

Japan International Cooperation Agency (JICA)

No. 1

General Corporation for Roads & Bridges (GCRB)
Ministry of Construction, the Republic of Yemen

**BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR THE ESTABLISHMENT OF THE
WORKSHOP FOR ROAD CONSTRUCTION MACHINERY
IN
THE REPUBLIC OF YEMEN**

SEPTEMBER, 1992

YACHIYO ENGINEERING CO., LTD.

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BASIC DESIGN STUDY REPORT ON THE PROJECT FOR THE WORKSHOP
FOR ROAD CONSTRUCTION MACHINERY IN THE REPUBLIC OF YEMEN

SEPTEMBER, 1992

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PREFACE

In response to a request from the Government of the Republic of Yemen, the Government of Japan decided to conduct a basic design study on the Project for the Establishment of the Workshop for Road Construction Machinery and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Yemen a study team headed by Mr. Ryo Yamana, Honshu-Shikoku Bridge Authority and constituted by members of Yachiyo Engineering Co., Ltd., from April 9th to May 9th, 1992.

The team held discussions with the officials concerned of the Government of Yemen, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Yemen in order to discuss a draft report and the present report was prepared.

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

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Yemen for their close cooperation extended to the teams.

September, 1992



Kensuke Yanagiya

President

Japan International Cooperation Agency

September, 1992

Mr. Kensuke Yanagiya,
President
Japan International Cooperation Agency
Tokyo, Japan

Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for the Establishment of the Workshop for Road Construction Machinery in the Republic of Yemen.

This study has been made by Yachiyo Engineering Co., Ltd., based on a contract with JICA, from March 31 to September 30, 1992. Throughout the study, we have taken into full consideration of the present situation in Yemen, and have planned the most appropriate project in the scheme of Japan's grant aid.

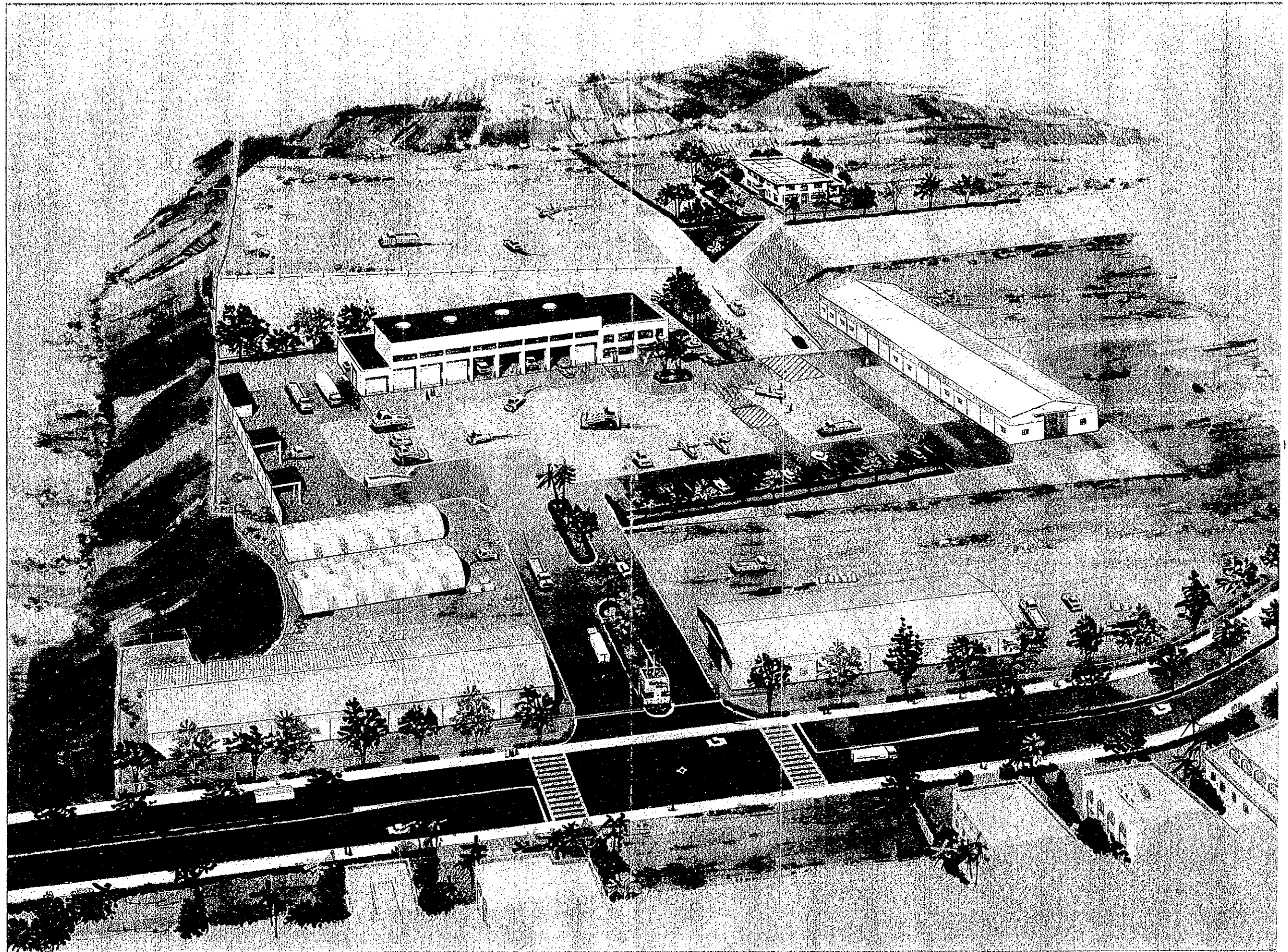
We wish to take this opportunity to express our sincere gratitude to the officials concerned of JICA, the Ministry of Foreign Affairs, Ministry of Construction and Embassy of Yemen in Japan. We also wish to express our deep gratitude to the officials concerned of General Corporation for Roads and Bridges, Embassy of Japan in Yemen for their close cooperation and assistance during our study.

At last, we hope that this report will be effectively used for the promotion of the project.

