar EP
Ceiling:	Sound absorption board

o Terminal building

Manager's room, office, bus driver's rest room, ticket counter, first aid clinic, information counter, post office, telephone room, police stand, operation control room, guard room.

ii) Type B

Floor:	Trowelled concrete finish
Skirt:	---
Wall:	Brick pointing joint finish
Ceiling:	Color corrugate steel sheet

o Terminal building

Waiting area

iii) Type C

Floor:	Trowelled concrete finish
Skirt:	Mortar VP
Wall:	Mortar VP
Ceiling:	Hardboard EP

o Terminal building

Storehouse

o Fee collecting stand, operation control stand

iv) Type D

Floor:	Mozzaic tile[1] or trowelled concrete finish[2]
Skirt:	---
Wall:	Ceramic tile
Ceiling:	Sound absorption board[1] or trowelled concrete finish[2]

o Terminal building

Toilet[1]

o Public toilet[2]

(4) Structure Design

1) Since there is no structure standard in the Kingdom of Nepal, the Indian standard, which mainly follows the BS standard, is normally applied. The structure standard for the project is based on the Japanese structure standard, but in places, the Indian standard is applying in accordance with local condition.

2) Load condition

i) Dead load

Dead load shall be calculated for structure members and finishing materials.

ii) Live load

The live load specified in the Japan building code for different types of room shall be applied as shown in the following table.

Table 4-4-1 Live Load

(Unit: kg/m^2)

Room	Floor & joist	Girder, column and foundation	For earthquake
Ordinary room	180	130	60
Office, waiting room	300	180	80
Warehouse	500	400	200

iii) Seismic force

According to the Indian Standard, Kathmandu is in Zone V where the basic horizontal seismic factor is 0.08 (refer to appendix of original Basic Design Study Report).

iv) Wind force

$p = c \times q$

p = wind pressure force kg/m^2

c = wind pressure factor

q = speed pressure

According to the Indian standard,

q = 150 kg/m^2

c = Japan building code standard

v) Earth bearing capacity

The earth bearing capacity is estimated as 9 t/m^2 from boring survey.

3) Structure

Main structure

Foundation:

Direct foundation of reinforced concrete

Frame:

Terminal building:

Combination of reinforced concrete and masonry structure with steel beam applied to roof of waiting area.

Public toilet:

Combination of reinforced concrete and masonry structure

Shed at boarding platform:

Steel frame structure

Fee collection stand and control stand:

Brick masonry structure

Roof:

Terminal building:

Asphalt waterproofed reinforced concrete and color corrugate steel sheet

Public toilet:

Asphalt waterproofed reinforced concrete

Shed at boarding platform:

Color corrugate steel sheet

Fee collection stand and control stand:

Asphalt waterproofed reinforced concrete

Exterior wall and partition:

Brick masonry structure

4) Construction materials

i) Concrete

Since the supply of Nepal cement is limited, imported cement is mostly used. Both fine and coarse aggregates are available locally. A ready-mixed concrete batcher plant will be installed at the site to control concrete mix. Concrete of 180 kg/cm^2 compressive strength at 28 days is believed to be suitable in view of the quality of local aggregate, but the actual design strength should be determined after providing for construction deviation.

ii) Steel bars

Since the structure is not large, high quality bars are not necessary, therefore bars of Indian standard which are available locally will be used.

iii) Steel

Supply of steel is not organized in Nepal owing to limited demand and most steel is imported, therefore Japanese steel SS-41 or equivalent JIS standard steel will be used.

4.5 Facilities Plan

(1) Electric Equipment

1) Basic design

Since there are no standards for electric equipment in Nepal, the electrical equipment for the project will be designed in accordance with the electrical regulations and electrical equipment wiring specification of Japan. However, materials will be selected from the viewpoint of easy installation and maintenance in Nepal.

2) Trunk power equipment

Power will be supplied by Nepal Electricity Agency (NEA) at low tension 3 phase 4 line 400 V/230 V 50 Hz for about 50 kVA to the distribution panel or power switch gear. Outdoor cable will be installed underground using CD conduits while indoor wiring be by cable. The secondary wiring from the switchgear will mainly be by cables, and equipment installed in humid places is provided with power leakage prevention breaker.

3) Lights and outlets

i) Lighting fixtures

Lighting fixtures will be mainly directly fixed fluorescent lamps of single phase, 2 wires, 230 V. Wiring is mainly by F-cables which will be buried in walls using CD conduits. Brightness of main rooms are designed as shown below.

Rooms	Lighting fixtures	Brightness(Lx)
Office rooms	FL 40 W x 2 directly fixed V type	500
Waiting area and counter	ditto	300
Other rooms	ditto	150

Emergency lights are not provided.

ii) Outlets

Outlets are provided at necessary places. Outlets for equipment are mainly single phase 2 line for 230 V.

4) Telephone equipment

The telephone wiring into the site will be performed by the Nepal Telecommunication Corporation up to MDF main terminal in the bus terminal building. Six circuits will be provided; three direct circuits for offices (Manager office 1 circuit, office 2 circuits) and three circuits for public telephone which will be connected after paying telephone charge to the operator. Unused conduits will be installed whenever necessary.

5) Public address system

An amplifier will be placed in the office and a repeater in the information counter. Speakers will be placed at suitable places in terminal building and outside area.

6) Outside lighting

High tension sodium lamps will be placed 8 m high in the parking lot and along the road.

