Document of
The World Bank

Report No. T 7042-YEM

REPUBLIC OF YEMEN

EMERGENCY FLOOD REHABILITATION PROJECT

TECHNICAL ANNEX

DECEMBER 2, 1996

Natural Resources, Water and Environment Division
Middle East Department
Middle East and North Africa Region

CURRENCY EQUIVALENTS

Currency Unit = Yemeni Rial (YR)
US$1 = 120 Yemeni Rials (market rate)
(As of June 1996)

MEASURES

1 meter (m)	= 3.28 feet (ft)
1 kilometer (km)	= 0.62 miles (mi)
1 cubic meter (m3)	= 35.315 cubic feet (ft3)
1 hectare (ha)	= 2.47 acres

ABBREVIATIONS AND ACRONYMS USED

EFRP	Emergency Flood Rehabilitation Project
FAO	Food and Agriculture Organization
GCRB	General Corporation For Roads and Bridges
GDP	Gross Domestic Product
GSNDR	General Secretariat for Natural Disasters and Relief
HLIC	Higher Level Inter-Ministerial Committee
HTB	High Tender Board
IDA	International Development Association
IMC	Inter-Ministerial Committee
LWCP	Land and Water Conservation Project
MAWR	Ministry of Agriculture and Water Resources
MOCHUP	Ministry of Construction, Housing, and Urban Planning
MOPD	Ministry of Planning and Development
ODA	Overseas Development Administration
OSOCC	On-Site Operation Coordination Center
PIU	Project Implementation Unit
PMU	Project Management Unit
PWP	Public Works Project
UNDP	United Nations Development Program
UNDRO	United Nations Disaster Relief Organization
WFP	World Food Program
WHO	World Health Organization

GOVERNMENT OF YEMEN FISCAL YEAR

January 1 - December 31

Vice President:	Kemal Derviş
Director:	Inder Sud
Division Chief:	Salah Darghouth
Co-Task Managers:	Nejdet Al-Salihi and Tijan Sallah

REPUBLIC OF YEMEN
EMERGENCY FLOOD REHABILITATION PROJECT
TECHNICAL ANNEX

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THE REPUBLIC OF YEMEN

EMERGENCY FLOOD REHABILITATION PROJECT[1]

I. BACKGROUND AND STRATEGY

A. Background

1.1 In June and July of this year, heavy rainfall and widespread flooding caused substantial loss of human lives and resulted in damages to livestock, crops, houses, irrigation infrastructure, flood control works, roads, rural water supply and other infrastructure. The floods have been the worst in the country's recent history; the rainfall has been the heaviest in about seventy years. It caused substantial damage and dislocation in mainly three governorates: Hadramaut, Shabwa, and Marib. It affected, to a lesser extent, Abyan, Al-Mahra and Al-Jawf Governorates. The total direct damage was very substantial, and estimates by Bank missions, utilizing information provided by the General Secretariat for Natural Disasters and Relief, put total damages at more than US$200 million (or 12 percent of GDP). About half of these estimated damages directly affected the agriculture sector (including farms, irrigation and wadi structures, and other related agricultural infrastructure) while the remaining damages were in rural infrastructure, roads and bridges, in addition to housing, health and educational facilities. The main effects of the crisis are as follows:

(a) **Economic Impact**: The economic costs of the damage to rural infrastructure alone is estimated at about US$200 million. This damage is very costly for a relatively weak economy. Economic activity in the rural sector has suffered severely as a result of the floods, and the outlook for 1996 and 1997 remains bleak, unless remedial measures are intensified to overcome the crop and livestock losses and the disruption to transport, communications, and other essential infrastructure. Despite continued moderate levels of investment (about 14 percent of GNP) financed mostly from concessional foreign assistance, the overall real growth rate this year and next year will be lower than that expected before the floods.

(b) **Physical Impact**: The estimated physical losses to agriculture by the Government include, among other things, damage to flood protection and spate irrigation earth dikes (500), masonry dikes (89), irrigation canals (11,020), and flood protection dikes (45). Also, 3,500 ha of arable land have been adversely affected, with 2,380 ha completely destroyed, and an estimated 37,000 ha of arable land has been severely eroded, with much of the topsoil washed away. With respect to transportation infrastructure, 16 locations on highways were severely damaged. In addition, there have been substantial damages to

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[1] This Technical Annex is based on the findings of IDA missions to Yemen in July and October 1996. The missions comprised Messrs. Nejdet Al-Salihi and Tijan M. Sallah (Co-Task Managers), Naji Abu-Hatim (Yemen Resident Mission) and Farouk Shahin (Consultant Engineer). The Task Team also comprised Messrs. K.S. Venkatraman and Terje Wolden. Peer reviewers for the project are Messrs. Gert van Santen and Ashok Subramanian. Ms. Conchita Castillo assisted with the typing of this report. This report was prepared under the overall supervision of Mr. Salah Darghouth, Division Chief, MN2NE, and reviewed by Ms. Tufan Kolan, Acting Project Advisor (MN2DR). It was approved by Mr. Inder Sud, Director, MN2, and Mr. Kemal Dervis, Vice President, MNA.

housing, health, education, and public utilities, which are being addressed by the Government and for which further donor assistance is being sought.

B. Country Assistance Strategy

1.2 In the past, IDA's country assistance strategy (CAS) for Yemen has concentrated on helping establish the basic economic institutions of a modern state and on providing basic infrastructure. In addition, IDA, together with several donors, has put considerable efforts in supporting agricultural development throughout the country and in providing basic education and health services. In the most recent CAS, given the past experience with the public sector and poor public finances, emphasis is on laying the foundations for growth through private-sector-led development. To this end, IDA's assistance strategy, in the next three years, is focused on: (i) implementing stabilization, structural reforms and social protection measures; (ii) improving portfolio implementation and sustainability of past and future investments; and (iii) promoting sustainable natural and human resource development. The proposed emergency project has been designed in conformity with the second objective of the CAS; it would help restore essential infrastructure damaged by flooding and thereby enable the sustainability of past and future investments.

II. GOVERNMENT'S EMERGENCY STRATEGY AND RESPONSE BY IDA AND DONORS

A. Government Strategy

2.1 The Government has requested urgent assistance from IDA and other donors to respond to the ongoing flood emergency. The Government has also taken the initiative to create, through the General Secretariat For Natural Disasters, a Flood Relief High Committee headed by the Deputy Prime Minister and Minister of Planning and Development, to handle all flood disaster relief activities and to coordinate with aid donors on the reconstruction effort. Notwithstanding the difficult financial situation facing Yemen, the Government has also agreed to contribute substantially to meeting the costs of the overall flood relief and rehabilitation program. The Government has also worked closely with the donor community and has requested a Donors' Meeting to be convened at an early date to serve as a basis to seek further donor assistance.

B. IDA's Response

2.2 In response to the flood emergency, IDA missions visited Yemen in July and October 1996 to assist the Government in assessing the extent of the flood damage and in preparing and appraising this Emergency Flood Rehabilitation Project. As a result, it was agreed that a three-pronged approach would be adopted to deal with the crisis. The first prong represented an immediate response to deal with urgent priority needs within the scope of ongoing IDA-supported projects. To this end, US$14.5 million was reallocated from existing credits to finance rehabilitation in agriculture, transport, roads and related structures, water supply, power, health and education. The second prong is this proposed Emergency Flood Rehabilitation Project, which includes a study to help prepare the basis for a flood preparedness and mitigation system. The IDA financing for these two prongs is about US$45 million, representing about 23 percent of the Government's Emergency Flood Reconstruction Program. And the third prong is to ensure

that IDA's country assistance program for Yemen does accommodate investments, in the medium to long term, to help implement the recommendations of the flood preparedness and mitigation study.

C. Donors' Response

2.3 The donor community has also been highly supportive of Yemen. The UNDP Sana'a Mission began donor coordination efforts almost immediately after the heavy rains with assistance from the United Nations Disaster Relief Organization (UNDRO). Through its "On-Site Operation Coordination Center" (OSOCC), the UNDP has mobilized available donors, including international, regional, governmental and non-governmental organizations in the immediate relief efforts. Many donors provided initial assistance towards the immediate relief needs of the flood victims through the provision of food, medicines, blankets and temporary shelter, as well as emergency medical services. Initial donor assistance, offered in cash and kind, came from multilateral (e.g., United Nations Development Program, World Food Program, Food and Agricultural Organization, UNICEF, World Health Organization) as well as 20 bilateral donors (e.g., Syria, Qatar, Netherlands, United Arab Emirates, Saudi Arabia, United Kingdom, Japan, Germany, Jordan, Oman, Sudan) and 4 international NGOs, and was estimated at about US$14.0 million. The UNDP OSOCC is also carrying out a full assessment of the flood damage. The study, known as the "White Paper," is ongoing and its findings are to be presented to the Government by the end of December 1996. As part of the "White Paper," the Netherlands Government is financing satellite imaging which, together with ground control surveys, will assist in defining the full extent of flood damage. The damage assessment in the "White Paper" would help the Government finalize its Emergency Rehabilitation Program and serve as the basis for the above-mentioned Donors' Meeting (para. 2.1).

III. RATIONALE FOR IDA INVOLVEMENT

3.1 IDA's support for the Emergency Flood Rehabilitation Project is appropriate on several grounds. First, Government has formally requested IDA's assistance in light of mutual partnership and IDA's extensive involvement in economic development in Yemen. Second, IDA is a key actor among several other donors active in the country. Given that, at present, the problems faced by Yemen from flood damages are huge, and no single donor can shoulder all the burden, IDA's involvement is critical to the success of the reconstruction efforts. Finally, IDA has extensive experience in emergency operations, which it can successfully share with Yemen.

IV. DETAILED PROJECT DESCRIPTION

A. Project Objectives

4.1 The proposed project would help to restore the country's essential economic infrastructure (roads, agriculture, rural water supply) and domestic food production capability destroyed or damaged by the heavy rains and flooding and facilitate road access to production centers, markets, and social services. It would strengthen Yemen's institutional capacity to manage disaster recovery programs and develop programs to mitigate the country's vulnerability to flood damage. The progress towards the achievement of these objectives would be monitored by performance indicators agreed with Government (Attachment 3). The project would also serve as a catalyst for donor financing and coordination of the reconstruction effort.