Very truly yours,



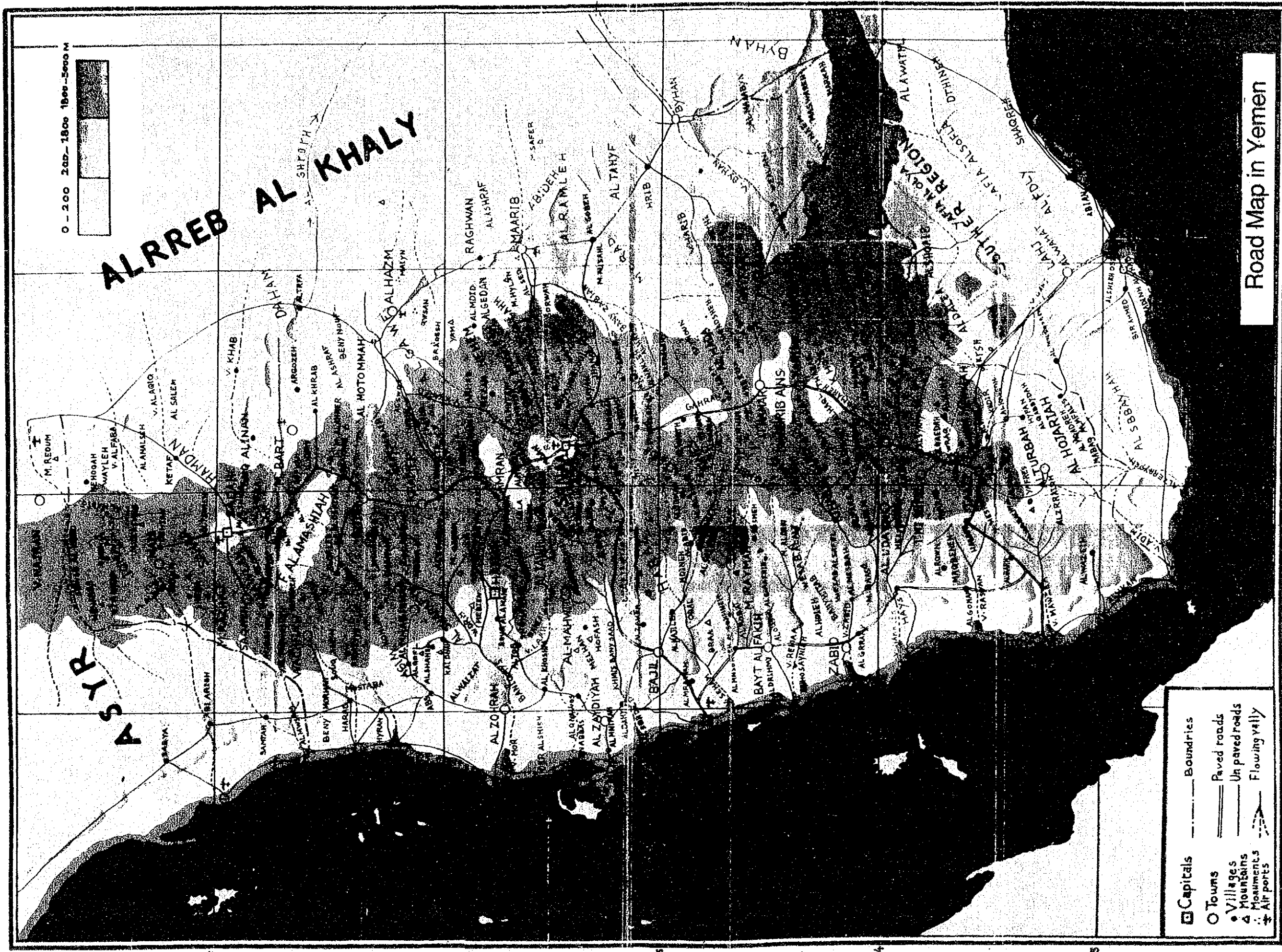
Project manager, Hisashi Kurokouchi
Basic design study team on the Project for
the Establishment of the Workshop for Road
Construction Machinery
Yachiyo Engineering Co., Ltd.



مشروع إنشاء ورشة لاصلاح وصيانة معدات
انشاء الطرق في الجمهورية اليمنية

THE PROJECT FOR THE ESTABLISHMENT OF THE WORKSHOP FOR
ROAD CONSTRUCTION MACHINERY IN THE REPUBLIC OF YEMEN

THE YEMEN



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- Towns
- Villages
- ▲ Mountains
- ✈ Air ports
- Boundries
- == Paved roads
- Un paved roads
- ~ Flowing vally

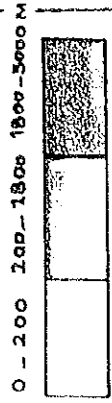
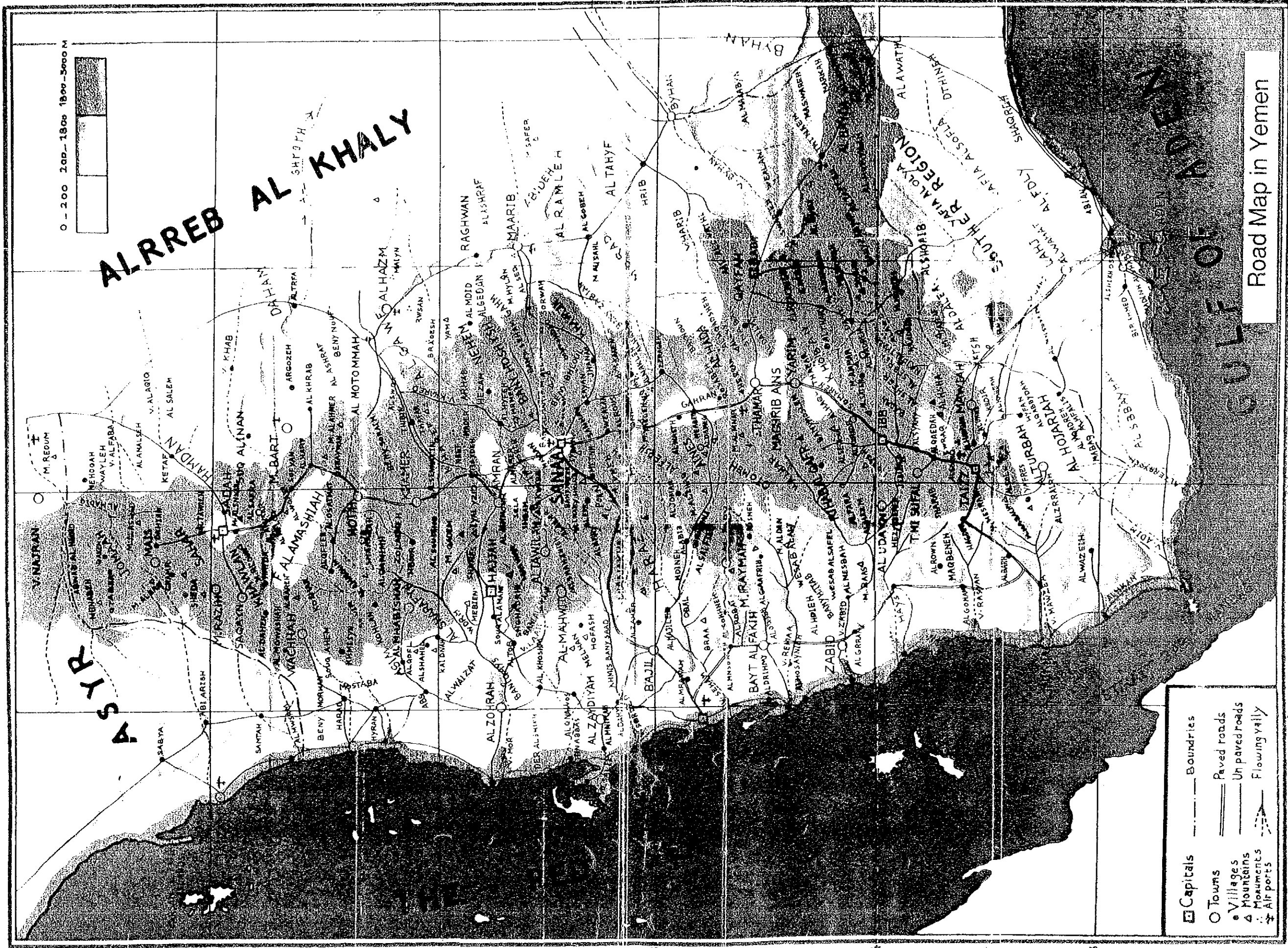
Road Map in Yemen