- This type of lamps is used along main roads in Kathmandu.
- High tension sodium lamp manufactured by Phillip in India readily available.
- The city has vehicles for performing repair and maintenance at high place.

- There is no problem for maintenance or repair as described above.

Floodlight will be provided on the eaves of the terminal and fluorescent lamps will be fixed on platforms with shed.

Brightness at each location shall be as follows:

Location	Lighting fixtures	Brightness(Lx)
Platform	FL 40 W x 1 directly fixed lamp with reflector	30
Road	NH 250 W on pole	10
Parking lot	NH 150 W - 250 W on pole	10

7) Others

Fire alarms and lightening rods are not provided.

(2) Water Supply, Drainage and Sanitary Facilities

1) Basic design

Since there are no standards nor regulations regulating water supply and drainage equipment, the equipment for the Project is based on the Design Standard of Equipment for Building specified by the Ministry of Construction and on the Design Standard of the Air Conditioning and Sanitary Engineering Association of Japan, but conditions in Nepal shall be considered.

2) Water supply equipment

Water will be supplied from the city water supply system (drinking water).

i) City water supply system

The Nepalese side will construct an 80 mmø pipeline from the 400 mmø main city water pipeline located about 1.5 km away to the project site boundary. From here, a pipeline will be constructed to the receiving water tank. This water is pumped up to an elevated tank from where water is supplied to necessary places such as pantry, toilet cistern, and drinking water fountain in waiting area. The city water supply system is shown in Fig. 4-5-1.

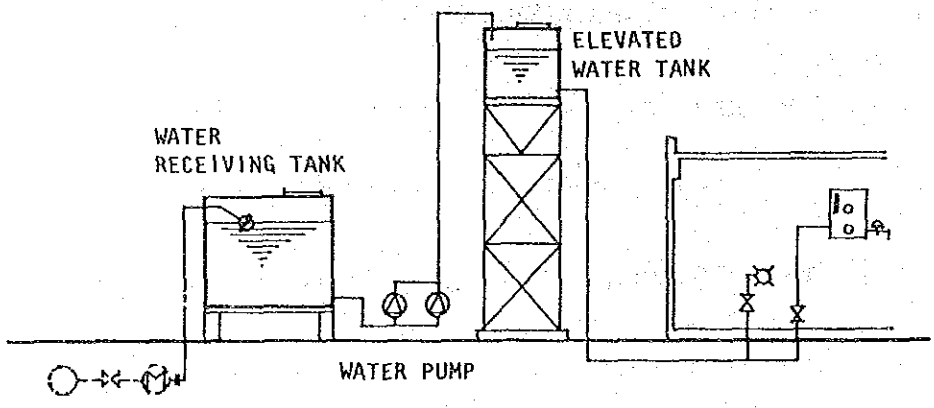


Fig. 4-5-1 City Water Supply System

Necessary city water supply

Staff	48 persons x 0.05 m^3/day/person	= 2.40 m^3/day
Contractor staff	290 persons x 0.05 m^3/day/person x 30%	= 4.35 m^3/day
Passengers	1,152 persons x 0.007 m^3/day/person x 30%	= 2.42 m^3/day
Passengers (toilet)	1,152 persons x 0.007 m^3/day/person x 70%	= 5.64 m^3/day
Staff (toilet)	48 persons x 0.06 m^3/day/person	= 2.88 m^3/day
	Total	17.69 m^3/day
Receiving tank capacity	20 tons x 1 tank (FRP sandwich panel)	
Elevated tank capacity	10 tons x 1 tank (FRP sandwich panel)	
Water pump	50 mmø x 60 l/min x 30 m x 2.2 kW	

ii) Sewage aeration facilities

Waste water discharged from the building includes ordinary waste water and sewage. Ordinary waste water and sewage are separated with ordinary waste water being permeated into the ground through a permeation pit while sewage is treated in a septic tank and permeated into the ground. Storm water is drained directly into the river.

iii) Sanitary fixtures

Toilets, water basins and faucets are located at necessary locations. Toilets are of Asian type and both faucet and buckets are provided for washing after finishing toilet and this water is used for flushing the toilet. A cistern is also provided for the toilet. A water washing basin is also provided for washing hands. Urinals are of continuous type with simple partition between persons and are flushed through a common drain.

(3) Ventilation Equipment

1) Basic design

Since there are no standards and regulations for mechanical equipment, the design of air conditioning equipment is based on the Design Standard of Equipment for Building specified by the Ministry of Construction and on the Design Standard of the Air Conditioning and Sanitary Engineering Association of Japan, but the condition of Nepal will be considered.

2) Ventilation equipment

Overhead ceiling fans will be provided for all rooms and the ventilation equipment for each room is shown in Table 4-5-1. Toilet and storage will be provided

with grade 3 ventilation while public toilet will have natural ventilation.

Table 4-5-1 Ventilation Equipment for Each Room

Room	Fan	Ceiling fan	Remarks
Drivers rest room		o	
Male & female toilet	o		Grade 3 ventilation
Post office		o	
Telephone room		o	
Waiting area			Natural ventilation
Ticket counter		o	
Information counter		o	
Operation control room		o	
First aid clinic		o	
Police stand		o	
Guard room		o	
Manager's room		o	
Office		o	
Lobby		o	

(4) Auxiliary Facilities

1) Gates

From the viewpoint of maintenance, manual operated gates will be provided instead of electric operated gates. One gate will be provided at the approach entrance to prevent taxi, passenger car and tempo from entering bus lane and another gate at medium/long route bus exit for collecting terminal utilization fee.