B. Project Description

4.2 The project, to be implemented in three years, would provide financing for the following components:

(a) Agricultural Infrastructure: Rehabilitation of embankments and other flood protection works; rehabilitation of existing irrigation systems, canals and service roads; and installation of secondary canals, wells, bunds, and weirs in the governorates most affected by the floods, mainly Shabwa, Marib and Hadramaut (base cost: US$13.0 million);

(b) Transport Infrastructure: Rehabilitation of main roads and associated structures (e.g., bridges, culverts) in the most affected locations, mainly in Shabwa, Marib, Hadramaut, Al-Jawf and Abyan (base cost: US$13.0 million);

(c) Water Supply Infrastructure: Rehabilitation of urban and rural water supply facilities through the supply of equipment such as chlorinators, pumps, generators, and pipes in all the affected Governorates (base cost: US$1.1 million); and

(d) Consultant Services and Studies: Assistance in the design and implementation of civil works, contract management and construction supervision, and the preparation of studies, including a flood preparedness and mitigation study. The proposed terms of reference for this study is presented in Attachment 6 (base cost: US$2.2 million).

C. Criteria for Selection of Rehabilitation Priorities

4.3 Details of damages in the agricultural and transport infrastructures are contained in Attachments 1 and 2. They have been prepared by consultants and discussed and agreed with Government, and comprise the priority list of works to be carried out during the three-year life of the project. At appraisal, the criteria used for selection of priority works were:

(a) For Agricultural Infrastructure: Priorities are: (i) to rehabilitate wadi embankments and related structures near rural human settlements and in areas where large numbers of hectares of agricultural land are involved; and (ii) to rehabilitate and improve irrigation infrastructure in the areas most severely affected by floods.

(b) For Transport Infrastructure: Priorities are: (i) to rehabilitate roads and bridges in areas most affected by the floods and with the greatest traffic intensity to reduce vehicle operating costs, and (ii) to rehabilitate critical roads to communities which would otherwise be without access to the larger economy to reduce their socio-economic isolation. In all these rehabilitation works, flood-resistant design and construction would be used. In all these rehabilitation works, flood-resistant design and construction would be used.

V. TECHNICAL ASSISTANCE AND STUDIES

5.1 For the transport infrastructure component, an estimated 12 staff months of technical assistance (engineering services) would be funded in order to: (i) carry out detailed designs of bridges and related structures including: layout mapping, design drawings, technical specifications, bills of quantities, cost estimates, construction procedures by force account or direct contracting, and implementation schedules; and (ii) oversee implementation of civil works, contract management and supervision. Support in the form of equipment for this TA as well as total estimated cost for this TA is presented in Attachment 2, page 6 of 6. For the agriculture infrastructure component (Attachment 1, page 6 of 8), 15.4 staff years of long-term technical assistance would be engaged in addition to 0.3 staff years of short-term consultancy services. Technical assistance would also be employed to prepare studies, including a flood preparedness and mitigation study (para. 4.2 (d), Attachment 6).

VI. PROJECT COST AND FINANCING

6.1 The total cost of the project, including price and physical contingencies, is estimated at $35.0 million equivalent, with a foreign exchange component of US$25.54 million, which is about 73 percent of total project costs. The proposed project would be exempted from customs duties and taxes. IDA's financial contribution to the proposed project would be SDR 20.8 million (US$30.0 million equivalent), which is about 86 percent of total project costs. Local cost financing by IDA is justified in view of the emergency nature of the project and the extra-budgetary burdens shouldered by the Government as a result of the floods. The UNDP would provide US$1.0 million equivalent on a grant basis, as part of the technical assistance. A breakdown of costs and the financing plan are shown in Tables 1 and 2 below. Because of the urgent need to facilitate early start-up of the emergency activities, a project preparation advance (PPA) of US$1.0 million has been agreed to by IDA. The PPA would be refunded through the proposed Credit.

Table 1
Project Financing Plan
(US$ Million)

	Local	Foreign	Total
IDA	4.46	25.54	30.00
Government	4.00	0.00	4.0
UNDP		1.0	1.0
	8.46	26.54	35.0

Table 2
Estimated Project Costs [2]

Sector	Local	Foreign	Total	Local	Foreign	Total
	---------- YR Million--------			----------US$ Million---------		
1. Agriculture, Rural Infrastructure, Irrigation and Wadi Flood Control	338.4	1221.6	1560	2.82	10.18	13.00
2. Roads and Bridges	466.8	1093.2	1560	3.89	9.11	13.00
3. Water Supply	12.0	120.0	132	0.10	1.0	1.1
4. Flood Study and Technical Assistance	24.0	202.8	226.8	0.20	1.69	1.89
BASE COST	841.2	2637.6	3478.8	7.01	21.98	28.99
CONTINGENCIES:						
Physical :	84.0	264.0	348.0	0.70	2.20	2.9
Price :	90.0	286.8	376.8	0.75	2.36	3.11
Subtotal:	174.0	550.8	724.8	1.45	4.56	6.01
TOTAL PROJECT COST	1015.2	3188.4	4203.6	8.46	26.54	35.00

VII. INSTITUTIONAL ARRANGEMENTS AND PROJECT IMPLEMENTATION

A. Project Implementation

7.1 The project would be implemented under the general supervision of a Project Management Unit (PMU), which would be overseen by an Inter-Ministerial Committee (IMC), consisting of the Ministers of Planning and Development (MOPD); Construction, Housing and Urban Planning (MOCHUP); Agriculture and Water Resources (MAWR) and other members to be agreed with IDA. The PMU will be attached to the MOPD and would come under the authority of the Deputy Prime Minister and Minister of Planning and Development. It will be headed by a National Coordinator, and will include a Deputy National Coordinator and two technical advisors, one specialized in agricultural infrastructure and the other in roads and bridges. As part of the PMU, there will be two sector coordinators for the field project implementation units (PIUs): one in the MAWR responsible for coordinating the activities of the field PIUs implementing the agriculture infrastructure component, and the other in the General Corporation for Roads and Bridges (GCRB) responsible for coordinating the activities of the field GCRB PIUs implementing the transport infrastructure (roads and bridges) component. The field PIUs for the agriculture infrastructure component would be the Land and Water Conservation Project PIU in Shabwa governorate; the Wadi Hadramaut III

[2] Net of taxes and duties.

PIU in Hadramaut governorate; and the Eastern Region Agricultural Development Project PIU in Marib governorate. The field PIUs for the roads and bridges component would be the GCRB PIUs in the concerned governorates. An organogram of these implementation arrangements is presented in Attachment 4.

7.2 The field PIUs implementing the project belong to agencies which already have technical departments familiar with IDA procedures. The responsibilities of these agencies, which have long-standing relationships with IDA, are as follows:

(i) MAWR will be responsible for rehabilitation of agricultural and rural infrastructure, irrigation works and flood protection schemes, and for the carrying out of the flood preparedness and mitigation study;

(ii) GCRB, under the Ministry of Construction, Housing, and Urban Planning, will be responsible for reconstruction of roads and related structures and rehabilitation to the highways network; and

(iii) the Public Works Project (PWP), under the guidance of the Ministry of Planning and Development, will be responsible for rehabilitation of damaged water supply infrastructure.

7.3 In addition to acting as the overall coordinator for the proposed project, the PMU will also coordinate donor activities with assistance from technical advisers to be provided under the project.

B. PMU Staffing and Project Administration

7.4 The National Coordinator and Deputy National Coordinator for the project would be appointed full-time. They will be supported by two sectoral technical advisers, one on a short-term and the other on a long-term contract basis. The PMU would also be supported with an accountant, secretarial staff, and office facilities. The National Coordinator, the Deputy National Coordinator and the sector coordinators of the PMU shall be established within one month after effectiveness. The terms of reference of the National Coordinator and his Deputy and other key project staff need to be agreed with the concerned line Ministry, MOPD, and IDA (Resident Mission). The proposed terms of reference for key PMU staff are presented in Attachment 5. Once appointed, the two sectoral technical advisors assisting the PMU will assist in reviewing annual programs, procurement procedures and evaluations, implementation progress on site, general technical verification and programming, and monitoring and evaluation.

C. Annual Work Program

7.5 The PIUs would prepare their annual program in accordance with the project and discuss and clear the annual program with their sector coordinators in the MAWR and the GCRB. Once the annual programs are cleared by the sector coordinators, they would then be brought to the PMU level for discussion and clearance, after which they would become the official annual program. The PMU shall verify the annual expenditures of each PIU in addition to reviewing procurement evaluation reports and recommendations for award.

D. Procurement

7.6 Procurement would be carried out as expeditiously as possible in accordance with IDA guidelines under emergency operations. For small contracts up to US$50,000, the Director of the field PIUs, in consultation with the PMU, will have approval authority for an aggregate amount not exceeding 20 percent of their annual investment budget. For contracts with a value greater than US$50,000, up to US$200,000, the PMU would have approval authority which would be subject to post-contract award review by IDA. For contracts between US$200,000 and US$1.0 million, the concerned line Minister would have approval authority subject to IDA's no-objection. Contracts above US$1.0 million would be subject to clearance by the PMU, IDA and the High Tender Board (HTB). A summary of procurement arrangements are shown in Table 3 below.

Table 3
Procurement Arrangements
(US$ Million)

Project Elements	Procurement Methods				
	ICB	NCB	SHP/FA/DC [1/]	Other	Total
Materials & Equipment	6.2 (6.2)[2/]		1.55 (1.55)		7.75 (7.75)
Civil Works		13.9 (11.67)	11.10 (9.33)		25.00 (21.00)
Technical Assistance				2.25 [3/] (1.25)	2.25 (1.25)
TOTAL	6.2 (6.2)	13.9 (11.67)	12.65 (10.88)	2.25 (1.25)	35.0 (30.0)

1/ SHP: Shopping Procedures for materials and equipment (vehicles and locally available equipment and materials).
FA: Force Account for Civil Works (US$4.5 million for roads/bridges and US$2.0 million for agriculture).
DC: Direct Contracting for works (US$3.5 million for agriculture and US$1.0 million for roads and bridges).
2/ Figures in parentheses are the respective amounts to be financed by IDA. Total costs include contingencies.
3/ Consultants recruited in accordance with IDA guidelines "Use of Consultants."

