

CHAPTER 5 PROJECT EXECUTION PLAN

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5.1 Execution Plan

The executing agency for the Project is the Ministry of Works and Transport, and the Project is implemented by Sajha Yatayat under the supervision of the Joint Secretary of the Ministry of Works and Transport. Sajha is operated under the direction of the Board chaired by the Secretary. The Board is the highest decision making organ of this Project too.

5.2 Demarcation of Undertakings

(1) Undertakings of the Japanese side

(a) Installation

(i) Construction work

Heavy repair shop, administration department, deep tube well water supply facility, spare parts store (modification of existing building), electrical work, water supply, sewage and sanitary work, ventilation work, well construction work, compressed air piping work, steam piping work.

(ii) Exterior work

Parking lot pavement work, parking lot lighting, drainage work within site, piping and wiring work among buildings, facilities and equipment, water piping work from end of city water main within site.

(b) Tools, machines and equipment

As listed in 4.3.3.

(c) Others

(i) Transportation of construction materials and equipment to the construction site.

(ii) Transportation and installation costs of machine and equipment for bus repair and tyre retreading machines.

(iii) Consultant work

(2) Undertaking of the Nepal side

(a) Main construction work

(i) Clear, level and reclaim the site prior to commencement of construction (including removal of existing building and water tank).

(ii) Provide facilities for distribution of electricity, supply of water, drainage, telephone system and other incidental facilities to the site.

(b) Exterior utility work

(i) Install city water supply line up to 1 m inside the construction site.

(ii) Construct drainage work outside the construction site.

- (iii) Install high tension power line up to the primary terminal of the breaker.
 - (iv) Install telephone circuit up to the telephone exchange.
- (c) Exterior work
- Install fencing for the site.
- (d) Equipment and fixtures
- (i) Supply household furniture, office furniture and fixtures
 - (ii) Install fire extinguisher
- (e) Others
- (i) Open an account of His Majesty's Government of Nepal with a Japanese foreign exchange bank and pay all banking commissions.
 - (ii) Exempt or bear all custom duties, internal taxes and other fiscal levies for Japanese nationals engaged in the construction and installation of machinery and equipment for the Project.
 - (iii) Exempt from the custom charges and import duties of imported construction material and bus repair tools, machinery and equipment.
 - (iv) Secure supply of construction material and equipment to be procured in Nepal.

- (v) Provide or acquire necessary permissions, licences and other authorizations necessary for carrying out the project.
- (vi) Maintain and properly use the facilities and equipment provided under the Japanese Grant Aid program.

5.3 Construction and Supervision Program

5.3.1 Construction Program

There are many construction companies in Kathmandu Metropolitan, but mobilization of skilled workers is limited. It is necessary to have Japanese experts provide technical training for some types of work, especially steel structure work and waterproof work.

Bricks, which are the main building material in the Kingdom of Nepal, are becoming more difficult to procure. Therefore, it is necessary to arrange procurement of bricks which satisfy the quality standard at an early stage, and to inspect the bricks carefully.

Good quality aggregates for concrete is also difficult to procure owing to the geological condition. The particle size of sand tends to be too fine while much of the crushed aggregate tends to be thin flat pieces. Since such conditions will adversely affect concrete strength, concrete mix must be carefully determined based on trial mixes.

Recently, imported materials and equipment from Thailand and Singapore as well as India can be seen in the Kathmandu metropolitan district. If the quality is good, such materials should be used without hesitation.

Since in the Kathmandu Metropolitan June to September is the rainy season, this should be considered when planning a construction schedule.

The construction work to be undertaken by the Nepalese side should be completed before the construction work of the Japanese side begins. Therefore, the Nepalese side and the Japanese side must discuss and agree on the construction and schedule of such work.

5.3.2 Supervision Program

The Consultant shall organize a team to smoothly implement this project from detailed design to supervision work in accordance with the basic design and the policy of the Grant Aid Program of the Government of Japan. The Consultant shall send a competent supervisor to the site to supervise construction, and shall also send experts when required for a short period to carry out inspection and guidance.

(1) Purpose of supervision

Provide necessary communication, including reports, with agencies of both countries in order to complete construction as scheduled.

Provide necessary instruction to the contractor to construct facilities as described in the construction documents.

Provide transfer of technology in construction in order to achieve the objective intended in Grant Aid Program Project.

Provide necessary instruction and recommendations to assure smooth operation after completion of the Project.

(2) Content of supervision

Provide assistance for construction contract.

Assist in selecting contractor, determining type of construction contract, preparation of construction contract, check contents of construction details and attend signing of construction contract.

Review and approve shop drawings.

Review shop drawings and inspect materials, samples and equipment submitted by the contractor.

Provide instruction on construction.

Review construction plan and schedule, provide instruction to contractor, and report construction progress to the owner.

Provide assistance on payment procedure.

Check the contents of request for payment during construction and after completion, and assist in processing such procedure.

Attend inspection.

Inspect completion of different parts as necessary during construction and provide instruction to the contractor. The consultant shall confirm the completion of the project and attend its acceptance as well as receiving the certificate of acceptance. The consultant shall report construction progress, payment procedure and matters regarding acceptance to government agencies of Japan.

5.4 Procurement Plan for Construction

5.4.1 Construction Materials for the Project

Construction materials produced in the Kingdom of Nepal which may be used in this project are described in the following paragraphs.

(1) Aggregates for concrete and mortar sand for fine aggregates may be collected from nearby rivers, but as described earlier, they contain much fine particles and clay so the sand should be washed and carefully mixed. Coarse aggregates are produced by crushing rocks in mountains and stones in rivers. Since the Himalaya mountains are a mountain range formed by contraction, they are subjected to strong directional pressure, so the rocks are stratified and tend to break into flat shape when crushed.

(2) Cement

Recently, a large cement plant is operating and producing cement in the Kingdom of Nepal. Because both quality and quantity have improved in accordance with the progress of construction, Nepal cement will also be used for construction.

(3) Bricks

Since bricks are the most popular building material for exterior walls, demand is large and it is feared that production may not be sufficient. Therefore it is necessary to procure the necessary quantity at an early stage of the Project.

(4) Terrazzo

In-situ polished terrazzo, together with bricks, is the most popular finishing material and may be used in this project.

(5) Wood

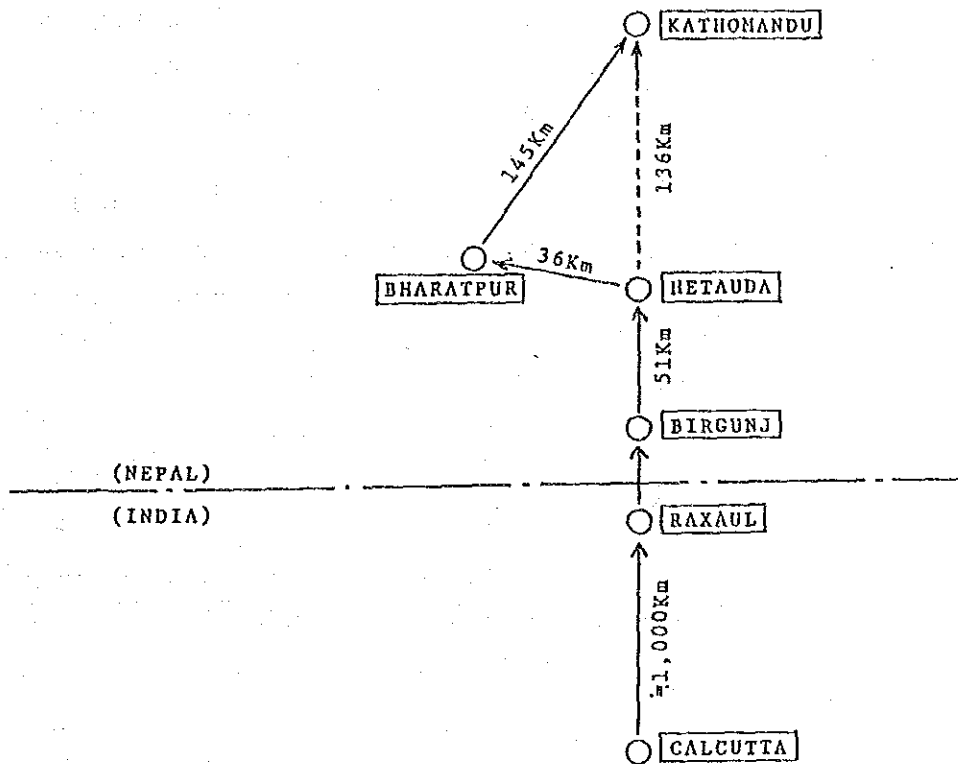
Wood is used for furniture and is available for interior finish, but it will be used for interior finish.

List of Materials to be Procured

	Nepal	Japan	Other Countries
Aggregates	o		
Cement	Δ		o
Steel bars		o	
Bricks	o		
Terrazzo	o		
Wood	Δ	o	
Aluminum window frame		o	
Asphalt waterproof material		o	
Main finishing material		o	
Main machinery and equipment		o	

(6) Other materials

Materials and equipment not procured locally are unloaded at Calcutta, India, then transported overland to Nepal. Customs clearance is performed between Raxhaul and Birgunji on the India/Nepal border. Although there are two routes from Birgunji to Kathmandu, the mountain road through Hetauda is not suitable for transporting material and equipment during the monsoon season. The road through Bharatpur is the normal route.



5.4.2 Machinery and Equipment

The machinery and equipment for this Project will be imported from Japan, and special technicians will be dispatched to assist in installation and test operation. Mechanics and two tyre retreading equipment operators will be dispatched.

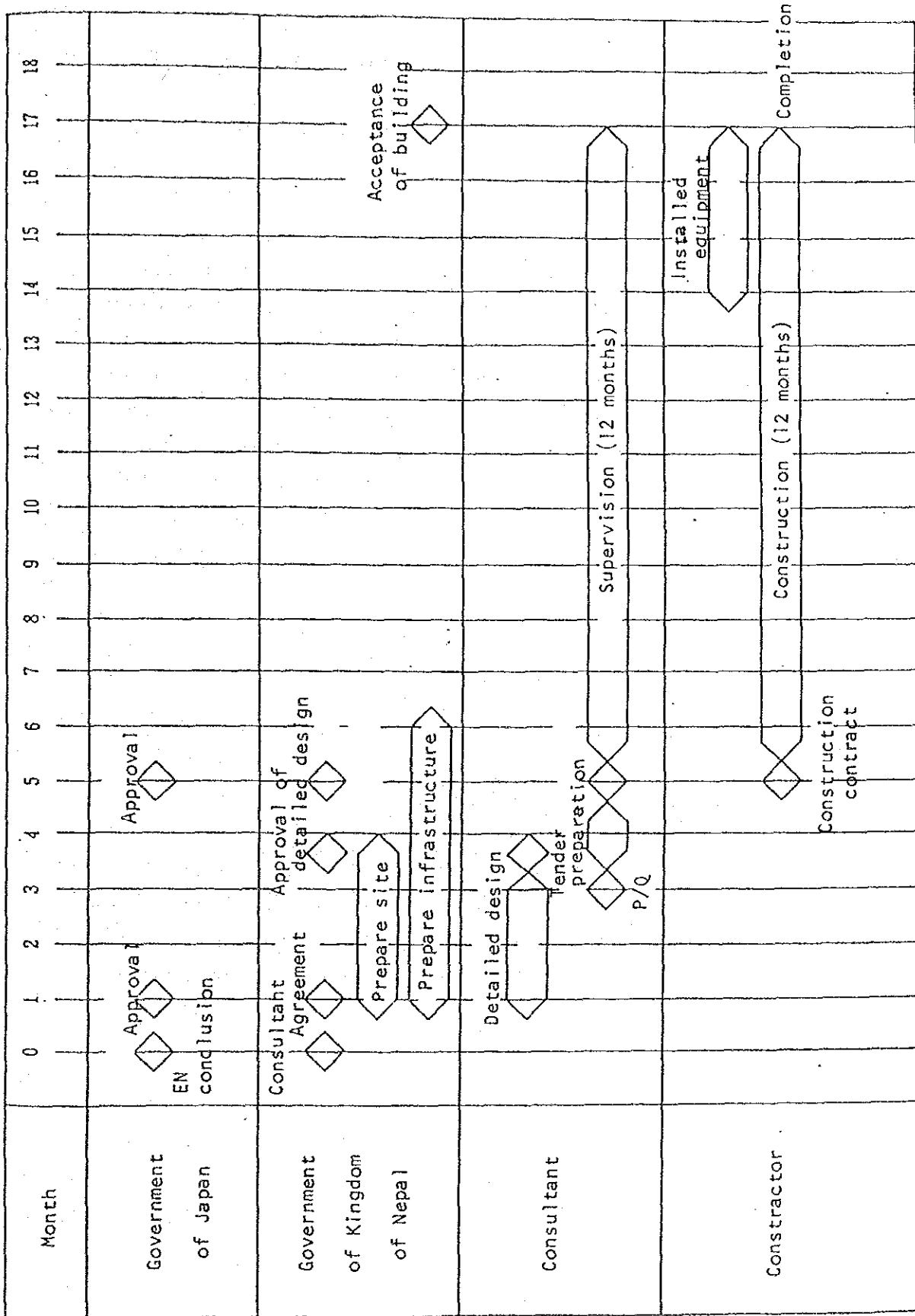
5.4.3 Water Supply Equipment

Deep tube well equipment, including filter equipment, will be purchased locally in view of scheduled maintenance and repair. If scheduled maintenance is not performed on the water pump and filter, a serious breakdown may occur, and breakdowns must be urgently repaired, or else bus repair will be largely affected. Since there are many deep tube wells in operation in Kathmandu Metropolitan, it is judged that locally available equipment is more desirable.