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THE YEMEN

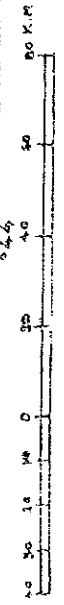


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Road Map in Yemen

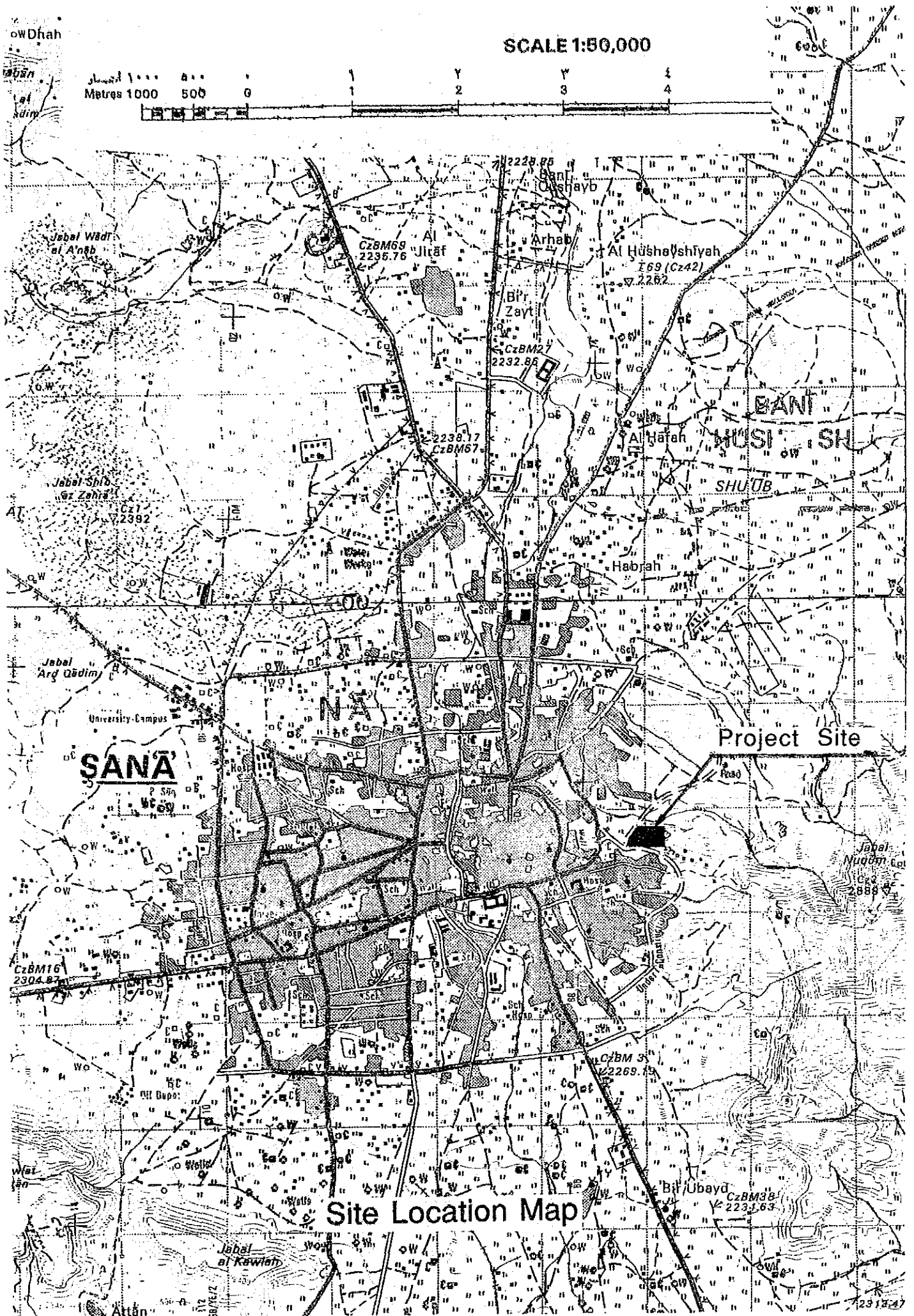
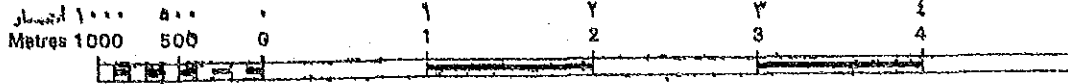
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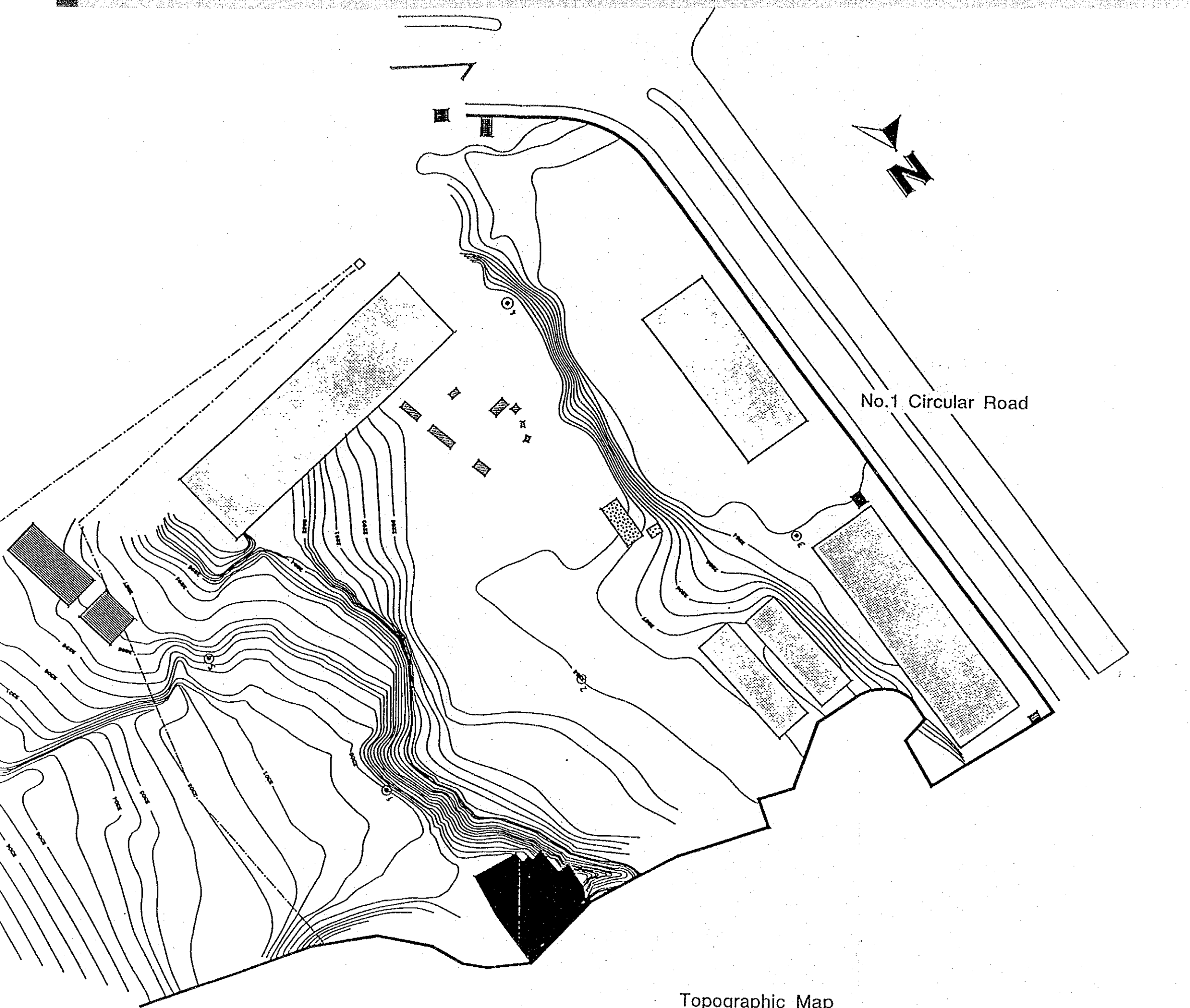
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Site Location Map