E. Disbursement

7.7 Three special accounts would be established under the project, one for the agriculture infrastructure component, another for the transport infrastructure (roads and bridges) component, and the third for the water supply component. The authorized allocations for the three special accounts would be: US$0.5 million (Agriculture); US$0.5 million (Roads and Bridges); and US$0.25 million (Water Supply). The special accounts will be periodically replenished on the basis of withdrawal applications, which should be supported by appropriate documentation. Payments out of the special accounts would be made only for eligible expenditures, and are required to be supported by appropriate documentation for periodic audits by IDA. The disbursement plan and schedule are shown below in tables 4 and 5 below.

Table 4
Disbursements Plan
(US$ Million)

Category	Credit Amount Allocated (US$ Million Equivalent)	Percentage of Expenditures to be Financed
Civil Works	20.0	85% of expenditures
Materials & Equipment	6.8	100% of foreign expenditures, 100% of local expenditures (ex-factory) and 85% of local expenditures for other items procured locally
Technical Assistance	0.8	100% of expenditures
Refunding of Project Preparation Advance	1.0	Amount due pursuant to Section 2.02(i) of Credit Agreement
Incremental Operating costs under parts A and B of the project	0.2	100% of expenditures
Unallocated	1.2	
TOTAL	30.0	

Table 5
Estimated Disbursement Schedule
(US$ Million)

IDA Fiscal Year	1997	1998	1999	2000
Annual	2.15	14.10	10.75	3.00
Cumulative	2.15	16.25	27.00	30.00

F. Accounts and Audits

7.8 The PMU shall maintain project accounts and submit an annual audit report to IDA no later than six months after the end of the fiscal year. Audits shall be carried out by private auditors to be hired for the duration of project implementation.

G. Supervision

7.9 IDA will carry out two supervision missions of the project annually with the PMU. One of these will be an annual implementation review conducted jointly with the Government to assess progress made

towards the implementation of the proposed project and agreed monitoring targets and the overall flood rehabilitation program. Physical works under the proposed project would be implemented over a three-year period.

H. Environmental Impact

7.10 The project is ranked Environmental Assessment Category "C" in accordance with O.D. 4.01. The project poses no environmental risks; instead it has built-in corrective measures to mitigate the effects of future floods (para. 4.2 (d)).

VIII. LESSONS LEARNED FROM PREVIOUS EMERGENCY CREDITS

8.1 In the recent past, Yemen has received two emergency recovery credits: the first was for flood emergency rehabilitation (Cr. 2073-YDR of 1989) and the second was for assisting resettlement of Yemeni returnees after the Gulf War (Cr. 2258-YEM of 1991). Of the two projects, the Emergency Flood Reconstruction Credit (Cr. 2073-YDR) of SDR 7.9 million (US$10 million), approved in December 1989 (Cr. 2073-YDR), was the most directly relevant to this project. It involved reconstruction of housing units, health centers, and agricultural infrastructure following the 1989 floods. The lessons learned from that project are that using existing implementing agencies and government timely provision of counterpart funds are important to the success of emergency operations. These factors were taken into account in the design of the proposed project. Another lesson learned is that Government needs to place high priority on following through with a flood preparedness and mitigation study. Under the proposed project, UNDP has agreed to finance the study. The recommendations from the study would identify investments for which donor assistance would be sought.

IX. BENEFITS AND RISKS

A. Benefits

9.1 The proposed project would help restore the agricultural infrastructure, the roads network and bridges and the water supply infrastructure damaged by the floods in the most affected Governorates. It would directly benefit over 124,000 people who were affected by the floods. To the extent feasible, labor-intensive methods and beneficiary participation will be used, which are expected to generate about 3,000 new job opportunities in construction activities. The project would also reduce the impact of future floods by providing the basis for an early warning system and, through studies, define long-term measures for flood control, prevention and mitigation. The flood preparedness and mitigation study would recommend administrative reforms and engineering measures which would comprise an investment program to be carried out in the medium-term.

B. Risks

9.2 The main risk associated with the proposed project relates to potential implementation delays due to the limited administrative and institutional capacity of the country in general. This risk would be minimized by the fact that: (i) both the MOA and the GCRB have implement IDA projects in the past; and

(ii) the Government has already established the inter-ministerial committee and appointed the National Coordinator for the PMU. During implementation, to guard against delays, both the PMU and PIUs would be provided with technical experts where necessary, and incentive levels of IDA supervision from the Resident Mission would be provided.

X. AGREEMENTS REACHED

10.1 During negotiations, agreement was reached with the Government that:

(a) MOPD will establish the IMC for management of disaster relief within one month after effectiveness of the Credit (para 7.1). Notification has been received that this has been done, and the IMC comprises the Minister of Planning and Development; Minister of Construction, Housing and Urban Planning; Minister of Agriculture and Water Resources and Minister of Electricity;

(b) for the purpose of ensuring the proper supervision of the implementation of the proposed project, the Government shall establish within one month after effectiveness of the Credit and thereafter maintain a PMU under supervision of the IMC (para. 7.1);

(c) a National Coordinator for the PMU would be appointed within one month of credit effectiveness (para. 7.1). IDA has recently been notified of Government's choice for the position;

(d) the monitoring indicators for the project are those in Attachment 3; and

(e) a flood preparedness and mitigation study would be completed not later than September 1, 1998. The study would recommend administrative reforms to introduce a flood preparedness program and engineering measures to reduce the country's vulnerability to such disasters (para. 4.2 (d)).

Attachments

Republic of Yemen
Emergency Flood Rehabilitation Project
Agricultural Component
Detailed Implementation Plan for Civil Works and Wadi Rehabilitation
(Base cost US$ '000)

	LCB		DC/FA		Community Contracting		Total	Implementation Plan					
ITEM	Nos	Cost	Nos	Cost	Nos	Cost	Amount	Prepa-ration		Comp-letion	Y1	Y2	Y3
A. SHABWA													
1. Wadi Ain			8	83	130	118	201	M1		M30	60	100	41
2. Wadi Beihan			11	220	112	92	312	M1		M30	94	156	62
3. Wadi Barkha			11	114	92	126	240	M1		M30	72	120	48
4. Wadi Abadan	1	63	5	61	61	128	252	M1		M30	76	126	50
5. Wadi Hamam			1	15	36	64	79	M1		M30	24	55	-
6. Wadi Dura'			10	65	66	168	233	M1		M30	70	117	46
7. Wadi Khusa			6	77	80	153	230	M1		M30	69	115	46
8. Wadi Yesbom					100	277	277	M1		M30	83	138	56
Sub-Total Shabwa	1	63	52	635	677	1126	1824				548	927	349
B. HADRAMAUT													
1. Wadi rehabilitation at Gawada and Otfa	1	252					252	M3	M5	M15	150	102	
2. Reconstruction of Shibam Diversion weir and wadi course rehabilitation	1	139					139	M6	M9	M18	39	100	
3. Rehabilitation of flood damage in 10 retention weir on W. Masila and W. Iden			10	200			200	M3	M6	M10	200		
4. Reconstruction of damaged diversion weir and irrigation canals	1	310					310	M8	M12	M20		310	
5. Rehabilitation of W. Neir at Husn-Dhuban			1	66			66	M5	M8	M11	66		

ITEM	LCB		DC/FA		Community Contracting		Total Amount	Implementation Plan Prepa-ration		Comp-letion	Y1	Y2	Y3
6. Reconstruction of damaged ainat (Sheikh Ahmed) weir on W. Masila	1	460					460	M12	M16	M30		200	260
7. Other Wadi Protection works on					3	42	42	M24		M36			42
8. Rehabilitation of 20km agricultural service roads			10	200			200	M6		M36	40	100	60
Sub-total Hadramaut	4	1161	21	466	3	42	1669				495	812	362
C. MARIB													
1. Flood protection for Canal B			1	80			80	M2	M5	M12	80		
2. Flood protection for. south canal (B.S)	1	260					260	M2	M5	M15	100	160	
3. Rehabilitation of secondary canals for 1625 ha in sectors 4, 5, 11 and 12 (Canals BS)			10	820			820	M5		M18	350	470	
6. Secondary for 1592 ha in sectors 6,7,8, 9 x 10 on Canal B.S.	1	2000					2000	M6	M9	M36	200	1000	800
7. Rehabilitation of other wadis in Marib Governorate			10	100	100	230							
Sub-Total Marib	2	2260	11	1000	100	230	3160				730	1630	800
Total civil works for flood rehabilitation	7	3484	84	2101	800	1068 1398	6653				1773	3369	1511

REPUBLIC OF YEMEN
EMERGENCY FLOOD PROTECTION PROJECT
AGRICULTURAL COMPONENT

IMPLEMENTATION PLAN FOR PROCUREMENT OF EQUIPMENT US $ '000'

ITEM	Nos			SUM	TENDERING	AWARD	COMPLETED	DISBURSEMENT			AMOUNT	REMARKS
	Shabwa	Hadramaut	Marib					Year 1	Year 2	Year 3		
A. MACHINERY												ICB
1. CONTRACT No. 1					M3	M9	M15					
a. Dozer	2	3		5							900	
b. Front Loader 3m3	2	1		3							420	
c. Loader/backhoe (110HP)	2	2		4							270	
d. Water Tanker 8 w/4wd/10t	2			2							210	
e. Dumptruck (7-8 m3)	2			2							250	
f. Flatbed Dump Truck (3t)	1	1		2							100	
SUB TOTAL								220	1930		2150	
2. CONTRACT No. 2					M10	M16	M19					ICB
a. Tractors (60-70 HP) + Dipper Trailer	4			4							148	
b. Tractor Implements	2			2							24	
c. Electric Generator (150 KVA)	2			2							60	
SUB TOTAL									232		232	
3. CONTRACT No. 3												SHP
a. Manual Soil Compactors		10		10	M1	M3	M6				40	
b. Misc. Workshop Equipment	1			1							25	
c. 28 HP Deisal Engined.	1			1							6	
d. Vertical Turbine Pump	1			1							3	
e. Unforeseen	L.S	L.S		L.S							30	
SUB TOTAL								104			104	
TOTAL MACHINERY								324	2122		2446	
B. VEHICLES					M1	M5	M12					ICB
a. Land Cruiser 4WD/Short	2			2				58			58	
b. Pick-up-DC/4 WD	6			6				144			144	
TOTAL VEHICLES								202			202	

REPUBLIC OF YEMEN
EMERGENCY FLOOD PROTECTION PROJECT
AGRICULTURAL COMPONENT

IMPLEMENTATION PLAN FOR PROCUREMENT OF EQUIPMENT US $ '000'