2) Baggage transport cart

10 carts capable of transporting 0.5 tons of baggage will be provided. An attendant is provided to rent out and record carts rented to porters. The porters will all be licensed porters and carry an identification card.

4.6 Basic Design Drawing

4.6.1 Comparison of Original Design and Revised Design

Items	Revised design	Original design
1. Land reclamation		
Site area (built-up surface)	34,200 m^2	62,000 m^2
Pavement level	1,297.0 m above sea level (expected flood level + 0.5 m)	1,297.5 m above sea level (expected flood level + 1.0 m)
Amount of earth for build up	33,000 m^3	69,000 m^3
2. Civil construction		
Pavement	25,000 m^2 (asphalt)	46,000 m^2 (asphalt & partly concrete)
Road width	5 m	8 m
Drainage	Surface drainage through concrete gutters	Underground drainage through concrete pipes
3. Medium/long route bus facilities		
Offboarding platform	8 berths	8 berths
Boarding platform	12 berths	12 berths
Parking lot	115 buses	124 buses
4. Connecting transport facilities (City bus, taxi & tempo, etc.)		
Bus platform	12 berths	12 berths
Taxi platform	6 berths	6 berths
Passenger car platform	---	4 berths
Taxi parking space	15 taxies	12 taxies
Passenger car parking space	30 cars	26 cars

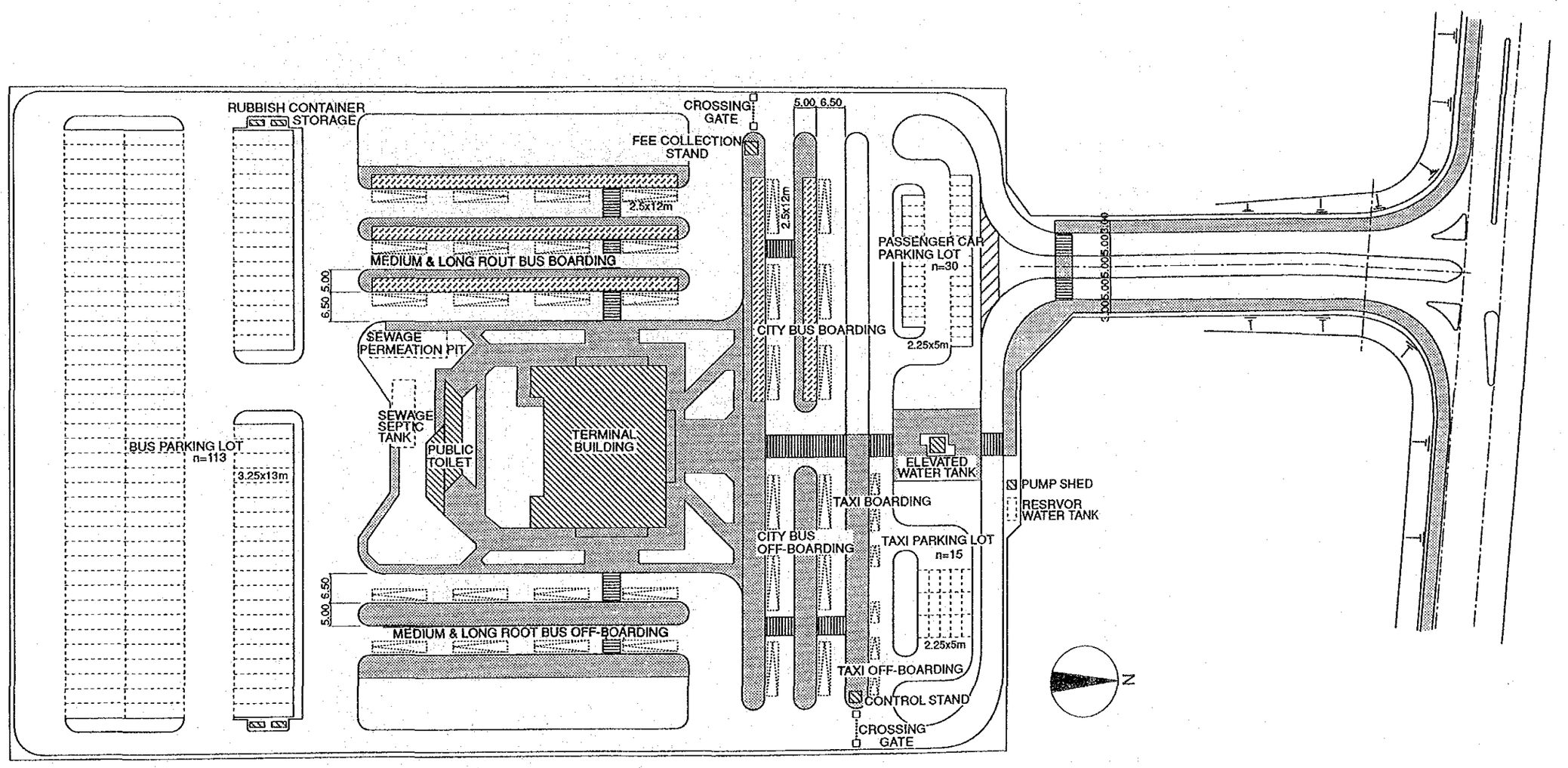
Items	Revised design	Original design
5. Terminal building		
Floor area	1,008 m^2	2,025 m^2
Main structure	reinforced concrete & partly steel frame	steel frame
Roof	asphalt waterproofed reinforced concrete & color corrugate steel sheet	color corrugate steel sheet
Wall	brick	brick
Floor	terrazzo, trowel finished concrete	terrazzo, clinker tile
Office	144 m^2	210 m^2
Manager room	27 m^2	included in office
Drivers rest room	45 m^2	45 m^2
Electric room	--	45 m^2
Storage	72 m^2	10 m^2
Ticket counter	72 m^2	54 m^2
First aid clinic	12 m^2	20 m^2
Information counter	18 m^2	28 m^2
Post office	10.5 m^2	30 m^2
Telephone room	15 m^2	20 m^2
Police stand	7.5 m^2	11 m^2
Guard room	10.5 m^2	--
Operation control room	10.5 m^2	--
Waiting area	504 m^2	1,373 m^2
Bank	--	12 m^2
Tea stand	--	38 m^2
Kiosk	--	24 m^2
Baggage counter	--	12 m^2
Others	--	93 m^2
Lobby & reception	33 m^2	--
Toilet	18 m^2	--
Corridor	9 m^2	--

