UNITED STATES AGENCY FOR
INTERNATIONAL DEVELOPMENT (USAID)
MISSION TO PAKISTAN

ENVIRONMENTAL ASSESSMENT

OF

BALOCHISTAN ROAD PROJECT

September 1991

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DATE : 23-10-1991

Chief
Office of Engineering,
United States Agency for
International Development,
Mission to Pakistan
18-6th Avenue, G-5,
Islamabad.

SUB: ENVIRONMENTAL ASSESSMENT OF BALOCHISTAN ROAD PROJECT - CONTRACT NO. 391-0470-C-00-1795-00

REF: Your Faxed letter # F 7073191 dated Oct. 7, 1991.

Dear Sir,

Enclosed herewith please find (25) copies of the Environmental Impact Assessment Report for Bela-Awaran Turbat - 376 Km, Balochistan Road.

This fulfilled all the requirement under the above Contract. It was a pleasure having worked on this USAID assignment.

We assure you of our best professional services at all times.

With kind regards.

Yours Sincerely,

Qamar Shaikh

QAMAR A. SHAIKH
Transportation Specialist
ACE - Karachi.

Encl: As above.

CC:

1. Mr.Chaudhry Laiq Ali
   Mission Environmental Engineer
   USAID Islamabad.

2. Anis Ahmed Chaudhry
   Team Leader
   Environmental Scientist - ACE - Lahore.

THIS REPORT IS IN APPRECIATION OF THE EFFORTS OF MANKIND TO PRESERVE & PROTECT HIS ENVIRONMENT

QAMAR A. SHAIKH
TRANSPORTATION SPECIALIST
ACE (PVT) LTD.

REPORT ON

ENVIRONMENTAL ASSESSMENT

OF BALOCHISTAN ROAD PROJECT

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Project Background and Purpose

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PROJECT BACKGROUND AND PURPOSE

1.1 PROJECT BACKGROUND

Associated Consulting Engineers ACE (Pvt) Ltd. entered into an agreement with United States Agency for International Development (USAID) vide Contract 391-0470-C-00-1795-00 dated March 28, 1991, to conduct environmental assessment study of Balochistan Road Project. This report has been prepared to comply with the study requirement of the Project.

The Project is located in the southern part of Balochistan Province of Pakistan (Figure 1.1). The Project will provide a black topped road from near Bela to near Turbet, a stretch of about 376 Km. The road will run in east - west direction almost parallel to the Makran coastline at an approximate distance of 90 Km from the Arabian Sea. The road will provide a modern communication facility to inter-link Makran Division, an extremely under-developed track of Pakistan bordering Iran, with the rest of the country via Karachi - Quetta bound National Highway N-25 which passes through Bela at a distance of 182 Km from Karachi.

Presently, the towns of Bela and Turbet are connected through an undeveloped track. Out of the total stretch of about 409 Km between the two towns, first 40 Km from Bela and about 28 Km near Turbet are black topped, while the remaining stretch of 341 Km is gravel/dirt road. The geometrics of the existing track is sub-standard and it generally lacks crossings over the natural drainage channels (rivers and nullahs).

Historically the existing track was a camel track linking Turbat and beyond with Bela. In early 60's, the Government of Pakistan planned to construct a road connecting Karachi with Iran border through Bela, Awaran, Turbat and Mand under a treaty between Pakistan, Iran and Turkey, namely Regional Cooperation for Development (RCD). For political reasons this project was dropped and instead the RCD highway was built between Karachi and Quetta (which is now known as National Highway N-25).

In early 1908s the Government of Balochistan planned to up-grade this communication facility with the technical and financial assistance of USAID. In this respect USAID engaged a consortium of consultants - M/s STV Lyon Associates of USA and Associated Consulting Engineers ACE (Pvt) Ltd. of Pakistan - in 1985 for planning, design and construction supervision of a 110 Km road stretch from near Mar Kaur, where asphalt road from Bela ends, upto the town of Awaran. The assignment of planning and design was completed in 1987 and the project construction was started. But due to unavoidable circumstances the construction works could not be completed.

In the meantime USAID engaged another consortium of firms, constituted of M/s STV Lyon of USA, and Engineering Consultants and Pakistan Consulting Services of Pakistan, in 1988 to plan and design the remaining part of the undeveloped road stretch from Awaran to near Turbet (about 231 Km) and to upgrading 35 Km black topped Bela - Awaran road preceeding 110 Km stretch of first contract. The assignment was completed in 1990.

Now the Government of Balochistan/USAID has planned to implement the Project according to the design provided by the Consultants.

This environmental assessment study has been prepared to comply with the pre-requisite of Government of Pakistan and USAID for implementing the Project.

1.2 OBJECTIVE OF THE PROJECT

Balochistan is the largest of Pakistan's four provinces. In spite of the fact that it occupies an area of 347,190 Sq. Km, which forms almost 44 percent of the total area of Pakistan, it supports about 4 percent of the nation's population of about 107 million. The rural-urban population distribution in the Province is 84 percent and 16 percent, respectively. Due to arid climate and extremely rugged topography, the settlements throughout the Province are few and far between, depending on the coincidence of cultivable land and relatively reliable water availability from surface flows or shallow groundwater. With the result, the Province of Balochistan is the least developed area of Pakistan. There are still some areas in the Province which are deprived of even the basic amenities including proper road facilities.

Administratively the Province is divided into four Divisions, viz., Quetta, Sibi, Kalat, and Makran. Makran is the remotest Division of the Province and virtually isolated by road from other areas of the Province and the nearest market centre of Karachi. The road network leading to and running throughout the Division is deficient and whatever is available consists of gravel/dirt tracks. With the result, the Division is one of the least developed areas in the Province.

To uplift the socio-economic conditions of the Makran Division, the Government of Balochistan initiated an integrated development programme in 1985, with the assistance of USAID under Balochistan

Area Development Project (BALAD). The project included various works in the field of water resource development, agriculture, roads, domestic water supply, social infrastructures (health, education, electricity, telephone), market facilities, office buildings etc. The project also included the Improvement of road links with the rest of the country. The principal link into and out of the Makran Division is the Bela - Awaran - Turbet road, a stretch of 409 Km. As referred earlier, of the total track, a stretch of 341 Km is shingle/dirt road, while the remaining 68 Km are black topped road. The Balochistan Road Project foresees not only the construction of 341 Km stretch of dirt road, but also the improvement of 35 Km black topped road to upgrade it to the design standards adopted for the rest of the road. The 28 km stretch of the road near Turbat (and the bridge on Kech River) has recently been constructed under BALAD Project.

1.3 OVERVIEW OF THE PROPOSED PROJECT AND STUDY AREA

Through the review of the Preliminary Reports on Balochistan Road Project, prepared by the Consultants referred in Section 1.1, it has been observed that the proposed road will almost follow the existing track with minor adjustment in the alignment at places where the existing track does not fit in the adopted design criteria (Ref. 1.1 and 1.2). The proposed road has been designed according to AASHTO Rural Roads Standards and appropriate cross drainage structures will be provided. The road will be an all weather 6.6 meter wide paved road with 1.5 m hard shoulder on the existing gravel track. There will be 29 RCC bridges (ranging from 40 Meter to 200 Meter) and 250 box/pipe culverts for this road. The design features of the road have been discussed in Appendix-A.

The road falls in three civil administrative units (districts) of Kalat and Makran Divisions. They are as follows :

1. Bela Sub-Division of Lasbela District (Kalat Division) - about 3 Km
2. Wadh Sub-Division of Khuzdar District (Kalat Division) - about 7 Km
3. Awaran Sub-Division of Khuzdar District (Kalat Division) -about 216 Km
4. Turbat Sub-Division of Turbat District (Makran Division)-about 150 Km

The road will negotiate or pass through close proximity of a number of rural settlements with a population of a few tens to a few thousands. Table 1.1 depicts the settlements alongwith approximate distance from Zero point near Kaniki River (almost 5 Km from junction of Bela-Awaran Road with Karachi - Quetta bound National Highway N-25 near Bela). The table also shows the population of these settlements according to 1981 Census Report (Ref. 1.3 to 1.5).

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The list in the table has been prepared on the basis of field observations made during the trip to the Project area from May 18 to 22, 1991. It does not depict the complete set of settlements in the close vicinity of the road. A number of settlements constituted of a few huts or roadside hotels/ shops, bearing no names, have not been included in the list. Such missing sites total to about ten. No detailed map showing the settlements was available. Figure 1.2 depicts approximate location of the settlements as observed during the field trip.

The Project road ends in between the settlement of Shahrak and Kisak, beyond which the road is black topped up to Turbat (28 Km). This section including bridge on Kech River has recently been constructed under BALAD Project. However, to assess the direct beneficiaries of the proposed road, the settlements up to Turbat have been included in the table. It can be observed from the table that the proposed road will directly serve a population of about 85,000. However, the actual benefits of the road will be far reaching than the limited area in the close vicinity of the road corridor. It is envisaged that the proposed road will benefit the whole Makran Division and Awaran Sub-Division of the Khuzdar District. The population of these areas is as follows (according to 1981 Census) (Ref 1.3 through 1.7) :

Unit	Area (Sq.Km)	Population
Makran Division :		
- Turbat District	22,539	379,467
- Panjgur District	16,891	160,750
- Gwadar District	15,216	112,385
Kalat Division :		
- Awaran Sub-Division	3,000	110,353

For the purpose of the environmental assessment, the study area will, therefore, constitute the whole of Makran Division and Awaran Sub-Division of Khuzdar District. However, great emphasis will be laid on the areas of direct influence viz., road corridor and areas of near vicinity.

The road passes through a mixed terrain of rolling plains, rugged mountains, and level plains. For the first 5 Km from Zero point near Kaniki River, the road traverses through a flat to gently rolling terrain with little agricultural activities (barani and riverain). From Km 5 to about Km 17, the road passes through almost barren mountains of the Hala Range at Lak Pass. Beyond Km

17 up to Km 56, the road passes through a series of hilly terrains and intermittant valleys with almost no agricultural activities except riverain agriculture in Goko and Mar Kaur at Km 32 and Km 36.4. From Km 56 to Km 98 the terrain is constituted of nearly level plain of Jhalawan Valley with some intermittant hills at Km 73 to Km 75. In this reach some agricultural activities have been noticed near the villages of Arah and Jhal Jhao (at Km 60 and Km 87 to Km 92). At Jhal Jhao agriculture is developed under irrigation through tubewells. The major portion of the valley, however, is barren with scanty vegetative growth.

From Km 98 to about Km 106 the road track passes through another mountains range through Serd Pass before entering into a wide valley extending up to Km 130. The valley is rich in vegetative growth, but no agricultural activity was observed along the road. After crossing another hilly terrain between Km 130 to Km 133, the road traverses through a vast and almost level valley of Kolwa, which extends up to the villages of Tank/ Hoshab (Km 293), beyond which is the Kech River valley up to Turbat. These two valleys are bounded in the south and north direction by Makran Coastal Range and Central Makran Range, respectively.

These two valleys are relatively more developed for agriculture under irrigation through tubewells, karezes, Kaurjos (canals diverted from river). However, agricultural activities were intensive near the village settlements.

1.4 ENVIRONMENTAL POLICY, REGULATION, PERMITS AND CRITERIA

Socio-economic stress of ever-growing population and the need of improvement in the living standards demand the resource and social infrastructure development projects. Notwithstanding the social and economic benefits, each and every development project interacts, to various degrees, with human, biological and physical resources of the project area and its environs. This interaction may induce favourable or unfavourable changes in the environmental baseline conditions of the area of project influence. It has been experienced that lack of environmental considerations in the project planning in the past has invariably resulted in the environmental degradation. Consequently, the past three decades have seen increasing public and official awareness, the world over, regarding the environmental problems in general as well as those associated with a development project. This lead to promulgation of official regulations for pollution control and environmental protection. These regulations demand an environmental impact assessment of the development project and planning mitigatory/ compensatory actions to minimise the adverse impacts.

The Balochistan Road Project falls under the influence of two official environmental regulations. These are as follows :

1. Government of Pakistan
2. US Laws and Regulations which control the review and approval of AID funded projects overseas.

In the preparation of the Environmental Assessment Report, effort has been made to comply with the contents of these regulations.

1.4.1 Government of Pakistan

A number of legislations had been enacted by the Government of Pakistan from time to time to regulate the public practices as regard land use, water use, land reclamation and drainage, forestry, wildlife, archaeological and historical properties, public health, energy, noise etc. However, the milestone of Pakistani environmental law and regulation is Ordinance No. XXXVII, "Control of Pollution and Preservation of Living Environment", enacted on December 1983. This was made effective from February 1984 with the establishment of Pakistan Environmental Protection Council (PEPC), headed by the President of Pakistan, and Pakistan Environmental Protection Agency (PEPA), headed by an appointed Director General. PEPC is a policy making body, while PEPA has the responsibility for establishing environmental quality standards, and implementing and enforcing the Ordinance. To assist the PEPA, Provincial Environmental Protection Agencies have also been established.

The Ordinance requires the preparation of an environmental impact statement for projects of significant size or projects likely to have significant environmental impact. For the preparation of this statement, the Government of Pakistan has published Environmental Impact Assessment Guidelines in 1986 covering various project fields including roads (Ref. 1.8). Very recently the Government of Pakistan has also drafted National Conservation Strategy, which provides a realistic study of why and where Pakistan's natural resources are threatened and how they can be harnessed and managed to their sustainable best (Ref. 1.9).

The Government of Pakistan has issued a standard proforma questionnaire for the preparation of environmental impact statement. This has been filled and attached as Appendix- B. This impact statement will be reviewed by PEPA, which in turn would recommend to the Government of Pakistan whether the project should be allowed to proceed or not.

Other Pakistani legislation relevant to environmental issues of this project are the Pakistan Forest Act, 1974, the Baluchistan

Wildlife Protection Act 1974, Antiquities Act 1975 of Department of Archaeology, Land Acquisition Act 1894, Local Government Ordinance of 1979 (Section 93 pertaining to Environmental Pollution).

According to Antiquities Act, it is required that an approval from the Director Archaeology should be obtained before the execution of a development project if it is located within two hundred feet of protected immovable antiquity. Inspite of the fact a number of archaeological sites have been identified in the project area, there is no protected antiquity. In this regard, certification from the Archaeology Department was requested which could not be obtained due to reasons explained in the relevant documents attached at Appendix- C. Now the Government of Balochistan has been requested by USAID to take up the matter with the Archeaology Department.

1.4.2 USAID Environmental Regulations

Basic policy for consideration of the environmental implications of AID-financed activities is embodied in the larger requirements set forth at 22 CFR part 216, "AID Environmental Procedures", which includes a comprehensive set of procedures to be followed, and requirements to be met, in evaluating proposed project. The AID Environmental Procedures, 22 CFR 216 is, in turn, rooted in the US National Environmental Policy Act of 1970 (NEPA).

In addition to NEPA and 22 CFR 216, numerous other regulatory documents applicable to the proposed project are :

- Foreign Assistance Act of 1961, Section 117, Environmental and Natural Resources

- Foreign Assistance Act of 1961, Section 118, Tropical Forests

- Foreign Assistance Act 1961, Section 119, Biological Diversity

- Council on Environmental Quality (CEQ) regulations, FR 43:230, November 1978.

- Execution Order (EO) 11514, "Protection and Enhancement of Environmental Quality, March 1970, as amended by EO 11991, May 1977.

- EO 12114, "Environmental Effects Abroad of Major Federal Actions," January 1979.

- Policy Determination (PD-6) regarding Environmental and Natural Resources Aspects of Development Assistance (April, 1983).

1.5 ENVIRONMENTAL ASSESSMENT SCOPING

According to item 3(a)-4 of AID Environmental Procedure 22 CFR Part 216, a scoping process as an important element of the overall environmental assessment for a AID- funded project. The purpose of the scoping process is to identify and understand both the nature and extent of social or environmental impacts and to take the counsel of local Government agencies, public representatives, affected groups and local NGOs regarding the mitigation measures. The scoping process is, in reality, a public involvement mechanism designed to provide a forum wherein the Government officials, other public and private groups, and concerned individuals can express their views and concerns related to the proposed action.

With this background, two scoping sessions were arranged by USAID at Quetta and Turbat on June 25, 1990 and August 21, 1990, respectively. The proceedings of these scoping meetings were compiled by USAID and provided to the Consultants for necessary action. These have been annexed at Appendix- D and summarised in the following paragraphs to highlight the main issues to be considered in the environmental assessment and consequently in the proposed mitigatory/compensatory actions.

The scoping meetings were attended by Government of Balochistan officials, political and social leaders, representatives of non-government organizations, and interested groups like transporters, local village representatives, fishermen from coastal areas, etc.

The overall impression of the scoping session is that almost all the participants, who expressed their views, have appreciated the project and considered it as a basic tool for the socio-economic development of the area, particularly that of Makran Division. It was emphasised that the road facility will help in the transportation of fish and dates, the main products of the area, to the market centre of Karachi. However, a number of socio-environmental related issues were also highlighted by the participants and attention of planners was drawn to consider these issues in the planning, design and execution of the Project. These are as follows :

- Issues related to project features and infrastructure facilities:

1. Road alignment should not disturb the sailaba cultivation by interrupting surface runoff; appropriate cross drainage should be provided for the free movement of the surface water

2. Concern about crossing of Kech/Kil Kaur Rivers at four places near Pirkot, Tajaban, Sami and Turbat

3. Road section from Tajaban to Turbat should not follow the alternate existing track south of Kech River, because, as such, the large villages like Sami, Shahpuk and Shahrak will be deprived of the road facilities

4. Sharp curves in the existing track should be removed and proper road signs provided to avoid accident

5. Provision of by-passes for the villages to avoid accidents and pollution

6. Concern about improved connection of Panjgur, Gwadar and Mand with the proposed Bela-Awaran - Turbat Road

7. Washroom/latrine facilities should be provided at selected points along the roads, particularly for ladies

8. Medical facilities for treatment of roadside injuries

9. Provision of water points along the road
10. Tree plantation along the road

11. Provision in road design for future development of infrastructure facilities like electricity, telephone and gas transmission lines

12. Development of agro-based industry

- Issues related to Biological Environment:

  1. Protection of ecosystem and rangeland

  2. Wildlife protection measures during construction and operation of road, and strengthening of wildlife protection agency

  3. Rangeland management for the grazing of prospective increased livestock population due to the Project

4. Protection of agricultural land and development of water resources of irrigated agriculture

5. De-salinisation plant for development of agriculture in the coastal area

- Social and Health issues :

1. Concern about health-hazards, during construction and operation of the road, induced by :

    - Dust, bitumen and vehicular smoke
    - Water-borne disease
    - Disease vectors
    - Sandfly
    - Noise, etc.

2. Morality prevention measures during construction and from prospective increased traffic in future

3. Impact on social structure of the area

4. Impact on employment, education and social set up

5. Disposal of waste material (spoil, spills of tar, empty drums etc.)

6. Women's role in the project

- Administrative issues :

1. Strengthening and training of C&W staff for road maintenance

2. Strengthening of Forest, rangeland and wildlife protection staff

3. Enforcement of traffic laws and orders to avoid accidents

4. Facilities for transportation of injured persons to hospitals

5. Early implementation of the project and measures to avoid delays on the part of contractor

6. Rescheduling of construction activities. It was suggested that the construction should be started from Turbat-side instead of Bela-side

References :

1.1 STV/Lyon Associates Inc. and Associated Consulting Engineers ACE (Pvt) Ltd., Bela-Awaran Road, Preliminary Report, Volume 1, 1987.

1.2 STV/Lyon Associates Inc. and Engineering Consultants and Pakistan Consulting Services, Bela-Awaran - Turbat Road, Preliminary Report, Volume 1, 1990.