5.5 Implementation Schedule

The construction schedule is estimated at 12 months as shown in the following Project implementation schedule.

Project implementation schedule



5.6 Maintenance and Administration Plan

5.6.1 Maintenance and Administration Plan

(1) Facilities

A competent person in charge of maintenance is assigned to the administration department to administer maintenance work. In view of the size of the facility, permanent operators (technicians, workers) are not employed within Sajha, and inspection and maintenance is contracted with a local construction company. The following facilities at least require scheduled inspection and maintenance:

- (i) Sewage treatment equipment
- (ii) Cleaning of drainage and oil trap
- (iii) Water pump and filter
- (iv) Cleaning of water reservoir.

(2) Machines, tools and equipment

Machines, tools and equipment for bus maintenance shall be taken care of regularly by a person designated among persons using them, but when repair and correction by the manufacturer is required, it shall be ordered through the procurement department.

5.6.2 Technical Assistance

The establishment of a scheduled inspection and repair program is most important for Sajha. In order that the major repair shop of this project together with spare parts, material and equipment provided by the 1987 grant aid will contribute to increase bus operating efficiency and maintain it at a high level, it is necessary to develop and upgrade the quality and skill of Sajha employees including maintenance technicians, inventory managers, and operation managers through long and short term technical assistance.

At present, an expert of JICA for automobile engineering and two engineers of Japan Overseas Cooperation Volunteers for automobile maintenance are dispatched to Sajha from Japan.

The fields of technical assistance in future may be as listed below.

- (a) Train technical leaders in inspection, maintenance and repair
- (b) Develop higher driving skill, and pre-operation and post-operation inspection
- (c) Prepare inventory control system
- (d) Plan efficient operation schedule based on market survey

5.6.3 Maintenance and Administration Expenses

An estimate of the necessary operating costs, maintenance and administration costs, and labour costs after completion of this facility is given in the following table.

Site	Item		Value (Rs/yr)	Total (Rs/yr)
Pulchowk	Operating costs	Power	1,337,364	6,990,665 (¥41,943,000)
		Water	8,017	
	Sub total		1,345,381 (abt. ¥8,072,000)	
	Labour costs		4,558,243 (abt. ¥27,349,000)	
	Total		5,903,624 (abt. ¥35,421,000)	
Lagankhel	Operating costs	Power	908,364	
		Water	3,360	
	Sub total		911,724 (abt. ¥5,470,000)	
	Labour costs		175,317 (abt. ¥1,052,000)	
	Total		1,087,041 (abt. ¥6,622,000)	

(1) Pulchowk site

(a) Power

- (i) Estimated average monthly consumption:
16,500 kW
- (ii) Base charge: Rs 4,522 (includes up to 50 kW)
- (iii) Rate charge: (16,500-50) kW/month x Rs 6.5/kW
= Rs 106,925/month
- (iv) Yearly power costs:
Rs (4,522 + 106,925)/month x 12 months
= Rs 1,337,364/year

(b) Water

- (i) Estimated average monthly consumption:
334.05 m³
- (ii) Base charge: Rs 280 (includes up to 140 m³)
- (iii) Rate charge: (334.05-140)m³/month x Rs 2.0/m³
= Rs(280+388.1)/month x 12 months
= Rs 8,017.2/year

(c) Maintenance costs

Since maintenance costs are not shown in either the budget or the costs of Sajha, the actual costs cannot be determined, but since maintenance costs are expected to be very small compared with the total expense, it is not included in this estimate.

(d) Labour costs

Since data are available only up to 1986, the costs since that time was estimated to increase at an annual rate of 10%.

- (i) Present number of employees: 738
- (ii) Estimated number of employees:
738-20 (body plant) + 62 (repair plant)
= 780
- (iii) Yearly labour costs:
Rs 3,594,000/738 x 780 x (1.0 + 0.1 x 2)
= Rs 4,558,243/year

(2) Lagankhel site

(a) Power

- (i) Estimated average monthly consumption:
11,000 kW
- (ii) Base charge: Rs 4,522 (includes up to 50 kW)
- (iii) Rate charge: (11,000-50) kW/month x Rs 6.5/kW
= Rs 71,175/month
- (iv) Yearly power costs:
Rs (4,522 + 71,175)/month x 12 month
= Rs 908,364/year

(b) Water

- (i) Estimated average monthly consumption: 102 m³
- (ii) Base charge: Rs 280 (includes up to 140 m³)
- (iii) Rate charge: Covered by base charge
- (iv) Yearly water costs: Rs 280/month x 12 month
= Rs 3,360/year

(c) Maintenance costs

Maintenance costs are not included, as in the Pulchowk site.

(d) Labour costs

Since data are available only up to 1986, the costs since that time were estimated to increase at an annual rate of 10%.

- (i) Present number of employees: 20

(ii) Estimated number of employees:

$$20 + 30 \text{ (tyre retreading plant)} = 30$$

(iii) Yearly labour costs:

$$\begin{aligned} & \text{Rs } 3,594,000/738 \times 30 \times (1.0 + 0.1 \times 2) \\ & = \text{Rs } 175.317 \end{aligned}$$

(3) Operating costs and revenue balance

Based on the estimate provided by Sajha when 100 buses are operated for (1987/88) the expenditure and revenue are estimated as follows:

<u>Expenditure</u>		<u>Revenue</u>	
Diesel & lub.	Rs.14,785,000	City routes	27,300,000
Spare & repair	6,108,000	Long-distance routes	13,300,000
New & repair tyres	2,900,000	Others (charter, etc.)	1,657,000
Salaries & allowances	6,385,000		
Telephone, elect, water, etc.	230,000		
Insurance	690,000		
Taxes & trip allowances	989,000		
Others	1,105,000		
Total	33,192,000	Total	42,257,000

Since telephone, electricity, water, salary and allowances are difficult to estimate accurately, these were over-estimated in the following estimates (which do not include interest on capital and depreciation).

Operating costs	Rs.35,219,105
Financial costs	3,321,660
Total	38,540,765
Operating revenue	42,257,000
Operating profit	3,716,235

From this figure, it is clear that the operation will show a profit if 100 buses are operated.

5.7 Project Cost

Project costs are estimated as follows:

(1) Nepal side contribution

The Nepal side contribution is estimated to be about 2.15 million rupiah (about 12.91 million yen) as shown in the following breakdown.

Breakdown of Costs

(Unit: Rs)

	Pulchowk	Lagankhel	Total
Exterior work	454,000	465,000	919,000
Water intake work	100,000	100,000	200,000
Power intake work	300,000	200,000	500,000
Telephone intake work	30,000	20,000	50,000
Equipment & fixtures	461,000	23,000	484,000
Total	1,345,000 (¥8,070,000)	808,000 (¥4,848,000)	2,153,000 (¥12,918,000)

CHAPTER 6 PROJECT EVALUATION

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6.1 Benefits of Project

The benefits expected from this Project are described in the following paragraphs. Furthermore, some benefits will accrue to the public transportation of the Kathmandu Metropolitan, as well as the improving of Sajha operation, which should contribute toward the orderly operation of the entire transportation system.

(1) Upgrade transportation services

(a) Improve operation reliability

When the bus repair shop is extended, bus repair capacity will be enlarged, bus operation rate raised, bus breakdown and loss of operation reduced, and bus operation efficiency raised which results in higher reliability.

(b) Improve operation safety

When buses are well maintained, operation safety is improved which contributes to higher reliability.

(c) Check raise of bus fares

When operation efficiency rises, and efficient operation is realized, costs are saved which increases revenue and makes bus rate increases unnecessary.

(2) Improve Sajha operation

Factors impeding Sajha operation are mainly spare parts purchase cost, repair cost, and tyre repair costs. The execution of this project is expected to improve bus operation and contribute to the sound financial situation of Sajha.

- (a) By implementing scheduled inspection and maintenance as well as overhaul, bus operation rate is raised and breakdown rate is reduced. Furthermore, life of parts is extended which reduces the amount of spare parts for one bus.
- (b) By retreading tyres, tyre purchase costs are reduced and a constant tyre supply is possible.
- (c) As bus operation efficiency rises, a constant efficient operation is possible which provides more time for inspection and maintenance.

The practice of scheduled inspection and maintenance at Sajha will improve operation safety and reliability which would make people realize the importance of maintaining scheduled inspection and maintenance. Since this will also result in reduction of costs, private companies can be expected to take up this practice. Furthermore, Sajha is expected to provide a model for efficient bus operation which is set up according to the demands required in the transportation of the Kathmandu Metropolitan. This should lead to the extension and rationalization of bus operation in this district.

6.2 Suitability of the Project

Sajha is an organization operated by the board of directors comprising the Secretary from the Ministry of Works and Transport, Representatives of Zonal Authorities and representatives of shareholders. Therefore, it is assumed that the operation of Sajha reflects the desire of the people of Nepal.

The purpose of this Project is to provide safe, sound bus operation as well as improve the bus operation rate. This will directly contribute to a sound, stable financial situation of Sajha by improving the following matters.

1. Urgently repair the ever-increasing number of buses in need of repair so that they will become fit for operation.
2. Establish a maintenance system for sound bus operation.

The first problem is being resolved through the provision of spare parts by the grant aid of 1987, while the second problem introduces a scheduled inspection and maintenance program to keep buses in operating order. However, this will require the repair shop to be extended, technicians to be increased and skills to be upgraded.

After the project is implemented and technicians are given upgraded skills, it is expected that the bus operation rate will improve and revenue increased through sound efficient bus operation. Furthermore, the upgrading of the skill of principal technicians through training should improve the efficiency of repair and maintenance.

If this Project is realized through the grant aid of Japan, it will provide Sajha with a sound financial situation and furthermore contribute toward providing a reliable, safe, sound bus operation service to the people of Nepal. Therefore, the significance of this Project is very high and is most suitable as a grant aid project.

CHAPTER 7 CONCLUSION AND RECOMMENDATIONS

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The implementation of this Project is expected to improve safety and reliability of the operation of Sajha bus operation and to contribute to the development of bus transportation service in the Kingdom of Nepal. The implementation of the following items is necessary for achieving the best results of this Project.

(1) Raise quality and quantity of technicians and workers

In order to operate the shop after its implementation, it is necessary to raise the quality and quantity of technicians and workers. This should be implemented by providing training to technicians and workers selected from among the present technicians and workers especially when replacing the spare parts provided in the Grant Aid Program of 1987. Then these technicians and workers are transferred to the new shop, together with newly employed personnel.

(2) Retrain bus drivers

In order to operate buses safely and to prevent breakdowns, drivers and conductors should be given training to raise driving technique, observe traffic rules, and perform inspection before driving.

(3) Quick, efficient supply of spare parts

In order to raise bus operation efficiency, quick, efficient supply of spare parts is just as important as improving techniques. An inventory control should be implemented to assure a constant supply of minimum

necessary stock through early order of spare parts based on historical records of scheduled inspection and maintenance.

(4) Establish scheduled inspection and maintenance system

Establish a daily, 5,000 km (about a month), 20,000 km (about 4 months) and 60,000 km (about 12 months) inspection and maintenance schedule and immediately start implementing from the shorter period inspections.

(5) Review operation schedule

Review operation schedule after studying passenger demand for different routes and time in order to establish an operation schedule which addresses rush hour period demand and low daytime and nighttime demands.

(6) In order to implement the above items smoothly, it is desirable to intensify and continue the present technical assistance for both short and long periods.

APPENDIX

APPENDIX

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1. BASIC DESIGN STUDY

1.1 Minutes (Basic Design Survey)

MINUTES OF DISCUSSIONS

ON

THE PROJECT FOR IMPROVING OF THE PUBLIC TRANSPORTATION

IN

THE KINGDOM OF NEPAL

In response to the request made by His Majesty's Government of Nepal for Grant Aid for the Project for Improving of Public Transportation (herein-after referred to as "the Project"), the Government of Japan decided to conduct a basic design study on the Project and entrusted Japan International Cooperation Agency (JICA) to send a basic design study team headed by Mr. Takashi EIZUKA, Chief of Service Section, Vehicle Service Division, Ministry of Transport, to Nepal from 29th of March to 15th of April, 1988.