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No.1 Circular Road

Topographic Map

- LEGEND
- TRANSFORMER
 - POWER LINE
 - BOARDER LINE
 - ⊙ BENCH MARK
 - ▤ EXISTING HANGARS
 - ▥ BUILDING FOUNDATIONS
 - ▧ GUARD ROOM
 - ▨ MACHINERY
 - ▩ ZINK SHADE
 - EXISTING HOUSES

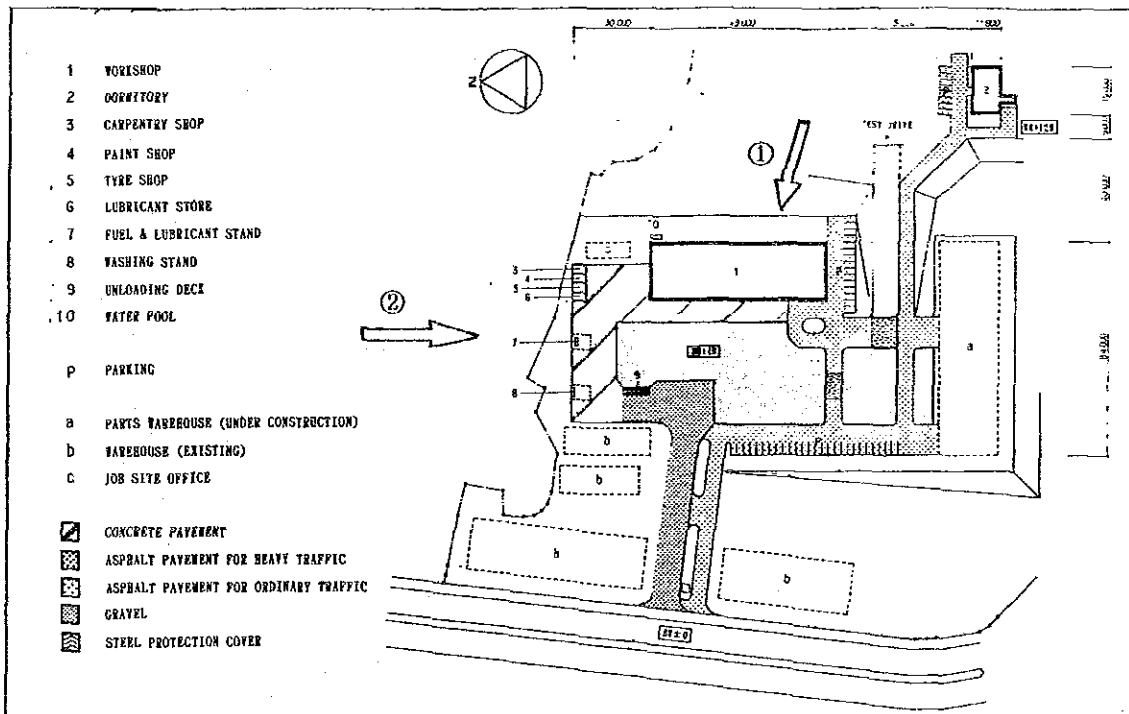
TOPOGRAPHIC MAP		
BASIC STUDY TEAM OF JICA		
G.C.R.B. WORKSHOP IN SANA'A-YEMEN		SHEET NO.
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MAY 1992	NASHER ENGINEERING OFFICE	1:500

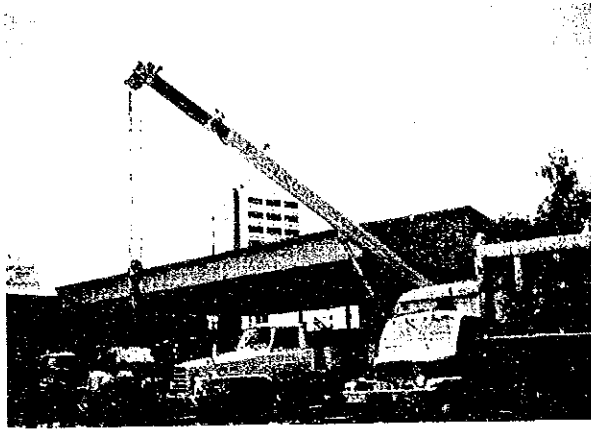


Project Site (1)



Project Site (2)





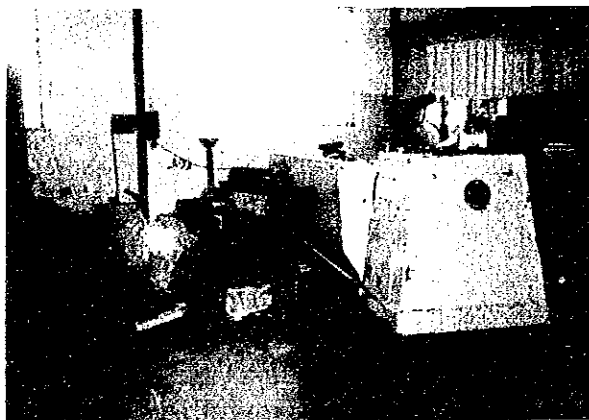
Garage at Existing Workshop
in Sana'a



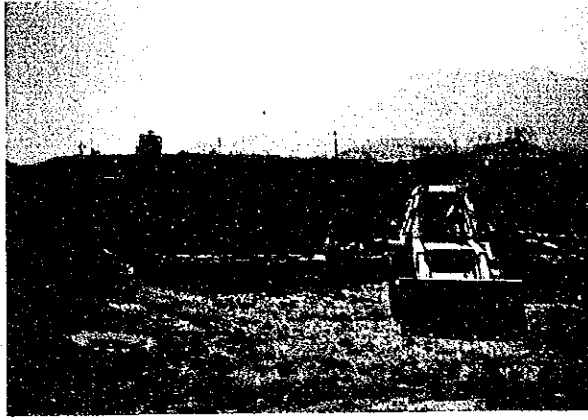
Repairing Shop at Existing
Workshop in Sana'a