1.3 Population Census Organization, Government of Pakistan, 1981 District Census Report of Lasbela, 1983.

1.4 Population Census Organization, Government of Pakistan, 1981 District Census Report of Khuzdar, 1983.

1.5 Population Census Organization, Government of Pakistan, 1981 District Census Report of Turbat, 1983.

1.6 Population Census Organization, Government of Pakistan, 1981 District Census Report of Gwadar, 1983.

1.7 Population Census Organization, Government of Pakistan, 1981 District Census Report of Panjgur, 1983.

1.8 Environmental and Urban Affairs Division, Ministry of Housing and Works, Government of Pakistan, Environmental Impact Assessment Guidelines, 1987.

1.9 National Conservation Strategy Secretariat, Government of Pakistan, National Conservation Strategy (Draft).

TABLE 1.1

LIST OF SETTLEMENTS IN THE NEAR VICINITY OF THE PROPOSED ROAD

Sr. No.	Approximate Distance from Zero Point Near Bela	Village/ Settlements	Population 1981 Census
AWARAN SUB-DIVISION			
1.	20.7	Sheerian Farhad	359
2.	32	Goko	367
3.	37	Manro Kaur	223
4.	59.9	Arah	267
5.	71.5	Larandari	165
6.	87	Jhal Jhao	469
7.	100.3	Babaro	89
8.	121	Londra	-
9.	142.3	Bedi of Awaran	1,471
10.	144	Awaran Bazar	817
11.	158.7	Tirtaj	148
12.	176.6	Buzdar	1,586
13.	184	Malar	1,750
14.	200.9	Zik	-
15.	208.4	Gishkaur	1,538
16.	219	Hore	1,319
17.	222	Lal Jani Bazar	167
18.	225	Sohar Kalat	403
TURBAT SUB-DIVISION			
1.	236	Marjai Kalat	333
2.	245	Dandar	2,661
3.	253.3	Azhel Kalat	919
4.	265.4	Rod Khan	785
5.	275.9	Bidrang	135
6.	290	Tank Bazar	945
7.	306.8	Hoshab	1,475
8.	326	Tajaban	653
9.	340	Hirok	4,410
10.	360	Sami	3,201
11.	365	Shahpuk	3,678
12.	367.3	Shahruk	1,250
13.	384	Kisak	1,395
14.	397	Jusak	First settlement of Turbat
15.	404	Turbat	52,337

CHAPTER 2

Description Of Project Alternatives And Infrastructure Requirements

CHAPTER - 2

DESCRIPTION OF PROJECT ALTERNATIVES

2.1 ALTERNATIVE CONSIDERED

In the Preliminary Reports of the Project (Ref. 1.1 and 1.2) no alternative route other than the proposed Bela - Awaran - Turbat Road was considered. However, alternative routes for at various segments of the proposed road were studied and discussed on engineering and social grounds. For the purpose of this report these will be dealt with in Section 2.2. In this section probable alternative routes, including no action alternative, have been discussed in the light of future development actions by the Federal or Provincial Governments. These alteratives are as follows :

1. No Action
2. Coastal Road Option
3. Khuzdar - Awaran - Turbat Road Option
4. Proposed Action (Bela - Awaran - Turbat Road)

2.1.1 No Action

As referred in Section 1.2, the purpose of the proposed road is to meet the requirements of integrated development programme of Makran Division which is being implemented under Balochistan Area Development (BALAD) Project. The programme is a multi-disciplinary action leading to overall development of the area in socio-economic fields. The geographic location of the Makran Division is such that it is presently in a state of isolation from the rest of the country with the exception that its major towns, viz. Turbat, Panjgur, Gwadar, Pasni and Jiwani are connected through air routes. There is no railway facility for the area. The existing land routes are extremely in a bad condition. These land routes are gravel/dirt roads having sub-standard geometric and pavement condition. They pass through very difficult hilly terrains and lack primary and secondary infrastructure facilities, like proper crossing over drainage channels, bus and truck stops, repair shops, check posts, tea and food shops, road side health facilities, water points, washrooms, etc.

In the absence of a proper linkage of the region with the rest of the country and particularly with the nearest market place of Karachi, the aims and objectives of the BALAD Project can not be fully realized. The status quo condition of the existing communication system will not only hamper the economic development of the area, but also result in social deprivation of the local people. The area generally lacks medical, education and other social infrastructures. The people have to travel a long distance to Karachi or Quetta for these facilities. In spite of the fact that air travelling is subsidised, the common man can not afford this facility. On the other hand road travelling, under the present conditions, is tiring and time consuming.

In the light of this, No Action alternative will not only leave the region in a state of general poverty and social deprivation, but also would not be compatible with the objectives of BALAD Project. Therefore, this option has not been recommended.

2.1.2 Coastal Road Option

The Ministry of Communication, Government of Pakistan, has planned to construct a coastal road connecting the coastal towns of Jiwani, Gwadar, Pasni and Ormara with Karachi. The road will run almost parallel to the coastal line and meet the Karachi - Quetta bound National Highway N-25 (or RCD Highway) at a point about 100 Km from Karachi. Presently, the road section from N-25 to Ormara is under construction by Frontier Works Organization. However, the progress on this road is very slow because of difficult terrian constituted of swamps and hills of Balochistan Axial Belt and Makran Coastal Range.

This road project is the part of overall development programme of the Ministry of Communication for the coastal area. The Ministry is planning to develop modern port and fish harbour facilities at Pasni and Gwadar. Pasni Fish Harbour has been completed and is in operation. The construction of Mini - Port at Gwadar is underway and would shortly be completed. The facilities at Gwadar will not only be used for unloading of fish but also handle large vessels transporting commodities of basic needs for Makran Division, like food grains, petroleum products, machinery, etc., from Karachi. Ultimately the facilities will be expanded to function as a substitute international sea port. Thus sharing the load of Karachi Port.

The coastal road will be used to transport the imports at Gwadar to the rest of the country, particularly to Karachi. Besides, the road will have a strategic importance from defence point of view. The development of a naval port at Gwadar is also the part of this strategy.

The town of Turbat is presently connected with Gwadar and Pasni by gravel/dirt roads, which have been upgraded to motorable dirt roads under the BALAD Project. Provision of a black topped road between Turbat and Pasni, thus connecting the area under study with the prospective coastal road, may resolve the communication constraints of the area and meet the objectives of the BALAD Project. Moreover, it has been found that the travelling distance between Turbat and Karachi will almost be the same as that on Bela - Awaran - Turbat Road.

Inspite of the fact that coastal road option will realise the objectives of the BALAD Project, but not to a full extent. The reasons are as follows :

1. The objective of the BALAD Project is the integrated development of whole Makran Division, which includes the districts of Turbat, Gwadar and Panjgur. The coastal road may, though, facilitate Gwadar District and to some extent Turbat District, it will play a limited role in the development of major portion of the Turbat District and whole of the Panjgur District, due to fartherness of the coastal road.

2. The Awaran Sub-Division of Khuzadar District, will be deprived of the modern communication facilities and so is the case with the large track of Turbat district.

3. The work progress on the coastal road is very slow. In spite of the fact that construction work on first section upto Ormara is in progress, the construction of remaining part of the road is still in doldrums due to many constraints at the Government level. Therefore, any late action on the part of Federal Government may hamper the development strategy of Government of Balochistan.

4. In view of the objectives of the coastal road, referred earlier, it is speculated that the road will be heavily used for the transportation of imported and export goods and for defence related traffic. The diversion of the traffic of the Makran Division may overload this road facility, thus causing delays.

2.1.3 Khuzdar - Awaran - Turbat Road

Presently this option is in the planning strategy of the Federal Government. Under the overall development strategy of the Province. Presently, the District Headquarters of Khuzdar is connected with Awaran by a shingle road which passes through a hilly terrain of Central Makran Range and hills of Axial Belt.

This option may meet the objectives of the BALAD Project by provinding an outlet for the concerned area. But the travelling distance from Turbat to N-25 will increase by about 150 Km,and Karachi by about 300 Km.

Therefore, this option can not be considered against the proposed Project.

2.1.4 Bela - Awaran - Turbat Road (The Proposed Action)

In the light of discussions made in the preceding sections, it can be concluded that the proposed action is the best alternative that is compatible with the objectives of the BALAD Project. Therefore, the proposed Bela-Awaran-Turbat Road should be implemented without any further delay for earlier realization of benefits of the BALAD Project, which is already nearing its completion. The provision of roads under other options, if constructed, will be an additional facility for the area.

2.2 ALTERNATIVE ROUTES CONSIDERED FOR THE PROPOSED ROAD

An overview of the proposed action has been given in Chapter - 1 (Section 1.1 through 1.3). These sections describe the development history of the Project and its objectives. A brief note on the Project route has also been reproduced from the Preliminary Reports (Ref.1.1 and 1.2). It is generally observed that the overall strategy of the road planners has been to follow the route of the existing road. This, as is understood from the Preliminary Reports, was in compliance with the intentions of the Government of Balochistan. The restriction to the existing route may also be due to the manoeuvring limitations imposed by the hilly terrain. In spite of this, at places minor deviations from e existing route have to be made on engineering considerations of the road geometrics. These may not be considered as alterantive routes.

During the planning study of Bela - Awaran Section of the road, a number of alternative routes for various reaches of the road were analysed for the following considerations :

1. Least construction cost
2. Does not by-pass any population centre now served by the existing road.
3. Provides a route which is famaliar to present users of the road.
4. Traverses land with potential for agriculture and livestock development, and should be compatible with future area development plans.

The recommended route will meet the objectives narrated above and it has been observed that it almost follows the old road track.

Beyond Awaran upto Tajaban (about 160 Km), it was found that the route of the existing road is clearly superior to any other alterantive route. However, a few minor adjustments at places were made in the road alignment to fit the design criteria, and to avoid disruption to agricultural land and settlements.

However, beyond Tajaban three alternative routes were considered to avoid multiple crossing over Kech River. Following the existing route, the road will cross the Kech River at three locations near Tajaban, Sami and Turbat. To avoid this multiple crossing two alternative routes other than the existing one were studied. One was connecting Tajaban with Sami along the right bank from where it will follow the old route upto Turbat. The other alternative proposal was to follow the existing route after crossing the Kech River at Tajaban. For the later reach, it was considered that instead of turning towards Sami accross the river, a new alignment along the left bank upto Turbat shall be provided. In both the cases the road has to cross the river once only. But both options were by-passing a set of villages presently served by the existing road. However, the concern of the Government of Balochistan was very clear. Therefore, the proposed road has to follow the old route, thus giving services to all the villages concerned. This will involve some extra cost on the provision of two additional bridges over Kech River.

2.3 INFRASTRUCTURE DEVELOPMENT

It is obvious that during the implementation and operation of a development project a number of infrastructure facilities are required which are not the part of the main project. In a road project these ancillary works include the housing and camping facilities for supervisory and construction staff, health care facilities, utilities, schools, transportation, communication facilities, security guards etc.

The stipulated construction period of the Project is about 52 months. It is envisaged that to complete the Project within stipulated time period, various sections of the road will be implemented simultaneously. This will require camping at various sites. According to a plan 4 stations have been foreseen. The tentative locations of these stations are as follows :

1. Base station, near Awaran
2. Secondary station-I, near Bela
3. Secondary station-II, near Jhal Jhao
4. Secondary station-III, near Hoshab

At each station housing and camping facilities will be required for the staff of engineers and contractors. The Engineers requirement will be as follows :

Base Station

Number		Requirements
1	-	Two bedroom residence (detached) for Chief Resident Engineer, with carport.
1	-	Two bedroom residence (detached) for Deputy Resident Engineer, with carport.
2	-	Two bedroom residences (duplex) for Site, Structural, Material Engineer, Chief Surveyor.
1	-	Dormitory with messing facilities for twenty-one single-status personnel (Inspectors, Lab. Techs., Draftsman, Admin. Personnel). Five individual rooms, 11 rooms double occupancy.
1	-	Three bedroom guest house (detached)
1	-	Recreational building suitable for 30 persons.
1	-	Office building with separate offices for :

- Chief Resident Engineer
- Deputy Chief Resident Engineer
- 4 Engineers (two offices)
- 12 Inspectors/Surveyors (one office)
- Secretary, Accountants, Admin.
- Assistant (2) , (one office)

- Miscellaneous Facilities, such as :
    - Guard house/quarters for 3 guards
    - Toilet facilities - 1
    - Conference room - 1
    - Tea room - 1
    - Storage - 1
    - Covered parking for 12 vehicles
    - One Soils/Materials Testing Laboratory with office space. Complete furnishings and equipment lists, including cooling and heating.

Secondary Stations (3)

Number		Requirements
1	-	Two bedroom residence for Resident Engineer, (detached), to become guest house after construction, with carport.
1	-	Two bedroom residence (detached) for Deputy Resident Engineer, with carport.
1	-	Dormitory with messing facilities and separate rooms for ten persons, and recreational room.
1	-	Office Building with Separate Offices for :

- Resident Engineer
- Deputy Resident Engineer
- Inspectors/Surveyors/Draftsman (one room)
- Admin. area
- Toilets
- Storage/Tea Room

- Soils/Material Testing Laboratory, with office (one room)

- Guard House/Quarters for three guards (three rooms)
- Covered parking for four vehicles

The Project will also provide residential and appropriate office facilities for all technical and administrative and support staff and camping facilities for the skilled and unskilled labour of the contractor. It is foreseen that the bulk of the skilled and unskilled crew will be engaged locally. As it will be difficult to get the labour from the villages where the station is located they will come from the surrounding areas and thus for such staff camping facilities has been envisaged. The villages in the area do not seem to have the capacity to accommodate such workers.

In addition to housing and camping facilities, the contractor is supposed to make arrangements for utilities like generators for electricity, tubewells for water supply, fuel (Kerosene and LPG), heating and cooling facilities etc. Proper sanitation facilities should be provided.

The health care facilities in the project area are very poor. It is not even sufficient for local people. Therefore, for the health care of the Project staff, dispensaries with appropriate para-medical staff and one or two bed facilities should be provided at each station. This should also include facility for transportation of patients to Turbat and Karachi.

In the interest of the work, it is speculated that the contractor will arrange transportation of engineer's and contractor's staff to and from camping stations and work sites. He will also be vigilant for security and safety of camps and work sites.

2.4 EMPLOYMENT

It is envisaged that the strength of engineer's staff will be about 100 including professional and technical staff; and administrative and support staff in about equal number. Similarly the total strength of the staff of the construction contractor is speculated to include 40 professional and technical staff, 20 administrative and support staff, about 200 skilled labour and 450 to 570 unskilled labour.

CHAPTER 3

Description Of Affected Environment

CHAPTER - 3

DESCRIPTION OF AFFECTED ENVIRONMENT

3.1 GENERAL

In Section 1.3 two sets of study areas have been delineated. One constituting of Makran Division (Turbat, Gwadar and Panjgur Districts) and Awaran Sub-Division of Khuzdar District, forms the extensive assessment area, while the second constituting of Project corridor and the area in near vicinity (about 10 Km on both sides of the road) forms the intensive assessment area. Therefore, an effort has been made to deal with the physical, human and natural resources that influence the environmental conditions of the Balochistan Road Project or that may be modified by the implementation of the Project for the two assessment areas.

3.2 PHYSICAL ENVIRONMENT

3.2.1 Air Resources

3.2.1.1 Climatology

The Project is located in the south-western part of Pakistan, which, in general, falls in the monsoon climatic zone of South-Asia. However, the country being located in the farthest end of this climatic zone, the climate of Pakistan is predominantly continental type as compared with that of other parts of the South-Asia. Consequently, the country is exposed to a sub-tropical and sub-humid (in the north) to arid (in the south and south-west) type of climate. The winds are generally from south-west direction in winter and from south-east direction in summer. The country is characterised by four distinct seasons. These are as follows :

Cold weather season	Mid December through March
Hot weather season	April through June
Monsoon season	July through September
Post monsoon season	October through mid December

The cold weather season is characterized by relatively low temperatures, high barometric pressure and low precipitation. The mean monthly temperature varies from below 4° C in mountain areas to about 10° C in northern zones of the plain area to approximately 18° in the southern zones. Rainfall during this season increases northward and westward with 25 mm or less in the middle and lower Indus Plain, 76 to 127 mm in the upper Indus Plain and 250 mm or more in the northern and northwestern areas.

The hot weather season is characterized by the high temperatures and low rainfall. The mean maximum daily temperature varies between 40 and 46°C. Rainfall varies from about 25 to 76 mm over the plains to approximately 102 to 127 mm in the mountainous areas. Thunderstorms over the hills and widespread dust-storms over the plains are experienced in this season because of western disturbances specially in northerly latitudes.

The monsoon season is characterized by persistent southeast winds, large rainfall amounts and moderate temperatures. The monsoon is well established by July and remains constant through August or continuing upto September. Mean monthly temperature in July exceeds 32°C through majority of the Indus Plain and Western Pakistan. The average rainfall during the season decreases from about 1,000 mm in the north Indus Plain to about 127 mm or less in the south.

The post-monsoon season is a transitional period between the monsoon regime and cold season and characterized by retreat of monsoon. The high pressure system begins to establish itself in mid-November. The weather during this period remains dry without any active wind system and least rainfall.

The climate in the coastal regions of Pakistan, which includes the Project area, is mainly determined by the south-east monsoons in summer and by travelling western depression in winter. According to the prevailing influences of two wind systems, the coastal regions may be divided into two sections. In the eastern section which includes Las Bela and further East to Karachi, the effect of southeast monsoons and occasional tropical cyclones is predominant but gradually decreases towards the west. A few of the tropical cyclones, originating in the Arabian Sea, occasionally follow the path of the southeast monsoons and create havoc around Karachi and the Las Bela plains. The western part of the coast is less exposed to the influence of southeast winds thus no rainfall in the area during summer. The monsoon, which is a prominent feature of the summer season around Karachi and Bela, hardly reaches a height of a few hundred meters. Further west it loses more and more height until it become so low that it finally is unable to cross the mountains of the Makran coast and ranges in Axial Belt. However, it is dominantly influenced by western depressions during winter. The intensity of these winds decreases after crossing the Arabian desert but they gain vigour over the Persian Gulf and provide occasional rain in the Makran. The temperatures in the summer are exceedingly high and there is little or no rainfall. Near the coast the heat is frequently aggravated by high humidity or a dust laden atmosphere.

The mean annual rainfall in Makran area now here reaches even 250 mm and long periods of drought occur, at times lasting as long as two or three years (Figure 3.1). Sometimes a sudden rainfall may devastate the land mostly in the mountainous part of the coast and occasional heavy thunderstorms give rise to floods in the rivers. In such cases sheet floods carry away even bushes and small trees and deposit them in the swollen rivers. But after a week of heavy rains the region remains desert because the temperature hardly changes, the rivers gets dry again and the atmosphere is soon dust-laden as before.

3.2.1.2 Site Meteorology

The Balochistan Road Project is located in the highlands of Balochistan and are not affected by the influence of maritime monsoon winds because the latter are neither powerful nor high enough to cross the Makran Coastal Range. On the contrary hot and dry winds from the northern highlands of Balochistan blow towards the south-east. Their dryness increases continuously as they descend the steep slopes of the mountains of Central Makran Range and pass towards the coast. The climate of the area under the influence of the meteorological conditions is semi-arid to arid. The daily variations in temperature are well pronounced and vary considerably over the year. Summer extends from April through October with June being the hottest. The temperature in June may shoot upto a level of about 47 ^{o}C. The highest temperature recorded in Turbat is 50 ^{o}C whereas as high as 49 ^{o}C was recorded in Bela.

In the winter season, which extends from December through February, the daytime temperatures ranges between 24 ^{o}C to 28 ^{o}C and the night-time temperatures ranges from 4 ^{o}C to 6 ^{o}C. The minimum temperature recorded in Bela is 1 ^{o}C. In winter, the area is influenced by the western depressions accompanied by some rainfall.