The team had a series of discussions with the authorities concerned of His Majesty's Government of Nepal and conducted a field survey in Lalitpur. As a result of the study, both parties have agreed to recommend to their respective Governments that the major points of understandings reached between them as attached herewith should be examined towards the realization of the Project.

Kathmandu, April 6, 1988

Takashi Eizuka

Takashi EIZUKA

Leader

Basic Design Study Team
Japan International
Cooperation Agency

G. P. Ranjitkar

G. P. RANJITKAR

Joint Secretary

Ministry of Works & Transport

ATTACHMENT

1. OBJECTIVE OF THE PROJECT

The general objective of the Project is to improve and strengthen the public transportation services in Nepal, and the specific objective of the Project is to establish the complete periodical maintenance system and to keep smooth and full of operation of public bus route.

2. EXECUTING AGENCY

The executing agency for the implementation of the Project is Sajha Yatayat, under Ministry of ~~Public~~ Works and Transport.

3. SITE OF THE PROJECT

The proposed site of the Project is located in the existing workshop area at Lalitpur and the existing parking area at Lagankhel as shown in Annex I.

4. REQUEST BY HIS MAJESTY'S GOVERNMENT OF NEPAL

The team will convey to the Government of Japan the request of His Majesty's Government of Nepal that the former takes necessary measures to cooperate in implementing the Project and provide necessary facilities and equipment as listed in Annex II within the scope of Japanese economic cooperation programme in grant form.


5. JAPAN'S GRANT AID SYSTEM

The Nepalese side has understood Japan's grant aid system explained by the team including a principle that a Japanese consultant firm and a Japanese general contractor should be used for the implementation of the Project.


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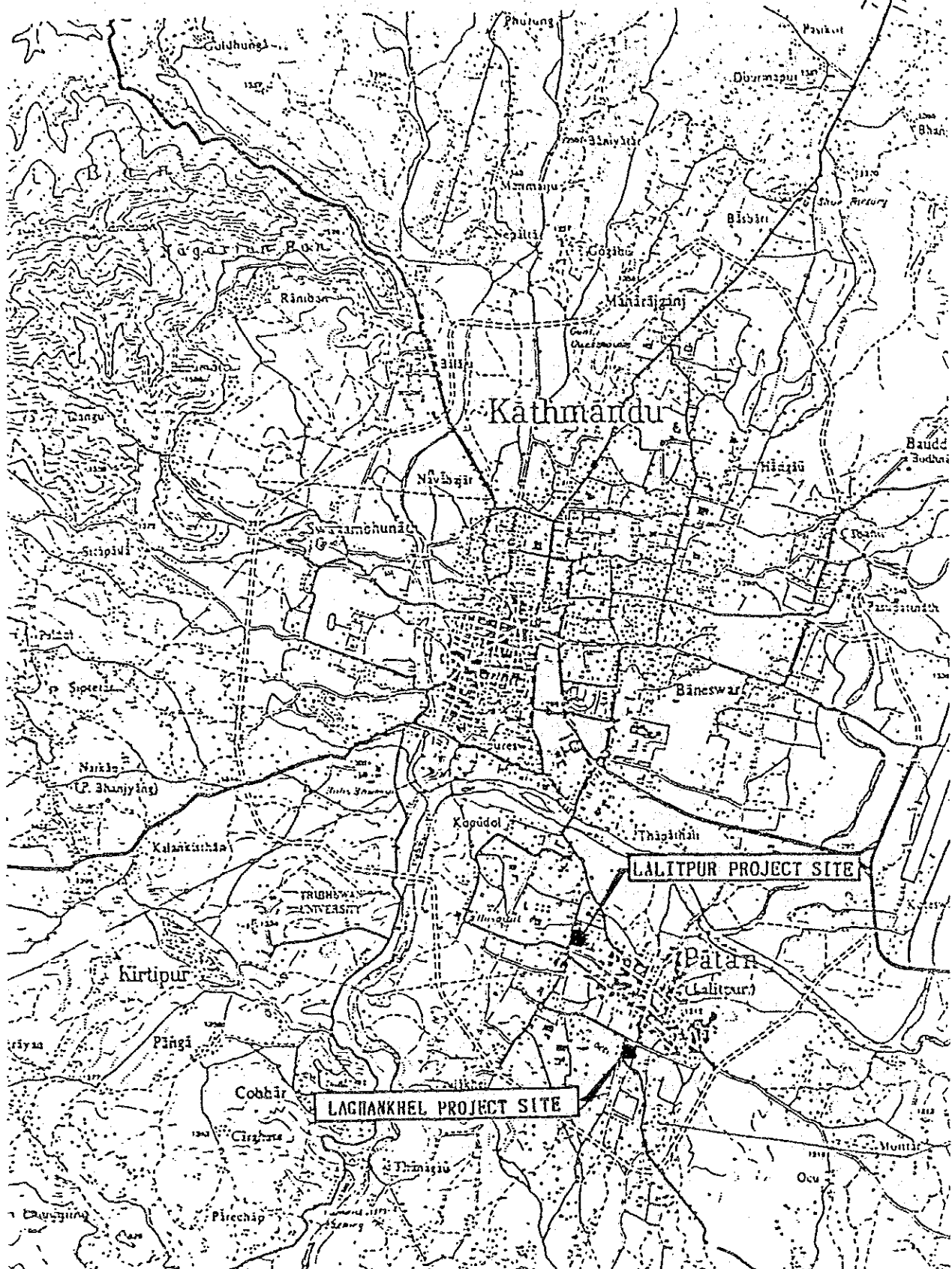
6. MEASURES TO BE TAKEN BY HIS MAJESTY'S GOVERNMENT
OF NEPAL.

His Majesty's Government of Nepal will take necessary
measures as listed in Annex III on condition that
the grant aid by the Government of Japan is extended
to the Project.


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ANNEX I

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ANNEX II

1. Facilities

1 - 1 Lalitpur site

- a. Heavy repair workshop
- b. Parking lot
- c. Administration and Storage
- d. Water Supply facility
- e. Expansion of fuel supply facility

1 - 2 Lagankhel site

- a. Body workshop
- b. Parking lot
- c. Tyre retread plant
- d. Installation of generator

2. Equipments


- 2 - 1 a. Equipments for heavy repair shops
- b. Equipments for body workshop
- c. Bus washing machine
- d. Training equipments


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ANNEX III

Necessary measures to be taken by His Majesty's Government of Nepal

- 1) To secure land necessary for the execution of the Project and provide enough space for such construction as temporary offices, working area, stockyard and others.
- 2) To clear, level and reclaim the site prior to commencement of the construction.
- 3) To provide facilities for distribution of electricity, water supply, drainage, telephone system and other incidental facilities to the site.
- 4) To provide data and information necessary for the Project.
- 5) To ensure prompt unloading, tax exemption and customs clearance of materials and equipment under the Grant Aid at the port of disembarkation in Nepal and also to facilitate the internal transportation of them.
- 6) To exempt Japanese nationals engaged in the Project from customs duties, internal taxes and other fiscal levies which may be imposed in Nepal with respect to the supply of the products and the services under the verified contracts.
- 7) To provide and/or acquire necessary permissions, licences and other authorizations necessary for carrying out the Project.
- 8) To bear all the expenses other than those borne by the Grant such as gardening, fencing, gates, exterior lighting, etc.


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- 9) To maintain and use properly and effectively the facilities constructed and equipment provided under the Japanese Grant Aid program and to prepare the maintenance cost for the facilities and equipment sufficiently after completion of the Project.


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1.2 Minutes (Explanation of Basic Design Draft Report)

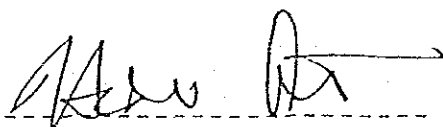
MINUTES OF DISCUSSIONS
ON
THE BASIC DESIGN STUDY
OF
THE PROJECT FOR IMPROVING OF THE PUBLIC TRANSPORTATION
IN
THE KINGDOM OF NEPAL

In response to the request of His Majesty's Government of Nepal for Grant Aid for improving of the Public Transportation (hereinafter referred to as "the Project"), the Government of Japan decided to conduct a basic design study on the project and entrusted the study to the Japan International Cooperation Agency (JICA).

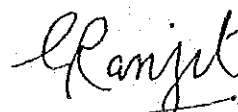
JICA sent the basic design study team headed by Mr. Takashi EIZUKA, Chief of Service Section, Vehicle Service Division, Ministry of Transport, from March 29 to April 15, 1988. As a result of the study, JICA prepared a draft final report and dispatched a team headed by Mr. Takashi EIZUKA to explain and discuss it from July 17 to 24, 1988.

Both parties had a series of discussions on the draft final report and agreed to recommend to their respective Government that the major points of understanding reached between them, as attached herewith, should be examined towards the realization of the project.

Kathmandu, September 7th, 1988



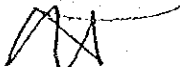
Hideo ONO
Resident Representative,
On behalf of Draft Final
Report Explanation Team
JICA



G.P. RANJITKAR
Joint Secretary,
Ministry of Works and
Transport

ATTACHMENT

1. The Nepalese side agreed in principle to the basic design proposed in the Draft Final Report.
2. His Majesty's Government of Nepal will take necessary measures as agreed on the Minutes of Discussions of the basic design study dated April 6, 1988 as shown Annex.
3. His Majesty's Government of Nepal will take necessary measures inclusive of preparation of budget for development and operating facilities upon the execution of the Grant Aid to the Project by the Government of Japan.
4. His Majesty's Government of Nepal will prepare an additional parking area for buses in view of insufficiency of areas in Pulchowk and Lagankhel sites.
5. His Majesty's Government of Nepal will remove all existing facilities within the project sites at Pulchowk and Lagankhel except a building under construction at Pulchowk site, and will complete the finishing works such as plastering, glassing, and painting for the exceptional building upon the execution of the Grant Aid to the Project by the Government of Japan.
6. His Majesty's Government of Nepal will provide trainings for technicians, workers, drivers and other personnel in order to maintain and operate buses sufficiently.
7. His Majesty's Government of Nepal will make its best effort to operate non-operating buses by efficient repairs with spareparts supplied under the Grant Aid in 1987, by the Government of Japan.
8. The final report (10 copies in English) will be submitted to the Nepalese side by the end of September, 1988.



ANNEX

Necessary measures to be taken by His Majesty's Government of Nepal.

- 1) To secure land necessary for the execution of the project and provide enough space for such construction as temporary offices, working area, stockyard and others.
- 2) To clear, level and reclaim the site prior to commencement of the construction.
- 3) To provide facilities for distribution of electricity, water supply, drainage, telephone system and other incidental facilities to the site.
- 4) To provide data and information necessary for the project.
- 5) To ensure prompt unloading, tax exemption and custom clearance of materials and equipment under the Grant Aid at the port of disembarkation in Nepal and also to facilitate the internal transportation of them.
- 6) To exempt Japanese nationals engaged in the project from customs duties, internal taxes and other fiscal levies which may be imposed in Nepal with respect to the supply of the products and the services under the verified contract.
- 7) To provide and/or acquire necessary permissions, licences and other authorizations necessary for carrying out the Project.
- 8) To bear all the expenses other than those borne by the Grant such as gardening, fencing, gates, exterior light, etc.
- 9) To maintain and use properly and effectively the facilities constructed and equipment provided under the Japanese Grant Aid program and to prepare the maintenance cost for the facilities and equipment sufficiently after completion of the project.

1.3 Members of Basic Design Study Team

(1) Basic Design Survey

Assignment	Name	Position
Team Leader	Takashi EIZUKA	Chief of Service Section, Vehicle Service Division, Land Transportation Department, Ministry of Transport
Project Coordinator	Hiroaki NAKAGAWA	Grant Aid Planning & Survey Department, Japan International Cooperation Agency (JICA)
Planner (Chief Architect)	Yoshio KAWAI	Senior Architect Azusa Sekkei Co., Ltd.
Architect	Yasushi ISHIKAWA	Architect Azusa Sekkei Co., Ltd.
Engineer (Equipment)	Susumu USHIDA	Automobile Maintenance Engineer Azusa Sekkei Co., Ltd.
Engineer (Water supply)	Masao KOJIMA	Soil Engineer Azusa Sekkei Co., Ltd.

(2) Explanation of Basic Design Draft Report

Assignment	Name	Position
Team Leader	Takashi EIZUKA	Chief of Service Section, Vehicle Service Division, Land Transportation Department, Ministry of Transport
Project Coordinator	Hiroshi SHIONO	Grant Aid Planning & Survey Department, Japan International Cooperation Agency (JICA)
Planner (Chief Architect)	Yoshio KAWAI	Senior Architect Azusa Sekkei Co., Ltd.
Engineer (Water supply)	Masao KOJIMA	Soil Engineer Azusa Sekkei Co., Ltd.