Repair Equipment more than
twenty years ago



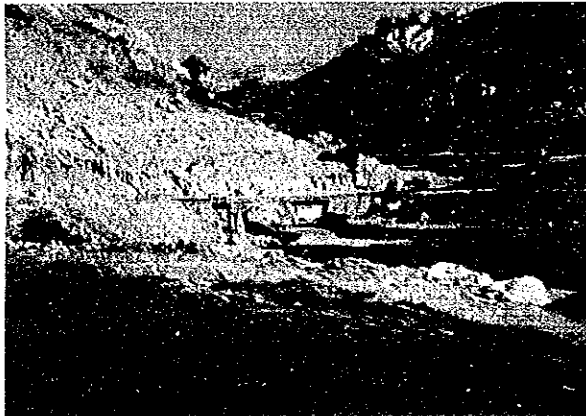
Welding operation



Test pit being excavated by to
Excavator



Bulldozer at work



Road going through mountain
ranges



Road between Hodeidah and
Sana'a

SUMMARY

SUMMARY

Roads play a central role in the transportation of both people and goods in the Republic of Yemen (hereinafter referred to as Yemen) as the country is still not served by railways. Recognising the importance of the road network as an important component of the infrastructure supporting all types of economic activities, the Government of Yemen has been very active in road improvement work and its even stronger commitment to the further consolidation of the country's road network has been felt ever since the unification of North Yemen and South Yemen.

As of 1989, the total length of roads under national management in Yemen is 6,585.5km, of which paved roads total 4,475km and gravel roads total 2,110km, while the total length of local roads is approximately 40,000km. Although the road network has been rapidly expanding in a relatively short period of time with an improved paved road ratio, the current figures for both national and local roads are still unsatisfactory.

The main body responsible for the construction/improvement of roads in Yemen is the General Corporation for Roads and Bridges (GCRB) of the Ministry of Construction which has its main office in Sana'a and branches in Hodeidah, Aden, Taiz and Ibb. The GCRB employs some 3,800 people and owns some 1,600 pieces of construction machinery and vehicles which are distributed throughout the country for road construction purposes.

Of these 1,600 pieces of construction machinery and vehicles, however, some 40 percent have either mechanical problems or are out of order because of deterioration. The main causes for the poor state of machinery include inadequate repair skills at the existing four workshops, inappropriate operation, poor maintenance and the inadequate provision/absence of repair facilities and equipment. While a training centre located in Taiz produces some 80 technicians/year to maintain and service construction machinery, the centre's inadequate training facilities and equipment fail to fully meet the need to train capable technicians.

Against this background, the Government of Yemen has prepared a plan to construct a workshop to provide maintenance and repair services for road construction machinery and to establish a new institute to train construction machinery maintenance/repair technicians and operators in order to solve the problems described above, to efficiently proceed with the construction of both national and local roads and to develop the human resources required to work in these fields. Moreover, the Government of Yemen plans to use the same workshop and training institute to maintain/repair agricultural machinery and to train relevant technicians as part of the government's agriculture modernisation efforts. The Government of Yemen has, therefore, requested the Government of Japan's provision of grant aid cooperation for the

construction of the planned facilities, including the provision of related materials and equipment.

In response to this request, the Government of Japan decided to conduct the Preliminary Study and, commissioned by the Government of Japan, JICA sent the Preliminary Study Team to Yemen for the period between November 8th and November 27th, 1991 to establish the background and contents of the request while explaining the mechanism of Japan's grant aid cooperation system to the Yemeni side. During this preliminary study stage, it was agreed that the part of the Project relating to agricultural machinery would be dropped in view of the unclear project implementation system on the Yemeni side.

Based on the findings of the Preliminary Study and commissioned by the Government of Japan, JICA sent the Basic Design Study Team to Yemen for the period between April 9th and May 9th, 1992.

The Basic Design Study Team held a series of consultations with Yemeni officials, confirmed the project background, contents of the request and the operation and maintenance plan for the requested workshop, etc., conducted a survey on the project site and project-related facilities and gathered relevant data and information. On its return to Japan, the Study Team conducted the necessary domestic work and prepared the optimal basic plan based on the survey and consultation results.

JICA then sent the Draft Final Report Explanatory Mission to Yemen for the period between July 18th and July 28th, 1992 to discuss and explain the contents of the Draft Final Report for the Basic Design Study to finalise the Report.

The field survey findings of the Basic Design Study Team are outlined below.

The Road Improvement Master Plan for 1987-1996 was prepared by a Lebanon's consultant for the GCRB in 1989. This Master Plan has separate targets for the construction of new roads, the paving of existing gravel roads, the construction of new gravel roads, the widening of existing roads, the upgrading of 2 lane roads and the repair of paved roads. The GCRB intends to invest some 8.2 billion YR (approximately 89 billion yen) in the 10 year period.

Prior to the field survey in Yemen, some members of the Basic Design Study Team visited the International Bank for Reconstruction and Development (IBRD: the key institution of the World Bank Group often simply described as the World Bank), which is currently providing assistance for road construction and improvement in Yemen, in Washington DC and confirmed the present state of progress of projects assisted by the IBRD. The principal aid policies of the IBRD for road construction and improvement in Yemen are summarised below.

- 1) There will be no loans for new roads except the Harad-Huth Road, the construction of which is being implemented under the Multi-Mode Transport Project.
- 2) The World Bank will continue to provide financial and technical cooperation for the improvement (road widening and paving) of the existing road network and for repair.
- 3) In regard to the Construction Machinery Training Centre in Taiz for which financial assistance has been provided for building construction, further assistance will be provided in terms of equipment and expert instructors.
- 4) The GCRB will be provided with continuous loans for the procurement of spare parts for construction machinery and vehicles.

The GCRB currently owns an asphalt plant and some 1,600 pieces of large and small construction machinery and vehicles, etc. More than 80 percent of these are distributed in the northern part of the country, centering on Sana'a, for road construction, improvement of maintenance work.

The construction machines and vehicles are generally stored and operated from material yards attached to the existing workshops of the GCRB or construction sites and repair work is also conducted there. The present facilities and equipment at these workshops are inadequate and the construction machinery management is rather inaccurate. The breakdown ratio of the existing construction machinery is as high as some 40 percent. This high breakdown ratio can be explained by (1) insufficient regular inspection, (2) inaccurate handling of machinery, (3) general deterioration of machinery, (4) inadequate repair capability, (5) shortage of technicians, (5) shortage of spare parts and (7) inadequate repair facilities and equipment.