ITEM	Nos			SUM	TENDERING	AWARD	COMPLETED	DISBURSEMENT			AMOUNT	REMARKS
	Shabwa	Hadramaut	Marib					Year 1	Year 2	Year 3		
C. GABION MATERIAL												
1. CONTRACT No. 1												
a. Gabion Wire (m3)	86	36	21	143	M3	M7	M14	1200	666		1866	DC
2. CONTRACT No. 2												
a. Filter Fabric (m2)	86	36	21	143	M3	M7	M11	287			287	ICB
TOTAL GABION MATERIAL								1487	666		2153	
D. MISC. EQUIPMENT MATERIAL & BASIC FURNITURE												
1. CONTRACT No. 1					M5	M7	M12	48				SHP
a. Survey Equipment	24										48	
b. Water Measuring equipment	20											
c. Rain Guages	4											
2. CONTRACT No. 2					M1	M3	M7	34			34	SHP
a. Computers (x3)	15											
b. Photocopying Machines (x2)	13											
c. Typewriters (x6)	6											
3. CONTRACT No. 3					M12	M15	M18					NCB
a. Basic furniture & drafting equipment	50								50		50	
4. 3 CONTRACTS												SHP
Misc. Equipment	9		100						70	39	109	
TOTAL MISC. EQUIPMENT								82	120	39	241	

REPUBLIC OF YEMEN
EMERGENCY FLOOD REHABILITATION PROJECT (EFRP)
AGRICULTURAL COMPONENT
SHABWA AREA

IMPLEMENTATION PLAN FOR BUILDING FACILITIES US $ '000'

ITEM	PREPARATION OF TENDERS	BIDDING & AWARD	CONSTRUCTION	DISBURSEMENT			AMOUNT	
				Year 1	Year 2	Year 3		
1. CONTRACT No. 1 Two room houses (5x 70 m_2) 180 m2 guest house & 30m3 elevated tank in Nisab	M1	M6	M18	100	132		232	LCB
2. CONTRACT No. 2 Two room houses with (5 x 70 m2) 180 m2 guest house & 30 m3 elevated R.C. tank in Beihan	M1	M6	M18	100	132		232	LCB
3. CONTRACT No. 3 Office (200 m2) & 8 room Bachelor Dormitory in Nissab	M7	M12	M21		170		170	LCB
4. CONTRACT No. 4 8 room Bachelor Dormitory (250 m 2) in Biehan	M7	M12	M21		100		100	LCB
TOTAL SUM				200	534		734	

REPUBLIC OF YEMEN
EMERGENCY FLOOD REHABILITATION PROJECT (EFRP)
AGRICULTURAL COMPONENT

TECHNICAL ASSISTANCE IN US $ '000'

ITEM	PERIOD		STAFF	UNIT COST	ANNUAL COST DISTRIBUTION			TOTAL	REMARKS
	FROM	TO	YEARS	PER YEAR	Year 1	Year 2	Year 3		
I. LONG TERM									
A. SHABWA STRENGTHENING									
1. Civil Engineer (Flood Protection)	M-1	M-36	3	50	50	50	50	150	
2. Surveyor	M-1	M-36	3	30	30	30	30	90	
SUB TOTAL SHABWA:			6		80	80	80	240	
B. HADRAMAUT									
1. Civil Engineer/flood protection	M-6	M-24	3	50	50	50	50	150	
C. MARIB									
1. Senior Irrigation Engineer	M-1	M-36	2	60	0	60	60	120	
2. Civil Engineer	M-6	M-36	2.4	50	20	50	50	120	
3. Surveyor	M-1	M-36	2	30	0	30	30	60	
SUB TOTAL MARIB			6.4		20	140	140	300	
TOTAL LONG TERM			15.4						
II. SHORT TERM CONSULTANTS IN SHABWA									
1. Flood Control, design quality			0.25	120	10	10	10	30	
TOTAL T.A.			0.25		160	280	280	720	
III. CONSULTANCY SERVICES, STUDY FLOOD CONTROL & MITIGATION	M6	M18			300	475		775	
TOTAL T.A. & CONSULTANCY					460	755	280	1495	

N.B: M-30 = Month (30)

REPUBLIC OF YEMEN
EMERGENCY FLOOD REHABILITATION PROJECT (EFRP)
AGRICULTURAL COMPONENT

SUMMARY OF PROJECT ESTIMATED BASE COST US $ '000'

ITEM	PROJECT AREAS			AMOUNT	REMARKS
	SHABWA	HADRAMAUT	MARIB		
A. INSTITUTIONAL SUPPORT					
1. Building Facilities	734			734	
2. Machinery & Equipment					
i. Machinery	1547	950		2497	
ii. Vehicles	202			202	
iii. Misc. Equipment, Material & Furniture	141			141	
SUB TOTAL MACHINERY & EQUIPMENT:	1890	950	0	2840	
B. WADI REHABILITATION & FLOOD CONTROL					
a. Civil Works	2024	1610	3639	7273	
b. Material (Gabion wire & Filter Fabric)	1293	540	320	2153	
SUB TOTAL WADI REHABILITATION & FLOOD CONTROL	3317	2150	3959	9426	
TOTAL SUM	5941	3100	3959	13000	
C. TECHNICAL ASSISTANCE, TRAINING & FLOOD STUDIES					
a. T.A.	270	150	300	720	
b. Flood Studies				775	
SUB TOTAL T.A. & STUDIES	270	150	300	1495	
TOTAL PROJECT COST	6211	3250	4259	14495	

REPUBLIC OF YEMEN
EMERGENCY FLOOD REHABILITATION PROJECT (EFRP)
AGRICULTURAL COMPONENT

SUMMARY OF TOTAL COSTS IN US $ '000'

ITEM	BASE COST	COSTING		TOTAL COST	AMOUNT	
		PHYSICAL	PRICE 12%		LOCAL	FOREIGN
A. CIVIL WORKS						
1. Wadi Rehabilitation & Flood Control	7273	727	873	8873	2662	6211
2. Building Facility	734	74	88	896	269	627
SUB TOTAL CIVIL WORKS	8007	801	961	9769	2931	6838
B. MATERIAL & EQUIPMENT						
1. Machinery	2497	250	300	3047	305	2742
2. Vehicles	202	20	24	246	24	222
3. Misc. equipment, material & basic furniture	141	14	17	172	34	138
4. Gabion wire & filter fabric	2153	215	258	2626	263	2363
SUB TOTAL MATERIAL & EQUIPMENT	4993	499	599	6091	626	5465
TOTAL SUM (A & B)	13000	1300	1560	15860	3557	12303
C. TECHNICAL ASSISTANCE & STUDIES						
1. T.A.	720	0	86	806	0	806
2. Flood Study; Consultancy Services	775	0	93	868	130	738
SUB TOTAL T.A. & STUDIES	1495	0	179	1674	130	1544
TOTAL COSTS	14495	1300	1739	17534	3687	13847

REPUBLIC OF YEMEN
EMERGENCY FLOOD REHABILITATION PROJECT

Flood Damages to Highways

The Project will improve the following road sections:

A.

Wadi	Roads Affected	Damage	Rehabilitation	Costs		
1. Wadi Markha	Ataq-Nuqub km 68.1-68.6	One 300 m long IC has been partly damaged by underscouring of one embankment and complete damage to the other. The wadi has widened its course by another 200 m by erosion of the wadi bank (including half the village)	It is recommended either to construct a 500 m long bridge or to rehabilitate the old IC so it can sustain strong currents and extend the length to 500 m. Further, the eroded wadi bank (towards the village inclusive of the new rehabilitated well) should urgently be provided with slope protections over say 400 m upstream to the IC (and village)	**Alt. 2: 500 m bridge directly founded**		
				500 new bridge	7,000 UDS/M	3.5m USD
				Rehabilitation of 300 m IC	70 USD/m	0.021
				400 M slope protection	150 USD/m	0.06 MUSD
				Sub-Total		**3.581 MUSD**
2. Wadi Hammam (Nisab)	Ataq-Nuqub km 38-42	The road has an oblique crossing to a very wide wadi and it has been severely damaged over 3 km. In contradiction with the design drawings the road has been constructed so that part of the wadi runs along both sides of the road. When constructed, the present ICs were not given downstream slope protections as designed. This is the main cause for the underscouring of the ICs. One of the ICs has been completely damaged in one end. The road embankment has been completely damaged over 700 m, either due to complete removal of the embankment or from double sided scouring due to the location of the road in between two wadi arms. Longer sections of the road with remaining asphalt surfacing is endangered due to lack of slope protection.	It is recommended urgently to safeguard the remaining asphalt surfaced, but exposed, road sections by slope protections as a new minor flood may remove further say 1 km road. The present ICs should be rehabilitated with sufficient downstream slope protections. Further 700 m previous road embankment at present partly removed and placed on an exposed "island" in the wadi is recommended converted to IC to allow more free passage of the wadi discharge. This may at the same time result in reduced downtime as increased opening area may cause lower water height in present ICs during flash floods.	1,100 m ICs	1,200 USD/m	1.32 MUSD
				1,100 m IC rehabilitation	900 USD/m	0.99 MUSD
				1,800 m slope protection	150 USD/m	0.27 MUSD
				1,400 m slope protection	150 USD/m	0.21 MUSD
				Sub-total		**2.79 MUSD**