1.4 Itinerary of Basic Design Study Team

(1) Basic Design Survey

The team held a survey in Nepal 18 days from March 29 to April 15, 1988. Team Leader, EIZUKA, participated from April 3 to 10 and Project Coordinator, NAKAGAWA, participated from March 29 to April 7 during the survey period.

Date	Place	Activities
March 29	Tokyo - Bangkok	(Travelling)
30	Kathmandu Lalitpur	. Visit officials at Japanese Embassy and JICA to discuss itinerary
31	Kathmandu Lalitpur	. Visit the Ministry of Works and Transport . Visit Sajha to explain Inception Report and Questionnaire . Visit Pulchowk site and Lagankhel site to survey the fiscal conditions
April 1	Lalitpur	. Observation of Horticulture Development Research and Training Center as a similar facility of grant aid project . Observation of city water supply facilities
	Lalitpur	. Visit Sajha to receive data
	Kathmandu	. Preparation of schematic drawings
2 (Holiday)	Kathmandu	. Preparation of schematic drawings . Observation of existing boreholes
3	Lalitpur Kathmandu	. Visit Sajha to discuss the project . Visit the Engineering Science Department, Kathmandu Water Supply & Sewerage Corporation to obtain data

Date	Place	Activities
April 4	Lalitpur Kathmandu Jawalakhel	<ul style="list-style-type: none"> . Visit Sajha to discuss the project . Visit Ministry of Water Resources to obtain data . Jawalakhel Office, Water Supply & Sewerage Corporation to obtain data of water supply
5	Lalitpur Kathmandu	<ul style="list-style-type: none"> . Visit Sajha to discuss the draft of Minutes . Observation of a tyre retreading factory . Observation and data obtainment of existing boreholes in Lalitpur
6	Kathmandu Lalitpur	<ul style="list-style-type: none"> . Visit Ministry of Works and Transport to confirm Minutes . Observation of maintenance facilities for trolley bus in N.T.C. . Observation of data concerning water supply
7	Kathmandu	<ul style="list-style-type: none"> . Visit Japanese Embassy to report the Minutes . Observation of car repair shops in the city . Visit Soil Chemistry Department, Ministry of Agriculture to obtain data concerning geological profile of Kathmandu valley . Visit Soil Research Center, Tribuban University to obtain geological data in Lalitpur
8	Lalitpur Kathmandu Thimi (Bhaktapur)	<ul style="list-style-type: none"> . Visit Sajha to discuss the project . Observation of car repair shops . Visit Sewerage Department, Water Supply and Sewerage Corporation to obtain sewerage condition data . Observation of the construction site of National Tuberculosis Center as a similar project

Date	Place	Activities
April 9 (Holiday)	Kathmandu The way to Pkhala	<ul style="list-style-type: none"> . Discussion within team . Observation of road conditions on the hill
10	Lalitpur	<ul style="list-style-type: none"> . Review and study of data . Digging holes on the ground to confirm soil conditions
11	Kathmandu	<ul style="list-style-type: none"> . Investigation of prices of construction materials . Obtainment of data concerning water sources
12	Kathmandu Lalitpur	<ul style="list-style-type: none"> . Visit Ministry of Works and Transport, Japanese Embassy and JICA to report the completion of the survey . Investigation of prices of construction materials
13 (Holiday)	Kathmandu	<ul style="list-style-type: none"> . Discussion within team . Review of data obtained
14	Lalitpur Kathmandu - Bangkok	<ul style="list-style-type: none"> . Visit Sajha to confirm memorandum
15	Bangkok - Tokyo	(Travelling)

(2) Explanation of Basic Design Draft Report

The team visited Nepal 8 days from July 17 to 24, 1988.

Date	Place	Activities
July 17	Tokyo - Bangkok	(Travelling)
18	Kathmandu	. Visit officials at Japanese Embassy and JICA to discuss itinerary
19	Lalitpur	. Visit Sajha Yatayat to discuss the Draft Final Report
	Kathmandu	. Visit the Ministry of Works and Transport
20	Kathmandu	. Observation of conditions of bus terminals
	Lalitpur	. Visit Sajha Yatayat to discuss the Draft Final Report
		. Visit officials at Japanese Embassy and JICA for interim reporting
21	Lalitpur	. Visit JICA, Discussion within the team
22	Lalitpur	. Visit Sajha Yatayat to discuss the Draft Final Report
		. Visit the Ministry of Works and Transport to confirm minutes of discussions
		. Visit officials at Japanese Embassy and JICA to report the conclusion of series of discussions with agencies concerned in Nepal
23	Kathmandu - Bangkok	(Travelling)
24	Bangkok - Tokyo	(Travelling)

1.5 List of Authorities Concerned

Nepalese

(1) Ministry of Works and Transports

Mr. G. P. Ranjitkar Joint Secretary

(2) Sajha Yatayat

Mr. M. R. Satyal General Manager

Mr. K. Karki Traffic Officer

(3) Water Supply and Sewerage Corporation

Mr. S. R. Tuladhar Assistant Manager,
Kathmandu Office

Mr. P. L. Joshi Manager, Patan Office

Mr. R. L. Karkee Foreigner's Desk

Mr. N. M. Pradhan Project Manager,
Engineering Science Lab.

(4) Tribhuvan University

Dr. M. P. Pradhan Chief Engineer, Geological
Research Center

(5) Ministry of Agriculture

Mr. R. B. Maskey Soil Researcher,
Geological, Agricultural
Chemical Department

Mr. P. R. Panday Chief Engineer,
Irrigation Department

Japanese

(1) Embassy of Japan

Mr. T. Nishina	First Secretary
Mr. T. Muromoto	Second Secretary
Mr. K. Hiroki	Second Secretary

(2) JICA, Nepal Office

Mr. H. Ono	Resident Representative
Mr. M. Sugimoto	
Mr. C. Ogawa	Expert for Sajha Yatayat
Dr. T. Kondo	Team Leader of Experts for Horticultural Development Research & Training Center
Dr. Y. Maruo	Expert for Tribhuvan University

2. SUMMARY OF SIMILAR FACILITIES' SURVEY

As similar facilities, car repair plants in the Kathmandu metropolitan district were surveyed. However, aside from the NTC trolley bus repair plant and the construction equipment repair plant, which are government agencies, all other car repair plants are for repairing mostly small cars, and there are no other plants which can repair large vehicles.

(1) NTC truck repair plant

The plant consists of a cargo warehouse, a garage and a workshop. There is no storage for parts and repair equipment and tools in the workshop are deteriorated and practically unusable.

(2) NTC small-car plant

The plant consists of an administration office, an inspection pit, and a workshop. The workshop can accommodate 4 cars and is mainly for repairing jeeps; however, the equipment and tools in this workshop are also deteriorated and practically unusable.

(3) M.O.R.

This plant consists of an administration office, an inspection pit, a workshop and an operation yard. The workshop is quite large, and the machine room is equipped with a lathe, a boring machine and a welding machine. However, unrepaired bulldozers, and disassembled engines are lying around in the workshop. It is not clear whether this is due to lack of spare parts or lack of skill.

(4) Durga Engineering Auto Works

The plant is well managed and is equipped with equipment necessary for overhauling engines. A crankshaft grinder, a boring machine and a valve seat grinder were operating and it was observed that 6 cylinder engines of 2,000 cc class can be overhauled at this plant. This plant could be used by Sajha for a subcontracting repair work.

(5) Dibya, Toyota, etc.

These plants are for repairing small cars and are not equipped to repair large vehicles.

3. DATA

3.1 Population in Kathmandu Metropolitan

Area and Population
Population distribution by sex for town panchayats, 1971 and 1981.

Town panchayats	Census 1971		Census 1981	
	Both sexes	Female	Both sexes	Female
Ilam	7,299	3,546	9,773	4,650
Bhadrapur	7,499	3,070	9,761	4,472
Damak 2	-	-	25,081	12,159
Biratnagar	45,100	19,075	93,544	42,655
Dharan	20,503	9,508	42,146	20,127
Dhankuta 1	-	-	13,836	6,741
Lahan 1	-	-	13,775	6,472
Rajbiraj	7,832	3,330	16,444	7,299
Janakpur	14,294	6,480	34,840	15,953
Jaleswar 2	-	-	16,000	7,000
Kalैया 2	-	-	14,047	6,092
Birganj	12,999	5,557	43,642	20,648
Hetauda	16,194	7,648	34,792	16,751
Bharatpur 1	-	-	27,602	13,195
Banepa 2	-	-	10,540	5,255
Bhaktapur	40,112	19,278	48,472	23,716
Lalitpur	59,049	28,674	79,875	36,408
Kathmandu	150,402	68,918	235,160	105,634
Pokhara	20,611	10,618	46,642	22,382
Tansen	6,434	3,041	13,125	6,184
Butawal	12,815	5,900	22,583	10,755
Sidarthnagar / Bhairhawa	17,272	7,973	31,119	14,766

Contd.....

Area and Population

Town panchayats	Census 1971		Census 1981	
	Both sexes	Female	Both sexes	Female
Taulihawa 2	-	-	12,112	5,767
Tribhuvannagar 1	-	-	20,608	10,260
Birendranagar 1	-	-	13,859	6,999
Nepalganj	23,523	10,671	34,015	16,008
Dhangadi 1	-	-	27,274	12,287
Dipayal 2	-	-	9,462	4,680
Mahendranagar 1	-	-	43,834	20,123

1. Town panchayat recognized after 1971 census.

2. Town panchayat recognized after 1981 census.

Source :- Population census 1971, 1981 & 2. Four monthly bulletin year 6-1 C.B.S.

3.2 Vehicles Registered in Bagmati Zone

POPULATION OF VEHICLE
REGISTERED IN BAGMATI ZONE

up to July 15/1987

	BUS	TRUCK	CAR	JEEP	TEMPO	MOTOR CYCLE	RICKSHAW	SADA	CRANE	ROAD ROLLER	TRACTOR	TOTAL	REMARKS
GOVERNMENT	112	604	503	1646	43	1024	X	X	6	4	36	4858	
CORPORATION	98	177	663	401	30	495	X	X	7	2	X	1872	
CD	10	5	495	164	16	200	X	X	X	X	X	890	
PRIVATE	596	761	6160	2740	83	14857	X	X	3	0	132	25340	
TAXI	1105	1177	1767	192	910	11	470	352	X	X	334	6318	
TOTAL	1920	2724	9668	5143	1082	17387	470	352	16	14	502	39278	

SOURCE:- BAGMATI ZONAL OFFICE
1988. 3.5

3.3 Length of Roads Classified by Type and Development Region and Extension of Transport Facilities and Goods Transported

Transport and Communication

7.7 Length of roads classified by type and development region, 1977 to 1985
(In Kms)

Type	(a) Black Top								
	1977	1978	1979	1980	1981	1982	1983	1984	1985
<u>Highway</u>									
E.D.R.	288	288	288	298	313	337	337	337	337
C.D.R.	533	548	573	573	609	636	346	647	647
W.D.R.	389	399	424	466	474	495	495	495	495
M.W.D.R.	-	-	-	-	43	78	108	179	164
F.W.D.R.*	21	33	35	54	34	36	40	50	61
<u>Feeder</u>									
E.D.R.	96	102	104	115	134	138	150	160	171
C.D.R.	128	147	149	149	149	175	235	260	288
W.D.R.	50	70	73	83	83	87	87	87	87
M.W.D.R.	-	-	-	-	38	33	34	35	35
F.W.D.R.*	17	17	21	37	-	-	-	-	-
<u>District Road</u>									
E.D.R.	-	-	-	-	-	1	7	7	10
C.D.R.	10	10	10	10	10	16	34	36	37
W.D.R.	15	15	15	15	15	15	16	16	16
M.W.D.R.	-	-	-	-	-	-	-	-	-
F.W.D.R.*	-	-	-	-	-	-	-	-	-
<u>City Road</u>									
E.D.R.	26	30	31	34	35	36	41	52	75
C.D.R.	136	146	147	155	161	162	173	192	207
W.D.R.	31	37	37	43	54	61	61	72	74
M.W.D.R.	-	-	-	-	8	8	12	12	12
F.W.D.R.*	9	9	9	12	7	8	8	8	8
Grand Total	1751	1851	1916	2044	2167	2322	2484	336	2724

Contd

Transport and Communication

(In Kms)

Type	(b) Gravel								
	1977	1978	1979	1980	1981	1982	1983	1984	1985
<u>Highway</u>									
E.D.R.	-	-	7	2	24	-	-	-	-
C.D.R.	107	92	75	65	38	11	1	-	27
W.D.R.	77	67	70	-	25	-	-	-	-
M.W.D.R.	-	-	-	-	89	84	67	16	29
F.W.D.R.*	64	70	144	76	43	41	39	50	39
<u>Feeder</u>									
E.D.R.	63	87	93	99	79	93	107	109	105
C.D.R.	56	77	91	112	159	173	178	160	152
W.D.R.	30	13	15	6	15	10	11	11	11
M.W.D.R.	-	-	-	-	8	30	22	50	50
F.W.D.R.*	28	32	28	12	4	14	17	17	17
<u>District Road</u>									
E.D.R.	11	13	15	15	15	51	97	118	156
C.D.R.	36	36	42	42	42	48	53	57	68
W.D.R.	10	10	10	14	14	17	29	40	51
M.W.D.R.	-	-	-	-	-	-	-	-	-
F.W.D.R.*	-	-	-	-	-	-	-	-	-
<u>City Road</u>									
E.D.R.	23	23	22	24	26	26	41	52	49
C.D.R.	46	61	61	72	85	93	173	192	139
W.D.R.	5	12	12	19	28	18	61	72	16
M.W.D.R.	-	-	-	-	2	3	12	12	2
F.W.D.R.*	-	-	-	6	7	7	8	9	7
Grand Total	556	593	685	564	703	719	2484	2645	918