While the Taiz Training Centre provides education and training for operators and technicians for road construction machinery, the inadequate provision and inadequate management of the training facilities and equipment make it difficult for the Centre to meet the demand for such manpower.

The Project prepared by the Government of Yemen to improve the operation rate of road construction machinery and to upgrade the technical skills of technicians involved in the maintenance and repair of such machinery through On-the Job-Training (OJT) at the planned workshop is outlined below.

- (1) The Project intends the construction of a new workshop with the purpose of improving the operation ratio of road construction machinery operating in northern Yemen and centering on Sana'a from the current 60 percent to 85 percent in 5 years' time.

- (2) The workshop to be constructed will not only act as the key service station for construction machinery and vehicles operating in northern Yemen but will also act as a medium-size model workshop for the entire country. Equipment capable of providing full-scale maintenance and repair services for construction machinery and vehicles will, therefore, be installed.
- (3) The construction of a training centre for construction machinery operators and technicians, included in the original plan, has been suspended until an appropriate time in the future and has been replaced by OJT at the workshop to improve the basic skills of technicians.
- (4) The construction of a dormitory building to accommodate trainees and a workshop administration block is included in the Project to facilitate OJT at the workshop.

The OJT at the Workshop will be provided for those working at the Workshop in addition to one or two outsiders for each shop sent from the existing workshops and other places. The contents of the training/education under the OJT scheme at the Workshop are given below. The training period is expected to be approximately 4 months.

Item	Description
Plant Operation and Management	Management of workshops and personnel control, etc.
Engine	Overhaul of engine and theory
Fuel Injection Pump	Functions and mechanism of fuel injection pump, overhaul, performance testing and theory
Engine Test	Performance testing of repaired/reconditioned engine and theory
Hydraulic System	Functions and mechanism of hydraulic cylinder and hydraulic valves, overhaul and theory
Torque Flow Transmission	Functions and mechanism of torque flow transmission, overhaul and theory
Torque Converter	Functions and mechanism of torque converter, overhaul and theory
Caterpillar of Construction Machine	Removal from and mounting to body, overhaul and padding
Braking System	Functions and mechanism of braking system for dump trucks and other systems, overhaul and theory
Suspension System	Functions and mechanism of suspension system for dump trucks and other vehicles, theory
Special Tools	Purposes and methods of use of special tools and troubleshooting for various machinery
Inventory Control	Inventory control and procurement of spare parts
Field Service	Practical field service training so that simple repair work can be conducted on site

The planned project site has an area of 4ha and is located in the eastern suburbs of Sana'a on the slope of Mt. NUKUM. It faces the First Ring Road at the front and is very conveniently located for the transportation and movement of the construction machinery and vehicles to be serviced at the site. No building or structure exists at the back of the site except for Mt. NUKUM. The existing Sana'a Workshop is located at the centre of the city and is under strong pressure to move from the present site due to noise and other environmental problems. In contrast, the planned project site is not expected to cause such environmental problems.

Electricity and telephone services, etc. can be extended to the site. In view of the unreliable electricity supply, the installation of an emergency power generation facility is necessary to

meet essential demands. While water can be supplied from the existing well on the site, no sewerage facilities are available on or around the site.

The Project aims at the construction of the following buildings.

Building	Structure	No. of Storeys	Main Facilities/Rooms
Workshop	Reinforced concrete	1 (partly 2)	Chassis Shop, Engine Shop, Undercarriage Shop, Engine Test Room, Fuel Injection Test Room, Electrical Room, Welding Shop, Spare Parts Storage, Tool Room, Practice Room, Workshop Manager's Room, Administration Room, Engineers' Room, Meeting Room, Secretary's Room Bedrooms (12), Multi-Purpose Room, Kitchen, Administration Room, Warehouse, Warden's Room
Dormitory	Reinforced concrete	2	
Carpentry Shop	Reinforced concrete	1	
Paint Shop	Reinforced concrete	1	
Tyre Repair Shop	Reinforced concrete	1	
Oil and Grease Storage	Reinforced concrete	1	

With regard to the equipment to be provided under the Project, appropriate specifications and quantities have been selected to achieve the project objectives, i.e., the effective and efficient maintenance and repair of construction machinery and vehicles and manpower development through OJT. The main items to be provided are given in the following table.

Category	Main Items
Practical Training Equipment	equipment for vehicle repair, equipment for engine repair (including engine performance testing equipment), equipment for fuel injection system repair, equipment for electrical equipment repair, equipment for hydraulic unit repair, equipment for battery repair, equipment for tyre servicing, machine tools, equipment for welding and sheet metal work, equipment for suspension servicing, air-compressor, washing equipment, petrol filling equipment, parts shelves, repair tools
OJT Equipment	slide projector, overhead projector, cutaway models, plastic models, system boards, AV equipment
Vehicles	station wagon, pick-up, mobile workshop, forklift

If the Project is implemented with Japan's Aid, the cost for undertaking by the Government of the Republic of Yemen are estimated some 27.2 million YR (1 YR = 10.87 yen as of May, 1992).

The GCRB will act as the project implementation body on the Yemeni side and, upon its completion, the workshop will be run as a section of the GCRB with 168 staff members, including a manager. Of these 168 staff members, 90 will come from the existing Sana'a Workshop which will be closed down with the opening of the new workshop and most of the remaining staff will be selected from amongst those completing training at the Taiz Training Centre.

The personnel cost for the new workshop has already been appropriated in the GCRB's current budget for various departments and, therefore, no extra funding is believed necessary. These favourable prospects in terms of staffing and the personnel cost are additional advantages of the Project. According to the GCRB's own estimate, the personnel cost in the first year will be 12,382,000 YR (approximately 135 million yen).

In addition to the above personnel cost, the workshop will require an estimated 10,150,000 YR (approximately 110 million yen) for the first year's operation and maintenance cost. Of this,

7,250,000 YR has already been appropriated for the existing Sana'a Workshop. The GCRB appears to be well capable of meeting the additional funding requirement of 2,900,000 YR as this figure only represents less than 0.1 percent of the GCRB's current budget.

At present, the GCRB is receiving financial aid from the World Bank for the procurement of the necessary spare parts for construction machinery and is constructing a spare parts warehouse at its own expense on the same site as that planned for the present Project. As the World Bank has already expressed its intention to continue this financial aid for the procurement of spare parts, it is most unlikely that the operation of the service facilities constructed under the Project will come to a halt because of a lack of spare parts.

In view of the fact that the equipment to be installed at the new workshop will eventually need replacing in 10-15 years' time due to natural deterioration, the GCRB is required to save a set amount of money as equipment renewal funds.