The western depressions may reach once or twice a year up to the coast of Sindh. Bela receives more rain in both summer and winter owing to the surrounding mountains which encircle the rain bearing winds. There are three types of storms that bring rainfall in the area :

a. Tropical or summer storms are responsible for summer or monsoon rains.

b. Extra-tropical cold weather storms (western depressions or disturbances) produces winter precipitation.

c. Convective storms (which are purely of local nature). are occassionally responsible for Pre-monsoon and Post-monsoon rainfall in the area.

The meteorological data collected from various stations in the areas are given in Appendix- E (Table I through Table XXVII) which indicates the facts mentioned above.

3.2.1.3 Existing Air Pollution Sources

The Project area forms the part of extremely undeveloped track of Pakistan. The economy of the area is based on agriculture, sheep herding and fisheries in the coastal towns. The area is almost devoid of any industrial set up. Recently the Government of Balochistan has allocated an area near Turbat at Km 392 for Mini Industrial Estate. But so far, no sizeable industry has been established. Therefore, in the Project corridor and its near vicinity, no major pollution source is existing, except for the diesel operated tubewells and existing traffic (Appendix- A). The existing traffic is not only responsible for the exhaust of smoke particulates and obnoxious gases but also dust due to undeveloped dirt track. The area is also exposed to frequent wind storm and localised cyclones, which pollute air by dust. Such pollution can be controlled to some extent by implementing integrated rural development programme through provision of irrigation for agriculture, rangeland/ forest development and construction of proper paved road network.

There is no air monitoring station in the area and data for pollutant level is not available. However, it is assumed that due to non-existance of major pollution source and relatively higher elevation of existing road, the air of the Project corridor and surroundings is free from pollutants.

3.2.2 Land and Water Resources

3.2.2.1 Physiography and Topography

Physiographically, Balochistan may be divided into four zones, (i) The Kachhi Plain (ii) the Suleiman, Kirthar and hill ranges of Axial Belt, (iii) the Chagai basin and associated Hill ranges and (iv) the Makran Hill Ranges and the coastal area.

The Project corridor mainly falls in the Makran Hill Ranges and partly in the hill ranges of Axial Belt zones (Figure 3.2). As described in Section 1.3, the road section from Km 0 to about Km 133 falls in the zone of hill ranges of Axial Belt. This is characterised by a number of hill ranges running in almost north-south direction with intermittant valleys having level to undulating configuration. Some of these hill ranges appear to form a link or continuation with the hill ranges of Makran zone, but actually these are geologically separated by a wide fractured and faulted zone (Ornach - Nal Fault and Awaran Fault).

The Makran Hill Ranges Zone consists of a number of parallel hills and intervening valleys. The orographic axis of these hill ranges follows an east-west direction, but in the eastern part, it gradually curves north-eastward. From north to south, the main hill ranges in this zone are the Saihan Range, the Central Makran Range, the Kech Bund Range and its eastern extension up to Gorjah Hill Range (running south of and parallel to the Kech Kaur and Kolwa Valleys), and Makran Coastal Range. The road section from about Km 133 up to Turbat falls in Kolwa and Kech Kaur Valleys (Section 1.3), and follows the axis of a major syncline These valleys fall in between the Central Makran Ranges and Makran Coastal Ranges.

The relief of the Makran region gradually decreases southward from about 3000 ft. in Siahan Range area, 2000 ft. in the Central Makran Range area to about 1500 ft in the coastal region. Similarly the hills of the Axial Belt reaches an elevation of over 3000 ft. However, the road corridor mostly falls within the elevation from 500 feet to 2000 feet (Figure 3.2). The elevation of a few stations along the road have been given in the following table.

ELEVATION OF SELECTED STATIONS

Station	Approximate Elevation above MSL (ft)
Bela	
Lak Chauki	
Maro Kaur	1096
Jhal Jhao	1158
Serd pass	1759
Awaran	1774
Buzdar	1773
Malar	2241
Hore	1630
Turbat	511

3.2.2.2 Geology

As noted earlier the road passes through two geomorphological zones of Balochistan, viz. Hill Range of Axial Belt and Makran Hill Ranges. Therefore, the proposed road alignment may be divided into two sections, namely, Bela-Awaran and Awaran-Turbat according to geomorphological features and geology. The geology of the Project corridor has been abstracted from the reconnaissance reports completed by the Hunting Survey Corporation Ltd., (1960-61) and Geological Survey of Pakistan (1977).

Bela-Awaran Section

This section incorporates a variety of terrain and rock types with particular importance for the treatment of cut and fill slopes. The soils are derived from the underlying parent rock and recent to sub-recent, fine to medium grained un-consolidated sediments, which form the wide flood plains of the local rivers. The predominent rock types of hill ranges of Axial Belt are :

Parkini Formation

This formation is predominently constituted of mudstone (90%) interlayered with thin ribs of hard, moderately jointed sandtone. The formation appears to be severly affected by tectonic disturbances, hence it is locally deformed and sheared. The dip of the formation is almost vertical, thus quite susceptable to surface erosion. Severe channelling were observed on the steep walls.

Hinglag Group

This formation is constituted of fine grained sandstone. They are brownish, moderately hard, moderately weathered, moderately jointed, interbedded with shale and some conglomerate. The exposures of this group are visible along the road section in deep cut made by the Goko River. More resistant beds of sandstone are found on the higher peaks of the mountains.

Turbat Group

This group is constituted of shale inter-bedded with sandstone, but predominently shale. The rocks are grey to dark grey, mostly laminated, and slightly to moderately weathered at places. They are subjected to tectonic cisturbances, hence closely packed system of folds and faults exist all along the alignment and locally deformed and sheared at places.

Awaran - Turbat Section

This road section follows a broad geological basin southward from Awaran. The alignment is entirely within the structural basin or valley with the Kech Kauras, the major drainage channel in this section. The basin follows the axis of a major syncline formed by the intense folding of the rock formations which constitute the enclosing hills and mountains. The basin is composed of recent to sub-recent alluvial deposits. Low level terraces of these deposits are made up of gravel particles in a matrix of silty fine sand.

The geological formation of Central Makran Ranges and Makran Coastal Ranges that occur on either side of the valley have contributed most of the deep alluvial material. These formations include shale and fine grained sandstone of Turbat group, poorly consolidated matrix of gravel and boulders in sandy clay of Kech Conglomerate and soft grey shale with sandstone and siltstone beds of Hoshab Shales.

Structurally the strata shows high angles of dip and closed packed system of folds and other evidences of tectonic disturbances in the region. At km 143 from Awaran the road crosses the Kil River from where the terrain becomes more undulatory as it has to cross the alluvial fans produced by nullahs which discharge from the mountains.

3.2.2.3 Geological Faults and Seismicity

For the safety and stability of road and structures it is important to undust and the seismicity of the area. According to published information, it has been concluded that the Project area falls in an active tectonic region. There are a number of faults in the region caused by the previous movements of the earth's crust, which have the potential for further movements.

The major known faults of this region along which seismic activities of various intensities and magnitudes were recorded in the past have been shown on Figure 3.3 and listed below :

1.	Pab Fault	:	It is NNW-SSE trending fault.
2.	Ornach - Nal Fault	:	It has a N-S trend with evidence of recent movements.
3.	Awaran Fault	:	It is NE-SW trending fault. Located 14 Km Northwest of Awaran village.
4.	Buzdar Fault	:	Traces, cutting through the recent alluvium. Both have NE-SW strike.
5.	Jhal Jhao Faults	:	They are 8 to 43 Km Northwest of Jhal Jhao. They strike NS and in WNW-ESE direction.
6.	Hoshab Fault	:	Thrust fault, about 320 Km long.

With the advancement of the state of art and the modern concept of plate tectonics, the seismic hazards of this region are considered to be higher than anticipated in the past. In addition to these faults there are number of associated active faults of a lesser displacement striking in different direction.

Since the area is surrounded by zones which experienced major earthquakes in the past, there is a need of taking adequate care and preferably seeking geotechnical advice in designing the slopes to withstand the pressure generated by the insitu and backfill material during earthquakes.

3.2.2.4 Mineral Resources

Geologically favourable formations for mineral resources are found only around the region through which Bela - Awaran Section traverses. An intrusion in this area had altered the ultrabasic rocks. Extinct mud volcanoes found at places are the good examples of this phenomena, according to which large volume of magmatic fluids given off by consolidating intrusions carries vast quantities of mineral matter.

From the best source of published information on mineral resources, namely, "Mineral Directory of Pakistan" it is recorded that no mining activity exist in the immediate vicinity of the proposed alignment. Around Bela 26 to 32 Km in the northwest and southwest directions, exploitable deposits of manganese are reported to be located and mined at several places. Also irridescent soapstone of non-commercial quality has been seen in the region of Nal, and chromite deposits at a few places.

Area beyond Awaran upto Turbat is formed of younger rocks, therefore except clays, gravels and sand no other deposits of economic importance may be located.

3.2.2.5 Surface Water Resources

As the Bela-Awaran-Turbat Road passes through a complex terrain of hill ranges and drainage valleys, the road encounters a number of natural drainage channels. According to an estimate there are about 300 small and large drainage channels (nullahs and rivers) throughout 376 Km stretch of the road. However, due to the nature of physiographic configuration of the Project area these channels form the part of one river system or another according to the drainage basin. The road falls in the drainage basins of three main rivers, viz., Porali River, Hingol River and Dasht River. These drainage basins are themselves constituted of a number of sub-basins drained by various tributaries of the three main rivers. Some of the major tributaries falling in the Project corridor are as follows :

Main River System		Tributary falling in the Project Corridor
1) Porali River	1)	Kaniki (Kud) River
2) Hingol River	1)	Goko Kaur
	2)	Mar Kaur
	3)	Arah River
	4)	Manro River
	5)	Nal (Hingol) River
	6)	Mashkai (Serd) River
3) Dasht River	1)	Gish Kaur
	2)	Kil Kaur
	3)	Kech Kaur

In addition to the tributaries and nullahs of these main river system, there are many other drainage channels (nullahs) in Kolwa Valley which traverse for some distance and then disappear in the valley.

Almost all of the channels in the project area are non-perennial to semi-perennial (semi-perennial term is used where perennial flow is available in certain reaches of the channel, while the remaining part of the channel remains non-perennial). This is attributed to the low rainfall in the area. The rains are generally received during the winter in thunder bursts, which cause flashy floods in the rivers. Thereafter there may be a long period of drought when there would be no surface runoff for 2 or 3 consecutive years. The summer monsoons are rare in the area (Section 3.2.1.2). The perennial flows in certain reaches of various channels are contributed from the groundwater and springs in the surrounding high grounds.

It is already referred earlier that the eastern part of the Project area receives relatively more rains than the western part. Therefore, the perennial discharges in Porali River System are more than in Hingol and Dasht Rivers on the basis of per unit catchment area. Hence the average annual perennial flow of Kud (Kaniki) river is about 25 cusecs, while the perennial flows in Nal River in Jhal Jhao area is about 1 cusec. The Mashkai river contains the highest perennial flow in Hingol River system and it amounts to about 2 cusecs during summer months and about 5-6 cusecs during winter months in upper reaches. This surface flow gradually decreases downstream due to diversion for irrigation to about 1.5 to 4 cusecs near Awaran. In Dasht River System, the streams contain small amounts of surface flows at various reaches. The surface flows range from 3 to 8 cusecs in Kil Kaur, 3 to 5 cusecs in Gish Kaur and 5 to 10 cusecs in Kech Kaur (Ref. 3.1 through 3.5).

The water quality of the river water is generally good, having dissolved solids less than 1500 ppm. However, this varies from place to place, depending upon the varying admixture of surface runoff and groundwater influent. The river water is used for irrigation, domestic and livestock purposes. Where the perennial flow is available, the river water is diverted into earthen channels (Kaurjo) for irrigation. This is particularly intensive on Dasht River System in Kolwa-Kech Valleys.

The use of river water within the Project corridor was not observed in Hingol River System. It is however reported that such diversion channels do exist in the upper reaches of the rivers of this system where assured perennial flows are available.

Due to shortage of water in the Project corridor, particularly in Bela-Awaran Section, the people are forced to use the water from small impoundments created in the river beds after rains or recession of surface runoff. Such impoundments are heavily contaminated by bacteria, inhabited by aquatic life, and loaded with sediment. Such water are used straight without any treatment. On drying up of this surface source the people obtain water from dug holes/wells created in the river bed or fetch water from far off places.

3.2.2.6 Groundwater

WAPDA has carried out hydrogeological investigation of Balochistan area in 70s and 80s and prepared reports on various river basins including the three, viz. Porali, Hingol and Dasht river basins, in which the Project road falls (Ref. 3.1 through 3.5). In the following paragraphs a brief account of WAPDA's findings has been presented on basin-wise :

1. Porali River Basin

Porali River basin lies at the Axial Belt of Lasbela Geo-anticline. The rocks exposed in the basin are sedimentary and igneous in origin and range in age from Jurassic to Recent. The unconsolidated deposits include valley fill deposits of quarternary age, laid down in topographically low areas.

The alluvium in the basin is assemblage of gravel, sand, silt and clay in different proportions. Promising aquifers are associated with alluvial fans, piedmont slope deposits and river channels.

Groundwater occurs under water table conditions in general except in southwestern part of Bela Plain where it occurs in semi-artesian conditions. Depth to water table ranges from 10 to 135 feet below land surface. The movement of groundwater is generally from north to south. The amount of groundwater recharge is estimated about 446 cusecs which is equal to discharge from the basin.

The investigations revealed that 306 cusecs of groundwater are discharged through evaporation and evapotranspiration from shallow depth to water table zones of which 50 percent may be checked by lowering the water table through installation of tubewells at appropriate places. The groundwater available for further development is 155 cusecs which include 19 cusecs as surface and sub-surface outflow.

Presently the exploitation of groundwater is mostly through shallow dug wells and a few tubewells installed by WAPDA during hydrogeological investigations. There are 4 springs and 2 karezes in the basin, but their discharges are very low. The present extraction of groundwater is about 62.5 cusecs. The perennial flows in the river system is also contributed from the groundwater through springs and seepage from high grounds, which in Kaniki river is about 25 cusecs. Thirty three percent of this base flow is utilized for irrigation.

The chemical quality of the groundwater is good in Wad, Ornach and partly in Bela Plain whereas rest of the basin has saline groundwater having total dissolved solids in the range from 2,000 ppm to 26,000 ppm.

2. Hingol River Basin

Total drainage area of the basin is about 13,200 square miles out of which about 3,900 square miles are covered with alluvium. The basin is further sub-divided in 13 sub-basins.

The alluvium in the basin is an assemblage of gravel, sand, silt, clay and their admixture in different proportions. Saturated gravel and sand constitute the main aquifer in the basin.

The groundwater generally occurs under water table conditions. Depth to water table ranges within 150 ft. below land surface. However, it is as deep as 282 ft below land surface in Mushkai sub-basin to as shallow as 4 ft below ground level in Jhal Jhao sub-basin. Groundwater flow is from north to south and northwest to southeast. The general slope of water table is about 25 ft/mile but it varies in sub-basins.

Total amount of recharge to groundwater reservoir of the basin through infiltration of precipitation falling over the catchment area is estimated about 397.5 cusecs. The groundwater discharge as extraction through artificial means such as utilization of perennial base flow through diversion, springs flow, karezes, open dug wells and private and WAPDA installed tubewells, is estimated about 101 cusecs. About 296.5 cusecs is lost by evaporation and evapotranspiration of the basin. Total discharge comes to 397.5 cusecs. The water lost through evaporation can be utilized for further development through tubewells.

The quality of water in the upper part of the basin is generally good, total dissolved solids varying from 300 to 600 ppm. Further downstream, in the vicinity of Jhal Jhao and Mashkai the groundwaters are slightly brackish, i.e., TDS ranging from 600 to 1000 ppm, but it is within safe limit for irrigation. The salts in the springs near Awaran, Sorab is also in the range of 300 to 1000 ppm while at places in upper reaches of the basin is upto 2000 ppm.

3. Dasht River Basin

Dasht River Basin covers about 10,465 square miles of which 3510 square miles are covered with alluvium. The basin comprises of 5 sub-basins namely Balgatar, Mianaz, Rod Khan, Kech and Dasht.

The groundwater occurs under water table conditions. Water table in the basin is less than 100 ft below land surface except for a few places where water table occurs below 200 ft as in Rod Khan and Mianaz sub-basins. The general slope of water table in the basin is about 11 ft. per mile. The variations in hydraulic gradient of the sub-basins indicate the heterogenety of sub-surface lithology of saturated material in the basin.

The amount of recharge to groundwater reservoir of the basin has been estimated about 151.3 cusecs and 31.25

cusecs through precipitation and irrigation return respectively, total being 182.55 cusecs. The utilization of groundwater is 97.75 cusecs and the remaining 102.80 cusecs are being lost through evapotranspiration. Thus the total discharge from groundwater reservoir of basin also comes to 182.55 cusecs, which means that the ground water reservoir of the system is under hydraulic equilibrium. However, 51 cusecs (safe yield 50%) are available for further development.

The chemical quality of groundwater is good and suitable for irrigation except for Balgatar, Rod Khan and Kech sub-basins due to high to very high sodium and very high salinity hazard. In Kolwa and Kech Kaur Valleys the salt concentration in groundwater varies from 250 to 900 ppm, while it is higher (upto 1500) in Dasht Valley and upto 2200 further downstream.

3.3 ECOLOGICAL ENVIRONMENT

The information on the ecological environment of the Project area is limited. The information provided in this report are based on the reconnaissance survey carried out during the month of May 1991, review of available literature and discussions with federal and provincial agencies (Refer 3.6 through 3.11).

3.3.1 Terrestrial Ecosystem

3.3.1.1 Plant Communities

The Project area is located in semi-arid to arid zone with no major rivers or natural water bodies in existence in the area. The rainfall is scanty and ground water resources are limited resulting in dry arid conditions in the Project area. Because of these ecological conditions, the area is included in tropical scrub forest. The topographical conditions (especially relief, micro-relief, soil depth, moisture availability and nutrients) and water limitations are important in determining the vegetative composition of the area. Tamarix (Tamarix aphylla), mesquite (Prosopus cineraria) and Salvadora oleoides are dominating in the area. Dominating plants found in the area are listed in Table 3.1.

Tamarix aphylla and Calotropis procera seems to be dominating in the plant communities in the Bela area whereas Prosopus cineraria seems to be pre-dominant in the Turbat area. Most of the area appear to be denuded of the plant cover and vegetation is only seen in depressions and along the river beds. The river bed itself provides an ideal habitat for the growth of some plants.

The plants that are commonly found in this specific river bed community are given in Table 3.2.

In the Bela area, Tamarix seems to be predominant in the river beds whereas in most of the other part of the Project area dwarf palm (Nanozzhops nitchiena) is dominating. Dwarf palm locally known as peesh is economically very important because it is harvested on commercial scale from the bed of rivers and used either locally for making mat, baskets and other products or transported to Karachi and other areas as raw. Dwarf palm is more abundant in Kolwa Valley. In Turbat area poisonous plant Nerium odorum is also common whereas this species is not common in the Bela area.

3.3.1.2 Animal Communities and Wildlife

Although the area is dry and arid but still it supports a diversified terrestrial fauna. Among the wild animals al' four major groups, viz., amphibians, reptiles, birds and mammals are well represented in the area. The reptiles, birds and mammals of the area are listed in Tables 3.3 through 3.5.

Birds form the most diversified group among the four groups. The area is inhabited by a variety of resident birds as well as migratory birds. Larks seem to be present throughout the area and because these birds are resident, therefore, encountered throughout the year. The bird fauna of the Bela is more diversified than that of the rest of the Project area. A comparatively less diversified bird fauna exists in the Turbat area than Bela, but the population of bird from Jhal Jhao to Hoshab is the least.