Contd

Transport and Communication

(In Kms)

Type	(c) Earthen								
	1977	1978	1979	1980	1981	1982	1983	1984	1985
<u>Highway</u>									
E.D.R.	--	20	18	26	--	--	--	--	--
C.D.R.	--	24	24	34	--	--	--	27	--
W.D.R.	--	13	8	31	--	--	--	--	--
M.W.D.R.	--	--	--	--	126	96	83	63	50
F.W.D.R.*	319	335	264	342	137	137	135	116	111
<u>Feeder</u>									
E.D.R.	301	269	261	253	259	266	278	285	294
C.D.R.	251	324	328	355	313	303	216	215	203
W.D.R.	119	138	133	142	100	141	144	171	168
M.W.D.R.	--	--	--	--	108	118	164	137	108
F.W.D.R.*	150	175	201	240	132	151	148	186	186
<u>District Road</u>									
E.D.R.	136	167	165	165	201	185	215	200	217
C.D.R.	227	227	221	223	223	228	220	226	263
W.D.R.	94	94	94	90	90	143	148	144	140
M.W.D.R.	--	--	--	--	225	230	230	230	232
F.W.D.R.*	124	216	224	250	20	20	20	20	34
<u>Urban Road</u>									
E.D.R.	8	18	18	21	21	21	21	35	57
C.D.R.	85	105	105	115	133	125	150	142	136
W.D.R.	15	26	26	37	50	53	51	49	73
M.W.D.R.	--	--	--	--	4	4	1	1	1
F.W.D.R.*	--	--	--	8	9	8	8	10	10
Grand Total	1829	2151	2090	2332	2151	2229	2232	2257	2283

Note: E.D.R. = Eastern Development Region
 C.D.R. = Central Development Region
 W.D.R. = Western Development Region
 M.W.D.R. = Mid-Western Development Region
 F.W.D.R. = Far-Western Development Region

Source: Department of Roads
 * Includes mid-western development region up to 1980

Transport and Communication
7.0 Extension of transport facilities and goods transported, 1976/77 to 1985/86

Item	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86
1. Air Ways										
a. International Route Coverage (km)	9779	143522	188115	230307	196912	195105	231276	24135	28527	31896
b. Internal Route Coverage (km)	21867	35926	41501	39433	37171	36482	39897	3303	3566	3383
c. Passengers in Domestic Flight (No)	184317	205212	239058	227502	214830	193415	215660	227897	253402	239490
d. Passengers in External Flight (No)	120333	131304	161182	172768	161705	160951	162506	153784	174220	196762
e. Cargo in Domestic Flight (Ton)	825	834	855	781	676	750	760	781	820	771
f. Cargo in External Flight (Ton)	913	842	1010	1257	1490	1917	1941	2105	3083	3339
2. Railways										
a. Available Facilities (km)	53	53	53	53	53	53	53	53	53	53
b. Number of Passengers (000)	1129.017	1155.424	1200.389	1260.251	1271.420	1273.578	1144.941	1192.000	1416.564	1500.000
c. Goods Transported (M. Ton)	31039.6	29569.0	23413.6	22928.6	20845.9	22075.12	19813.0	18107.0	16500.0	17000.0
3. Pipeways										
a. Available Facilities (km)	43	43	43	43	43	43	43	43	43	43
b. Goods Transported (M Ton)	18061.794	17516.770	11007.000	8766.014	566.000	105.000	8017.992	11577.125	9009.000	25000.00
4. Roadways										
a. Available Facilities (km)	-	4505	4691	4940	5021	5270	5546	5717	5925	5925

Source: Royal Nepal Airlines Corporation, Nepal Transport Corporation and Department of Roads.

3.4 Meteorological Data at Kathmandu Airport

INDEX NO. : 1030

STATION : KATHMANDU AIRPORT

YEAR : 1984

Month	AIR TEMPERATURE °C					RELATIVE HUMIDITY %			VAPOUR PRESSURE mb.		PRECIPITATION mm.						
	Mean		Absolute extreme		Number of days ≥ 30 (≤ 0)	Observed at		Observed at		Total	Maximum in 24 hrs. & date	Number of rainy days					
	Max.	Min.	Max. date	Min. date		0840	1740	0840	1740			≥ 1.0	10.0	25.0	50.0		
JAN	17.1	1.1	20.8 12	-2.6 27	0	18	96	62	7.0	8.3	14	14 / 17	1	0	1	0	0
FEB	20.7	2.4	24.8 28	-0.2 24	0	4	94	52	8.7	9.2	17	14 / 20	3	2	1	0	0
MAR	26.0	8.3	28.8 18	3.6 20	0	0	81	48	12.3	11.9	14	14 / 27	1	0	1	0	0
APR	28.3	11.2	31.8 21	6.4 9	4	0	66	43	13.3	11.8	60	21 / 27	9	6	3	0	0
MAY	27.5	17.1	31.6 19	11.5 1	8	0	76	68	19.6	20.2	96	19 / 13	12	8	4	0	0
JUN	28.2	20.0 _a	32.0 1	18.2 3 _a	3	0 _a	82	77	23.6	23.4	275	70 / 3	19	12	4	1	2
JUL	28.1	20.3	29.8 17	19.0 19	0	0	85	82	23.7	24.3	250	30 / 9	26	16	9	1	0
AUG	29.2	19.8	31.5 14	13.0 16	7	0	82	79	23.6	24.4	302	77 / 16	18	10	5	2	1
SEP	26.3	17.3	29.0 2	12.6 25	0	0	90	78	20.8	21.2	260	45 / 8	15	5	7	3	0
OCT	27.2	14.4	29.8 2	9.2 31	0	0	88	71	18.2	18.2	18	17 / 15	2	1	1	0	0
NOV	22.6	5.8	25.5 3	3.2 11	0	0	89	64	11.1	11.3	0	0 / 10	0	0	0	0	0
DEC	19.4	3.4 _a	22.3 2	-1.9 26 _a	0	3 _a	93	67	8.8	9.8	7	7 / 14	1	1	0	0	0
YEAR	25.1	11.7	32.0 JUN	-2.6 JAN	22	25	85	66	15.9	16.2	1313	77 / AUG	107	61	36	7	3

Missing number of days :

a = 1:

3.5 Financial Accounts of Sajha Yatayat in These 5-years

SHREE
SAJHA YATAYAT

Description	2037/038 1981/82	2038/039 1982/83	2039/040 1983/84	2040/041 1984/85	2041/042 1985/86	2042/043 1986/87
1. Diesel & Lub.	19,01,054/-	46,13,993/-	49,93,560/-	50,90,939/-	74,05,662/-	00,40,000/-
2. Spare & Repair	6,73,461/-	9,43,094/-	11,76,492/-	17,40,706/-	21,79,910/-	32,72,000/-
3. New & Repair Tyres	2,30,931/-	5,64,269/-	6,70,990/-	11,40,467/-	15,07,041/-	13,93,000/-
4. Salaries & allowances.	6,52,559/-	17,17,096/-	19,50,363/-	24,71,416/-	34,20,179/-	35,94,000/-
5. Taxes & trip allowances.	98,947/-	1,30,229/-	3,95,967/-	5,09,178/-	6,88,498/-	6,40,000/-
6. Telephone, Elect, water etc.	20,765/-	92,491/-	1,02,914/-	1,26,797/-	1,48,546/-	1,83,000/-
7. Printing & Stationery.	80,235/-	1,92,091/-	2,00,700/-	2,10,202/-	2,34,500/-	2,25,000/-
8. Insurance.	53,027/-	1,02,377/-	1,63,069/-	1,90,442/-	2,34,754/-	2,31,000/-
9. Auditor's Fee.	6,000/-	9,000/-	12,000/-	12,000/-	12,000/-	15,000/-
Total operating Expenses.	36,39,437/-	86,93,776/-	99,18,924/-	1,20,16,010/-	1,62,13,030/-	1,80,67,000/-
Total operating Revenue.	44,35,481/-	1,09,06,741/-	1,35,43,154/-	1,54,51,655/-	1,81,02,271/-	1,96,03,000/-
Gross Profit -----	5,96,044/-	22,94,965/-	36,24,230/-	26,35,637/-	19,19,193/-	15,36,000/-
Financial Cost						
Interest On Capital	64,039/-	2,71,660/-	2,71,660/-	2,71,660/-	2,71,660/-	2,71,660/-
Depreciation	8,00,450/-	27,00,405/-	27,04,654/-	28,02,007/-	30,66,026/-	30,50,000/-
Net Loss/ Profit -----	9,44,409/-	29,72,105/-	29,76,314/-	31,54,667/-	33,37,686/-	33,21,660/-
Net Loss/ Profit -----	-3,40,445/-	-6,77,140/-	6,47,916/-	-5110,930/-	-14,18,493/-	-17,05,660/-

3.6 Long-distance Services of Sajha Yatayat

SAJHA YATAYAT
(1987 JUL ~ 1987 DEC)
LONG ROUTE SERVICE

ROUTE	OPERATION MONTHS	BUS NUMBER	TOTAL		
			REVENUE	COST	NET PROFIT / LOSS
BIRGUNJ (DAY)	6 MONTHS	4	1,428,391.41	978,025.55	450,365.86
TRISHULEE (DAY)	"	2	585,383.70	511,214.91	74,168.79
JANAKPUR (DAY)	4 MONTHS	2	703,449.60	543,123.44	160,326.16
POKHARA (DAY)	6 MONTHS	3	713,003.30	570,726.06	142,277.24
BHAIRHAWA (DAY)	"	2	865,692.70	794,052.07	71,640.63
BHAIRHAWA (NIGHT)	"	3	773,822.85	866,044.40	92,221.55
TOTAL		16	5,069,743.56	4,263,186.43	806,557.13

3.7 List of Water Sources

(A) Surface water

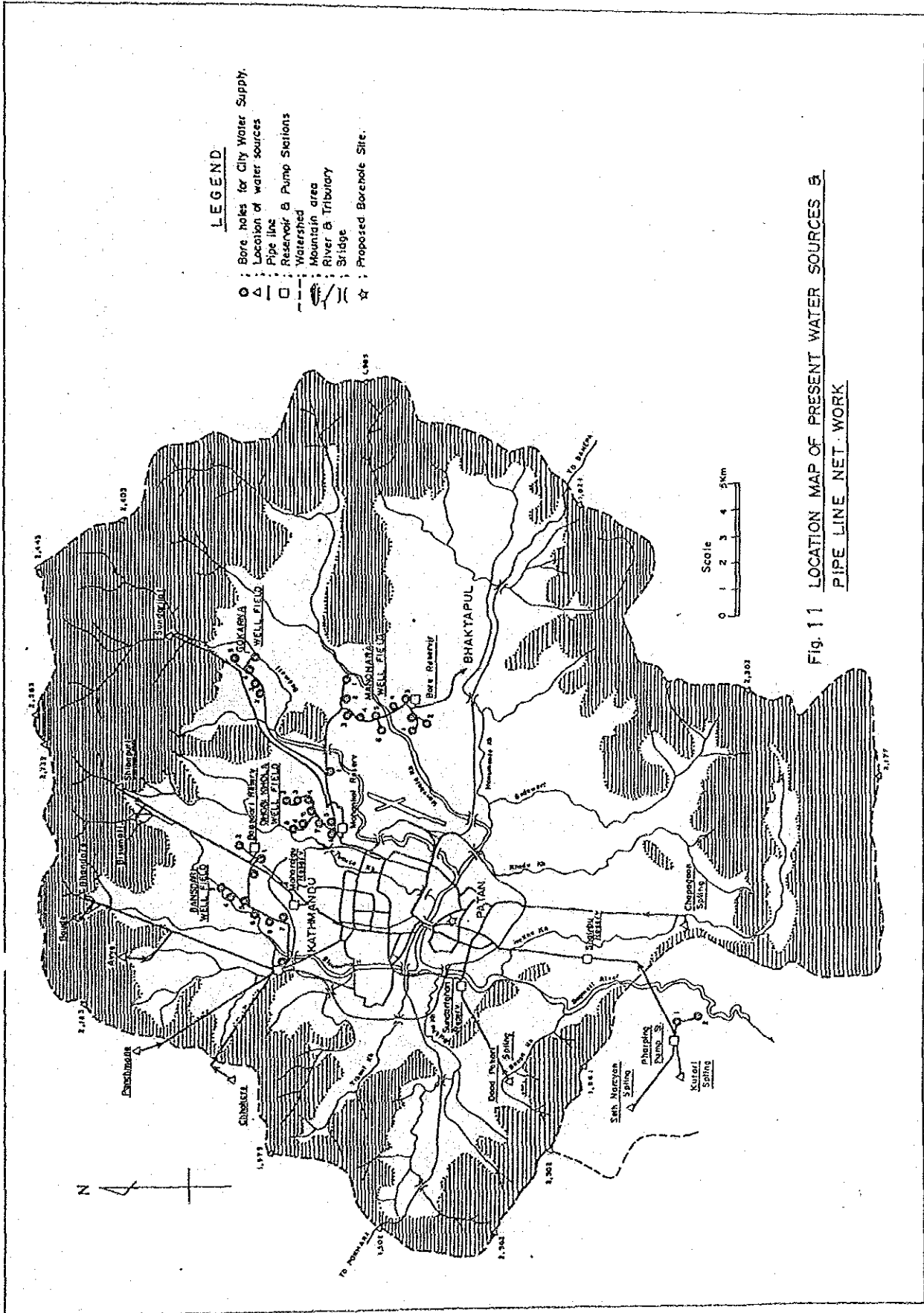
	<u>Yield m³/day</u>
1. Pharping	15,000
2. Sundarijal	21,600
3. Tribhimdhara + Mahadev Khola	4,600
4. Dhood Pokhaari	1,200
5. Shivapuri & Bishnumati	3,200
6. Sundarighat	1,100
7. Moledole	1,700
8. Lokkot	500
<hr/>	
Total	48,900