Wadi	Roads Affected	Damage	Rehabilitation	Costs		
3. Wadi Bayhan	Ataq-Nuqub km 0	The present 28 cell culvert (7 units of 4 cells with height 2.4 m and width of 3m) has been nearly clogged by debries. The wadi has overtopped the multicell culvert and cut an 80 m long opening partly in the narrowings in the wadi. The original wadi course was narrowed by gabion protected embankments. One abutment is completely damaged and 3 units of 4 cells are tilting due to undersouring. Even without clogging the drainage capacity of the multicell culvert was insufficient.	It is recommended to demolish the under designed multicell culvert, which further is sensitive to clogging and to either construct a new 200 m long bridge with a height from wadi bed to underside bridge of 5.5 m. or to construct an adequately designed IC.	200 m new IC Demolishment of 120 m culvert 400 m slope protection **Sub-Total**	1,200 USD/m 200 USD/m 150 USD/m	0.24 MUSD 0.024 MUSD 0.06 MUSD **0.324 MUSD**
4. Wadi Mafauir	Nuqub-Ataq km 158-160	Wadi Mafauir overtopped the road and scoured the downstream slope with hole up to 3 m over about 1,700 m A2-3 m width of the asphalted road surface is undermined.	It is recommended urgently to rehabilitate the downstream slope with a boundary concrete wall to the asphalt and a slope of stony materials (alternative stone pitching or gabions). The upstream road shoulders should locally be armoured with stony materials.	500 m concrete wall and protection work Rehabilitation of 3 m road width over 1,7000 m **Sub-total**	 500 USD/m 250 USD/m	 0.25 MUSD 0.43 MUSD **0.68 MUSD**
5. Wadi Harib/Ain	Harib-Nuqub km 45.0	2 pieces of 5 cell units (3x3m) multicell culvert under construction have been overtopped by 1.5 m water partly clogged by debries and completely damaged due to underscouring	It is recommended to construct a 200 m long bridge with a height from wadi bed to underside bridge of 5.5 m.	200 m bridge demolishment of 30 m culvert 400 m slope protection **Sub-total**	7,000 USD/m 200 USD/m 150 USD/m	1.40 MUSD 0.006 MSUD 0.06 MUSD **1,466 MUSD**
6. Wadi Ablah	Harib-Marib km 3.7-4.8	A14 cell 3m x 3 m culvert has not sufficient drainage capacity, and it was in addition completely clogged by debries during the flood. The road was overtopped on longer sections. This resulted in complete removal of 2.5 m. high road embankments over 3 sections with a total length of 185 m and damage due to scouring of downstream slope on further, say 600 m road sections. The damage pattern is strongly influenced by 3-4 m high sand bank constructed by the farmers.	The potential technical solutions are in practice limited due to farmers' right of way. Solutions include a bridge or an IC instead of the present multicell culvert but on the same location. It is recommended to construct a 100 m long bridge and raise the road elevation locally around the bridge by up to 2m. Road sections being raised less than 1 m, but which have experienced downstream damage, should be armoured by stony materials on downstream slope.	100 m bridge Demolishment of 500 m vulvert 1,200 m embank- ment and road 500 m back slope protection **Sub-total**	7,000 USD/m 200 USD/m 300 USD/m 150 USD/m	0.700 MUSD 0.01 MUSD 0.36 MUSD 0.075 MUSD **1.145 MUSD**

Wadi	Roads Affected	Damage	Rehabilitation	Costs		
7. Wadi Algamis	Harib-Marib km 53-55	Revision of project during construction has exchanged an Irish Crossing (IC) with a minor culvert without sufficient drainage capacity. The wadi has therefore created a new wadi course (say 30 m wide) 3-4 km along the road with severe scouring (upstream slope) and overtopping associated with damage to downstream slope.	As proposed by Army Corps of Engineers, it is recommended urgently to exchange the under designed culvert with a 150 m long IC. In addition, the new wadi course should be closed by a dam. The damaged road sections should urgently be rehabilitated inclusive construction of road shoulders with stony materials.	150 m IC 1,000m road 1,000 m increase slope protection **Sub-total**	1,200 USD/m 300 USD/m 150 USD/m	0.18 MUSD 0.30MUSD 0.15 MUSD **0.63 MUSD**
8. Wadi Alsal	Al-Fardah Hazem Algof	Total damage of IC	Replacing with new IC	120 m new IC	1,200 USD/m	0.144 MUSD
9. Wadi Al-Khaleg	Al Fardah Hazem Al-Jof	Total damage to IC	Replacing with new IC	80 m new IC	1,200 USD/m	0.096 MUSD
10. Wadi Al Slamat	Al-Fardah-Hazem Al Jof	Total damage to IC	Replacing with new IC	80 m new IC	1,200 USD/m	0.096 MUSD
11. Wadi Deeqa km 266	Amin Al Naqba	Total damage to IC protection 35 m long damage	Replacing with new IC	100 m new IC	1,200 USD/m	0.12 MUSD
12. 308 km	Amin/Al Naqba	Total damage to IC	Replacing with new IC	35 m new IC	1,200 USD/m	0.042 MUSD
13. Wadi Amakin	An Naqabah Azzan km 61	The present approximately 300 m long IC is severely damaged. The central 100 m has disappeared. The outer sections have been severely underscoured.	It is recommended the IC is replaced by a new 300 m long bridge and a height from deepest wadi bed to underside bridge of 6.5 m. Alternatively, the damaged IC should be exchanged by a vented fort with a drainage area of about 100 m^2	100 m new IC 280 rehab IC slope protection **Sub-total**	1,200 USD/m 900 USD/m	0.12 MUSD 0.252 0.038 MUSD **0.41 MUSD**
14. Wadi Galah km 487	Amin Al Naqba	Total damage to culvert	Replacing culvert with IC	30 m new IC	1,200 USD/m	0.036 MUSD
15. Wadi Al-Mashater km 16	Shuqra Zengbar	Total damage to IC	Replacing with new IC	150 m new IC	1,200 USD/m	0.18 m MUSD

Wadi	Roads Affected	Damage	Rehabilitation	Costs		
16. Wadi Sugm	Shuqrad-Ahwar km 2.0-7	The downstream side of the road has been damaged from substantial overtopping on longer sections. Most of the ICs on the road have been damaged due to insufficient design (asphalt strip in between two concrete slabs and lack of downstream slope protection) and lack of maintenance.	The damaged roads should urgently be rehabilitated (for example by rock slope on the downstream side so that further damage to the road during minor floods can be prevented). The damaged and insufficiently designed ICs should be exchanged by properly designed and constructed ICs. The under designed culverts should either be widened or exchanged by ICs.	400 m IC 3,000 road rehabilitation **Sub-total**	1,200 USD/m 150 USD/m	0.48 MUSD 0.45 MUSD **0.93 MUSD**
Grand Total						**12.67 MUSD**
B. Design and Supervision						**0.50 MUSD**

A + B = 12.67 + 0.5 = 13.17 MUSD

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REPUBLIC OF YEMEN

EMERGENCY FLOOD REHABILITATION PROJECT–ROADS/BRIDGES COMPONENT

No.	Location.	Project Name	Rehabl.	Length (m)	Costs MUSD	1st YEAR	2nd YEAR	3rd YEAR	Implementation Procedures
1	Nuqub –Ataq km 75	Wadi Markha	Bridge	500	3.581				NCB
2	Nuqub –Ataq km 38–42	Wadi Hammam (Nissab)	New IC Reh. IC	1100 1100	2.79				NCB
3	Nuqub –Ataq km 206	Wadi Bayhan	New IC	200	0.324				FA
4	Nuqub –Ataq km 158–160	Wadi Mafauir	Reh.of Road	1700	0,68				FA
5	Harib– Nuqub km 45	Wadi Harib/Ain	Bridge	200	1.466				NCB
6	Marib–Harib km 3.7–4.8	Wadi Ablah	Bridge	100	1.145				NCB
7	Marib–Harib km 53–55	Wadi Algamis	New IC	150	0.63				FA
8	Alfardah–H.Algal	Wadi Alsial	New IC	120	0.144				FA
9	Alfardah–H.Algal	Wadi Al–khaleg	New IC	80	0.096				FA
10	Alfardah–H.Algal	Wadi Al Slamat	New IC	80	0.096				FA
11	Amin–Naqaba km 266	Wadi Deeqa	New IC	100	0.12				FA
12	Amin–Naqaba km 308	Wadi Al arem	New IC	35	0.042				FA
13	Naqaba–Azzan km 61	wadi Amakin	New IC Reh. IC	100 280	0.41				FA
14	Naqaba–B.Ali km 487	Wadi Galah	New IC	30	0.036				FA
15	Shuqra–Zengbar km 16	Wadi Al Mashater	New IC	150	0.18				FA
16	Shuqra–Ahwar km 2–7	Wadi Sugm	New IC	400	0.93				FA
	Grand Total(1–16):		**12.67 MUSD**						

Preparation,Design,Tender documents

Implementation

Combined Designs

DESIGN OF ROADS, BRIDGES AND RELATED STRUCTURES

Description	Number	Total USD
Experts	12 staffmonths	75,000
Transportation/Vehicle	2 months	25,000
Accommodation		15,000
Equipment/Computer/Software		25,000
Total Station		25,000
Geotech Study		120,000
Backup, Miscellaneous		25,000
Subtotal		310,000
Contingencies		40,000
TOTAL		350,000

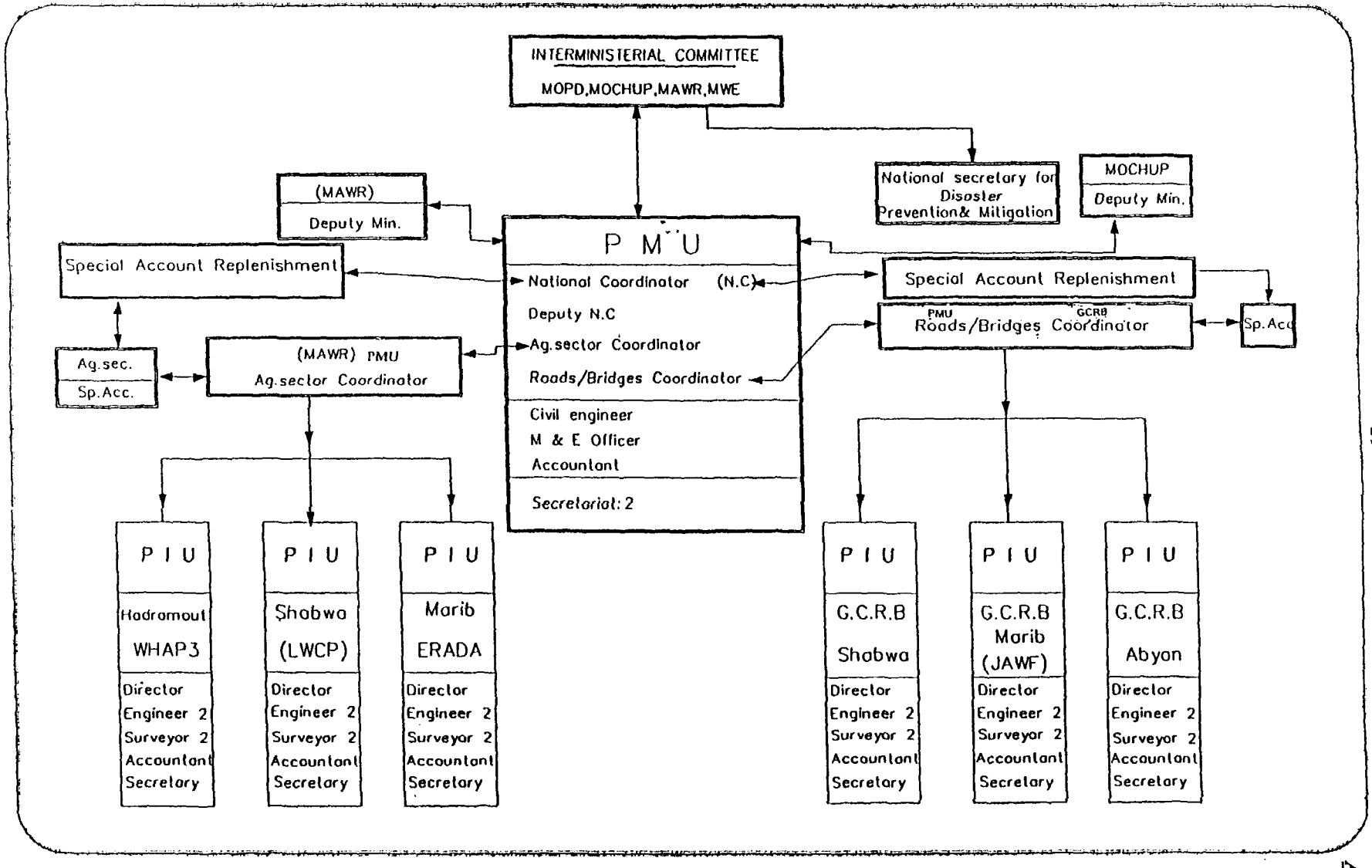
REPUBLIC OF YEMEN
EMERGENCY FLOOD REHABILITATION PROJECT
PROJECT OBJECTIVES AND IMPACTS