The same is noticed in the case of reptiles. A large number of reptiles such as geckos, skinks, monitors and snakes are known to inhabit the plains and mountainous region of Bela whereas a less diversified reptile fauna exists in other part of the Project area.

Although over 40 species of mammals exist in the area (Table 3.5), the population of mammals is very thin. However, it varies from area to area. Bela is relatively rich in mammal population than other areas of the Project. The hilly tracts of Lak pass and Serd pass seem to devoid of any mammal pupolation. This is because of non-availability of permanent water body and vegetation in this area. However, in some parts of the Project area, a variety of mammals can be seen. The population of larger mammals such as panther, wolf, Balochistan bear, hyena, urial,

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Sindh wild goat and chinkara is most affected and only a very thin population exists in or within the proximity of the Project area.

3.3.2 Aquatic Ecosystem

There is no prominent water body in the Project area except for rivers and streams which remains dry in most part of the year. Some permanent or semi-permanent impoundment, however, does occur in river beds. The water flows in the rivers and streams only after heavy rains. These water impoundments act as reservoirs for use of the local population. The water is used for agriculture as well as for the drinking and other domestic purposes. In these impoundments fish of small variety are found, which have no importance for commercial or domestic fisheries. This is because a very thin population of fish is found in the impoundments and the fish fauna is not diverse.

Cyprinion watsonii seems to be dominating species of fish which is found in practically all of the rivers of Project area. In addition, Cyprinion dispar was also present in small numbers in the Porali and Kaniki Rivers in the Bela area. These species are found to be growing to a maximum size of about 12 cm.

The population of other vertebrates such as amphibians and aquatic reptiles is also very thin.

In the rainy season the river flow with considerable speed but these flash flood lasts for few days (at times for few hours). Even in such periods the density of the aquatic animals remains very thin.

In the Hingol River snub-nosed crocodile (Crocodylus palustris) is found especially in its lower reaches. Although this river and its tributaries cross the Bela-Turbat Road but crocodile is not reported to be inhabiting this area.

In the Project area especially in the Hoshab to Turbat area Karezes are used for irrigation purposes. Some of the larger Karezes are inhabited by aquatic animals especially fish and freshwater crab. The Project activities will however not alter the Karezes and thereby the fauna of these water bodies will be not affected.

3.3.3 Wetland Ecosystem

There is no wetland in the Project area. Despite this fact a number of water fowl can be observed at the small impoundments at the river bed. The population of such bird is very thin. These are believed to be the stagglar bird migrating from Siberia to the Balochistan and Sindh coasts and beyond.

3.3.4 Endangered Species

Although the area of Bela-Awaran - Turbat Road is located in an arid zone, it is inhabited by a diversified mammal and bird fauna. Among these, some of the species of mammals and brids can be categorized into endangered, vulnerable, rare and even threatened. Among mammals Balochistan black bear (Selenarctos thibetanus gedrosianus), Sindh wild goat (Capra hircus balfourii), panther (Leo pardus) and wild sheep (Ovis orientalis) can be categorized as endangered. These species may not necessarily be regarded as endangered in other parts of Pakistan, but in the Project area their population is considerably thin and will be exposed to further hunting pressure due to easy access because of the construction of the road. It may be mentioned that the mammals population in the immediate vicinity of the road has already been reduced considerably and mammals are seldom reported along the road. The population of endangered mammals mentioned above especially Balochistan black bear in the Jhal Jhao area requires special attention. This species is reported to occur in the area but only a few sightings have been reported in the recent past. This species seemingly have been reduced to only a few specimens which may be occurring in the vicinity of the Project area. The Project, during construction and even in operation, will not pose any direct threat to this species because the road will be constructed on the existing alignment and no major alteration will be made. Sindh wild goat in the Lakh Pass and Jhal Jaho areas will be exposed to increased hunting pressure. Although no reliable record of panther and wild sheep is available from the Project area but those inhabiting in the Hingol National Park and Dhrun National Park will get exposure to hunters from other parts of Balochistan and the country. Other mammals that may be threatened will be foxes, hares, hyenas, wolfs and anteaters that are inhabiting in the Project corridor as well as in the immediate vicinity.

Among the birds, falcons (Falconiformis), houbara bustard, partridges and quails will be exposed to hunting pressure. These species although are not endangered, their population in the Project area are vulnerable because of the excessive hunting pressure and other human activities.

None of the plant species, insects, fish or other invertebrate occurring in the area can be considered as endangered or threatened and there would be no major impact on their population due to construction of the road.

In the Project corridor no national park, wildlife sanctuary or game reserve exists, except for two national parks i.e. Hingol National Park and Dhrun National Park which are located within the Project study area. In addition, there are six wildlife sanctuaries located in the vicinity of the Project area. Information about these national parks and wildlife sanctuaries is given in Table 3.6. The tentative locations of these national parks and sanctuaries are shown in Figure 3.4.

3.4 SOCIAL, CULTURAL, AND INSTITUTIONAL ENVIRONMENT

3.4.1 Land Use

Very little agricultural activity was observed along the road which passes through hilly, unproductive terrain except few patches where sailaba and irrigated agriculture is being practiced (Section 1.3). However, 307 Km of the road passes through Jhalawan, Kolwa and Kech Valleys which are the largest rainfed agricultural tract. This tract appears to have much potential for agricultural development and will reap immediate benefits from the Project. The entire region is under different administrative units having an estimated area of 15,000 square Km and present estimated rural population of about 0.6 millions. Between Bela and Awaran the only important rainfed agricultural tract is the valley of Jhalawan (Jhal Jhao). Jhal Jhao is a Sub-Tehsil of Awaran Sub-Division,having estimated population of 62,000.

The other famous agricultural tract is Kolwa/ Awaran Valley which starts from the town of Awaran and continue upto Hoshab 163 Km to the west. The first 90 Km of the road to Marjie Kalat lies in Khuzdar District, the remaining portion of about 73 Km lie in the Turbat District. Awaran Tehsil has a population of 98,000. In Kech Valley, from Hoshab to Turbat, the agriculture is mostly dependent upon irrigation from Kech River, Karezes/springs, wells/tubewells installed along the river. The main produce of this area is dates, vegetables, fodders, wheat/barley and rice.

In the adjoining valleys of Jhalawan and Kolwa/ Awaran, farmers mainly practice dry land farming. In the eastern areas of the valley Mushkai and Nal are the two river systems which flood the dry arable land. The areas in the centre and the west of the valley are basins of closed drainage and only the locally collected flash flood waters are used for cultivation. In areas around Awaran Town where both surface and ground water resources are relatively abundant, irrigated agriculture is practiced. The main crops in the region are wheat, barley, sorghum, pulses, fruits, vegetables and fodder.

As referred earlier, the area of project influence covers Makran Division and part of the Khuzdar District, therefore, the land utilization, area irrigated by different sources, cropped areas and crop production of the four districts, (Khuzdar, Panjgur, Turbat and Gwadar) are discussed in the following paragraphs.

3.4.1.1 Land Utilization

The four districts have geographical area of 11,953,741 hectares with 6,781,260 hectares of reported area. At present only 2.8 percent or 186,797 hectares are cultivated. About 84,073 hectares are cropped annually which is only 45 percent of the cultivated area. This area will surely get benefit from the Project through improved mechanization, more exploitation of water resources and greater mobility of agricultural labour force. Nearly 6,594,363 thousand hectares are uncultivated lands including 1,955,552 hectares of cultivable waste lands which can at least be developed as range lands for the development of livestock which is one of the important source of income for the people of this area. The land utilization of the four districts is given in Table 3.7.

Due to non-availability of land use map of the region from the source, an indicative map has been included in Figure 3.5 to show the areas where agricultural activities along the road were observed during the field trip.

3.4.1.2 Irrigation

The main sources of irrigation in the area are rainfall, kaurjo (canals) karezes and occasional wells/ tubewells. Because of limited groundwater resource, lack of electric power and high cost of groundwater pumping with diesel sets, tubewells are not very popular in this region. Rainfall is not only scarce (100-150 mm) but also unreliable and usually untimely. The main sources of irrigation are, therefore, the kaurjo and kareze systems, which draw their source from major rivers. The kaurjos take diverted water directly from major rivers while karezes take water from underground aquifers which are mainly river fed. The wells/ tubewells are constructed in the valleys where groundwater aquifer is available along the river streams.

The area irrigated by different sources in the four districts is shown in Table 3.8. About 41 percent of the irrigated area is fed by kaurjos and 59 percent from groundwater aquifer. The groundwater contribution is shared by Karezes 30.4 percent, tubewells 20.1 percent and wells 8.3 percent. The contribution by tubewells will certainly increase with the implementation of the Project as there are many pockets where groundwater has not been exploited so far due to expensive transportation of tubewell construction and operation materials.

3.4.1.3 Cropping and Crop Production

As depicted in the section on land utilization there is no scarcity of good fertile cultivated agricultural land in the Project area but there has always been an acute shortage of irrigation water due to low rainfall. These natural conditions limit and determine the cropped area and production. In kharif (summer) season about 89 percent of the cropped area is irrigated by springs, karezes, wells and tubewells. The crop yields are similar to the other irrigated areas in the other parts of the province. The remaining 11 percent area is rainfed and mostly includes low delta crops, like fodders, sorghum and mung pulses.

However, in rabi (winter) season about 57 percent of the cropped area is rainfed, the major crop grown is wheat followed by barley and fodders. The main reason for this is that major portion of the rainfall occurs in winter season. The irrigated and un-irrigated cropped area is shown in Table 3.9.

The area produces fairly large amount of marketable surplus particularly fruits (mainly dates), onions, vegetables, melons, wheat, barley, cumin and fodders. These commodities fetch very low prices due to non-availability of good transportation facilities. The most affected commodities are dates, other fruits, vegetables, melons, onions, cumin, wheat and barley. The crop production in the area is given in Table 3.10.

3.4.2 Socio Economics

3.4.2.1 Demography

The human population along the road is very thin and sparce. However, large number of small settlements/ hutments are scattered all over the area in the valleys. These small settlements and hutments are grouped into a mauzas or village. It is very difficult to pin point the population of each mauza as these are not properly marked on the maps provided in the Population Census Reports. The main towns/ villages to get immediate benefits along the road are: Arrah, Jhal Jhao, Awaran, Malar, Ghishkaur, Matal, Azal Kalat, Dandar, Rod Khan, Hoshab, Tajaban, Hirok, Sami, Shahrak, Turbat proper and its suburbs.
Efforts have been made to estimate the population of the entire region which is going to benefit directly from the Project. The projected population of this region estimated on the basis of 1972-1981 population census growth rate works out about 0.76 million. About 0.24 million is settled in Awaran Sub-Division of

Khuzdar District and 0.52 million in Turbat Town, Turbat Tehsil and Hoshab Sub-Tehsil of Turbat District. Nearly 0.16 million population of Jhal Jhao Sub-Tehsil and Awaran Tehsil will get direct benefits from the Project. About 0.08 million population of Mushkai Tehsil which is at present linked by Kacha road with the Bela-Awaran - Turbat road will get indirect benefits. This road in the near future may be metalled and the population of this area will receive direct benefits of the Project. In Turbat District about 0.16 million population of Hoshab Sub-Tehsil, Shahrak Union Council and about 0.16 million urban population of Turbat Town will be direct beneficiaries of the Project. The two union councils Nasirabad and Ginna of Turbat Tehsil having a population of about 0.2 million will also be benefit indirectly. The population of these areas collected from 1981 population census and estimated for the year 1991 on the basis of 1972-1981 census annual growth rates of 8.2% in Khuzdar and 11.87% in Turbat District are tabulated below :

Year	KHUZDAR DISTRICT POPULATION				TURBAT DISTRICT POPULATION						
	Awaran Tehsil	Jhal Jhao S. Tehsil	Mashkai Tehsil	Total	Turbat Town	Hoshab S.Tehsil	Shahrak Union Council	Ginna Union Council	Nasir-abad Union Council	Total	All Areas
1981	44,394	28,291	37,668	110,353	52,337	20,994	29,968	39,957	25,658	168,914	279,267
1991	97,633	62,218	82,841	242,692	159,671	64,049	942,768	121,902	78,278	515,327	758,019

The Project will, however, also benefit the people of Gwadar, and Panjgur Districts and the remaining area of Turbat District. As such the total projected population benefiting from the Project, directly or indirectly, will be about 2 million.

3.4.2.2. Employment and Economy

The major sources of employment in the area are crops livestock husbandry, fishing, trade and employment in business and government within and outside the country. Small scale cloth and leather embroidary work, manufacture of rugs and tents, salt manufacture, fish processing and mat making from date palm leaves are undertaken by only small numbers. According to socio-economic survey of Makran Division under BALAD Project a little less than half the work-age members (49% all women), were engaged in household work, while 14% were employed as unskilled labour and domestic help, 12% were engaged in crop raising, 6% in white collar government and business jobs, 6% in fishing, 2% in animal raising and 2% were involved in trade (Ref. 3.12). The unemployment among the work-age members of the sampled population came to 8.8 percent.

The table below shows the numbers and percentages of the families employed in the main economic activities. According to this table, the main activity is farming followed by blue collar jobs. The blue collar jobs included unskilled labour within and outside the country, soldiers and domestic help. Relatively smaller numbers were engaged in government and business. Fishing is an important occupation in coastal area.

Activity	No. of Families	Percent
Fishing	339	11
Farming	1003	33
Animal raising	281	9
Blue Collar jobs	707	23
White Collar jobs	139	5
Trade	165	5
More than one activity	404	14

Source: Socio-Economic Survey of the Makran Division of Balochistan

The economy of the districts under the influence of the Project is mainly dry and irrigated land farming, livestock raising and fishing in the coastal district of Gwadar. Most of Gwadar population extracts a subsistance living from fishing and farming. In the district of Panjgur, 90% of the population is dependent upon irrigation from the semi-perennial flows of Rakhshan River. A similar percentage of the central Turbat District population is dependent upon the Kech, Nihing and Dasht River systems. Water from these river systems is used for both irrigation and drinking. The groundwater recharge by these rivers is exploited by karezes and wells/ tubewells. The main agricultural produce of these two districts is fruit (mainly dates). In the year 1988-89 an area of 7517 hectares produced about 66,700 tonnes of fruits. The population of Gwadar is mainly dependent upon fishing and related activities. During 1988, some 95,000 tonnes of fish valued at 417 million rupees were produced in this coastal district. A relatively smaller portion of Gwadar population is engaged in agriculture, animal raising, trade and services.

In Khuzdar District the valleys of Jhal Jhao/ Kolwa Awaran through which the road passes has a different resource base and topographical conditions than Makran Division. In the mountains of Jhal Jhao and Kolwa people mainly raise livestock. Khuzdar District has 5.409 million livestock population, out of which 5.088 million (94%) are sheep and goats. In the valleys people mainly engage in dry land and irrigated farming. The main crops grown in winter are wheat and barley with a total production of 56,400 and 8,960 tonnes respectively in 1988-89. In summer the main crops grown are, rice, sorghum, fruits, onions and fodders, producing 1030, 660, 18910, 41850 and 44350 tonnes,respectively.

3.4.2.3 Transportation

All the surplus production such as dates, fish, barley, fruits and vegetables are exported to other areas through this road whereas almost all necessities and agricultural inputs must be imported. Bela-Awaran-Turbat road is linked by dirt roads to all important towns in the area and buses and trucks ply on these roads. At present trade is being carried out at great disadvantage to the population of this region because of the high costs of transportation and loss of time due to lack of quality road system. The local market being very small, any investment in agriculture, fisheries, livestock and in industrial sector could only be profitable if reasonable cost access to outside markets is possible. The increased traffic on this road after its improvement will provide this opportunity, with the result investment in these sectors is expected to occur rapidly.

3.4.2.4 Facilities and Services

Education facilities at degree level are available only at district headquarters. Awaran Sub-Division has two high schools, two middle and fifteen primary schools. Schooling facilities in Turbat District area are much better. There is one girls high school and four boys high schools at Turbat, Sami, Absor and Shaitump. There are seven middle schools at Hoshab, Dandar, Hirok, Shahpuk, Singanisar, Chasar and Kosh Kalat.

Hospital with bed facilities are available at District Headquarters. However, medical facilities along the road are also available, Awaran has Rural Health Centres with ten beds. Gishkaur, Malar have Sub-Health Centres while Jhal Jhao has Civil Dispensary. In Turbat District along the road there are two civil dispensaries at Hoshab and Shahrak, one Sub-Health Centre at Dandar and Basic Health Units each at Hirok, Sami and Jusak. In addition to these, private medical clinics are also available in Turbat Town and its suburbs.

Generally the rural population of the area is deprived of electricity. The large towns like Turbat, Panjgur, Gwadar and Pasni are provided electricity from localised oil operated generators. Recently an oil operated power house has been installed near Pasni which will supply electricity to Turbat, Panjgur and rural areas.

The condition of fuel supply is also vary poor. The rural mass generally use wood, while kerosene and LPG is available in towns.

Police/ Levies check posts are located in each Sub-Division, Tehsil and Sub-Tehsil Headquarters to maintain law and order. Fire fighting facilities are available only at District Headquarters.

Main marketing centre is at proper Turbat Town. However, daily utilities are available at numerous places along the road where one can have tea, soft drinks, food, medicines and other daily necessities.

3.4.3 Cultural Resources

The history as well as socio-economic and political conditions of Jhal Jhao/ Kotwa region through which about 376 Km of the road passes are described in detailed in Appendix F (Social Soundness analysis). A brief description of these aspects has been reproduced in the subsequent paragraphs.

3.4.3.1 Makran Area

Makran has historically been the most important part of Balochistan because of its strategic location between the Indian sub-continent and the Middle East and West. Famous Iranian Kings including Kaikaus and Kai Khusrau ruled this area and Alexander the Great passed through Makran in 325 B.C. Makran was part of the Sassanian Empire during 5th and 6th centuries. By the middle of the 7th century Muslim Arabs conquered Makran and made it a part of their expanding empire. Various Iranian, Turkish, Afghan and Mongol invaders brought Makran temporarily under their

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control. However, probably because of its harsh physical environment and relatively poor resource base, they could not hold on to it for long. The Ahmadzai rulers of Kalat first invaded Makran in 1715 but it was not until the time of Naseer Khan in the middle of 18th century that Makran was finally subjugated and brought under the dominance of Kalat. From that time until the creation of Pakistan, Makran remained under the rule of the Khans of Kalat. In 1947, along with other Kalat states, Makran became part of Pakistan. In 1976 it became a separate district under the Kalat division and in 1986 it was made into a full fledged administrative division of Balochistan.

Most of the Makran consists of unproductive mountains, the valleys in between. The valleys are fertile and productive when irrigated. The rivers (Rakhshan, Kech, Nihing and Dasht) are among Makrans most precious resources. Hundreds of karezes and kaurjos (canals) wells/ tubewells use the rivers as their source and provide irrigation to 19,530 hectares. During 1988-89 about 18,902 hectares were under various crops yielding 0.298 million tonnes crop production. In coastal Gwadar most people depend on fishing for a livelihood, making the sea the second most important resource of Makran. During 1988, some 95,000 tonnes of fish valued at 417 million rupees were produced in Makran. A few people depend on livestock. The number of people engaged in trade and services is small but economically important, especially because of the remittances sent back by Makranis working in the Gulf.

All major Baloch tribes in the course of migration from the Middle East first entered the sub-continent via Makran and lived there for many years before migrating further east. However, today the typical Baloch tribal organization common to other part of Balochistan is non-existent in Makran. Concepts of tribalism and tribal organization involving ethnic and political units with their own heirarchial leadership and a common and contiguous territory, are almost unknown. In Makran the population is divided into three main categories; the former ruling and dominant class called "Hakim", the middle class composed of various tribes of mainly Baloch origin called "Baloch", and the lower class consisting of village and farm labour, domestic servants, artisans (lori) and former slaves called collectively as "Hizmatgar".