(B) Ground water

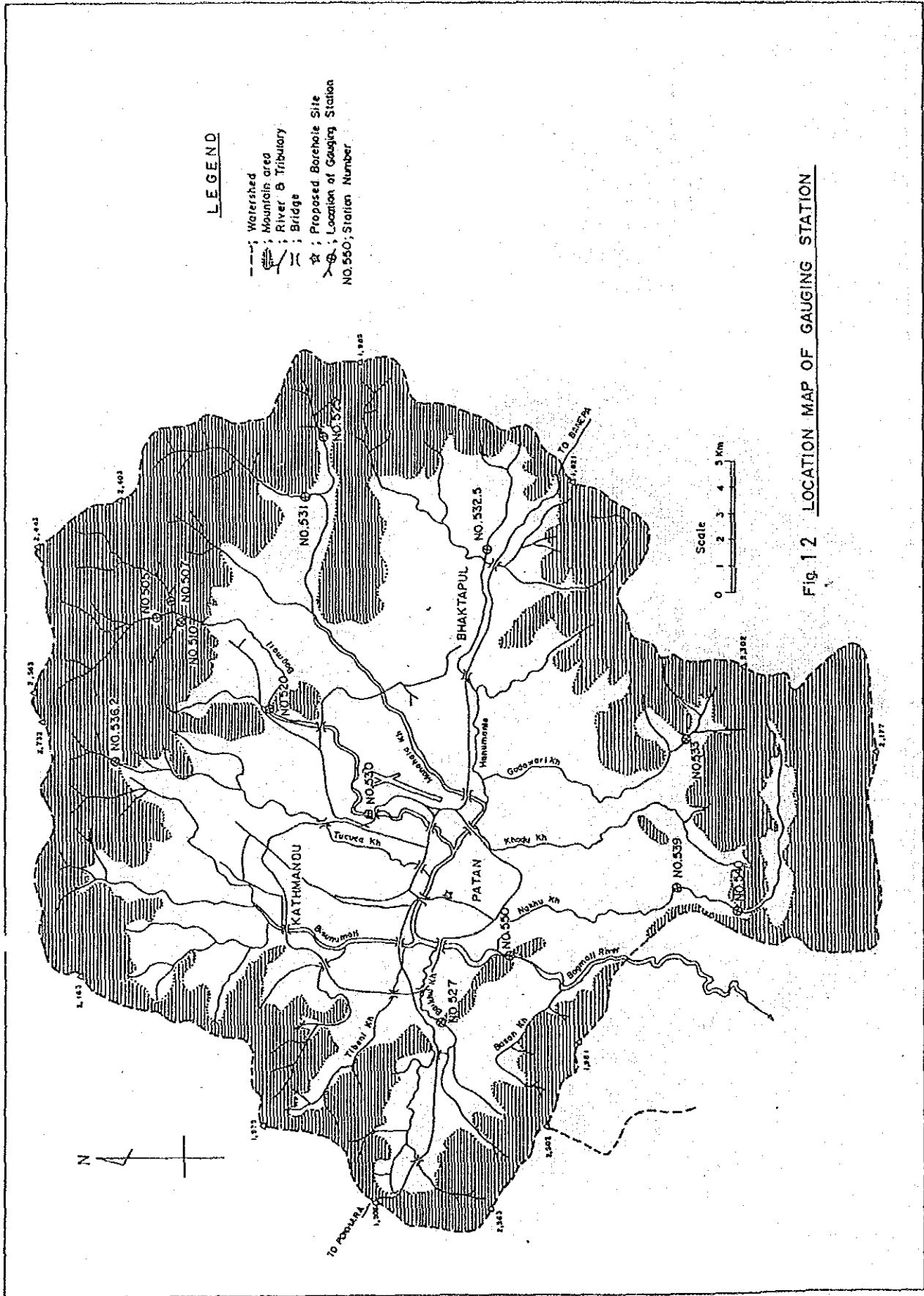
	<u>Yield m³/day</u>
1. Pharping Well No.2	2,904
2. Bansbari Dhapasi	1,584
3. Bansbari Well No.2	1,717
4. Bansbari Gongabun Well No.3	2,376
5. Bansbari Gongabun Well No.4	3,168
6. Bansbari Gongabun Well No.7	3,168
7. Bansbari Gongabun Well No.8	2,904
8. Gokarna Well No.2	2,640
9. Gokarna Well No.3	2,772
10. Gokarna Well No.4	1,848
11. Dhobikhola Well No.1	396
12. Dhobikhola Well No.3	1,848
13. Dhobikhola Well No.4	1,320
14. Dhobikhola Well No.5	1,650
15. Dhobikhola Well No.6	1,320
<hr/>	
Total	31,615