The implementation of the Project with Japanese grant aid cooperation will lead to more effective and more efficient road construction work in Yemen where more than 95 percent of the transportation of people and goods relies on the road network and will also contribute to manpower development in Yemen through OJT. In addition, the Project will result in a higher construction work efficiency in both the public and private sectors, particularly in the field of road construction, shorter construction period, improved operation rate and a longer life of construction machinery, and will reduce the construction cost through these improvements. Moreover, as Yemen is suffering from an accumulation of foreign debt, the Project could help to reduce the size of the budgetary deficit.

The implementation of the Project appears to be an urgent necessity for Yemen which spends some 20 percent of the national budget on road construction and improvement. An improved and well maintained road network resulting from the implementation of the Project will have a significant impact on the improvement of public life and on the development of Yemen's economy in which roads play a crucial role.

The above analysis confirms that the Project satisfies the objectives of Japanese grant aid cooperation and that its implementation is highly appropriate. Should the provision of technical cooperation through the dispatch of experts be feasible, the benefits of project implementation are expected to be significantly enhanced. In view of such positive prospects, the implementation of the Project with Japanese grant aid cooperation appears highly desirable.

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CHAPTER 1 INTRODUCTION

CHAPTER 1 INTRODUCTION

Roads play a crucial role in the national development of the Republic of Yemen (hereinafter referred to as Yemen) which is a mountainous country and which is still served by railways. Recognising the importance of roads, the First 5-Year Plan (1977-1981) gave the highest priority to the construction/improvement of the road network. The present Fourth 5-Year Plan incorporates the Medium-Term National Road Programme (until 1996) and active efforts are being made to construct/improve roads with the assistance of such aid organizations as the World Bank and others. The total length of constructed national roads is 6,585km (1989 figure), of which paved roads total 4,475km, while the total length of local roads is approximately 40,000km. However, both figures are still unsatisfactory to effectively meet the development needs of the country.

Unfortunately, the progress of road construction work is hampered by the fact that some 40% of the approximately 1,600 various road construction machines available in the country are either out of action due to severe deterioration or are not fully operational due to mechanical problems. This situation is aggravated by the lack of appropriate skill and equipment to conduct repairs at the 4 existing workshops in the country, the general inexperience of operating these machines, the lack of adequate regular maintenance and the shortage/uneven distribution of workshops. Although a training institute, assisted by the World Bank and others, produces construction machinery maintenance/repair workers with an annual output of some 80 technicians, the inadequate facilities and equipment of this institute cannot properly provide the required volume of technical training.

The Government of Yemen has prepared a plan to construct a workshop to provide maintenance and repair services for road construction machinery and to establish a new institute to train construction machinery maintenance/repair technicians and operators in order to solve the problems described above, to efficiently proceed with the construction of both national and local roads and to develop human resources to work in these fields. Moreover, the Government of Yemen plans to use the same workshop and training institute to maintain/repair agricultural machinery and to train relevant technicians as part of the government's agriculture modernisation efforts. The Government of Yemen has, therefore, requested the Government of Japan's provision of grant aid cooperation for the construction of the planned facilities, including the provision of related materials and equipment.

In response to this request, the Government of Japan decided to conduct the Preliminary Study and, commissioned by the Government of Japan, JICA sent the Preliminary Study Team led by Mr. Shinichi Mori of the Economic Cooperation Bureau, Ministry of Foreign Affairs to Yemen

for the period between November 8th and November 27th, 1991 to establish the background and contents of the request while explaining the mechanism of Japan's grant aid cooperation system to the Yemeni side. During this preliminary study stage, it was agreed that the part of the Project relating to agricultural machinery would be dropped in view of the unclear project implementation system on the Yemeni side.

Based on the findings of the Preliminary Study, the Government of Japan decided to proceed to the Basic Design Study and JICA, commissioned by the Government of Japan, sent the Basic Design Study Team led by Mr. Ryo Yamana of the Honshu-Shikoku Bridge Authority to Yemen, as well as to the World Bank in Washington, D.C. for the period between April 9th and May 9th, 1992. On their way to Yemen, three members of the Study Team, including Mr. Yamana, visited the World Bank in Washington, D.C. to discuss the relationship between the Project and assistance programmes of the World Bank for Yemen.

The Basic Design Study Team held a series of consultations with Yemeni officials, conducted a survey on the project site and project-related facilities, gathered relevant data and information and confirmed the extent of the required cooperation and the measures to be undertaken by the Yemeni side. On its return to Japan, the Study Team conducted the necessary domestic work, involving the decision on the optimal project size, the selection of the required materials and equipment, project cost estimate and the preparation of an implementation plan based on the field survey findings.

JICA then sent the Draft Final Report Explanatory Mission led by Mr. Ryo Yamana to Yemen for the period between July 18th and July 28th, 1992 to discuss and explain the contents of the Draft Final Report for the Basic Design Study to finalise the Report.

The present Report compiles the optimal size of the facilities to be constructed, the selected materials and equipment, the basic design study processes and conclusions, the project implementation plan, the operation and maintenance plan, the project evaluation and several recommendations. A list of the Study Team members, a list of the people interviewed, the field survey schedules and the Minutes of Discussions, etc. are given in the Appendices.

CHAPTER 2 BACKGROUND OF THE PROJECT

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2.1 General Facts About Yemen

2.1.1 Geographical Location, Topography and Climate

Yemen is located in the southwestern part of the Arabian Peninsula, facing the Red Sea to the west and the Arabian Sea (Gulf of Aden) to the south. Across these seas, it faces such African countries as Ethiopia, Djibouti and Somalia. The northern and eastern parts of the country are characterised by barren rocky land and deserts, bordering Saudi Arabia. The eastern border is also shared by Oman. Although the total national land area of 528,000km² is some 1.4 times larger than Japan, most parts of the country consist of rocky mountains and deserts.

The geographical importance of Yemen is associated with the Strait of Mandab which is a gate to the Red Sea and further to Europe via the Suez Canal. The Red Sea is important for Japan as an alternative oil route if trouble occurs in the Persian Gulf through which Middle Eastern oil (accounting for 80 percent of Japan's oil imports) is transported via the Strait of Hormuz. Yemen has strong historical ties with Ethiopia and Somalia which are located on the other side of the Red Sea and there is frequent economic and cultural exchange between these countries.

North Yemen and South Yemen were united on May 22nd, 1990 to form the Republic of Yemen with Sana'a designated the new republic's capital city. Sana'a is located at approximately 44°E and 15°30'N at an elevation as high as 2,300m. During the time of North Yemen, Sana'a was almost at the centre of the country and prospered as the country's political, cultural and transport centre. Since unification, however, Sana'a can no longer be described as being at the centre of the country because of the country's extension to the south and far to the east. Nevertheless, the central importance of Sana'a is increasing. As the newly unified country has started on the path of reconciliation and uniform development, having overcome the long-standing antagonism and conflict between the North and South, Sana'a's geographical location is of national importance.

The climate of Yemen is mild throughout the year and there is practically no necessity for air-conditioning even in the middle of summer (mean July temperature: 22.5°C). In winter, the temperature can drop below zero in the evening and early morning, sometimes necessitating heating. The relative humidity in the dry season is extremely low and wind tends to cause a dusty environment, particularly during the daytime.