The dominant classes consist of members of the Gichki, Nausherwani, Mirwani and Bizenjo tribes, which traditionally owned most land and other property in Makran. Although some changes have since taken place up to about a half century ago it was the custom that if a member of the dominant classes killed a common Baloch, no blood compensation could be claimed. Hakims would not marry with Baloch and sometimes took the lives of the Hizmatgar without cause.

The Baloch form the middle class and generally own some land. They have been locally organised under community leaders (Kahuda) who settle their disputes and deal with the dominant class' chiefs and the government on their behalf. The main Baloch tribes found in Makran are, Rind, Kiazai, Hot, Kalmati, Rais, Sangur, Puzh, Gongezh, Kahudi, Dashti, Rakhshani, Kohi, Mazarzai, Sijidi, Ban, Kashani, Isazai, Wadela, Askani, Noohani, Mirazai, Shahizai, Omarzai, Goahramzai and Siah Pad.

The Hizmatgar are represented by the Meds, Darzadag/ Nakib, Loris and Golam. They engage mainly in menial and artisan work. The Meds along the coast are mainly fishermen, the Darzadag are generally landless wage labourers and Loris do blacksmith, carpentary and other artisan work. Golam work as agricultural labourers as well as domestic servants. Traditionally these classes could not sit at the same mat and eat with the Baloch. Even today, the Baloch never give their daughters in marriage to any of these classes. If a Baloch marries the daughter of a Hizmatgar, the bridal price paid is far less than that paid for a Baloch bride. The Darzadag considers themselves superior to the Loris, Meds and Golam. The Golam (former slaves) still work mainly as domestic servants and until about three decades ago, the Hakim would still demand numbers of them in Labb (bridal price) for their daughters.

Like other Baloch, Makranis customarily raise contributions among themselves on certain social occasions. In Makran, this sytem is called Bijjar. The person concerned visits his relatives, friends, neighbours and fellow tribesmen and requests their assistance, which is given in the form of cash or animals such as sheep and goats. Giving is voluntary but in some cases chiefs and other members of dominant classes demand Bijjar from members of their own tribes and poor subjects as a right. Cooperation is evident in other spheres of life as well. The farmers cooperate in different agricultural operations such as digging and maintaining karezes and bund making to arrest rain water. In the coastal fishing villages reciprocal assistance is provided in the making of local boats and nets.

3.4.3.2 Jhal Jhao/Kolwa Region

Jhal Jhao/Kolwa/Awaran regions have been under different administrative units but have historically been part of Jhalawan ruled by representatives of the Khans of Kalat. Although Bazenjo, Mirwani, Mohammad Hasani and Rakshani groups make up the bulk of the population, sections of Kalandarani, Kahodai, Sangur, Kolwai, Sajidi, Channal, Somalani and Jihandani are also found. Each tribe is divided into classes which are in turn divided into sections. Here for centuries a relatively egalitarian based tribal system existed. Tribesmen owned allegiance to their class and section heads who themselves owned alliance to the Sardars. The Sardar was sometimes independent and at other times under the overlordship of the Khan of Kalat. The system was relatively egalitarian because only the chiefs and sometimes section head's families were highly placed in the society, all other tribemen being equal in status. The Sardar received voluntary contributions called Bijjar from tribesmen and no coersion was involved. It is only recently a tribeman was required to pay a fixed portion (usually 1/6th) of his produce to the Chief. Most land in Jhal Jhoas and Kolwa was owned by Mirwani, Bazenjo and Nasherwani Sardars. As a result of 1972-76 land reforms, most land is in the possession of owner cultivators. There is still tribal solidarity and co-operation at the local level. Marriages still take place principally within the tribe and elders settle inter-tribal disputes. However, with the reduced power of the main player, the Sardars traditional social organization is also in decline.

In the Jhal Jhao/Awaran Kolwa region neither tribal organization nor traditional leadership patterns are as strong as in other areas of Balochistan in the North, yet tribal social organization and a heirarchical leadership system exist. The tribe is headed by a Sardar which each clan, section and family under him is headed respectively by a Motabar/Mir, Takri/ Kahudari, and Spetrish. Since the incorporation of the state of Kalat in Pakistan and the demise of the Khan of Kalat as Chief of Chiefs, the traditional Sardari system in this region has weakened considerably. The land reforms of 1972-76 which abolished Shashak (1/6th of produce owned to the Chief) and ensuing Sardars vs. tribemen conflicts further weakened the system. The conflicts also resulted in the tribemen uniting under their local, sub-tribal and sectional leaders against the Sardars, most of whom also lived outside the area. Tribal solidarity was evident when Mr. Majeed Bazenjo won election to the Provincial Assembly. In general, the Chiefs and their families still command some respect and following but traditional authority has been seriously challenged and undermined during the last few years.

3.4.4 Archecological Resources

As referred earlier, the project road follows an old camel track of historical importance. Therefore, it is expected that the project corridor may be rich in archecological resources. In this respect Archecological Department of Pakistan was contacted. It was learnt from the source that in spat of the fact that archecological reconnaissance report of coastal diversion of Makran is available but to comply the study requirement a specific survey of the project corridor by the staff members of the Department would be needed before issuing a certificate. In this respect necessary action was taken (Appendix C). After completion of the assignment, the relevant documents, received for the Department will be annexed to this report.

In the meanwhile, it may be worth mentioning that during the reconnaissance visit of the Consultants in the month of June, a number of mounds containing shards and debris of artifacts were recognised in the near vicinity of the road corridor. It was reported by the local people that these mounds were the Forts-Kalats- of the Kingdom of Kalat. These mounds on located in Kolwa valley at Awaran (Km 144), Sahar (Km 225), Margie (Km 236) and Azhal . (Km 251). These Kalats are in the near vicinity of the road, but more would be disturbed by the proposed road alignment. In addition, there are three Kalats in the valley beyond Serd Pass (Km 106 to Km 128). These Kalats are at a quite distance from the road alignment, hence would not be affected.

At Km 21 these are graves of Sheerin and Farhad, a legaridy couple who scrified their lives for love, at a distance of 50 feet from the Central Line of existing road. These graves and an adjoining mosque willbe affected by the proposed road. Therefore, realignment of the road will be needed at this road.

References

3.1 Nasir Geotechnics; Government of Balochistan, Groundwater Reconnaissance Survey of Balochistan, 1974.

3.2 Hydrogeological Directorate General, Pakistan Water and Power Development Authority, Perspective for Water Resources Development in Balochistan, 1986.

3.3 Hydrology Project, WAPDA, Quetta, Groundwater of Porali River Basin, 1984.

3.4 Hydrology Project, WAPDA, Quetta, Groundwater of Hingol River Basin, 1984.

3.5 Hydrology Project, WAPDA, Quetta, Groundwater of Dasht River Basin, 1985.

3.6 Robert, T.J., 1991. The birds of Pakistan, Vol. 1, Non-Passeriformes. Oxford University Press, Karachi, 598 p.

3.7 Robert, T. J., 1977. The mammals of Pakistan. Ernest Benn

Ltd., London, 384 p.

3.8 Khanum, Z.; Ahmad, M.F. and Ahmad, M., 1980. A checklist of birds of Pakistan with illustrated key for their identification. Rec. Zool. Survey of Pakistan, 9(1&2):1-138.

3.9 Ali S. and S. Ripley, 1983. A pictorial guide to the birds of the Indian Sub-continent, Oxford University Press, New Delhi.

3.10 Minton, S. A. Jr., 1966. Contribution to the herpetology of West Pakistan. Bull Am. Mus. Nat. Hist. 134(2):31-184.

3.11 Forest Department, Government of Balochistan, Unpublished material and data.

TABLE 3.1

LIST OF DOMINANT PLANTS FOUND IN THE PROJECT AREA

Page 1 of 1

SPECIES	RELATIVE ABUNDANCE
TREES	
Tamarix aphylla	Common
Prosopus cineraria	Common
Salvadora oleoides	Common
Acacia senegal	Common
Acacia nilotica	Common
Zizyphus nummularia	Rare
SHRUBS	
Euphorbia caducifolia	Common
Commiphora wightii	Common
Capparis decidua	Common
Calotropis procera	Common
Rhazya stricta	Common
Capparis cartilaginea	Rare
Haloxylon griffithii	Rare
Haloxylon recurvum	Rare
Indigofera oblongifolia	Common
HERBS	
Goniogyna hirta	Common
Tephrosia sp.	Common
Aerva persica	Common
Zygophyllum sp.	Common
Citrullus colocynthis	Rare
Inula garantioides	Rare
Boerhaavia sp.	Rare
Crotalaria burhia	Rare
GRASSES	
Dactyloctenium scindicum	Common
Lasiurus hirsutus	Common
Cymbopogon jwarancusa	Common

TABLE 3.2

LIST OF DOMINANTING PLANTS INHABITING RIVER BEDS

SPECIES	RELATIVE ABUNDANCE
Acacia senegal	Rare
Salvadora oleoides	Rare
Prosopus cineraria	Rare
Euphorbia caudicifolia	Rare
Periploca aphylla	Rare
Acacia jacquemontii	Common
Nanozzhops nitchiena	Common
Phoenix sylvestris	Common
Gymnosporia senegalensis	Rare
Cocculus laeba	Rare
Capparis cartilinea	Rare
Rhazya stricta	Rare
Tamarix sp.	Common
Nerium odorum	Common
Saccharum spontaneum	Common
Saccharum ravennae	Common
Indigofera oblongifolia	Common
Vernonia cinerascens	Rare

TABLE 3.3

LIST OF AMPHIBIANS AND REPTILES FOUND IN THE PROJECT AREA

SR.No.	SPECIES	AREA
1.	Indus Toad Bufo andersoni (Boulanger)	Bela
2.	Balochistan Toad Bufo olivaceus (Blanford)	Turbat
3.	Tiger Frog Rana tigrina (Daudin)	Bela
4.	Skittering Frog Rana cyanophlyctis (Schineider)	Awaran to Turbat
5.	Spotted Pond Turtle Geoclemys hamiltoni (Gray)	Bela
6.	Afghan Tortoise Testudo harsfieldi (Gray)	Bela
7.	Indian Star Tortoise Testudo elegans (Schoepff)	Bela
8.	Snub-nosed Crocodile Crocodylus palustris (Lesson)	Bela Dashat
9.	Fat-tailed Gecko Eublepharis macularius (Blyth)	Bela to Jhal Jaho
10.	Baloch Rock Gecko Bunapus tuberculatus (Blanford)	Bela
11.	Sindh Sand Gecko Stenodactylus orientalis (Blanford)	Bela
12.	Keeled Rock Gecko Cyrtodactylus scaber (Heyden)	Bela
13.	Warty Rock Gecko Cyrotodactylus kachhensis (Stoliczka)	Bela to Awaran
14.	Quetta Rock Gecko Cyrotodactylus watsoni (Murray)	Bela

15.	Blunt-tailed Spider Gecko Agamura persica (Dumeril)	Bela to Turbat
16.	Nikolsky Spider Gecko Agamura agamuroides (Nikkolsky)	Bela
17.	Banded Dwarf Gecko Tropiocolotes halenae (Nikolsky)	Bela to Awaran
18.	Spotted Indian House Gecko Hemidactylus brooki (Gray)	Bela to Turbat
19.	Persian Gecko Hemidactylus persicus (Anderson)	Bela to Turbat
20.	Blotched Gecko Hemidactylus triedrus (Daudin)	Bela
21.	Bark Gecko Hemidactylus leschenaulti (Dumeril and Bibron)	Bela
22.	Yellow-bellied House Gecko Hemidactylus flaviviridis (Ruppell)	Bela
23.	Indian Garden Lizard Calotes versicolor (Daudin)	Bela Awaran, Turbat
24.	Indian Spiny-tailed Lizard Uromastix hardwicki (Gray)	Bela to Turbat
25.	Yellow-headed Agama Agama nupta fusca (Blanford)	Bela to Awaran
26.	Black Rock Agama Agama melanura (Blyth)	Bela to Turbat
27.	Brilliant Agama Agama agilis (Olivier)	Bela to Turbat
28.	Gray Toad Agama Phrynocephalus scutellatus (Olivier)	Bela to Turbat
29.	Yellow-speckled Toad Agama Phrynocephalus leuteoguttatus (Boulenger)	Bela to Jhal Jhao
30.	Black-tailed Toad Agama Phrynocephalus maculatus (Anderson)	Bela to Turbat

31.	Bronze Grass Skink Mabuya macularia (Blyth)	Bela
32.	Yellow-bellied Mole Skink Eumeces taeniolatus (Blyth)	Bela to Turbat
33.	Oragne-tailed Skink Eumeces schneideri blythianus (John Anderson)	Bela to Turbat
34.	Earless Dwarf Skink Ablepharus grayanus (Stoliczka)	Bela
35.	Mekran Fringe-toed Sand Lizard Acanthodactylus cantoris blanfordi (Boulenger)	Bela
36.	Yellow-tailed Sand Lizard Acanthodactylus micropholis (Blanford)	Bela to Jhal Jhao
37.	Long-tailed Desert Lacerta Eremias guttulata watsonanna (Stoliczka)	Bela
38.	Short-nosed Desert Lacerta Eremias brevirostris (	Bela
39.	Punjab Snake-eyed Lacerta Ophisops jerdoni (Blyth)	Bela
40.	Indian Monitor Varanus bengalensis (Daudin)	Bela to Turbat
41.	Indian Desert Monitor Varanus griseus (Daudin)	Bela
42.	Beaked Thread Snake Leptotyphlops macrorhynchus (Jan)	Bela
43.	Indian Sand Boa Eryn johni (Russel)	Bela
44.	Glossy-bellied Racer Coluber ventromaculatus (Gray)	Bela
45.	Cliff Racer Coluber rhodorachis (Jan)	Bela to Turbat
46.	Royal Snake Sphalerosophis atriceps (Fischer)	Bela

47.	Persian Diadem Snake *Sphalerosophis diadema schirazianus* (Jan)	Bela
48.	Red-spottedf Diadem Snake *Sphalerosophis arenarius* (Boulenger)	Bela
49.	Dark-headed Dwarf Racer *Eirenis persica* (John Anderson)	Bela to Awaran
50.	Golden-spotted Wolf Snake *Lycodon striatus bicolor* (Nikolsky)	Bela
51.	Streaked Kukri Snake *Oligodon taeniolatus* (jerdon)	Bela
52.	Afro-Asian Sand Snake *Psammophis schokari* (Forskal)	Bela
53.	Pakistan Ribbon Snake *Psammophis leithi* (Gunther)	Bela
54.	Persian Horned Viper *Pseudocerastes persicus* (Dumeril and Bibron)	Bela to Turbat
55.	Saw-scalled Viper *Echis carinatus* (Schneider)	Bela to Turbat

TABLE 3.4

LIST OF BIRDS FOUND IN THE PROJECT AREA

SR.No.	SPECIES	AREA
1.	Great White Pelican Pelecanus onocrotalus (Linnaeus)	Bela area
2.	Eurasian Bittern Botaurus stellaris (Linnaeus)	Bela area
3.	Cinnamon Bittern Inobrychus cinnamomeus (Gmelin)	Bela area
4.	Westren Reef Heron Egretta gularis (Bose)	Bela area
5.	Purple Heron Ardea purpurea Linnaeus	Bela area
6.	Pariah Kite Milvus migrans (Boddaert)	Bela, Jhal Jhao, Awaran and Turbat area
7.	Egyptian vulture Neophron percnopterus (Linnaeus)	Throughout the Project area
8.	Oriental White-backed vulture Gyps bengalensis (Gmelin)	Bela area
9.	Eurasian Griffon Vulture Gyps fulvus (Hablizl)	Bela to Awaran area
10.	Eurasian Black Vulture Aegypius monachus (Linnaeus)	Bela to Awaran
11.	Short-toed Eagle Circaetus gallicus (Gmelin)	Bela to Turbat
12.	Pallid Harrier Circus macrourus (Gmelin)	Bela
13.	Eurasian Sparrow Hawk Accipiter nisus melaschisros (Hume)	Bela

14.	Indian Sparrow Hawk or Shikra Accipiter badius canchroides (Severtzov)	Bela to
15.	Buzzard Eagle Butastur teesa (Franklin)	Bela to Turbat
16.	Desert Buzzard Buteo butea japonicus (Temminck & Schlegel)	Bela
17.	Long-legged Buzzard Buteo rufinus (Cretzschmar)	Bela to Turbat
18.	Tawny Eagle Aquila rapax vindhiana (Franklin)	Bela to Turbat
19.	Steppe Eagle Aquila rapax nipalensis (Hodgson)	Bela
20.	Imperial Eagle Aquila heliaca (Savigny)	Bela to Awaran
21.	Golden Eagle Aquila Chrysaetos (Linnaeus)	Bela to Jhal Jhao
22.	Bonnelli's Eagle Hieraaetus fasciatus (Vieillot)	Bela to Turbat
23.	Booted Eagle Hieraaetus pennatus (Gmelin)	Bela to Awaran
24.	Euracian Kestrel Falco tinnunculus (Linnaeus)	Bela to Turbat
25.	Merlin Falco columbarius (Linnaeus)	Bela to Hoshab
26.	Northern Hobby Falco subbuteo (Linnaeus)	Bela to Jhal Jhao
27.	Laggar Falcon Falco biarmicus jugger (J.E. Grey)	Jhal Jhao to Turbat
28.	Peregrine Falcon Falco peregrinus (Tunstall)	Bela to Hoshab
29.	Red-capped Falcon Falco pelegrinnoides (Temminck)	Bela to Awaran

30.	Chukar Alectoris chukar (J. E. Grey)	Bela to Jhal Jhao
31.	See-see Partridge Ammoperdix griseogularis (J.E. Brandt)	Bela to Turbat
32.	Black Partridge Francolinus francolinus (Linnaeus)	Bela
33.	Indian Grey Partridge Francolinus pondicerianus (Gmelin)	Bela to Turbat
34.	Common Quail Coturnix coturnix (Linnaeus)	Bela to Turbat
35.	Moorhen Gallinula chloropus (Linnaeus)	Bela
36.	Houbara Bustard Chlamydotis undulata (Jacquin)	Bela to Turbat
37.	Pied Avocet Recurvirostra avosetta Linnaeus	Bela
38.	Stone Curlew Burhinus oedicnemus (Linnaeus)	Bela to Hoshab
39.	Cream-coloured Courser Cursorius cursor (Litham)	Bela to Turbat
40.	Little Ringed Plover Charadrius dubius (Scopoli)	Awaran
41.	Red-wattled Lapwing Hoplopterus indicus (Boodaert)	Bela, Awaran to Turbat
42.	Marsh Sandpiper Tringa stagnatilis (Bechstein)	Bela to Jhal Jhao
43.	Greenshank Tringa nebularia (Gunnerus)	Bela
44.	Green Sandpiper Tringa ochropus (Linnaeus)	Bela to Hoshab
45.	Close-barred Sandgrouse Pterocles lichtensteinii (Temminck)	Bela to Turbat

46.	Coronetted Sandgrouse Pterocles coronatus (Lichtenstein)	Bela to Turbat
47.	Spooted Sandgrouse Petrocles senegallus (Linnaeus)	Bela to Turbat
48.	Chestnut-bellied Sandgrouse Pterocles exustus (Temminck)	Bela to Turbat
49.	Imperial Sandgrouse Pterocles orientalis (Linnaeus)	Bela to Turbat
50.	Rock Dove Columba livia (Gmelin)	Bela to Turbat
51.	Indian Ring Dove Streptopelia decaocto (Frivaldszky)	Bela to Turbat
52.	Red Turtle Dove Streptopelia tranquebarica (Hermann)	Bela to Turbat
53.	Little Brown Dove Streptopelia senegalensis (Linnaeus)	Bela to Turbat
54.	Rose-ringed Parakeet Psittacula krameri (Scopoli)	Bela to Turbat
55.	Pallid Scops Owl Otus bruceli (Hume)	Bela to Awaran
56.	Northern Eagle Owl Bubo bubo (linnaeus)	Bela to Turbat
57.	Short-eared Owl Asio flammeus (Pontoppidan)	Bela to Awaran
58.	Sindh Nightjar Caprimulgus mahrattensis (Sykes)	Bela to Turbat
59.	European Nightjar Caprimulgus suropaeus (Linnaeus)	Bela to Jhal Jhao
60.	Little swift Apus affinis (J.E. Gray)	Bela to Turbat
61.	White-throated Kingfisher Halcyon smyrnensis (Linnaeus)	Bela, Jhal Jhao