OBJECTIVES	INPUTS (Resources provided for project activities)	OUTPUTS (Main goods and services produced by the Project)	RISKS AND CRITICAL ASSUMPTIONS (The outcome is dependent on..)	OUTCOMES AND IMPACTS (of project activities)
I. Restore the agricultural infrastructure damaged by the 1996 floods	IDA Credit: US$12.0 million (base cost) Government Funds: US$12.0 million (base cost)\	A. Shabwa • Civil Work: - Villages: 120 - Well farms: 740 - Canals: 18 - Miscellaneous: bank protection, spurs, revetments, vertical stone walls, etc.	• Timely availability of government counterpart funds. However, this may be supplemented by grant funding from E.U. (US$4.0 million)	A. Shabwa • Restored main agicultural infrastructure affected by floods such as irrigation schemes and wadi embankments protecting agricultural land and rural villages . About 30% of wadi embankments rehabilitated in Year 1; 80% in Year 2; and 100% in Year 3.
	Contracts: - NCB 1 contract (US$65,000) - DC/FA: 52 contracts (US$650,000) - Community DC 650 contracts (US$1,130,000)			
	. Equipment and Materials - Gabion wire baskets: 86,000 m^3 - Filter fabric: 86,000 m^2 - Equipment: 22 pieces (US$1,600,000) - Vehicles 6 nos - Others & Miscellaneous (US$141,000)		• Farmer willingness to contribute labor to re-establish agricultural productivity of their lands and safety of their villages affected by the floods. (Samples of affected farmers interviewed indicated strong willingness to contribute labor for reconstruction efforts).	
	Equipment 17 pieces (US$910,000) Vehicles. 2no.s	• Building facilities - Buildings 1,760 m^2		

OBJECTIVES	INPUTS (Resources provided for project activities)	OUTPUTS (Main goods and Services produced by the Project)	RISKS AND CRITICAL ASSUMPTIONS (The outcome is dependent on..)	OUTCOMES AND IMPACTS (of project activities)
	Technical Assistance -Civil engineer (3 SY) -Short-term Consultant (3SM) B. Hadramaut Contracts: -NCB: 4 contracts (US$1,200,000 -DC/FA: 21 contracts (US$470,000) -Community D.C. 3 contracts (US$42,000) Equipment and Material -Gabion wire basket: 36,000 m3 -Filter fabric: 36,000m2 -Equipment 17 pieces (US$910,000) -Vehicles: 2nos Technical Assistance -Civil Engineer expert (3SY) Consultancy Services for technical assitance and flood studies (US$775,000) C. Marib Contracts: US$3.16 million	B. Hadramaut •Civil Works - Bank protection for Al-Guada and Al-Otfa on Wadi Sarr 500 m sloping embankment armored with Gabion mattress - 10 gabion groins, 260 m long - Reconstruct diversion weir and canal intake on Wadi Theby - Rehabilitate Shibam diversion weir - Construct a closure structure on the diversion channel and excavate in Wadi channel to direct flow in Husin Bin-Dhuban - Rehabilitation for 10 weir in Wadi Masila and Wadi Idim - Reconstruct Ainat Weir - Rehabilitate 20 km of affected agricultural service roads - C. Marib •-Completed 13 contracts for rehabilitation and flood protection for canals and 110 contracts for wadi rehabilitation	• Timely availability of counterpart funds; (EU grant is expected to mitigate risks). • Farmer willingness to contribute labor; (samples of affected farmers interviewed indicated strong willingness to contribute labor).	B. Hadramaut 30% of wadis and weirs rehabilitated by year 1; 80% in year 2; and 100% in year 3. C. Marib 25% of canals rehabilitated in year 1; 75% in year 2; and 100% in year 3.

OBJECTIVES	INPUTS (Resources provided for project activities)	OUTPUTS (Main goods and Services produced by the Project)	RISKS AND CRITICAL ASSUMPTIONS (The outcome is dependent on..)	OUTCOMES AND IMPACTS (of project activities)
II. Restore the roads and bridges infrastructure damaged by the floods	IDA Credit: US$11.31 million (base cost) Government: US$1.89 million (base cost) Contracts: Prepare 4 NCB contracts and organize force account for roads and bridges rehabilitation in at least 9 different locations	A. New bridges (800 m) B. New Irish crossing (I.C.) (2,545 m) C. Rehabilitate (I.C.) (1,380 m) D. Demolish (I.C.) (300 m) E. Slope protection (5,900 m) F. Demolish existing culvert (200 m) G. Embankment and road (1,200 m) H. Road construction (1,000 m) I. Road rehabilitation (4,700 m) J. Concrete wall and protection work to road (1,700 m)	• Timely availability of counterpart funds (EU grant is expected to mitigate risks).	20% of roads and bridges identified for rehabilitation under the project restored in year 1; 75% in year 2; and 100% in year 3.
III. Supplement ongoing works to rehabilitate rural and urban water supply	IDA Credit: US$1.1 million (base cost) to procure chlorinatiors, pumps, generators, and pipes	Rehabilitated water supply facilities through installed equipment .	Effective coordination between the PMU of this project which will provide the imported materials and the PMU of the Public Works Project which would implement the works.	• 60% of identified water supply equipment operational in year 1, and 100% by year 2. •
IV. Study for flood prevention and mitigation	UNDP grant: US$1.0 million	Study and recommendations for technical solutions and institutional arangements for dealing with natural disasters in the future.	UNDP funding committed with possible other parallel financing.	• Actionable recommendations in place by year 2.

REPUBLIC OF YEMEN
EMERGENCY FLOOD REHABILITATION PROJECT



Attachment 4

REPUBLIC OF YEMEN
EMERGENCY FLOOD REHABILITATION PROJECT

The National Coordinator (NC)

Proposed Terms of Reference

1. The National Coordinator (NC) of the above-mentioned project shall be selected from a shortlist of at least three candidates drawn up by the Ministry of Planning and Development and the concerned line Ministries. The selected candidate should have professional qualifications, experience and project management abilities acceptable to IDA.

Responsibilities of National Coordinator

2. The key responsibilities of the NC shall, among other things, include:

- liaising and coordinating with the Inter-Ministerial Committee;
- heading the PMU and coordinating with sector coordinators;
- reviewing procurement decisions and giving clearance for award of contracts up to US$200,000;
- reviewing and approving requests by sector coordinators for replenishment of special accounts;
- coordinating with line ministries and General Corporation for Roads and Bridges (GCRB) on issues of project implementation; and
- reviewing, approving and monitoring annual work programs with each sector and providing general review of quality control of implemented works.

Criteria for Selection of National Coordinator

3. The NC would have to meet the following requirements:

- to be a senior civil servant with a civil/agricultural engineering or related engineering degree and a minimum of 15 years experience in the implementation of rural infrastructure and related development projects in Yemen;
- to be sufficiently senior to liaise with the Minister of Planning and Development, the concerned line Ministers and the Chairman of GCRB;

- to have experience working on IDA-financed projects;
- to have good decision-making abilities and the ability to work across ministries in the context of a multi-sectoral project;
- to be able to facilitate the implementation of required works under the project in an expeditious manner; and
- to have working-level fluency in English.

Benefits and Compensation

4. Benefits shall be comparable to those in the private sector.

Date of Appointment

5. The NC shall be appointed no later than one month after effectiveness of the above project.

REPUBLIC OF YEMEN
EMERGENCY FLOOD REHABILITATION PROJECT

Deputy National Coordinator (DNC)

Proposed Terms of Reference

1. The Deputy National Coordinator (DNC) of the above-mentioned project shall be selected from a shortlist of eligible candidates drawn up by the Ministry of Planning and Development and the concerned line Ministries. The selected candidate should have professional qualifications, experience and project implementation abilities acceptable to IDA.

Criteria for Selection of Deputy National Coordinator

2. The DNC would have to meet the following requirements:

- to be a civil engineer with a minimum of 15 years experience on rural infrastructure projects in Yemen;
- to have had considerable experience working on IDA-financed projects and strong familiarity with IDA procurement and disbursement procedures; and
- to have a strong field orientation and an ability to work with sector coordinators, line ministries and the field project implementing units (PIUs).

Responsibilities:

- assist the National Coordinator (NC) in his duties and responsibilities; and
- provide technical support to the NC.

Benefits and Compensation

3. Benefits for the DNC will be comparable to those in the private sector.

Date of Appointment

4. The DNC shall be appointed no later than one month after effectiveness of the above project.

REPUBLIC OF YEMEN
EMERGENCY FLOOD REHABILITATION PROJECT

Agriculture Sector Coordinator & Roads and Bridges Sector Coordinator

Proposed Terms of Reference

1. The two sector coordinators (Agriculture Sector Coordinator and Roads and Bridges Sector Coordinator) of the above-mentioned project shall be selected from a shortlist and cleared with IDA and the Ministry of Planning and Development by the respective sector implementing agencies. The selected candidate should have professional qualifications, experience and project implementation abilities acceptable to IDA.