Items	Revised design	Original design
6. Auxiliary building		
•Platform		
Roof area	900 m^2 (roof width 3 m)	2,640 m^2 (roof width 5 m)
Structure	steel frame, color corrugate steel sheet roof	steel frame, color corrugate steel sheet roof
•Public toilet		
Floor area	148 m^2	185 m^2
Structure	reinforced concrete & brick	reinforced concrete
Floor	trowel finished concrete	clinker tile
•Supply storage		
Floor area	--	70 m^2
Structure		reinforced concrete
•Rubbish disposal		
Floor area	outside container storage	35 m^2
Structure	concrete pavement 27 m^2 x 2	reinforced concrete
•Fee collection stand & control stand		
Floor area	4 m^2 x 2 = 8 m^2	4 m^2 x 3 = 12 m^2
Structure	reinforced concrete & brick	reinforced concrete
•Fuel supply stand		
Roof area	--	70 m^2
Structure		steel frame, color corrugated steel sheet roof
•Inspection pit	--	installed
7. Facility		
Electric facility	-- Indoor lighting Telephone equipment Public address system Outside lighting	Power substation Indoor lighting Telephone equipment Public address system Outside lighting

Items	Revised design	Original design
Water supply, drainage facility		
Water supply facility	Installed	Installed
Underground water supply facility	--	Installed
Waste water, sewage drainage	Septic tank & ground permeation	Septic tank & ground permeation
Ventilation equipment	Fan & ceiling fan	Fan & ceiling fan
8. Equipment		
Bus guiding equipment		
Signal	--	Installed
Gates	Manual operated[1)]	Electric operated
Bus service equipment		
Bus washing equipment	--	Installed
High pressure washing equipment	--	Installed
Passenger service equipment		
Baggage transport cart	10 carts[1)]	10 carts
1) To be included in auxiliary facilities		