62.	Common Eurasian Kingfisher Alcedo atthis (Linnaeus)	Bela
63.	Little Green Bee-eater Merops orientalis (Latham)	Bela to Turbat
64.	Blue-cheeked Bee-eater Merops superciliosus persicus (Pallas)	Bela to Turbat
65.	Eurasian Roller Coracias garrulus (Linnaeus)	Bela to Turbat
66.	Indian Roller Coracias benghalensis (Linnaeus)	Bela to Turbat
67.	Hoopoe Upupa spops (Linnaeus)	Bela to Turbat
68.	Eurasian Wryneck Jynx torquilla (Linnaeus)	Bela to Awaran
69.	Sindh Pied Woodpecker Dendrocopos assimilis (Blyth)	Bela to Turbat
70.	Singing Bush Lark Mirafra javanica	Bela to Turbat
71.	Redwinged Bush Lark Mirafra erythroptera	Bela to Turbat
72.	Ashycrowned Finch Lark Eremopterix grisea	Bela
73.	Deset Finch Lark Ammomanes deserti	Bela to Turbat
74.	Bar-tailed Desert Lark Ammomanes cincturus	Bela to Turbat
75.	Rofosus-tailed Finch Lark Ammomanes phoenicurus	Bela to Turbat
76.	Large Desert Lark Alaemon alaudipes	Bela tc Turbat
77.	Sand Lark Calandrella roytal	Bela to Turbat

78.	Crested Lark Galerida cristata	Bela to Turbat
79.	Dusky Crag Martin Hirundo cancolor	Bela to Turbat
80.	Pale Crag Martin Hirundo obsoleta	Bela to Turbat
81.	Swallow Hirundo rustica	Bela to Turbat
82.	Common Wood Shrike Tephrondornis pandicerianus	Bela
83.	White-cheeked Bulbul Pycnanatus leucogenys leucotis	Bela to Turbat
84.	Red-vented Bulbul Pycnonotus cafer	Bela to Turbat
85.	Black Drongo Dicrurus adsimilis	Bela to Turbat
86.	House Crow Corvus corax	Bela to Lakh Pass
87.	Raven Corvus corax	Bela to Turbat
88.	Brown-necked Raven Corvus ruficollis	Bela to Turbat
89.	Rufous Chat Erythropygia galactotes	Bela
90.	Indian Robin Saxicoloides fulicata	Bela to Turbat
91.	Stoliczka's Bush Chat Saxicola macrorhyncha	Bela
92.	Isabelline Chat Oenanthe isabellina	Bela to Turbat
93.	Hooded Chat Oenanthe monacha	Bela to Turbat

94.	Streaked Wren-Warbler *Prinia gracilis*	Bela to Turbat
95.	Grey Shrike *Lanius excubitor*	Bela
96.	Grey Hypocolius *Hypocolius ampelinus*	Bela to Turbat
97.	Tawny Pipit *Anthus campestris*	Bela
98.	Pied Wagtail *Motacilla alba*	Bela to Turbat
99.	Common Myna *Acridotheres tristis*	Bela to Turbat
100.	House Sparrow *Passer domesticus*	Bela, Turbat
101.	Yellow-throated Sparrow *Petronia xanthocollis*	Bela to Turbat
102.	Trumpeter Bullfinch *Carpodacus githagineus*	Bela

TABLE 3.5

LIST OF MAMMELS FOUND IN THE PROJECT AREA

SR.No.	SPECIES	AREA
1.	Desert Hedgehog Hemiechinus aurita collaris (Gray)	Bela
2.	Afghan Hedgehog Hemiechinus megalotis (Blyth)	Bela to Turbat
3.	Brandt's Greater Hedgehog Paraechinus hypomelas (hypomelas)	Bela
4.	Blandford's Lesser Lowland Hedgehog Paraechinus hypomelas blandfordi (Anderson)	Hoshab to
5.	Pale Gray Shrew Crocidura pergrisea (Miller)	Awaran to Turbat
6.	Egyptian Fruit Bat Rousettus aegyptiacus arabicus (Anderson and de Winton)	Bela to Turbat
7.	Large Rat-tailed Bat Rhinopoma microphyllum (Brunnich)	Bela and Turbat
8.	Indian False Vampire Megaderma lyra (Geoffroy)	Bela
9.	Bicoloured Leaf-nosed Bat Hipposideros fulvus (Gray)	Jhal Jhao to Turbat
10.	Trident Leaf-nosed Bat Asellia tridens (Geoffroy)	Bela to Turbat
11.	Kuhl's Pipistrelle Pipistrellus kuhli (Kuhl)	Bela to Turbat
12.	Scaly Anteater Manis crassicaudata (Gray)	Bela
13.	Indian Wolf Canis lupus pallipes (Sykes)	Bela to Turbat
14.	Asiatic Jackal Canis aureus (Linnaeus)	Bela to Turbat

15.	Desert Fox Vulpes vulpes pusilla (Blyth)	Bela to Turbat
16.	Hill Fox Vulpes vulpes griffithi	Awaran to Turbat
17.	King Fox Vulpes cana (Blanford)	Awaran to Turbat
18.	Balochistan Black Bear Selenarctos thibetanus gedrosianus (Blanford)	Jhal Jhao
19.	Marbled Pole Cat Vormela peregusna (Guldenstaedt)	Awaran
20.	Ratel Mellivora capensis (Schreber)	Bela to Turbat
21.	Small Indian Manogoose Herpestes auropunctatus (Hodgson)	Bela and Turbat
22.	Indian Grey Mangoose Herpestes edwardsi (Geoffroy)	Bela to Turbat
23.	Striped Hyaena Hyaena hyaena (Linnaeus)	Bela to Turbat
24.	Indian Desert Cat Feelis libyca ornata (Gray)	Awaran
25.	Jungle Cat Felis chaus (Guldenstaedt)	Bela to Turbat
26.	Caracal Felis caracal (Schreber)	Bela to Turbat
27.	Leopard Panthera pardus (Linnaeus)	Bela, Jhal Jhao to
28.	Chinkara Gazella gazella bennetti (Sykes)	Jhal Jhao to Turbat
29.	Sindh Wild Goat Capra hircus blythi (Hume)	Bela to Jhal Jhao, Awaran
30.	Balochistan Urial Ovis orientalis blanfordi (Hume)	Bela to Jhal Jhao

31.	Cape Hare Lepus capensis (Linnaeus)	Bela to Turbat
32.	Five striped Palm Squirrel Funambulus pennanti (Wroughton)	Bela to Turbat
33.	Indian Crested Porcupine Hystrix indica (Kerr)	Bela to Turbat
34.	Soft-furred Field Rat Rattus meltada (Gray)	Bela
35.	Sand-coloured Rat Rattus gleadowi (Murray)	Bela to Turbat
36.	House Rat Rattus rattus (Linnaeus)	Bela to Turbat
37.	House Mouse Mus musculus (Linnaeus)	Bela to Turbat
38.	Indian Brown Spiny Mouse Mus platythrix (Bennett)	Bela
39.	Cairo Spiny Mouse Acomys cahirinus (Desmarest)	Bela to Awaran
40.	Short-tailed Mole Rat Nesokia indica (Gray and Hardwicke)	Bela to Turbat
41.	Long-tailed Hamster Calomyscus bailwardi (Thomas)	Bela to Turbat
42.	Balochistan Gerbil Gerbillus nanus (Blanford)	Bela to Turbat
43.	Indian Gerbil Tatera indica (Hardwicke)	Bela to Turbat
44.	Persian Jird Meriones persicus (Blanford)	Bela to Turbat
45.	Libyan Jird Meriones libycus (Lichtenstein)	Awaran to Turbat
46.	Swinhoe's Jird Meriones crassus (Sundevall)	Awaran to Turbat

TABLE 3.6

LIST OF NATIONAL PARKS, WILDLIFE SANCTUARIES
LOCATED IN THE PROJECT AREA

SR.NO.	NAME	LOCATION/ DISTRICT	AREA (IN HACTARE)	IMPORTANT ANIMALS
A.	NATIONAL PARKS			
1.	Dhrun	Khuzdar	165,004	Sindh wild goat, urial, chinkara, foxes Asiatic jackal, Indian wolf, Leopard, Cape hare Seesee partridge, chukar, black partridge and Indian gray partridge
2.	Hingol	Lasbella/ Gwader	167,700	Sindh wild goat, urial, chinkara, foxes Asiatic jakal, Indian wolf, leopard, Cape hare Seesee partridge, Houbara bustard, sand grouses
B.	WILDLIFE SANCTUARIES			
1.	Kachau	Khuzdar	21,660	Sindh wild goat, urial, foxes, Cape hare Seesee partridge, Houbara bustard
2.	Shashan	Khuzdar	29,555	Sindh wild goat, urial, foxes, Cape hare Seesee partridge, Houbara bustard
3.	Ch ani	Khuzdar	19,433	Sindh wild goat, urial, foxes, Cape hare leopard Seesee patridge
4.	Dureji	Lasbella	178,259	Sindh wild goat, urial, chinkara Seesee patridge, Houbara bustard chukar, sand grouses

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5.	Khurkhara	Lasbella	18,345	Indian gray partridges, Black partridge sand grouses, Haubara bustard
6.	Kalwah Kap	Khuzdar	33,198	Urial, chinkara, foxes, Cape hare, Houbara bustard, sand grouses

C. GAME RESERVES

No game resrve in the area.

TABLE 3.7

LAND UTILIZATION STATISTICS

(1988-89)

(AREA IN HECTARES)

District	Geographical Area	Reported Area	CULTIVATED AREA			CROPPED AREA		UNCULTIVATED AREA			
			Current Fallow	Net Sown	Total (4+5)	Area sown more than once	Total (5+7)	Culturable waste	Forest	Not available for Cultivation	Total (9+10+11)
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
Khuzdar	6,489,158	5,304,749	47,098	63,457	110,555	50	63,507	1,784,932	17,360	3,391,902	5,194,194
Turbat	2,253,889	554,432	25,293	15,046	40,339	10	15,056	76,941	-	437,052	513,993
Panjgur	1,689,091	673,228	18,966	4,311	23,277	-	4,311	55,074	-	594,877	649,951
Gwadar	1,521,603	248,851	11,367	1,259	12,626	-	1,259	38,575	15,545	182,105	236,225
Total	11,953,741	6,781,260	102,724	84,073	186,797	60	84,133	1,955,522	32,905	4,605,936	6,594,363

SOURCE: Agricultural Statistics Balochistan 1988-89.
Statistics Wing Directorate General of Agriculture Department, Balochistan, Quetta.

TABLE 3.8

AREA IRRIGATED BY DIFFERENT SOURCES

OF IRRIGATION (1988-89)

(AREA IN HECTARES)

District	Total Area Irri- gated	CANALS			Tanks	Wells	Tube-wells	Karezes, Springs & Others	NUMBER OF		TRACTORS	
		Govt.	Pri-vate	Total					Wells	Tube-wells	Govt.	Pri-vate
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
Khuzdar	31,000	-	15800	15800	-	700	3500	11000	120	276	5	126
Turbat	15,000	-	5000	5000	-	2000	5000	3000	320	483	20	193
Panjgur	3,150	-	-	-	-	1500	1600	50	700	164	2	146
Gwadar	1,380	-	-	-	-	-	80	1300	-	22	6	50
Total	50,530	-	20800	20800	-	4200	10180	15350	1140	945	33	515

SOURCE: Agricultural Department, Balochistan.

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TABLE 3.9
DISTRICT-WISE CROPPED AREA IN HECTARES

Kharif Crops	KHUZDAR		TURBAT		PANJGUR		GWADER		TOTAL	
	Irri-gated	Un-Irri-gated	Irri-gated	Un-Irri-gate	Irri-gated	Un-Irri-gated	Irri-gated	Un-Irri-gated	Irri-gated	Un-Irri-gated
Rice	664	-	929	-	80	-	-	-	1673	-
Sorghum	214	931	-	-	-	-	-	-	214	931
Mung	42	409	-	-	-	-	-	-	42	409
Fruits	1846	-	5517	-	2000	-	990	-	10353	-
Onion	1674	-	250	-	36	-	37	-	1997	-
Vegetables	456	-	1106	-	141	-	-	-	1703	-
Melons	370	50	278	-	6	18	-	-	654	68
Chillies	71	-	103	-	-	-	-	-	174	-
Fodder	481	1031	2090	-	160	40	120	-	2851	1071
Guar Seed	2	4	-	-	-	-	-	-	2	4
Potato	38	-	-	-	-	-	-	-	38	-
Moth	5	3	-	-	-	-	-	-	5	3
Bajra	41	-	-	-	-	-	-	48	41	48
Coriander	-	-	9	-	-	-	-	-	9	-
Garlic	-	-	11	-	-	-	-	-	11	-
Kharif Total	5904	2428	10293	-	2423	58	1147	48	19767	2534
Rabi Crop										
Wheat	16516	25397	386	210	60	940	-	-	16962	26517
Barley	400	6000	200	-	130	260	-	-	730	6260
Cumin	2501	-	-	-	-	-	-	-	2501	-
Masoor	32	17	-	-	-	-	-	-	32	17
Vegetables	605	-	1779	-	-	-	4	-	2388	-
Fodder	99	-	2180	-	240	200	60	-	2579	200
Rabi Total	20153	31414	4545	210	430	1400	64	-	25192	33024
Annual Total	26057	33842	14838	210	2853	1458	1211	48	44959	35558

TABLE 3.10

DISTRICT-WISE CROP PRODUCTION IN TONNES

Kharif Crops	KHUZDAR Irri-gated	KHUZDAR Un-Irri-gated	TURBAT Irri-gated	TURBAT Un-Irri-gate	PANJGUR Irri-gated	PANJGUR Un-Irri-gated	GWADER Irri-gated	GWADER Un-Irri-gated	TOTAL Irri-gated	TOTAL Un-Irri-gated
Rice	1030	-	2150	-	100	-	-	-	3280	-
Sorghum	200	460	-	-	-	-	-	-	200	460
Mung	30	200	-	-	-	-	-	-	30	200
Fruits	18910	-	46210	-	20500	-	7100	-	92720	-
Onion	41850	-	3000	-	450	-	400	-	45700	-
Vegetables	5430	-	11330	-	1571	-	-	-	18331	-
Melons	6580	50	4170	-	110	180	-	-	10860	230
Chillies	100	-	150	-	-	-	-	-	250	-
Fodder	21790	22560	74700	-	7150	750	6000	-	109640	23310
Guar Seed	2	3	-	-	-	-	-	-	2	3
Potato	450	-	-	-	-	-	-	-	450	-
Moth	5	2	-	-	-	-	-	-	5	2
Bajra	40	-	-	-	-	-	-	25	40	25
Coriander	-	-	4	-	-	-	-	-	4	-
Garlic	-	-	60	-	-	-	-	-	60	-
Kharif Total	96417	23275	141774	-	29881	930	13500	25	281572	24230
Rabi Crops										
Wheat	31000	25400	760	150	90	560	-	-	31850	26110
Barley	4400	4560	130	-	85	120	-	-	4615	4680
Cumin	1700	-	-	-	-	-	-	-	1700	-
Masoor	220	7	-	-	-	-	-	-	22	7
Vegetables	7240	-	18460	-	-	-	50	-	25750	-
Fodder	5300	-	84300	-	7450	2000	2100	-	99150	2000
Rabi Total	49662	29967	103650	150	7625	2680	2150	-	163087	32797
Annual Total	146079	53242	245424	150	37506	3610	15650	25	444659	57027

CHAPTER 4

Environmental Impacts Of The Proposed Project

CHAPTER - 4

ENVIRONMENTAL IMPACT OF THE PROPOSED PROJECT

4.1 PHYSICAL ENVIRONMENT

4.1.1 Air Quality

Both fixed and mobile sources consuming fossilized fuel cause degradation of air quality. It is resulted from emissions of non-reactive pollutants constituted of carbon monoxide, sulphur oxides and particulate matters such as smoke, lead and dust; and reactive pollutants composed of hydrocarbons, carbon dioxide, nitrogen oxides and ozone. Some of the pollutants (normally non-reactive) have localised effects on the atmosphere, while the other (reactive) have global effects (Appendix- A).

The extent and proportion of emission of various pollutants from vehicles is a complex matter as it is dependent on various factors including the condition of engine, vehicle and engine type, speed, road condition and gradient, etc. Therefore, in the absence of real data it is difficult to assess the emissions. A detailed account on this aspect is given in Appendix-A. However, to give an idea about the historical increase in the annual load of emission from the increased traffic on various road sections, an estimation has been made on average conditions. These has been shown in Table 4.1.

The gravity of air pollution from the vehicles and its effects on the local atmosphere also depends on the climatic factors (winds, precipitation, temperature etc.) and pattern and volume of traffic. These factors regulate the dispersion and settlement of pollutants with the consequence their dilution in the local atmosphere. Thus the assessment of change in air quality would require model studies under various local conditions as regards atmosphere and traffic pattern and volume. This is beyond the scope of the present Study.

The estimates given in Table 4.1 has been compared with the data available from a study for urban area of Lahore, where pollution is contributed not only from heavy road traffic but also from railways and industries. Consequently the emissions are many time higher than those on Bela-Awaran-Turbat Road for projected year 2003. According to this study the observed concentrations of various air pollutants in Lahore are normal except that of particulates and ozone (which are high) when compared with the ambient air standards of World Health Organization (Ref. 4.1). On this ground it can be concluded that the air quality of the Project area would not be much affected by the increase in traffic during construction or during operation of the road particularly when the topography and atmospheric conditions are favourable for the dispersion of the pollutants.

However, considering the effect of air pollution on biological health, particularly that of workers, an account on remedial measures is given in Appendix- G.

4.1.2 Noise

The aspect of noise has been covered in details in Appendix-A. A summary of the same account is given here for the interest of the reader.

One of the unfortunate consequences of transportation on our way of life has been an increase in noise level. The noise emission from vehicles is a complex issue and is contributed by many sources such as engine, driving shaft, fan, tyres, air inlet, exhaust and, at times, horns. They are emitted at different levels from the ground and have different frequencies, resulting in a complex effect. The noise levels are also affected by the road condition and gradients. With improved road pavement and easy grades much of the noise is buffered.

An assessment on noise level of projected traffic for year 2003 has been made and reported in Appendix-A. According to this assessment, the predicted noise level at distance of 200 ft from roadway (from where the residential area may start along a highway) is 67 dBA on L10 scale, which is within the desirable noise limit of 70 dBA for the landuse category of residences, schools, hospitals, hotels, parks, etc.

The Bela-Awaran - Turbat Road is an ages old transportation route. No appreciable alignment change is envisaged. The road passes through a barren and sparsely populated areas. The villages are small by any standards. The dwellings/hutments are traditionally built of thick mud walls with small low level windows and thatched roofs, hence they themselves are mitigative against noise.

As regards the effect of noise on wildlife, it would be insignificant. Primarily because the population of wildlife in the Project area is very thin and almost non-existance in the vicinity of road, and secondly because the noise level on the improved road conditions would be better than on the existing gravel/dirt track and sub-standard geometrics.