Grand Total 48,900 + 31,615 = 80,515 m³/day

3.8 Location Map of Present Water Sources and Pipeline Network



3.9 Location Map of Gauging Station



3.10 Location Map of Existing Boreholes

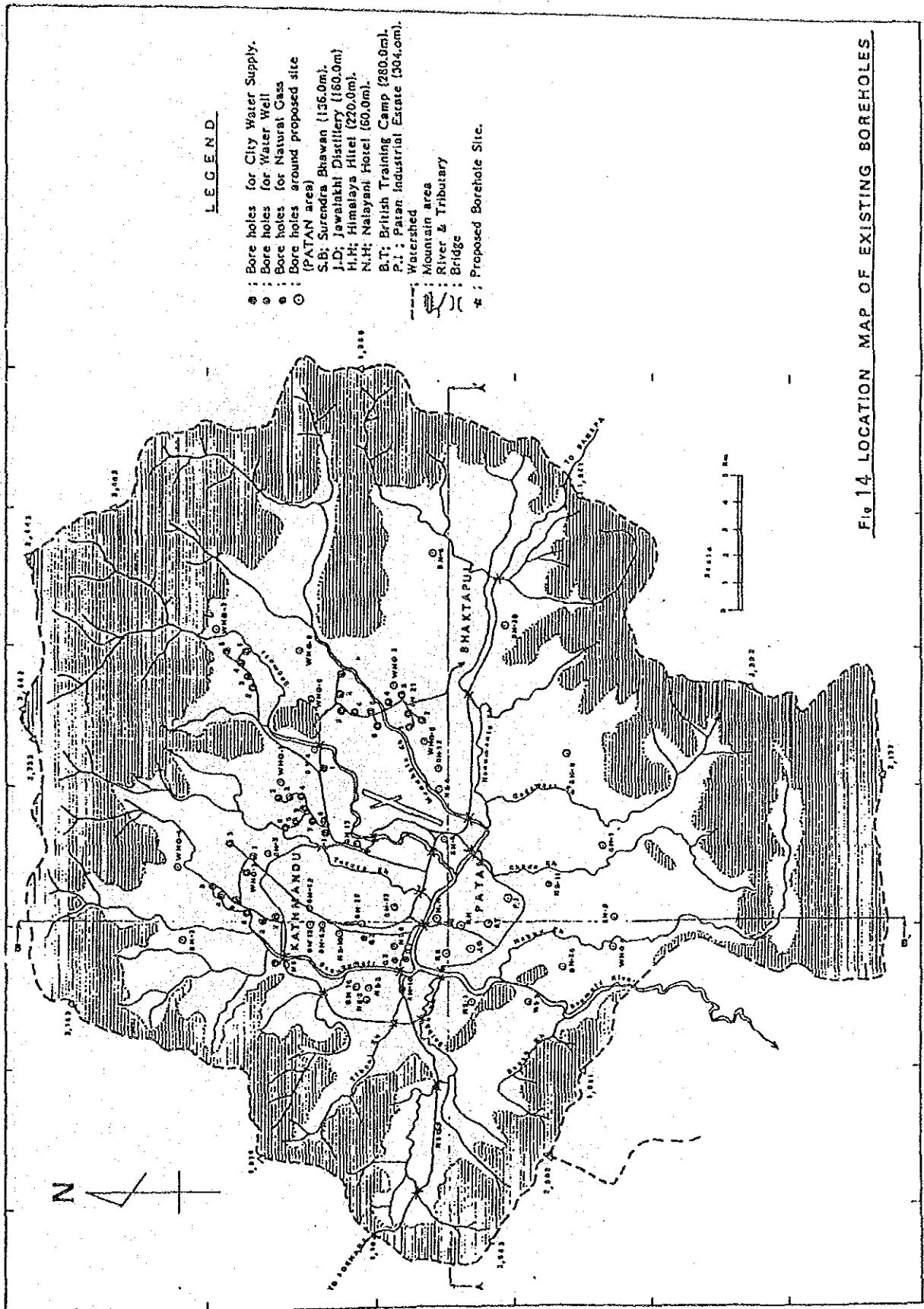


Fig 14 LOCATION MAP OF EXISTING BOREHOLES

3.11 Geological Map of Kathmandu Valley

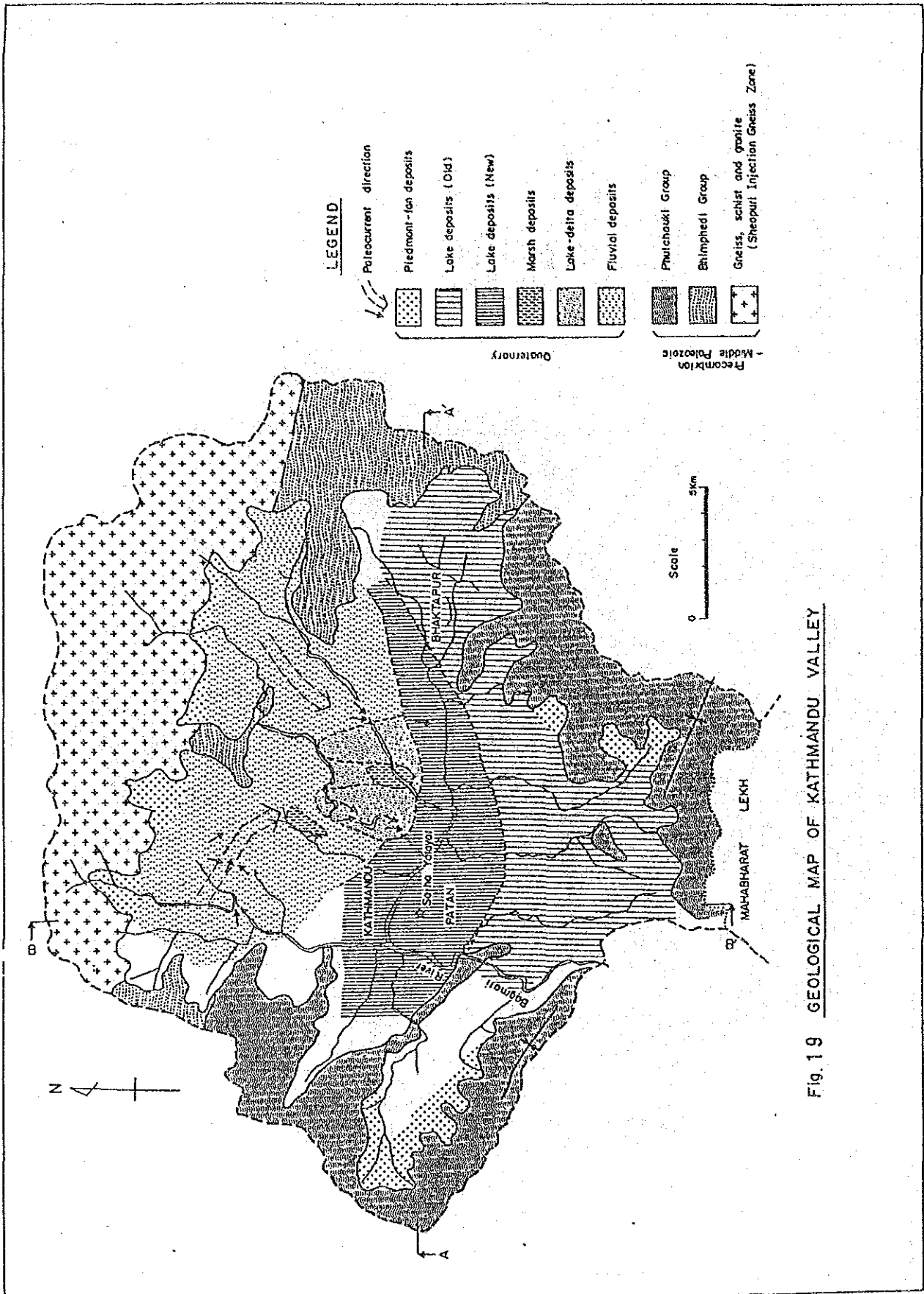
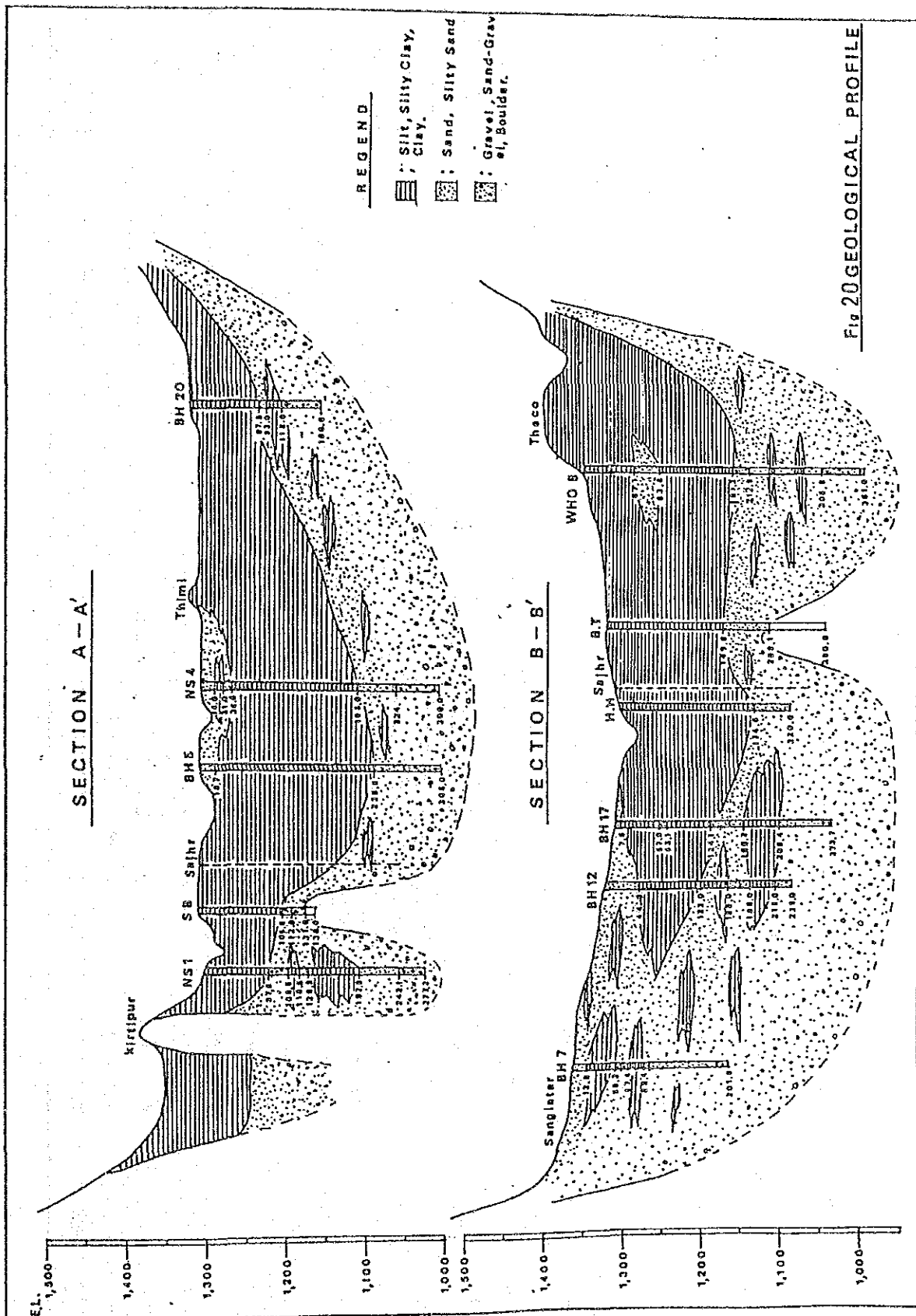


Fig. 19 GEOLOGICAL MAP OF KATHMANDU VALLEY

3.12 Geological Profile of Kathmandu Valley



3.13 Water Quality Test Results of Ground Water and Surface Water in Patan Area

N.S = Not Specified

Item (Symbol)	Himalaya Hotel	Jawalakhal Distillery	British Training Camp	Surenda Bawan	Patan Industrial Estate	City Water	Kathmandu City Water	Water Quality Specification	
								Hot Water Boiler	Drinking Water
pH	6.8	6.3	7.6			6.0	7.1	6.5 - 8.6	7.0 - 8.5
Turbidity (degree)	6.4	60.0	-			-	0.5	2.0	5.0 - 25.0
Chromaticity (degree)	44.8	150.0	10.0			5.0	-	-	5.0 - 50.0
Vaporized Residue (TDS) mg/l	-	370.0	530.0			-	138.0	-	500 - 1,500
Hardness (CaCO ₃) mg/l	180.0	150.0	297.0			67.3	160.0	30 - 150	100 - 500
Chlorine (Cl) mg/l	12.0	17.0	15.4			5.8	8.0	20	200 - 600
Sulfuric acid (SO ₄) mg/l	36.5	8.0	-			-	5.0	20	200 - 400
Iron (Fe) mg/l	0.7	5.0	5.2			0.6	-	0.3	0.1 - 1.0
Manganese (Mn) mg/l	0.6	2.0	0.05			0.03	-	0.3	0.05 - 0.5
Magnesium (Mg) mg/l	-	90.0	9.6			9.4	11.0	-	50
Zinc (Zn) mg/l	96.9	-	130.0			0.7	-	Not detected	Not detected
Lead (Pb) mg/l	-	0.1	-			-	-	0.05	0.05 - 1.5
Cadmium (Cd) mg/l	-	-	-			-	-	0.5	5.0
Silica (SiO ₂) mg/l	-	-	-			-	-	-	0.1
Copper (Cu) mg/l	-	-	-			-	-	-	0.01
Ammonia (An) mg/l	83.2	-	10.0			80.0	-	30	250
Potassium (Ca) mg/l	-	60.0	103.1			11.4	46.0	-	N.S
Electric conductivity (Ec)	1,180	666	-			-	222	-	N.S

3.14 Water Quality After Treated by Aeration and Sand Filter

N.S = Not Specified

Tested Item (Symbol)	Himalaya Hotel		Jawalakhel Distillery		Hot Water Boiler Water Quality Standard	WHO Water Quality Standard
	Before Treatment (Raw Water)	After Treatment	Before Treatment (Raw Water)	After Treatment		
	pH	6.8	7.0	6.5		
Turbidity (degree)	6.4	5.1	28.0	12.0	2.0	5.0 - 25.0
Chromaticity (degree)	44.8	45.4	-	-	N.S	5.0 - 50.0
Vaporized Residue (TDS) mg/l	-	-	306.0	250.0	N.S	500 - 1,500
Hardness (CaCO ₃) mg/l	180.0	180.0	170.0	88.0	30 - 150	100 - 500
Chlorine (Cl) mg/l	12.0	12.0	7.0	5.0	20	200 - 600
Sulfuric acid (SO ₄) mg/l	36.5	31.0	-	-	20	200 - 400
Iron (Fe) mg/l	0.7	0.48	1.5	2.4	0.3	0.1 - 1.0
Manganese (Mn) mg/l	0.5	0.5	-	-	0.3	0.05 - 0.5
Magnesium (Mg) mg/l	-	-	19.0	8.0	-	50.0
Zinc (Zn) mg/l	-	-	-	-	0.5	5.0
Lead (Pb) mg/l	-	-	-	-	N.S	0.1
Cadmium (Cd) mg/l	-	-	-	-	N.S	0.01
Silica (SiO ₂) mg/l	83.2	83.5	-	-	30	250.0
Copper (Cu) mg/l	-	-	-	-	0.05	0.05 - 1.5
Ammonia (Am) mg/l	96.9	79.8	-	-	Not detected	Not detected
Potassium (Ca) mg/l	-	-	37.0	22.0	N.S	N.S
Electric conductivity (Ec)	1,180	1,140	666	532	N.S	N.S

Notes: The fineness of sand of sand filter in Himalaya Hotel is a problem.
The iron content test result of test conducted at Jawalakhel Distillery is questionable.

3.15 List of Other Data

(1) General

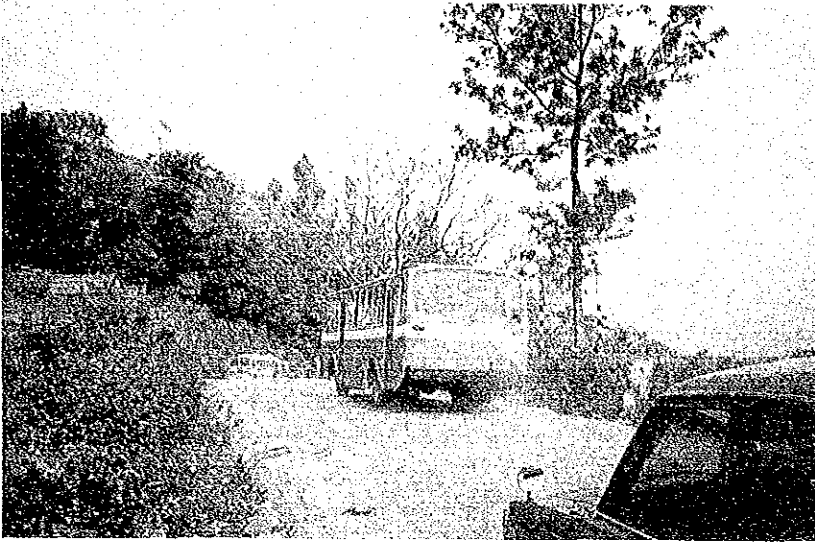
- . Statistic Years of Nepal, 1987
- . Nepal in Figures, 1985
- . Climatological Records of Nepal, 1976-1984
(Supplemental data)
- . Population Monograph of Nepal, 1987
- . Maps
 - (i) Kathmandu Valley
 - (ii) Kathmandu City
 - (iii) Patan (Lalitpur) City

(2) Water supply

- . "Master plan for the water supply and sewerage of Greater Kathmandu and Bhaktapur, vol.IIc" WHO, UNDP 1973
- . "Surface water records of Nepal, Supplement No.11, 1976" Ministry of Water Resources, 1984
- . "Study of future water supply for Kathmandu/Lalitpur, surface water sources outside the valley, Inception report" UNDP 1987
- . "Soil map of Kathmandu valley" Ministry of Land Reform 1987
- . "Land Utilization map" Ministry of Land Reform 1984
- . "Irrigation project maps" Ministry of Land Reform.
"Key plan of Kathmandu valley distribution system"
Water Supply and Sewerage Board
- . "Geological map of Central Development Region"
Ministry of Land Reform 1984

- . "Geology of Nepal" The Land Resource Mapping Project 1984
- . "Kathmandu Metropolitan Area Maps" UNDP
- . "Kathmandu Valley and West No.1 District" Government of India
- . "Wells and pumping mains and Trunk distribution mains as built" Water Supply & Sewerage Board