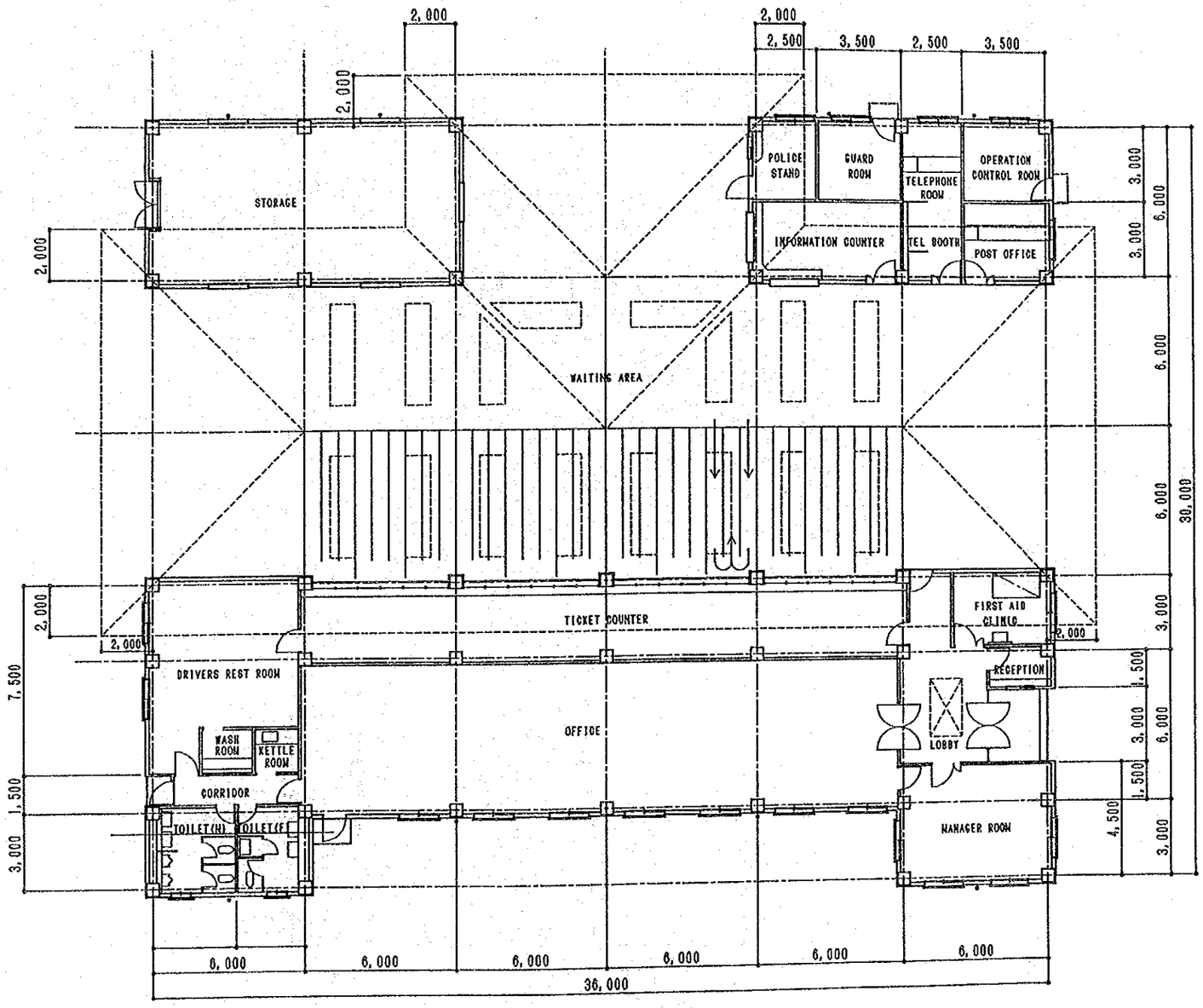
4.6.2 Basic Design Drawing

GENERAL LAYOUT PLAN	scale 1/1,000
TERMINAL BUILDING GROUND FLOOR PLAN	scale 1/200
TERMINAL BUILDING NORTH ELEVATION/ SECTION	scale 1/200
TOILET/MEDIUM, LONG ROUTE BUS BOARDING AREA	scale 1/200
PLAN OF DRAINAGE SYSTEM	scale 1/1,000

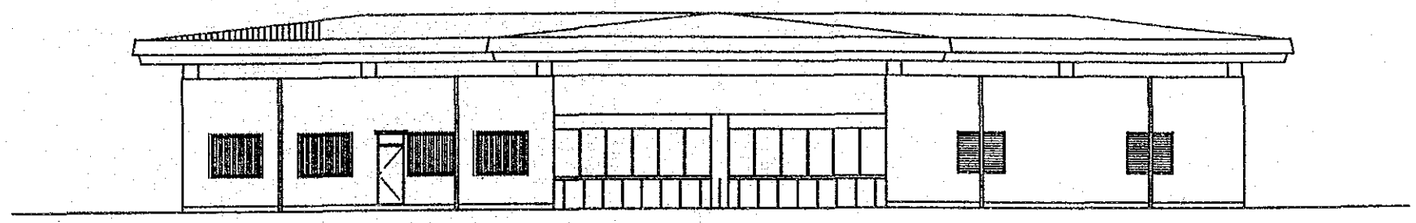


GENERAL LAYOUT PLAN
SCALE 1:1000

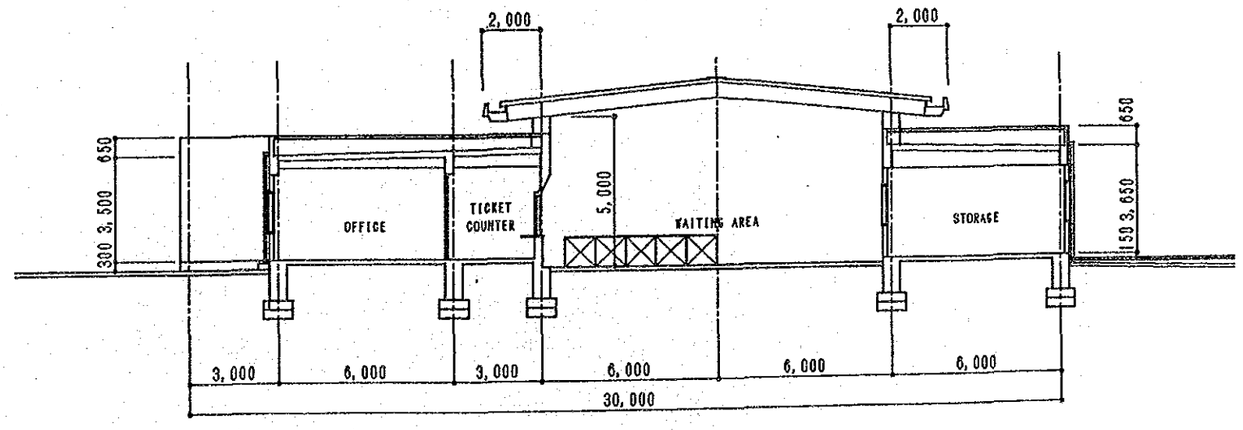
Project for Construction of
Bus Terminal in Kathmandu



TERMINAL BUILDING
GROUND FLOOR PLAN SCALE 1:200
Project for Construction of
Bus Terminal in Kathmandu