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4.1.3 Water Resource

As referred earlier (Section 3.2.2.5) the rivers in the Project area are semi-perennial in nature, having very little perennial discharges in certain reaches. During the field visit in the month of May, a few water bodies of varied size, ranging from a few hundred to a few thousand square feet in stretch, were observed in the river beds along the road at Kaniki, Mar Kaur, Larandri, Ara, Serd Kaur, Mashkai, Kil Kaur and Kech Rivers. Of these, the waters in Serd (Chil) Kaur, Kil Kaur and Kech Rivers were in flowing condition, with, however, very little discharges. In other rivers the water bodies were in the form of impoundments.

It was reported that the local people use these waters for domestic and livestock purposes only with the exception of Kil Kaur and Kech River where the water was also used for irrigation at Hoshab, Tajaban, Hirok, etc.

The perennial flows and stagnant water bodies are relatively large during winter months after rains, which gradually reduce through summer months and almost disappear in late summer. Under such conditions, it can be concluded that there are very little chances of obtaining water for road construction and for use of labour camp from the surface resouces in the vicinity of the road or elsewhere. Any such withdrawal from the existing surface resource will deprive the local people of the limited available resource. There is no other sizeable water body in the area from where the water can be drawn for construction activities. Therefore, the Contractor has to look for an alternative water resource. The most probable source is the groundwater.

Owing to the shortage of surface water supply, the local people in the Project corridor have developed groundwater resouces through dug wells, Karezes and tubewells. Such instances are common in Kolwa and Kech valleys (from Awaran upto Turbat). The terrain of Bela-Awaran section being hilly and rocky, the groundwater development is infrequent and is limited in the river valleys mostly through dug wells and dug holes in the river beds. Recently the Government of Balochistan has started installing tubewells for domestic water supply and irrigation. However, the pumped water is insufficient to meet the local requirement. Therefore, no water can be spared from the existing source for road construction purposes. It is recommended the the Project should provide tubewell facilities at different stations to meet the Project requirement. This will also facilitate the local population. After the construction of the road the tubewells may be handed over to the Government of Balochistan for use by local people.

The Project will provide bridges, pipe and box culverts over the rivers and nullahs, thus will ensure free movement of surface run-off in the channels. However, the road embankments may obstruct the sheet flows in the level plains of the valleys particularly in Kolwa area. Due to low railfall in the area this impact may be insignificant in general terms. But the winter rains are normally received in thunder storms and heavy surface runoff is resulted as most of the land area is denuded. The road embankment will obstruct the land drainage, thus may cause impoundment in the upstream side and even damage the embankment. This may also effect the barrani agriculture in the downstream area. Therefore, it is recommended that some additional cross drainage structures may be provided in such level areas.

The construction activities may disturb the existing sites of water impoundment in the river beds. Therefore, the contractor should be vigilant not only for the protection of such sites/water bodies from being physical disturbed but also protected against pollution from the spill of waste material, like asphalt, oil, other obnoxious material and sewerage disposal of construction camp. In general, the whole of the drainage area should be kept free from such spillage as the surface run-off during rains may contaminate the water bodies.

4.1.4 Land Resource

The most prominent impact of the Project on land resource will be the change in physiographic configuration in the Project corridor. The construction of road will involve a lot of cutting and filling in hilly terrain to fit the grades with the design criteria. Moreover, to protect the road from splashes of surface run-off in plain area, the road at places will run on embankments. All these factors would influence the physical configuration of the area, which, with the present scenario of land formation and land use, may be immaterial. But its secondary impacts are worth considering. These are related with the stability of the slopes and land erosion. It is envisaged that the best engineering knowledge would have been used by the planners to design the slopes so that incidence of erosion and land slide is minimised.

However, in the light of local geology and a speedy reconnaissance along the proposed alignment, there seems to be certain exposed geological factors which may effect the potential development of the site or may create hazards during operation. These are as follows :

1. The unconsolidated river deposits where slopes are not yet at a stable angle in relation to their composition, are

subject to erosion. Large mass of loose conglomerates were observed to dip towards the road in the partly developed road section. They are liable to fall. In such area a steeper gradient should be provided.

2. There are evidences of slips of material onto the road in mudstone terrain. Steep slopes composed of these inherently weak and soft rocks are scheduled to be unstable, particularly during the rainy seasons when the beds dipping towards the slope at an angle less than the amount of inclination of the sloping surface. To minimise exposure to rainfall erosion and avoid land slides, cut slopes through the mudstone should be as steep as possible. Also enlarging the section of the cutting and provision of high retaining walls in addition to adequate drainage system may help in reducing the impact of this geological factor.

3. Similarly there are several locations where steeply dipping beds of sandstone dip onto the alignment. Though they are not easily prone to slip, the presence of joints, fissures and other planes of weakness effectively reduces their strength and likely witness frequent slips, particularly during rains. Such exposures may be stabilized by reducing their gradients and dressing properly in accordance with the orientation of the existing planes.

4. For the stability and safety of the Project features and that of cut slopes, consideration should also be given to the earthquakes, as a number of active faults have been identified in the Project area (Section 3.2.2.3). In this regard the advice of a geotechnical expert is desirable.

As regards the effect of the road and subsequent traffic on the soils of the area are concerned, it will be insignificant. However, during construction a lot of cutting and filling will be involved, which may effect the soils of the surrounding area. Inspite of the fact that lands are mostly barren and undeveloped, it is desirable that in hilly tracts cut and fill material should be balanced so that no spoil is left for dumping elsewhere. This will also minimise the borrow areas. Such practice will avoid degradation of the soils by erosion (in borrow area) or loss of fertility of the top soil (in spoil area). In level plains where filling is required for embankment, the material should be obtained from appropriate places in the hilly tracts or eroded areas instead of making ditches along the road or other places on the level plains. The borrow area should be properly graded/dressed afterward to avoid degradation/ erosion. A special care would be needed near the settlements and cultivated area.

The most deteriorating elements in the road construction are tar, oil, cement and other chemicals. Their spillage will alter the soil conditions to an extent that they may become unproductive (at least for sometime). Therefore, care should be taken in handling these materials. Their containers should also be disposed off properly.

4.2 Ecological Environment

4.2.1 Effect on Terrestrial Plant Ecology

As referred earlier, the Project road will pass through a barren and undeveloped land tract. Due to harsh climatic condition, the natural vegetation is scanty and sparsed. The hilly tracts, from Km 5 to Km 17, Km 42 to Km 56, Km 98 to Km 107 and Km 130 to Km 135, are almost devoid of vegetation except for scanty vegetation in nullahs. The remaining stretch generally bear poor vegetation except for reach from Km 107 to Km 128 and Km 136 to Km 140, where moderate growth of Phoenix, Accacia, Tamrix, Capparis, Zizyphus, Prosopus, Calotropis, etc. are found. However, the land clearance for additional right of way would not involve much cutting of the vegetative cover. The growth in Kolwa and Ketch valleys is generally poor with moderate growth along rivers and nullahs, particularly near Hoshab and Tajaban. Here again disturbance to the vegetative growth due to construction activity will be insignificant.

It is also presumed that during the construction of road almost no material from vegetative growth in area, like planks for shuttering and scaffolding or fuel for melting asphalt, will be used. However, fuel wood in small quantities is expected to be used by the labour for cooking. This might effect the area in the vicinity of camps. The overall effect of such cuttings may be insignificant. But due to poor vegetative growth and low regeneration rate in the area it is desirable that the contractor should provide substitute fuel source to the labours.

The vegetative growth in the area is, to some extent, under the pressure of grazing and wood cutting for fuel purposes and for construction material. However, due to thin local population, small herds of livestock and geographic isolation of the area, the effects of grazing and wood cutting is not deletarious, except near big villages and towns where harvesting on commercial scale is carried out for local use. The Project is expected to decrease the pressure on plant communities because alternate fuel source such as kerosine and liquid petroleum gas (LPG) will be available due to cost effective transportation from Karachi.

4.2.2 Effect on Animal Community and Wildlife

It has already been referred in Section 3.3.1.2, that the wildlife population in the area is thin. Specifically in the Project corridor, a balance in animal communities has already been developed due to the traffic on existing road. Therefore, the improvement of the road seemingly will not alter the balance. However, the hunting pressure is expected to increase as a result of better transportation facility. The road will ease the access to the mountanous area in the vicinity of Project corridor and national parks and wildlife sanctuaries, thereby the wildlife will be exposed to hunting pressure.

Wildlife protection laws are already in existence in the form of Balochistan Wildlife Protection Act, 1974 and amendments thereafter. Under this law a list of protected animals has been provided. The law is administered by the Balochistan Wildlife Management Board. The Board is also authorised to use local administration on the wildlife protection aspects. Endangered animals under the "Balochistan Wildlife Protection Act, 1974, Third Schedule" are listed as "protected animals" which are not allowed to be hunted, killed or captured. Some of the species/group that are known to exist in the Project area are given in Table 4.2.

U.S.Department of Interior, under statutory authority of the "Endangered Species Act of 1973" and its amendments consider Indian monitor and chinkara as endangered. Indian monitor is placed on the endangered species list because it is being affected by its trade. The chinkara is placed on the concerned list due to over-exploitation of its population because of hunting and habitat destruction. Although under the Section 7(a)(2) of the Endangered Species Act, all U.S. Federal agencies are required to ensure that the activities they authorize, fund or carry out not likely to jeopardize the continued existence of such a species or to destroy or adversely modify its critical habitat. However, an opinion from the Office of the Solicitor, U.S. Department of Interior, indicates that Section 7 does not apply in foreign countries. It may further be added that Indian monitor is not commercially or otherwise hunted or traded in the area. Similarly Project construction and operation will not change this situation. Chinkara used to occur in the area in appreciable numbers some 20 to 30 years back and because of the traffic and other disturbances its population has decreased. It is seldom encountered in the Project area. The construction or operation of the Project will not make any change in this situation. Accessibility to other fringed area where chinkara is still found will increase which may result in increased hunting pressure on Chinkara.

Therefore, as a mitigation measure, Wildlife Department of Government of Balochistan is needed to be strengthen for its monitoring capabilities to ensure protection of endangered species in the vicinity of Project especially in national parks and wildlife sanctuaries.

4.2.3 Effect on Aquatic Ecosystem

Construction of Bela-Awaran - Turbat Road is not expected to affect the aquatic habitat except that those water impoundments located in its immediate vicinity. These may be degraded because of the use of the water for drinking or other purposes including washing of vehicles. Such activities are currently practiced in Turbat area where vehicles are washed in Kech River. The water in the impoundments near the Bridge at Turbat is now significantly polluted because of this activity. Despite this, fish (Cyprinion watsonii) is noticed to be inhabiting in this impoundment.

In the construction phase, some material would be taken from the river beds for the purpose of construction. The removal of material from river bed may lead to erosion and increase in turbidity at the time of rains. During the rainy season the river carries heavy turbid waters and increase in the turbidity will not pose any threat to productivity of the water bodies. The erosion may lead to formation of new impoundments and also increase in the depth of some of the present impoundments which will have a positive impact and the population of fish and its diversity is expected to increase.

Disposal of waste material in the channels and in their surroundings may pollute the water bodies, which will be fatal to aquatic life. Therefore, care should be taken during the construction phase to avoid disposal of any construction material in the impoundments in the river beds or in the vicinity.

The construction of road will facilitate the access to lower reaches of Hingol River where population of crocodile is inhabiting. A reasonable population of the crocodile is inhabiting the Hingol and Dhrun National Parks where it is included under the protected animals under the Balochistan Wildlife Protection Act, 1974.

4.2.4 Impact of Air Quality on Biological Ecosystem

From the discussion in Section 4.1.1, it is learnt that the impact of the Project on air quality is insignificant. Therefore, it may be envisaged that the expected change in the air quality would not effect the ecosystem of the Project area.

4.3 IMPACT ON SOCIAL AND CULTURAL ENVIRONMENT

4.3.1 Demographic Impact

4.3.1.1 Population Patterns

The main feature that controls the distribution of population in the area of Project influence is the availability of water. Due to overall scarcity of water in the area and low discharges at the water availability points, the settlements are generally scattered and constituted of very thin population. The proposed road is not likely to change the existing distribution pattern of the population. However, it is expected that a few hutments may develop along the road side as tea and food shops, and vehicle repair workshop, a practice which is even now in vogue along Bela-Awaran - Turbat Road and other roads in the area. The increase in such hutments, however, depends on the availability of water. Inspite of the fact that the groundwater potential of the area is reasonable, the exploitation cost is beyond the reach of general populace. Therefore, it is expected that such development will be limited near those villages where the Government of Balochistan has provided muncipal or irrigation water supply.

The implementation of a development project always attract outsiders to settle in the area of development. But in the project area, the influx of outsider settlers will be limited due to its harsh climate, low economic potential and socio-ethnic set up in the area. However, the road facility would support the industrial development in Turbat, resulting in internal migration of local population. This may also attract the traders and industrialists from Karachi and other parts of the country. However, the change in settlement pattern would be slow and seemingly will not create problem as observed in big cities of Pakistan. Therefore, no mitigatory action will be required.

4.3.1.2 Employment Pattern

The proposed road will induce employment opportunities during construction phase. Compelled from the poor economy, the local people will look forward to avail these opportunities. Even the people from far places would be attracted. Therefore, it is recommended that the contractor should engage unskilled and semi-skilled labour from the local resource. This will include the general labour, drivers/machine operators, masons, etc.

Besides the short term change in employment pattern during the construction of the road, the Project as such will not induce significant change in the existing employment pattern. However, depending upon the development in the industrial and agricultural sectors in the area, a significant change in the employment pattern is envisaged. The role of the road in the development of these sectors is obvious, as it will facilitate the transportation of industrial machinery, tubewell and farming machinery and equipment, and the end products. With the result more people will be engaged in industrial and agricultural sectors. Presently a situation of under-employments exists in the area. Therefore, the development in industrial or agricultural sectors will not affect any other sector.

The road will also facilitate the migration of local population to other area for search of employment, which presently is limited due to lack of communication. Similarly, the existing hesitation of para-medical staff, teachers and other such staff for accepting employment in the area will reduce, thus help developing various social welfare facilties.

4.3.1.3 Economic Pattern

The proposed road is expected to leave a great beneficial effect on the economy of the area of Project influence in general and specifically on that of Turbat and other settlement near the road.

The economy of the area of Project influence is generally agriculture, sheep herding and fisheries in the coastal towns of Pasni, Gwadar and Jiwani. The agriculture and livestock business is normally below subsistence level. This is attributed to many factors including the non-availability of agricultural inputs, of which the most important is the water. The remoteness and isolation of the area from the rest of the country may be considered the main cause for the slackness in the development. This has not only impaired the supply of non-water inputs but also hampered the marketing of the agricultural produce to the important market of Karachi. The areas around Turbat are popular for the production of quality dates on commercial scale, but due to lack of transportation facilities the local people rarely get the benefit of Karachi market.

The proposed road will play a great role in the development of agricultural sector. It will facilitate the transportation of drilling implements and tubewells machinery for water resource development, and thus intensify the agriculture for not only meeting the local requirement but also export surplus. The livestock business is also expected to increase.

The proposed road will also beneficially effect the economic condition of coastal towns by easing the transportation of fish and salt. The main economy base of these towns is the fisheries. There are about 600 boats in Pasni Town which unload about 21,000 tons of fish annually at Pasni Fish Harbour. Out of this about 30 percent is locally used in Makran Division, while the rest is exported to Karachi in the form of trash fish (20 percent) for poultry feed, and salted fish (50 percent) for the Karachi market and export to Sri Lanka. The main route of transportation is through land (85 percent of the total export to Karachi) via Bela-Awaran - Turbat Road. The remaining 15 percent is transported by sea. Inspite of the fact that the land route is longer than the sea route and the transportation cost is about 33 percent higher on the land route, the fishermen are compelled to use this route due to non-availability of long range motor boats. Therefore, the fishermen have to bear high cost for transportation. It has been reported that with the improvement of Bela-Awaran - Turbat Road, the transportation cost will reduce by 15 to 20 percent.

The fish is also transported from Gwadar port, which is being developed into a mini-port. The facilities are under construction. The port will handle the landing of about 40,000 tons of fish and lobster. A major portion of the catch will be exported to Karachi. It is also planned that the Gwadar Port will handle other sea imports to share the load of Karachi Port. These imports will later be transported to up-country. The Project road will form the pivotal route for the inland movement of the goods and fish unless a substitute route along the coast is developed. It has been learnt that the Government of Pakistan (Ministry of Communication) has planned to construct a road along the coastal line connecting the coastal towns with Karachi. The project has a planning history of decades. At present the road section from National Highway N-25 at Siranda upto Ormara is under construction by Frontier Works Organization. But due to topographic problems the project is progressing very slowly. The remaining part is still pending. With the completion of this road, the utilization of Bela-Awaran - Turbat by the coastal towns will reduce. But still there is a long way in the completion of the coastal road.

In short the primary beneficiaries of the road will be the local farmers, animal raisers, and businessmen in the vicinity of Project corridor. These benefits will accrue in the form of direct employment opportunities and improved access to outside markets for inputs and outputs. Improved living conditions would result from higher income, lower costs of living and better access to educational and health facilities and other amenities of life. The secondary beneficiaries would be the entire population living in the entire south-western regions of Balochistan. Improved income levels and better access to social services will benefit the entire region directly and through trickle down effects. The multiplier effects would include higher land values, production of high value crops, animals, and fish, high profits to the businessman resulting from higher employment, higher incomes, high consumption levels and higher demand for goods and services.

The construction of the road would provide greater mobility to agriculture and other labours. Studies in Khuzdar and Nal area indicate that agriculture labour have benefited significantly from the construction of the RCD Highway. Until the mid-seventies a share cropper was paid 1/5th of fruit crops and 1/4th of all other crops. Now-a-days the share is 1/4th and 1/3rd respecti ely. The change is due to increased mobility of labour made possible by construction of the road.

As mentioned earlier all necessities of life including staple grain in Makran are imported from outside, mainly Karachi. While there is a little question that small land owners will benefit from a reduced price for inputs and better areas to markets, the poor spend a disproportionately higher percentage of their income on imported necessities and high costs of transportation further burden them the most. Accordingly, the construction of an efficient road system and consequent lower costs of transport would benefit both land owner and the poor farmer.

Another important economic benefit of the road will be that it will facilitate mineral prospecting in the area particularly along the contacts between volcanic and sedimentary rocks where deposits of manganese or chromite can be expected. There is a great demand of these minerals in the steel industry. Also the extinct mud volcano sites may be explored for a good source of steam for power generation and extracting useful chemicals such as amonium carbonate, sodium bicarbonate and boric acid.

4.3.1.4 Resettlement

The Project will not involve any resettlement issue. The majority of the village habitation listed in Table 1.1 are situated at a safe distance from the proposed right of way of the road. The towns/villages of Jhal Jhao, Bedi, Awaran, Gishkaur, Hosab, Sami, Shahpuk and Shahrak are the exception, where the road will pass through the villages. The majority of these villages will not pose major limitation to the route. The villages of Awaran, Sami and Shahpuk will, however, pose some restriction. To avoid resettlement in such areas the right of way has been kept upto the existing building lines. Therefore, the Project will not involve any major resettlement except for a few hutments here and there. In this respect it is recommended that the owners should be appropriately compensated to meet the replacement cost of the facility.

4.3.2 Infrastructure Requirement

It is obvious that during the implementation and operation of a development project a number of infrastructure facilities are required which are not the part of the main project. In a road project these ancillary works include the housing and camping facilities for supervisory and construction staff, health care facilities, utilities, schools, transportation, communication facilities, security guards etc. Besides these primary infra-structure facilities, a road project also require ancillary works to meet the social, security and safety requirements of the road users, which may be categorised as secondary infrastructures.