3.16 Photographs

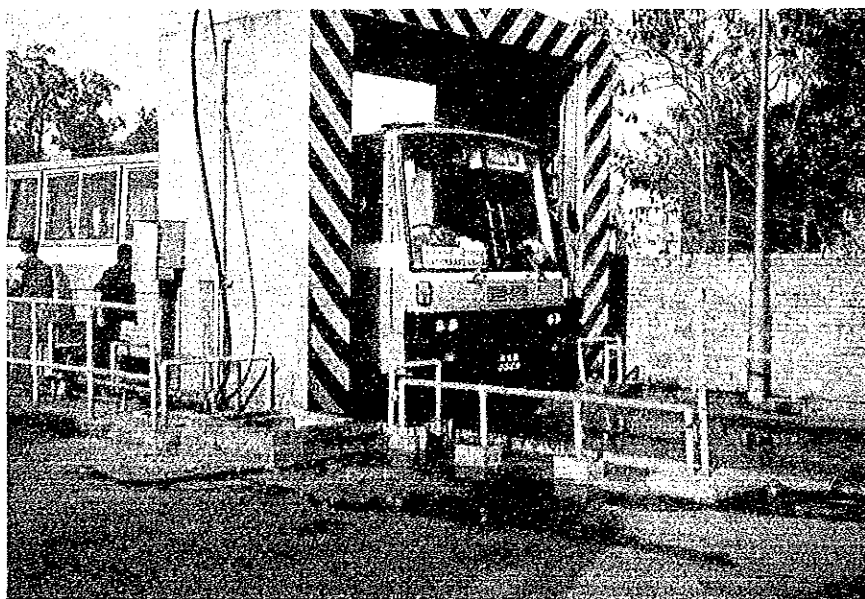
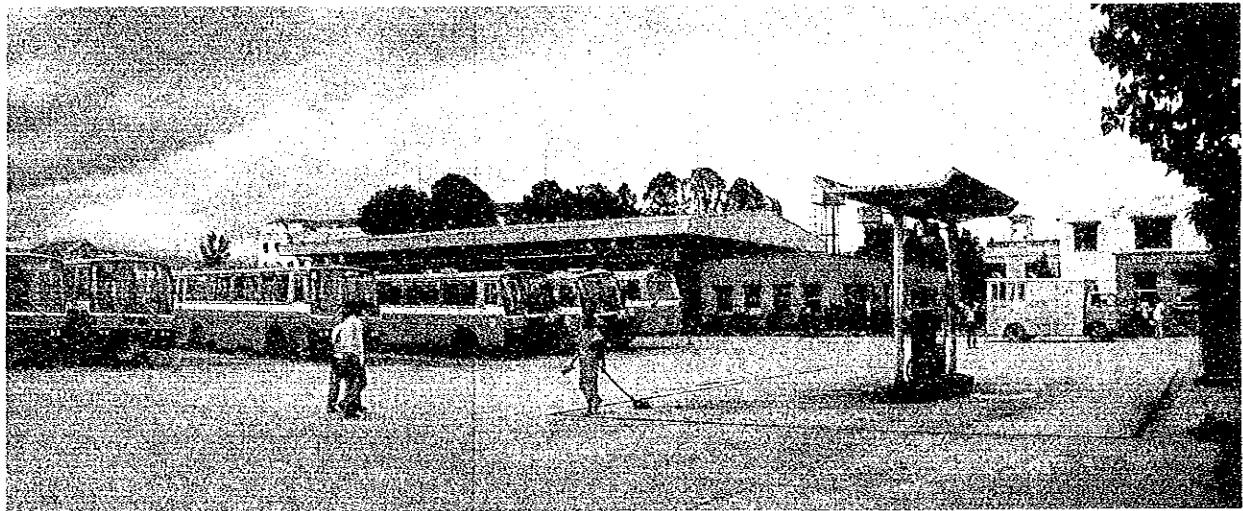
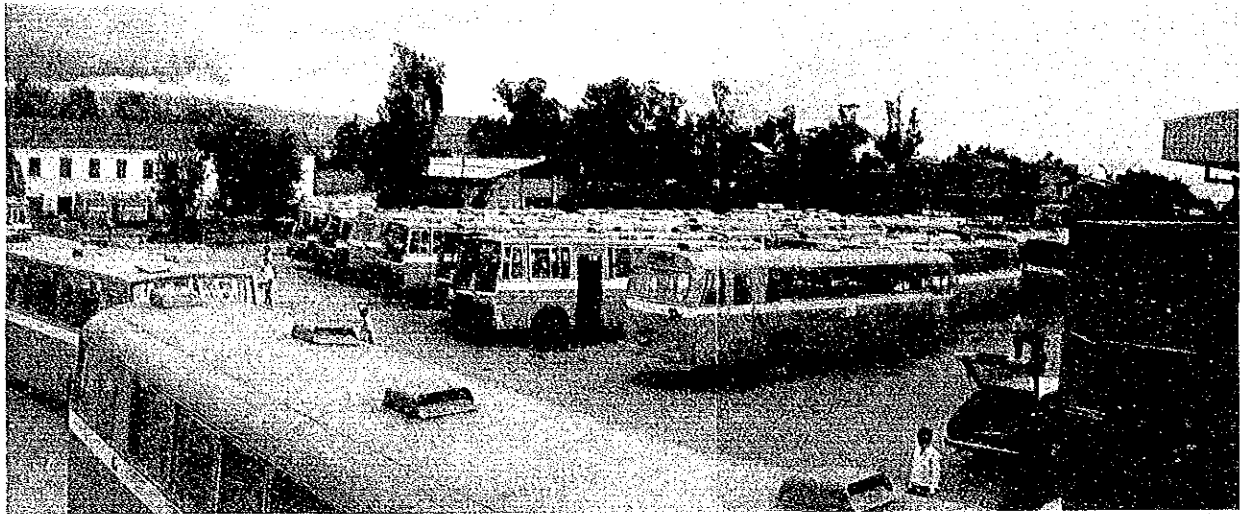


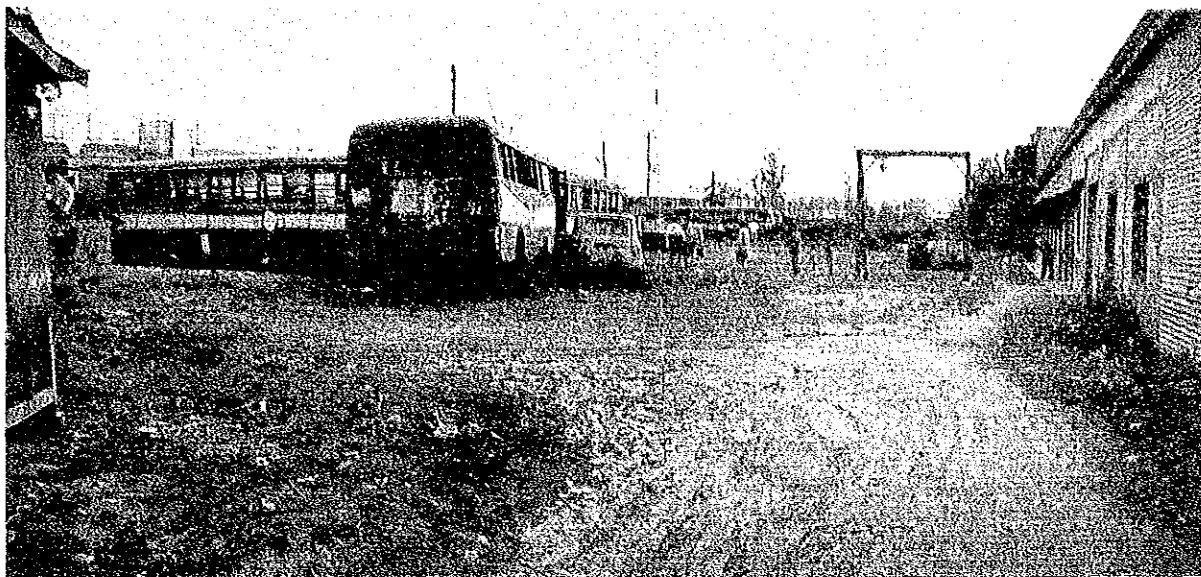
Long route bus going uphill



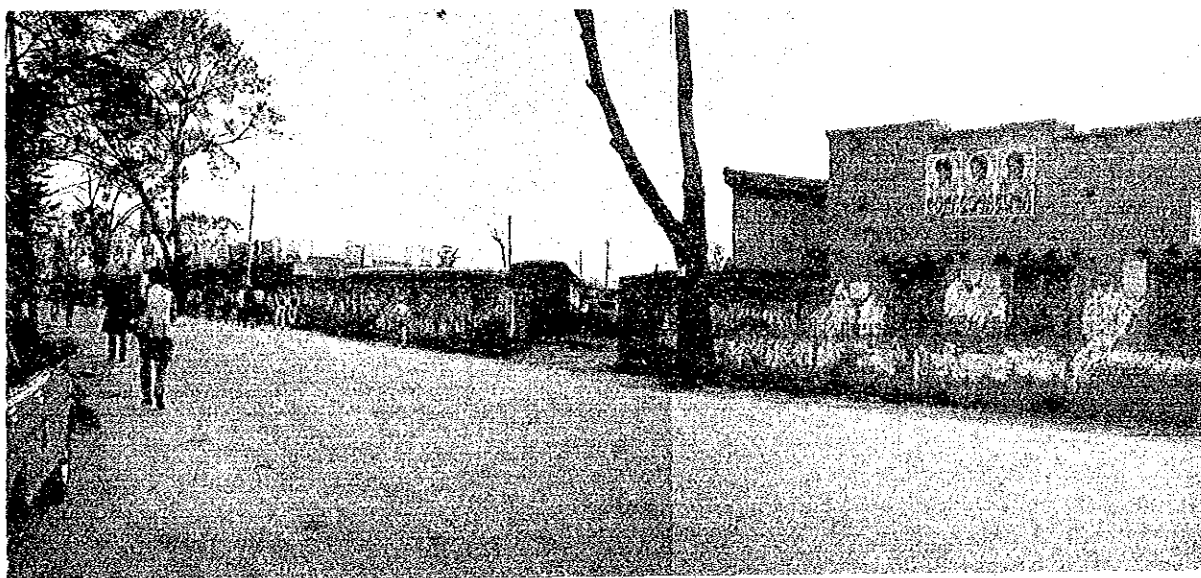
City route bus





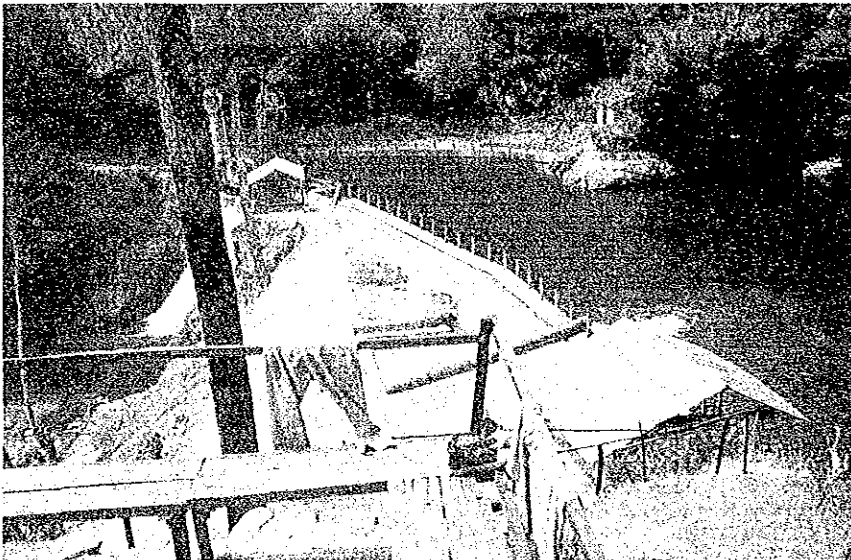


Lagankhel site

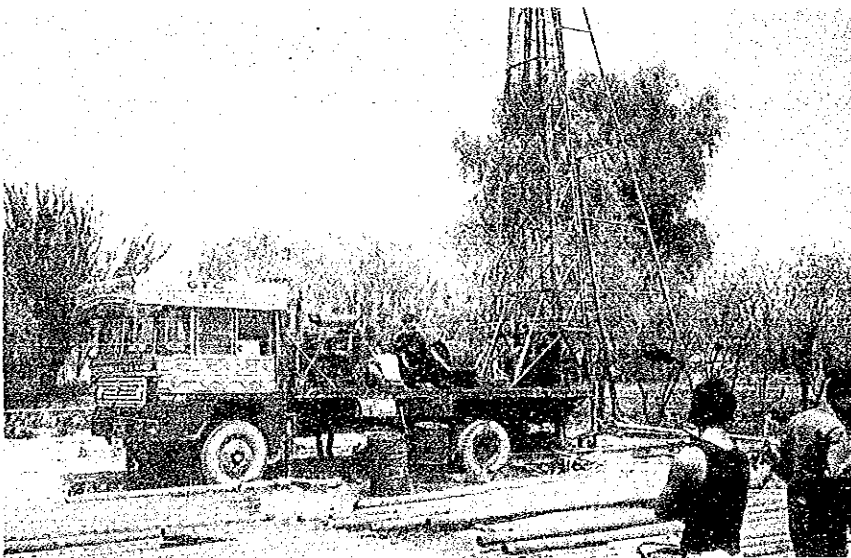




Leakage of the main pipe
line of city water



A water source
(Sundarijal)



Boreholing site

JICA