NORTH ELEVATION

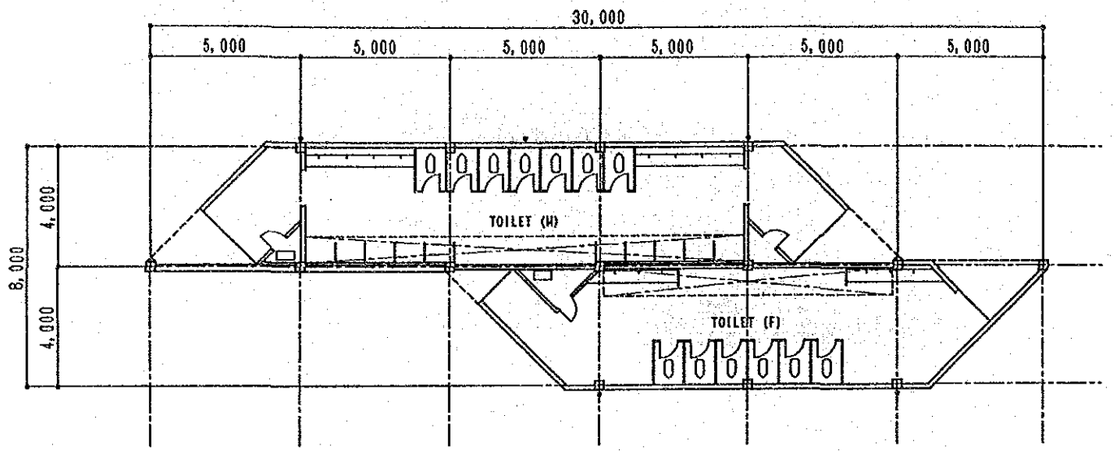


SECTION

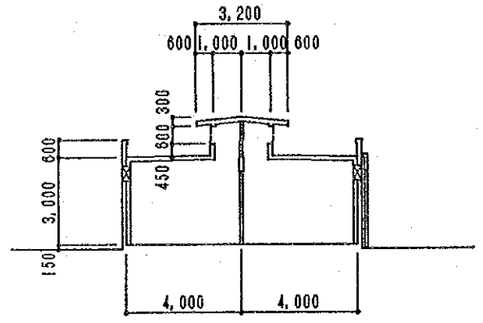
TERMINAL BUILDING
NORTH ELEVATION / SECTION

SCALE 1:200

Project for Construction of
Bus Terminal in Kathmandu

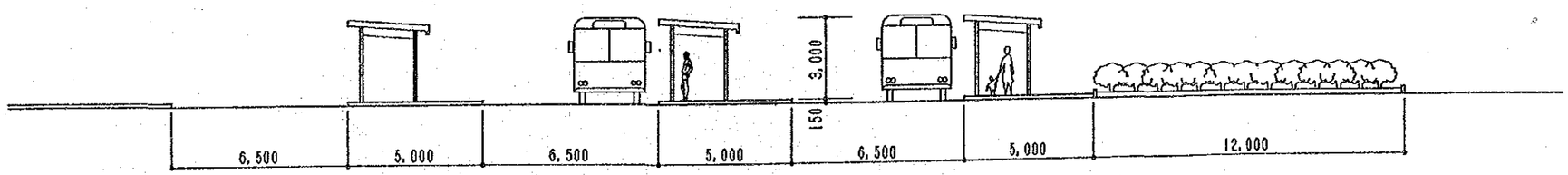


PLAN



SECTION

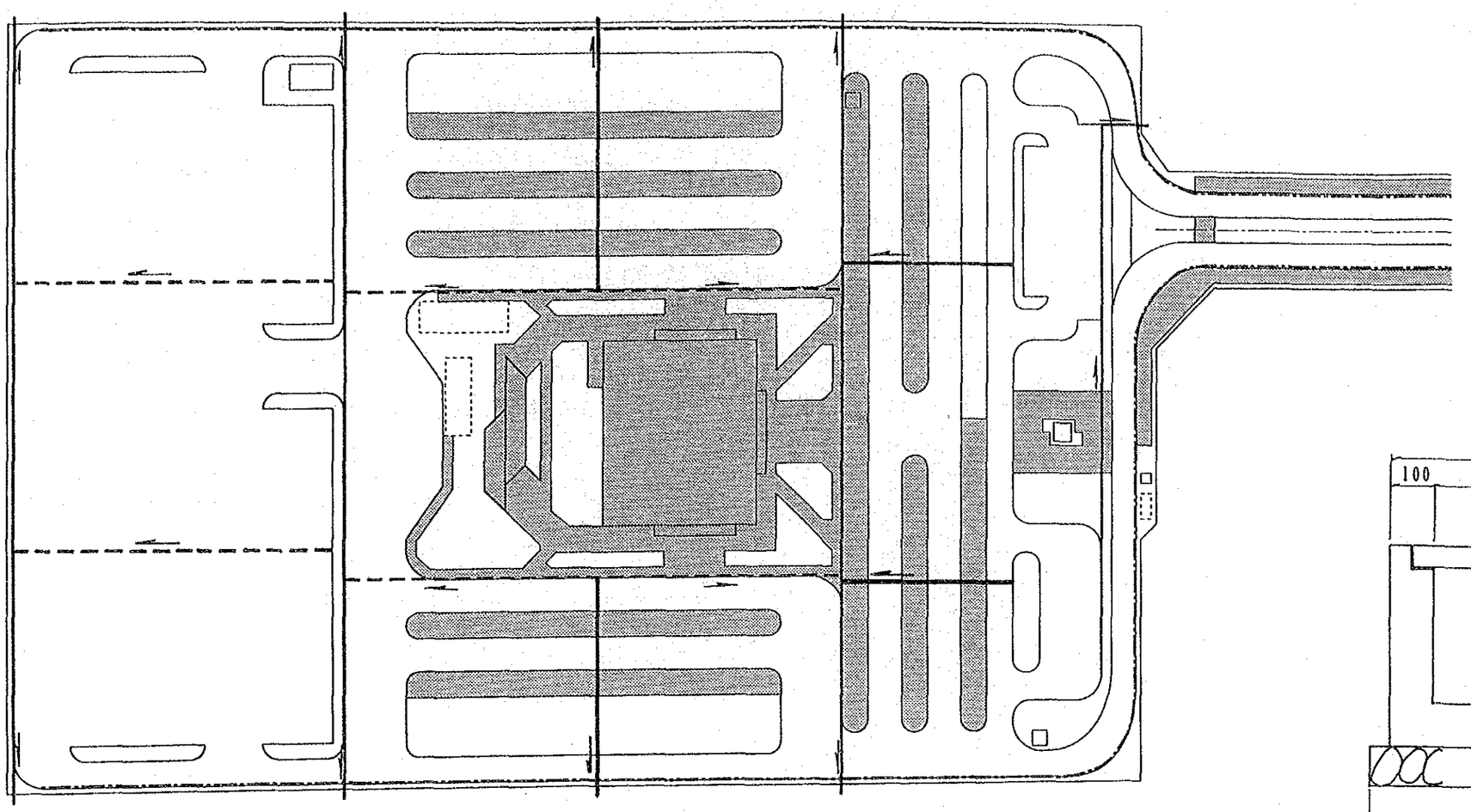
PUBLIC TOILET



SECTION OF MEDIUM, LONG ROUTE BUS BOARDING AREA

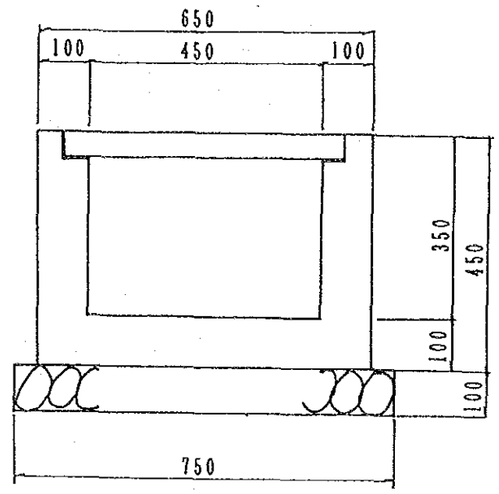
TOILET / MEDIUM, LONG ROUTE BUS BOARDING AREA SCALE 1:200

Project for Construction of Bus Terminal in Kathmandu

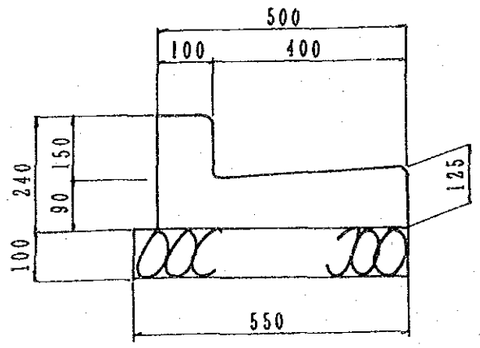


LEGEND

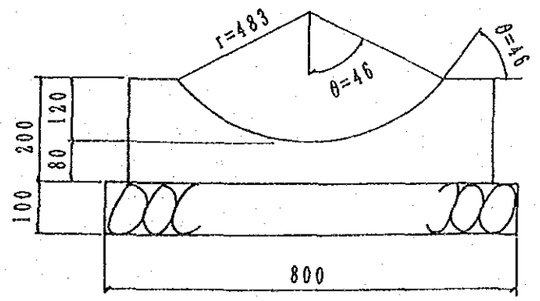
- U-Shaped Gutter
- L-Shaped Gutter
- Rolled Gutter



U-SHAPED GUTTER



L-SHAPED GUTTER



ROLLED GUTTER

PLAN OF

DRAINAGE SYSTEM

SCALE 1:1000

Project for Construction of
Bus Terminal in Kathmandu

CHAPTER 5

PROJECT EXECUTION PLAN

CHAPTER 5. PROJECT EXECUTION PLAN

In order to implement this project smoothly as well as to assure a smooth operation of the terminal, this supplemental basic design study especially reviewed the executing organization plan, the demarcation of the undertaking between the Nepalese side and the Japanese side, maintenance and management plan and the execution schedule. Also the bus operation control within the bus terminal as well as the operation route and schedule of city buses connecting with this terminal was studied for proposing an optimum plan. Furthermore in order to promote the usage of equipment and materials readily available in Nepal, a resurvey was conducted.

5.1 Execution Organization

The execution agency of the project is the Ministry of Local Development and the actual operation will be carried out by the Kathmandu Town Municipality which will newly set up a bus terminal section.

The construction and installation of the equipment shall be performed under the grant aid program of Japan, and under this program a Japanese consultant shall be selected to prepare detailed design of the facilities and equipment. After completion of detailed design, a Japanese construction contractor shall be selected by tender to execute the construction.