There are 2 rainy seasons, i.e., from March to April and from July to August. The annual rainfall is 200-500mm but considerably varies from year to year. In Sana'a, thunderclouds tend to appear in the afternoon, causing torrential showers with occasional lightning.

The country's main industry is agriculture with wheat, vegetables and fruit being cultivated on the mountain slopes.

2.1.2 Population

The population of Yemen is estimated to be roughly 11.4 million (1990) with former North Yemen accounting for 9.3 million (1986) and former South Yemen accounting for 2.3 million (1988). Given the annual population increase rate of approximately 3.1 percent, the population will be double this figure in 20 years' time. The estimated population in the year 2000 is 17.4 million, an increase of some 6 million on the current level. To arrest a population explosion, the Ministry of Planning and Development has published a special committee report entitled "National Population Strategy 1990-2000 and Population Action Plan" to promote family planning.

The problem of an increasing population size is closely related to all government policies and directly or indirectly affects a wide range of issues, including food production, housing, education and economy (employment). Since no national census has been conducted since unification on May 22nd, 1990, it is impossible to accurately determine the population size. In addition to a natural increase, a large number of people who have lost their jobs have been forcibly returned from neighbouring countries since the Gulf War and are living in tents in many areas of Yemen, aggravating the seriousness of the population issue.

2.1.3 Socioeconomic Conditions

The unification of North and South Yemen on May 22nd, 1990 did not solve all the country's domestic problems. As the present time is a kind of transitional period to create an integrated society following the unification of two completely different political regimes, administrative control is not adequately exercised across the country. After the Gulf War, some 800,000-1,000,000 Yemenis returned from various Arab countries, causing a serious shortage of hard currency and forcing these repatriates to face problems of housing and poverty. While this critical state of the Yemeni economy is expected to continue for some time, President Saleh, supported by a strong domestic power base, is aggressively exerting efforts to create a modern state.

The main industry in Yemen is agriculture which accounts for 70 percent - 80 percent of the working population. The main products are sorgham, millet, wheat, grapes, coffee and cotton. Some of these are exported but make little contribution to the overall earning of hard currencies by Yemen. Instead, the Government of Yemen is making every effort to exploit its oil resources, the estimated reserves of which are as large as 10 billion barrels. The oil fields at Mareb in the east currently produce 200,000 barrels/day, a large enough quantity to operate on a commercial basis. Other oil fields have been found to the east of Aden (in former South Yemen) and there is fierce competition between American, British, French and Japanese development companies to reach the commercial production stage. If efforts to exploit the oil resources succeed, Yemen's trade balance will greatly improve with the possibility of curing the government budget's habit of being in the red.

The general budget for fiscal 1991 showed revenues of 35.3 billion YR and expenditure of 62 billion YR with a budget deficit of 15.7 billion YR (1 US dollar = 12 YR). Table 2-1 shows the main economic indices (1986-1990) while Table 2-2 shows the national budget for fiscal 1992.

Yemen's relations with Japan are friendly with the mutual establishment of embassies and the provision of a series of grant aid cooperation projects by Japan as shown in Appendix-10 (for the period between 1976 and 1990).

Table 2-1 Main Economic Indices of Yemen (1986-1990)

Macroeconomic Index	North Yemen				South Yemen				Unified Yemen
	1986	1987	1988	1989	1986	1987	1988	1989	
	1986	1987	1988	1989	1986	1987	1988	1989	
GNP (\$mn)	3,983	4,212	5,907	6,865A	1,159	1,246	1,275	1,304A	11,231
Real GNP Growth Rate	9.4	4.8	19.2B	12.0A	-9.0	3.5	0.3	2.0A	8.0
Per Capita GNP	430	441	601	678	522	547	545	539	869
Price Increase Rate (%) A	29.3	21.8	22.0	22.0	1.0	3.0	2.5	5.0	30.0
Export Value (FOB) \$mn C	16.1	48.2	447.0	606.0	30.4	70.9	82.2	113.8	800.0
Import Value (FOB) \$mn C	796.6	1,189.4	1,309.4	1,282.7	447.9	456.9	596.1	553.9	1,900.0
Budget Balance \$mn	-125.3	-452.2	-694.3	-579.0	-175.7	-129.7	-404.5	-416.6	-1,000.0
Foreign Reserves \$mn	431.7	539.5	285.1	279.2	138.0	97.1	79.9	45.2	-
Foreign Debt \$mn	2,366	2,636	3,034	3,324	1,733	1,936	2,240	2,505	-
Exchange Rate 1\$=YR/YD	9.639	10.342	9.772	9.760	0.345	0.345	0.345	0.345	12.020

(Source: Statistical Data of Yemen)

Note: A: Estimate

B: World Bank Estimate

C: Based on balance sheet of basic tax payment (petroleum products excluded for South Yemen)

Table 2-2 National Budget of Yemen (Fiscal 1992)

(Unit: 1,000 YR)

No.	Ministry Name	Governmental Funding	Foreign Funding	Private Funding	Domestic Loan	Total
1	Ministry of Agriculture & Water Resources	748,332	962,284	28,669	—	1,739,285
2	Ministry of Fishery	51,325	111,441	109,926	—	272,692
3	Ministry of Industry	700	561,081	324,423	8,952	895,156
4	Ministry of Electricity & Water	1,109,444	1,172,309	125,740	—	2,407,693
5	Ministry of Oil & Mineral Resources	48,977	190,030	460,952	—	699,959
6	Ministry of Construction	1,897,866	1,320,672	122,488	—	3,340,926
7	Ministry of Transport	89,900	153,380	221,598	110,000	574,878
8	Ministry of Communication	283,813	426,479	140,000	69,994	920,286
9	Ministry of Higher Education	123,999	194,250	—	—	378,049
10	Ministry of Education	957,916	196,250	—	—	1,154,168
11	Ministry of Public Health	279,387	83,472	—	—	362,859
12	Ministry of Civil Services	9,725	32,184	—	—	37,909
13	Ministry of Labour & Training	1,150	30,000	—	—	31,150
14	Ministry of Insurance & Social Affairs	16,530	45,566	355,722	—	417,818
15	Ministry of Housing & Urban Planning	635,630	338,992	10,140	—	984,762
16	Ministry of Justice	26,354	—	—	—	26,354
17	Ministry of Culture & Tourism	65,507	36,305	—	—	101,812
18	Ministry of Information	134,484	65,916	—	—	200,400
19	Ministry of Commerce & Supplies	—	246,000	101,707	—	317,707
20	Ministry of Finance	8,103	—	128,700	—	136,803
21	Ministry of Youth & Sports	19,386	—	—	—	19,386
22	Ministry of Local Administration	120,942	25,063	70,040	—	216,015
23	Ministry of Planning & Development	96,965	144,433	—	—	341,398
24	Environmental Preservation Council	2,320	10,960	—	—	13,280
25	Survey Authority	6,500	39,174	—	—	45,675
26	Sana'a City Secretariat	69,721	—	—	—	69,721
Total		6,800,978	6,356,142	2,200,075	188,946	15,546,141

(Source: GCRB)