Criteria for Selection of Sector Coordinators

2. The Sector Coordinators (SCs) selected from their respective sectors would have to meet the following requirements:

- to be a senior engineer from the Ministry of Agriculture and Water Resources or from the General Corporation for Roads and Bridges with a minimum service of 15 years, a minimum of 10 years experience on implementation of civil works projects, and with a minimum of 5 years experience with IDA-financed project;

- to have had considerable experience working on IDA-financed projects and strong familiarity with IDA procurement and disbursement procedures;

- to have a strong field orientation and an ability to review annual work programs submitted by the field PIUs and a demonstrated ability to work effectively within the line ministry or highway authority and to coordinate with the PMU in securing necessary approvals (e.g., annual work program, budget and procurement) to proceed with project works.

Benefits and Compensation

3. Benefits will be comparable to those in the private sector.

Date of Appointment

4. The SCs shall be appointed no later than one month after effectiveness of the above project.

REPUBLIC OF YEMEN
EMERGENCY FLOOD REHABILITATION PROJECT

Proposed Terms of Reference

For other staff of the PMU and incremental staff of the field PIUs, the estimated staff budgets are as follows:

For other staff of the PMU:	Length of Service
Expert/Civil Engineer	24 staffmonths
Engineer (civil, 10 years expr.)	36 staffmonths
Procurement Officer	36 staffmonths
Accountant	36 staffmonths
Monitoring & Evaluation	36 staffmonths
Subtotal	US$123,600

For incremental staff of PIU for flood works:	Length of Service
Sr. Engineer (civil, 15 years experience)	36 staffmonths
Engineer (civil, 5 years experience)	36 staffmonths
2 Surveyors	36 staffmonths
Account	36 staffmonths
Miscellaneous	36 staffmonths
Subtotal	US$61,200

REPUBLIC OF YEMEN
EMERGENCY FLOOD REHABILITATION PROJECT

Study for Flood Emergency Preparedness and Mitigation Program

Proposed Terms of Reference

1. Major floods affected large parts of Yemen in 1978, 1982, 1989 and 1996. The Government of the Republic of Yemen (ROY) recognizes the need to develop measures for mitigating the social and economic impact of such floods and designing an emergency preparedness program to protect the inhabitants of flood prone areas. This study is being financed under an IDA Credit for an Emergency Flood Rehabilitation Project, which is in response to major flooding in June 1996 affecting the Governorates of Shabwa, Marib and Hadramaut. To coordinate and monitor this study, as well as the implementation of the proposed Emergency Flood Rehabilitation Program, the Government has established an Emergency Project Coordination Unit (EPCU), working under the guidance of the Ministry of Planning and Development (MOPD).

2. It is proposed to recruit consultants to carry out the study in cooperation with staff of the EPCU, other ministries, national and local agencies and private organizations. The EPCU shall assist the consultants in obtaining the relevant information, including data and reports listed in paras. 9 and 10 below.

Objectives

3. The main objectives of the study are to:

(i) assess the existing arrangements for managing emergency disasters and propose an appropriate institutional framework, at the national and local levels, which will activate automatically in the event of future catastrophic events;

(ii) develop community-based early warning and evacuation procedures and public awareness programs aimed at protecting population and property and minimizing disruptions to economic activity; and

(iii) identifying engineering options to mitigate the impact of torrential rains and flash flooding, which may be implemented over the medium to long term.

Study Area

4. Economic activities (mainly agriculture) and population settlements in ROY are mostly concentrated in 20 major wadis. The area affected covers some 350,000 hectares. The consultants should draw upon existing studies and other available information.

Scope of Work

5. The consultant's work involves inter-related tasks comprising the following:

(A) Institutional Setting and Framework

Task No.1: Review of Existing Government Response

With the assistance of the EPCU and the High Committee for Coordination of Flood Relief (HCCFR), the consultants will review the existing emergency management system and specifically the Government's experience in responding to the 1996 flood disaster in the three Governorates most effected by the floods. Particular attention should be paid to identifying measures to improve the organizational and managerial structure related to: (a) early warning and evacuation systems; and (b) implementation of relief operations. As part of this review, a workshop involving the managers in key sectors affected by the 1996 flood relief program will be held to assess ways to improve:

(a) the overall performance of the existing relief and early warning flood evacuation programs;

(b) evacuation procedures, storage and provisions for emergency shelter;

(c) public health issues;

(d) communications; and

(e) inter-ministerial coordination, coordination at the governorate and local levels; and coordination with donor agencies.

Task No. 2: Assessment of National and Governorate Logistical Capabilities

The consultants, with the support of the EPCU, HCCFR and the administration in the governorates where the wadis exist, will prepare inventories and assessments of the state of existing equipment for the emergency logistics at the national and local levels, such as four-wheel drive vehicles, earth moving equipment, etc. From this list, a plan will be developed for the deployment of resources in the case of flood emergencies. Lists of equipment needs will be prepared on this basis.

Task No. 3: Proposals for establishing an Office for Flood Emergency Preparedness

With the support of the EPCU, HCCFR and the Ministry of Planning and Development MOPD and the sector ministries concerned, the consultants will propose an institutional framework for coordination, communication and response to flood emergencies. Staffing and budgetary requirements will be analyzed and a training program for staff of the Flood Emergency Preparedness Office will be prepared, using international centers for Disaster Preparedness and Management.

Task No. 4: Preparation of Governorate and Local Level Emergency Action Plan

The consultants will assist the Governorates and district flood relief committees in reviewing existing emergency flood disaster plans and developing improved procedures covering the following actions:

(a) proposing institutional arrangements which would improve the distribution of relief needs such as food, potable water supplies, medicines, blankets and temporary shelter;

(b) conducting search and rescue operations and guiding evacuees to shelters;

(c) monitoring and controlling communicable diseases;

(d) assessing flood damage; and

(e) developing an assistance program for low-income families affected by the floods, including cash-for-work projects, short-term loans, grants in kind and food-for-work approaches.

(B) Community-Based Early Warning and Evacuation Systems

Task No. 5: Preparation of a Public Awareness Campaign

A sustainable flood preparedness program will require extensive and broad-based community support. A public awareness media strategy will be developed by the consultant to stimulate local preparedness initiatives. The campaign will also inform the public about the warning system and how it will work, evacuation routes and procedures, and will identify safe zones where people can move during floods. It should consider a range of media to test the effectiveness of various public awareness programs. The materials for such a program will be prepared by the consultant. In areas which have been flooded previously, flood markers will be erected to remind the public of the levels of the highest known floods and to serve as a reference point for future warnings.

Task No. 6: Establishment of a Community-Based Flood Warning and Evacuation System

Ultimately, flood preparedness hinges on the active involvement of inhabitants at the community level to take the necessary measures to reduce the threat from floods. This will require establishing community-based warning and evacuation systems as follows:

(a) appointing flood monitors in each vulnerable community;

(b) providing the flood monitors with sufficient training, equipment and materials to enable them to monitor flood threats and organize community evacuations in advance of actual flooding; and

(c) incorporation of the flood monitors into an overall National Flood Forecasting and Warning System.

To carry out this task, the consultants will coordinate with the meteorological authorities and local agencies and propose the necessary actions and logistics to establish such a community-based system.

Task No. 7: Interim Flood Evacuation Protection Improvement

When the housing and agricultural flood mitigation programs (see below) have been fully implemented, it will be necessary to study evacuation requirements in all areas vulnerable to major flooding. These investigations will determine the maximum expected flood levels and the facilities available to shelter evacuees in non-flood prone areas. The consultants will also recommend

emergency flood protection measures that should be taken in order to mitigate the impact of floods with a 10-year recurrence on major economic assets. Consultants will also give indications of water levels likely to occur with a 50- and 100- year recurrence and the effect of this on the same assets.

(C) Economic Development Strategies, Engineering and Investment Options

Task No. 8: Alternative Economic Development Strategies to Mitigate Flood Risks

The objective of this task is to identify development strategies to lessen the impact of flooding on the population and the economy, through:

(a) preparing an inventory of ongoing development projects and investments in order to identify possible adjustments which could reduce flood losses or contribute to flood mitigation or prevention; and

(b) exploring alternative development strategies, projects and investments that could be initiated to take advantage of periodic flooding under controlled flooding plans (such as spate irrigation and aquifer recharge).

For this task, the consultants will work together with the MOPD, the Ministry of Agriculture and Water Resources (MAWR) and the National Water Resources Authority (NWRA).

Task No. 9: Flood Protection Monitoring Program

Working in conjunction with the Regional Authorities of the MAWR and the Housing and Roads and Bridges Directorates of the Governorates, the consultants will: (i) assess the maintenance practices of existing flow control and flood protection structures; (ii) identify low-cost techniques for maintenance by local communities; and (iii) propose low-cost technology to make emergency repairs. A Pilot Program will be identified, together with the various specialized Regional Agencies, to define existing flood protection structures which have previously been prone to difficulties during floods, are of a substandard design, are in a deteriorated state of maintenance or are located in populated areas where breaching may cause loss of life and property.

Task No. 10: Agricultural Flood Control Mitigation

The agricultural flood control mitigation program will be designed to reduce agricultural losses and to improve water harvesting, aquifer recharge and spate irrigation in flood-prone areas. This task will be carried out in coordination with the MAWR, taking into account strategic irrigation development plans. The report should include maps identifying existing infrastructure and the identified study areas on the wadi banks prone to 5, 10, 50 and 100-year flood recurrences; this will involve:

(a) updating existing assessments of flood damage, proposing detailed rehabilitation or reconstruction of irrigation and flood control infrastructure, and assessing the quality and appropriateness of the rehabilitation works already completed or under execution;

(b) collecting, analyzing and updating existing physical information (meteorology, hydrology, geology, hydrogeology, morphology, topography); and reviewing the existing studies for irrigation and flood control infrastructure in the study area;

(c) locating zones vulnerable to the same flood recurrence or return period and plotting them on a "flood zone map;"

(d) assessing existing urban and rural infrastructure by type of development and the population density and other relevant social and economic parameters;

(e) assessing levels of flood protection works required for each of the above- mentioned types of infrastructure, and designing a "Flood Protection Requirements Map;"

(f) overlaying the zoning maps (c) and (e), in order to identify the areas where the level of flood protection needs to be upgraded, as a matter of priority;

(g) identifying, at the reconnaissance level, specific sub-projects to meet the required level of flood protection for various areas as defined in (f) above;

(h) preparing a program to implement the flood protection measures described in (g), establishing priorities based on social and economic factors, with preference to more densely populated urban and/or rural areas, and proposing a realistic phased implementation schedule. This should include the recommendations for terms of reference for follow-up steps for further investigations, feasibility studies and detailed designs as required for the gradual implementation of the sub-projects.