The Kathmandu Town Municipality will set up an advisory board to assure the smooth operation of the bus terminal. This advisory board will be set up prior to the signing of the E/N for this project and will be active during and after construction of the bus terminal. The section chief of the bus terminal section who shall be the coordinator during construction and manager of the terminal after completion will also be appointed prior to the signing of E/N.

5.2 Demarcation of Undertakings

The project shall be undertaken by the Japanese side and the Nepalese side as shown in the following table.

	Undertakings on the Japanese side	Undertakings on the Nepalese side
(1) Basic construction		
1) Road crossing		·Pavement and route change of the ring road and the approach road intersection (within a 10 m range from the ring road center)
2) Site preparation		·Site preparation at the present level and removal of obstructions
3) Reclamation	·Reclamation and subgrade work including those for the approach road	
4) Water supply	·Piping inside the terminal	·Piping from the main branch to the site boundary
5) Water drainage	·Drainage within the terminal	·Drainage from the terminal drainage boundary to the Vishumati river
6) Power	·Wiring from the site boundary	·Wiring to the site boundary from the main cable ·Expense relating to wiring
7) Telephone	·Wiring from main terminal board (main terminal board will be installed by Japanese side)	·Wiring from main line to main terminal board.

	Undertakings on the Japanese side	Undertakings on the Nepalese side
(2) Road facilities	·Road inside the terminal ·Boarding/offboarding platforms for all transport ·Parking lot construction ·Pedestrian pathway work	·Plant planting
(3) Building	·Structure for project and other related construction	·Expenses for permission & licenses ·Construction not included in Japanese undertaking
(4) Other facilities	·Terminal lighting facilities ·Sign on road surface ·Signboard installation (information board) ·Baggage transporting carts ·Gates	
(5) Furnitures & fixtures	·Benches (fixed) ·First aid kit	·Carpets, curtains, desks & chairs and other fixtures
(6) Equipment/materials & their transportation	·Sea freight and insurance ·Inland transportation	·Customs clearance and duties
(7) Other works related to the project		·Banking arrangements and related expenses ·Provide necessary assistance for entry and exit of consultant and contractor staff also provide exemption of duties and Nepal taxes

5.3 Maintenance and Management

5.3.1 Maintenance and Management Organization

An electrician and a civil superseer are posted in the maintenance subsection to perform maintenance regularly. Scheduled inspection and maintenance may be implemented by concluding a maintenance agreement with special construction companies or local construction companies.

5.3.2 Maintenance and Management Plan

(1) Facilities

The following pieces of equipment must be serviced regularly.

(a) Sewage septic tank
(b) Water receiving tank
(c) Water distribution pump

The administration subsection should employ about 10 workers to keep the entire terminal clean.

5.3.3 Maintenance and Management Expense

(1) Management Expense

1) Management expense

i) Personnel cost

Section chief	1 x Rs2,400/month	Rs2,400
Assistant section chief	1 x Rs1,500/month	Rs1,500
Civil superseer	1 x Rs1,500/month	Rs1,500
Electrician	1 x Rs1,500/month	Rs1,500
Common employee	20 x Rs1,300/month	Rs26,000
Total		Rs32,900

32,900/month x 12 = Rs394,800/year

ii) Power

Estimated average monthly consumption	12,900 kWh/month
Basic charge	Rs100/month
Charge kWh	Rs1.8 x kWh x 12,900 kWh = 23,220
Annual power expense	(Rs100 + Rs23,220) x 12 = Rs279,840

iii) Water

Estimated average monthly consumption	20 m^3/day (600 M^3/month)
Basic charge (supplied by	3"ϕ pipe up to 700 m^3/month) Rs1,685/month
Annual water charge	1,685 x 12 = Rs20,220/year

iv) Facilities maintenance and management expense

Cleaning expense	20 worker x Rs900/month x 12 =	Rs216,000/year
Maintenance & management expense		Rs600,000/year
Total		Rs816,000/year

v) General administration expense Rs40,000/year

2) Revenue

Estimate of annual bus terminal revenue

Although there is some movement for raising terminal fee, the estimate is based on the present fee since raising such public utility fee may lead to a reduction of its utilization. The fees will be collected by KTM itself and will not be entrusted to private enterprises through tenders.

i) Bus lane fee

Rs20 x 200 buses/day x 365 = Rs1,460,000

ii) Ticket counter rent

Rs10/ft^2 x 10.7643 ft^2/m^2 x 72 m^2 = Rs7,750/month

Rs7,750 x 12 = Rs93,000

iii) Telephone charge

Telephone revenue Rs2.0/call

Telephone payment Rs1.0/call

Number of booths (number of telephones) 3

Rs1.0 x 3 x 5 calls/hour x 18 hours = Rs270/day

Rs270 x 365 = Rs98,550

iv) Parking charge for passenger cars

Rs5.0/hour utilization rate 30%

30 cars x 0.3 x 18 hr x Rs5.0 = Rs810/day

Rs810 x 365 = Rs295,650

(Unit: Rs)

Income		Expenditure	
Bus terminal fee	1,460,000	Personnel expense	394,800
Ticket counter rents	93,000	Power charge	279,840
Telephone charge	98,550	Water charge	20,220
Parking charge	295,650	Maintenance/ management expense	816,000
		General administration expense	40,000
Total	1,947,200	Total	1,550,860

(Profit 396,340)

3) Budget for bus terminal operation

Self supporting operation is the principle for the bus terminal operation, but KTM will allocate an annual budget of Rs500,000 for smooth operation, maintenance and necessary construction.