(i) in the light of the findings, the consultants will propose policies to implement, manage, operate, and maintain the irrigation and flood control infrastructure, including:

  (i) drafting of legislation to introduce and update the flood zoning maps to reflect future modifications during the implementation of the long-term program;

  (ii) drafting the requirements to obtain licenses or authorizations for future urban or rural developments including conditions to avoid conflict of interest among sectors or among projects within one sector; and

  (iii) modifying construction codes of flood protection control and irrigation infrastructure. These codes will be customized to take into account the type of project, the level of the flood zone and the site physical conditions, such as geological and soil mechanics characteristics, and localized rainfall.

Task No. 11: Roads/Bridges and Buildings Flood Mitigation Program

The consultant will design a Roads/Bridges and Buildings flood mitigation program for flood prone areas. This program should recommend structural measures that can be used to reduce losses to these infrastructure facilities. Such measures might include:

(a) structural design of diversion weirs or raised platforms;

(b) flood protection embankments for rural population centers in clusters of houses or small villages and agricultural infrastructure;

(c) raising road embankments, increased cross drainage capabilities of culverts and bridges, re-alignment of critical sections of roads prone to flood inundation and at wadi crossing in addition to protection of roads embankments;

(d) introducing building standards which insure maximum endurance of buildings under flood conditions and water resistant construction; and

(e) improving the site selection of individual buildings to avoid construction in flood prone areas.

This task would be carried out in cooperation with the Directorate of Local Government, the Ministry of Construction, Housing, and Urban Planning (MOCHUP), and MAWR.

Time Schedule and Reports

6. The consultant shall commence field work within 30 days from the effective date of the contract, which shall be defined as the date of receipt of an advanced payment equivalent to 10 percent of the contract sum. This will be known as the starting date. The following reports, in English and Arabic, will be submitted to the Ministry of Planning and Development.

Inception Report: 20 copies of which to be prepared within 45 days of the starting date, to include, inter alia, an updated work program, a list of data sources consulted or to be consulted, an update of the working method including the participation of Yemeni staff, and a description of supplementary data needed and methods of collection.

Draft Final Report: 20 copies of which to be submitted within twelve months of the starting date, to include , inter alia, the results of the 11 tasks described above. Maps shall be prepared on a scale 1:10,000. The report will be reviewed and discussed with the relevant government authorities and IDA.

Final Report: 40 copies of which to be submitted within two months of the completion of the discussions, to incorporate the results of the review.

7. It is anticipated that the Study and reporting process will take about fifteen months, however, the consultants should prepare a schedule based on their experience and assessment of needs to be included in their technical proposal.

Manpower Requirements

8. It is anticipated that about 80 man-months of expert services will be required, including local professionals and support staff. The consultant should feel free to make their own estimate of both expatriate and local manpower requirements, commensurate with the availability of basic technical information and the methodology to be adopted by them. The prospective consultants are urged to make field visit and have discussions with staff of MOPD, MAWR, MOCHUP, NWRA and local governorates to enable them to prepare a realistic estimate in this regard.

Facilities and Information to be Provided by the Government

9. The EPCU shall be responsible for providing the consultants free access to the project areas.

All administrative support services required in connection with entry and work visas for the consultants' personnel will be provided by MOPD. The Government of ROY shall exempt the consultants and their expatriate personnel from all local taxes, duties and customs duties for equipment, materials and supplies brought into ROY for carrying out the services. The exemption from customs duty would also include personal effects of expatriate personnel provided these items are taken back on completion of services.

10. The EPCU shall provide all available technical and statistical information such as maps, reports and information required for carrying out the study, and provide assistance for the collection of additional data from Yemeni agencies. The background technical information available before the 1996 flood, to be provided, will include: (i) meteorological and hydrological information for those wadis on which irrigation projects are under implementation or have recently been completed; (ii) studies and "as built" drawings and design reports for irrigation and flood control infrastructure; (iii) Feasibility Study for Long-term Wadi Rehabilitation by Binnie and Partners (April 1988); (iv) reports on past floods in various wadis; (v) various study reports performed by SOGREAH, France, including the Wadi Hadramaut Final Report, 1981; (vi) various reports by Sir M. MacDonald & Partners; (vii) various Preparation Reports made by FAO; (viii) Scheme of Water and Land Resources Development in Hadramaut Valley, by SELKHOZPPROM-EXPORT and MAAR; (ix) satellite mapping and geophysical data completed by Robertson Group (UK); (x) Technical Report (5/89) from FAO on procedures for the spate and ground water irrigation; (xi) hydrology reports on the Tihama Wadis; (xii) hydrology reports on the wadis Adhana and Al-Jawf in the Marib Governorate; and (xiii) Report 35 of the Water Resources Assessment of Yemen (WRAY) and any other relevant reports which may be considered necessary for the study.

11. Information to be provided to consultants by Government shall also include that prepared subsequent to the 1989 flood such as: (i) Report on Flood Damage by Mott MacDonald, dated April 13, 1989; (ii) Evaluation of March/April 1989 Flood Damage and Rehabilitation Needs, by R.F. Camacho-FAO; and (iii) The Technical Reports prepared by DOI and other government agencies. Information to be provided shall also include that prepared subsequent to the June 1996 floods such as: (i) White Paper prepared for Government through ODA assistance; (ii) aerial photography of flood-affected areas and satellite imagery through Netherlands assistance; and (iii) miscellaneous short-term consultant sectoral assessment reports for the 1996 flood damage.

12. The Government shall be responsible for providing office facilities and five professional counterpart staff in addition to all available reports, studies and maps.

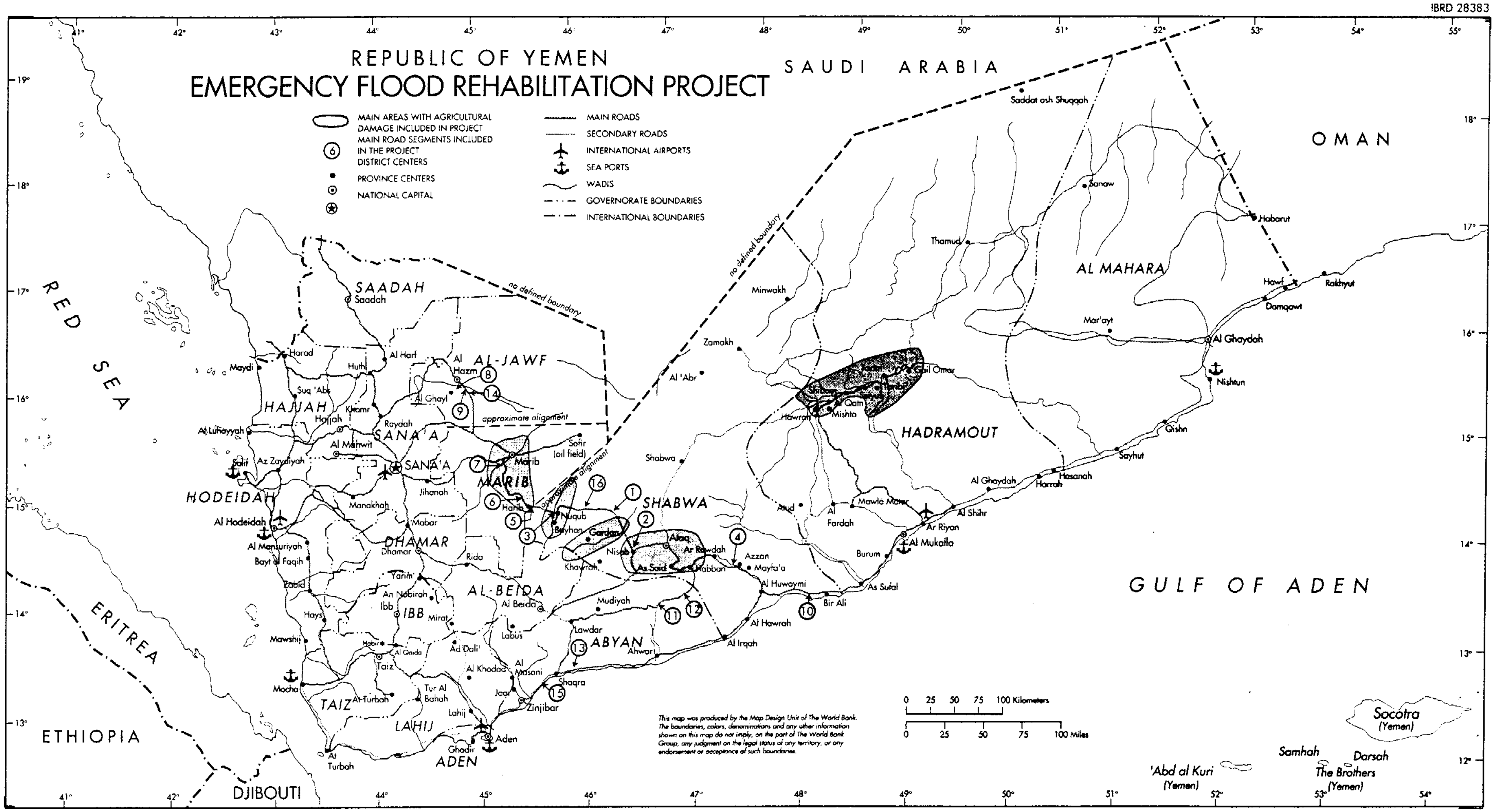
Other Provisions

13. The consultant shall provide any materials and equipment required for the study, as well as transportation and any local professional and support staff deemed necessary to carry out the work.

14. The consultants are encouraged to explore the availability of water resources and flood information about Yemen in international archives and submit their findings in their proposals.

MAP SECTION

IBRD 28383



NOVEMBER 1996

IMAGING

Report No: P- 7042 YEM
Type: ~~MOP~~ TAN