4.3.2.1 Primary Infrastructures

The stipulated construction period of the Project is about 52 months. It is envisaged that to complete the Project within stipulated time period, various sections of the road will be implemented simultaneously. This will require camping at various sites. According to a plan, 4 stations have been foreseen. The tentative location of these stations are as follows:

1. Base station, near Awaran.
2. Secondary station-I, near Bela
3. Secondary station-II, near Jhal Jhao
4. Secondary station-III, near Hoshab.

At each station housing and camping facilities will be required for the staff of engineers and contractors. The total strength of the engineer's staff is speculated to be above 100 including technical staff and administrative and support staff in about equal number. Similarly the total strength of the contractor's staff is speculated to include 40 managerial and technical staff, 20 administrative and support staff, about 200 skilled labour and 450 to 570 unskilled labour.

The Project will provide residential and appropriate office facilities for all technical and administrative and support staff and camping facilities for the skilled and unskilled labour. It

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is foreseen that the bulk of the skilled and unskilled crew will be engaged locally. As it will be difficult to get the labour from the villages where the station is located they will come from the surrounding areas and thus the contractor has to make camping arrangement for such staff. The villages in the area do not seem to have the capacity to accommodate such workers.

In addition to housing and camping facilities, the contractor is supposed to make arrangements for utilities like generators for electricity, tubewells for water supply, fuel (kerosine and LPG), heating and cooling facilities etc. Proper sanitation facilities should be provided.

The health care facilities in the Project area are very poor. It is not even sufficient for local people. Therefore, for the care of health of the Project staff, dispensaries with appropriate para-medical staff and one or two bed facilities should be provided at each station. This should also include facility for transportation of patients to Turbat and Karachi.

In the interest of the work, it is speculated that the contractor will arrange transportation of engineer's and contractor's staff to and from camping stations and work sites. He will also be vigilant for security and safety of camps and work sites.

4.3.2.2 Secondary Infrastructure

As road will pass through an almost barren and sparsely inhabitated tract, a number of secondary infrastructures are required in the project. They include water supply, washing rooms and latrines, praying places, bays for bus and truck parking and check posts with appropriate strength of gaurds and police. A lot of emphasis was laid on the provision of these facilities in the scoping sessions. Therefore, it is necessary that road planners and designers should provide these facilities along the road at appropriate distances. As regards the medical facilities for the injuries in road accidents a detailed account has been given in the Appendix- G.

4.3.3 Cultural Resources

4.3.3.1 Cultural Patterns and Values

Cultural patterns and values of a society are normally deep rooted, which are subject to change in a time spread over generations. There are many factors that are responsible for the change in the cultural patterns and values. Primarily time factor plays a great role in such changes. With the passage of time every society is liable to change to some extent due to inherent process of evolution. However, when this is combined with the insurgance of outside influence through personal contacts or communication media like television and radio and education, the pace of change accelerates manifold. The economic condition plays a great role in the acceptance or rejection of outside influence. A road network would though increase the personal communication, the process of influence is slower than through other media.

There are other factors which resist the outside influence. The tribal binding is the most important of such factors. In the area of Project influence, the tribal bindings though have weakened, the coherence with the traditions and old norms is still deep rooted. Therefore, there is no likelihood of rapid and unmanaged social - cultural change nor of any radical disruption of the existing social set-up. The society in the area is in a process of gradual change which will continue on the same pace for a long time, unless there is a drastic change in socio-economic set up. The influence of other road networks in the Province can be taken as an example. The National Highway N-25 though has influenced the economic condition of the area, the social values of general mass have not changed much even after the elapse of 3 decades.

On the other hand, sometimes the social, cultural and political factors pose resistance to a development project, particularly a road project. In the Project area no social and cultural impediments to the successful implementation of the Project are foreseen. Presently the road is the basic need of the area and its importance is well understood by various sections of the local population. The majority of the population and the business and farming communities consider the construction of this road a sine quo non for the development of the area and for improvement in their socio-economic conditions, thus improving their living standards. These aspects have been dealt in details in Appendices D and F.

4.3.3.2 Historical and Archaeological Resources

The proposed road will mostly follow the route of ages old camel track which was improved in 60's for vehicular traffic. The existing route is already at a safe distance from the known historical and archaeological resources. The increased right of way of the proposed road or the change in route at places will not disrupt any of the known archaeological site except a shrine of Shireen - Farhad and attached mosque at Km 21 (Section 3.4.3). Therefore, it is recommended that the planner should realign the road in this section. Similarly, minor adjustment in the alignment at km 155 would also be required to avoid a graveyard.

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The history of the Project area is very old. There might be the remains of Dravidian era and even of prehistoric (paleolithic to neolithic) times. From the discussions with knowledgeable people, it has been found that such remains have not been observed on the ground. However, during excavation or cutting of the mountain slopes such historical wealth may expose. Therefore, the contractor and supervisory engineers should have to be very watchful. If such features are identified, the Department of Archaeology, Government of Pakistan, should be notified.

Realising that the disruptive impact of the road on archaeological resource is almost nil, there should not be any hindrance in its implementation from this point of view. However, the Government of Balochistan should liaise with the Department of Archaeology, Government of Pakistan, in respect of legal requirements of the project and for assistance as and when required by the engineers and contractors in respect of identification and preservation/salvage of archeological monuments, if found during excavation/cutting.

Notwithstanding the project road will benefit the archaeological field by opening the area for exploration and research. Tourism is also expected to flourish.

4.3.4 Land use Impact

As also discussed earlier, the proposed road will generally pass through an almost barren and sparsely inhabited land tract. Moreover, the proposed road will almost follow the course of existing road with the exception that its right-of-way will be enlarged. With the consequence that some extra land will be acquired for the additional right-of-way. It has been learnt, that almost all of the land area belongs to the Government of Balochistan (Appendix F). The local people, however, have cultivation and grazing right over the land allotted to them by the Provincial Government. In the case of this project such land exists in patches at various Locations particularly in the vicinity of settlements. The details of such proprietory land has been shown in the Preliminary Reports of the Project (Ref. 1.1 and 1.2) and summarised below :

Reach	Proprietory rights
0 - 35	Mixture of private and Government land
35 - 87	Government land
87 - 92	Mostly private land in Jhal Jhao area
92 - 140	Government land

O-7

140	- 148	Awaran Town/cultivation privately owned
148	- 367	Mostly Government land with exception near settlements like Gishkaur, Dandar, Hoshab, Hirok, Sami, Shahrak etc.

According to the estimate given in the Preliminary Reports, about 900 acres of land will be acquired from private owners in a stretch of 376 Km. Acquisition of this land will not be a problem as a lot of Government land is available in the vicinity of such acquired land and the owners can be compensated in land for land form. However, the Project has to bear the replacement costs of structures, trees or other development features existing on the land.

It has been envisaged that the impact of the construction of the road on existing land use will be insignificant. Of the land acquired from private owners for additional right of way, the major portion is barren or moderately developed for rainfed agriculture. The disruption of irrigated agriculture will be insignificant. The intensively irrigated area falls in Kolwa valley at km 236 to 253 and at Bidring, Hoshab, Tajaban and Shahrak, where part of the irrigated land may be effected. As the majority of these irrigated tracts exist on one side of the road (mostly on left side), it will easier to avoid them by shifting the road slightly to other side. However, it is unlikely that the road will consume any large tract of the irrigated land.

The Project will also not disrupt the land use under settlement to any level of significance. Only a few hutments may have to be removed (Section 4.3.1.4).

It is however speculated that the operation of the Project road will bring major change in the land use pattern. The Project will help intensifying the agriculture and livestock in the area of Project influence through easement of the transportation of inputs and water resource development machinery and equipments. The Project may also help in the development of industry in the area. More intensifcation of settlements along the road, depending upon the availability of water, is also expected. All these land use changes are beneficial to the local economy.

4.3.5 Occupational Health and Safety

The occupational health and safety hazards that can be encountered during the construction of road have been discussed in Appendix-G. An outline of these discussion is reproduced in this section.

The safety hazards are associated with the operation of construction machinery, equipment and tools, transportation, blasting, land cutting and slides, fire etc. The causes of safety hazards are usually complex involving human errors, operational faults of machinery and unforeseen incidences. The majority of the causes are controlable with efficient management, staff training, machinery maintenance and other preventive measures like sheltering and use of helmets etc. Accident prevention is essentially an engineering problem and mainly rests on strict compliance with safety rules and regulations.

Health hazards arise through many sources. The concerned sources during Project implementation are contaminated water, poor quality food, insect and animal bite, air and dust etc. The common diseases associated with these sources in the Project area are as follows :

- Water -borne diseases

  Cholera, Amoebic dysentery, Bacillary dysentery, Typhoid, Paratyphoid, Hepatits etc.

- Insect-borne diseases

  Malaria, Sandfly, Leishmaniaris etc.

- Milk-borne diseases

  Tuberculosis, Diphtheria

- Animal-borne diseases

  Rabies, Schistosomiasis, Rat-bite fever, Hookworm, Roundworm, Threadworm etc.

Pulmonary tuberculosis and silicosis are resulted from the dust from stone-cutting, blasting and fugutive dust. Bitumen and other fumes from burning materials may cause acute respiratory irritation and bronchites.

For the safety of the workers it is advisable that every preventive measures should be adopted for the exposure to the disease source. Water and food quality should be of health standards. Sanitary condition at the camp and working place should be proper. The workers should be supplied with gas-masks, helmets, full boots and gloves (Also see Appendix- G).

In addition to the preventive and precautionary measures, each camp should have a dispensary equipped with first-aid material, dressing material and drugs essential for use in communicable disease (for more details see Appendix- G).

References

4.1 Aziz, J.A. et al, Institute of Public Health Engineering and Research Report, A Short Survey of Lahore Air, 1974.

TAPLE 4.1

HISTORICAL INCREASE IN LOAD OF POLLUTANT EMISSION
ON BELA-AWARAN-TURBAT ROAD

oad ection	Dis- tance	Total million * Vehicle Km/Year		Total Emission in Mt/ annum **											
				Existing (1989)						Year 2003					
	Km	Existing	Year 2003	Parti-culate	Carbon Monoxide	Hydro-Carbon	Nitrogen Oxide	Surphur Oxide	Alde-hyde	Parti-culate	Carbon Monoxide	Hydro-Carbon	Nitrogen Oxide	Surphur Oxide	Alde-hyde
ela-waran	145	6.77	58.06	6.84	89.36	16.93	90.72	11.51	1.35	58.64	766.39	145.15	778.00	98.70	11.61
waran-ami	215	8.63	74.24	8.72	113.92	25.58	115.64	14.67	1.73	74.98	979.97	185.60	994.82	126.21	14.85
ami-urbat	44	2.81	24.11	2.84	37.09	7.03	37.65	4.77	0.56	24.35	318.25	60.28	323.07	40.99	4.82

Note: * The existing and projected traffic in various road sections has been given in Appendix-A.

** The average annual emission levels of various pollutants adopted in the estimates are as follows (these units are for urban area :

- Particulates = 1.01 g/km
- Carbon Monoxide = 13.2 g/km
- Hydrocarbon = 2.5 g/km
- Nitrogen Oxides = 13.4 g/km
- Sulphur Oxides = 1.7 g/km
- Aldehydes = 0.2 g/km

TABLE 4.2

WILDLIFE KNOWN FROM THE PROJECT AREA AND PROTECTED UNDER BALOCHISTAN WILDLIFE PROTECTION ACT, 1974 THIRD SCHEDULE

Sindh Wild Goat

Urial

Members of Family Ardeidae

(Eurasian Bittern, Cinnamon Bittern, Western Reef Heron, Purple Heron)

Members of Family Pelecanidae

(Great White Pelican)

Members of Family Accipitridae

(Egyptian vulture, Oriental white-backed vulture, Eurasian Griffon vulture, Eurasian black vulture, short toed eagle, Pallid harrier, Eurasian sparrow hawk, Indian sparrow hawk, Buzzard eagle, desert eagle, long-legged eagle, tawny eagle, steppe eagle, imperial eagle, golden eagle, Bonnelli's eagle, botted eagle)

Members of Family Falconidae

(Eurasian kestrel, merlin, northern hoppy, Laggar falcon, peregrine falcon, red-capped falcon)

Members of Family Phasianidae

(Chakur, see-see partridge, black partridge, Indian gray partridge, common quail)

Member of Family Otididae

(Houbara bustard)

Blandford's or king fox

Balochistan black bear

Caracal

Leopard

Chinkara

Snub-nose crocodile

All lizards of genus varanus

(Indian monitor, Indian desert monitor)

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* Wildlife given in the parentheses are not specifically mentioned in Thrid Schedule but only their family or generic names were given. These species of such families/genera are reported from the Project area.

CHAPTER 5

Environmental Mitigation Measures

CHAPTER - 5

ENVIRONMENTAL MITIGATION MEASURES

5.1 GENERAL

In the process of environmental impact assessment of the Project a thorough understanding of the environmental baseline conditions was developed from the available literature and data, site visit and discussions with the local people and knowledgeable persons (Appendix H). The impact analysis was done on the basis of experience of team members, scoping process and consultation with knowledgeable people. In the course of impact analysis, "Checklist of Project Planning", provided in the TOR, was repeatedly considered for various construction activities and operation of the Project. This helped in developing a Project Impact Matrix. The matrix has been included in Table 5.1 which depicts the gravity of impacts on various environmental parameters without considering the good management practices on the part of engineers and construction contractor. In the light of Project Impact Matrix (Table 5.1) and the discussion thereon as reproduced in Chapter 4, an environmental mitigation plan has been proposed in the subsequent sections.

5.2 POTENTIAL ENVIRONMENT ISSUES

5.2.1 Construction Phase

According to the Project Impact Matrix and discussions in Chapter 4, the critical environmental areas worth considering during construction are as follows:

- Soil erosion
- Slope stability
- Energy and Mineral Resources
- Surface water quantities and qualities
- Localised terrestrial ecology
- Public health
- At-risk population

The adverse effects listed above, in reality, are not potential ones, as they are subject to Project management practices and engineering design. Therefore, apparently there is no potential environmental issue related to the Project construction. On the other hand, the Project is highly beneficial in the area of employment.

5.2.2. Operation Phase

During the road operation, the adverse impacts would be in the areas of terrestrial ecosystem, endangered species and at-risk population (Table 5.1). The gravity of impact in these areas is, however, subject to enforcement of concerned laws and orders, which are already in vogue through various Ordinances in the field of Forestry, wildlife and road traffic. Therefore, the risk in these areas can be minimised by strict enforcement of these laws and orders.

The operation of the road will, however, be highly beneficial for socio-economic development of the area. This will include agricultural lands and land utilization, energy and mineral resources, public health and control of disease vectors, distribution system, employment and institution, nutrition etc.

5.3 Mitigation Measures

The measures to be adopted to mitigate the adverse impact and enhance the benefits have already been discussed in Chapter 4 in their respective sections. However, they have been briefly discussed in the subsequent section for the consideration of the planners, executing agencies and local administration.

5.3.1 ENGINEERING RELATED ISSUES

The environmental issues encountered during the construction phase are mostly related to the engineering practices adopted during the planning, design and construction phase. The soil related issues, such as soil erosion and slope stability, have been well considered in the design of the Project. The supervisory engineers have to be watchful that the desired cut slopes are achieved by the contractor (Section 4.1.4). As regards the hazards due to land cutting and blasting, specific clauses should be included in the contract documents for the contractor to pracrtice safe techniques specified for different works in Factories Act and Construction Industry Act. Every possible care should be taken in the operation of construction machinery to avoid accidents and injuries to work force.

Similarly, clauses should also be included for the use of local resource for the construction of the road. The use of local vegetation for construction and heating purposes at work site or at the camp by the labour should be avoided. The Contractor should import these items from Karachi market.

As referred earlier, there is scarcity of surface water resource in the area. Therefore,the use of water from this source for construction or for other purposes should be avoided. The water in the impoundments should be protected from pollution due to construction activities, spoils, spillage of oils and asphalt and disposal of sewerage of construction camp. Washing and bathing in the pounds specified for drinking purpose by the local people should also be avoided.

As regards the public health aspect, there are two considerations in this area. One is related to the water - borne diseases likely to develop in the work force by the use of contaminated water of the impoundments, and the other aspect is related to the disease - vectors, like mosquitos, sandfly and snails which are common in the Project area. Therefore, the Project management should have to be very careful that the exposure of the work force to the vectors is avoided. During construction activities precaution should be taken that the habitats of sandfly are not disturbed. The work force is provided with full-boots, helmets, gloves, mosquito nets, etc. In addition to the precautionary measures, each camp should be provided with a dispensary equipped with first aid material and necessary drugs.

The designer should make adjustment in the road alignment at km 21 and km 155 to avoid shrine and graveyard referred in Section 4.3.3.2.

5.3.2 ADMINISTRATION RELATED ISSUES

The issues related to the protection and preservation of flora and fauna of the Project area purely administrative matter. These require the strengthening of concerned departments for the enforcement of the laws and orders and careful monitoring of the ecosystem of the area. Government of Balochistan should take necessary action in this regard.

Due to increase in traffic volume and speed, the frequency of accidents on the developed road are likely to increase. Therefore, an efficient police system in the area will be required. The Government should establish checkposts at appropriate locations and the police should be provided with vehicles so that they could patrol the road.

It has been observed that the area generally lacks medical and first aid facilities. This is needed to be strengthened not only for the benefit of the local population, but also for the road users. The Government of Balochistan should establish more basic health units, dispensaries and hospitals in the area. Similarly, considerations should also be given for the supply of other basic amenities, like electricity, fuel, domestic water supply, sewarage system etc.

In addition to these, there are other actions which are needed to be implmented to realize the benefits of the road. These actions are particularly related to the agricultural and rangeland development. The basic hurdle in the agricultural development in the area is the shortage of water for irrigation. The surface recource is very limited. Therefore, groundwater resource should be exploited for Kolwa and Jhalawan valleys, where extensive tracts of cultivable land exist. The BALAD Project has done extensive work in this field in Makran Division. A similar programme should also be implemented in Awaran Sub- Division of Khuzdar District. The strengthening of agricultural extension services and supply of inputs, like quality seeds, fertilizer,pesticide, etc, would also be needed for intensification of agriculture.

5.3.3 INFRASTRUCTURE FACILITIES

The basic infrastructure development for the implmentation of the Project is the residential and office requirements for the construction staff at various stations. The details of these requirements are given in Section 2.3. The facilities will also include the provision of utilities including generators for electricity, tubewells for water supply at the camp and for construction purposes, fuel for camp and construction activities, sewerage and drainage system, communication system (radio/telephone). For the safety and security of the camp and work place, an appropriate security arrangement should be made.

As referred earlier, the local streams are used for obtaining water for domestic use. Therefore, disposal of sewerage in these streams will be undesirable. It is recommended that the Project should provide a separate disposal arrangements, such as septic tanks. Similarly, the solid waste material should be dumped at appropriate places and covered with earth.

In addition to these primary infrastructures for the construction phase, the Project should also made the provision for washrooms, latrines and water points at appropriate distances along the road for the convenience of the users of the road. For the convenience of the passengers and drivers, the planners should also make the provision for bays along the road for bus stops and truck parking near the village.

5.4 PROPOSED ACTIONS FOR SPECIFIC ISSUES RAISED IN SCOPING SESSIONS

The environmental issues raised in the scoping sessions by various people, viz. Government officials, public and social representations, NGOs and local people, have been described in

Appendix-D. For the convenience of the readers these have also been compiled in Section 1.5. Almost all of these aspects have been covered in the environmental assessment process and discussed in Chapter-4. Of these, the salient issues have also been reflected in the Project Impact Matrix (Table 5.1) and discussed in preceeding sections as regards the action required to fulfill the obligations. However, for further elaboration, these have been compiled in Table 5.2 to illustrate the impact rating, mitigation actions required and showing of responsibilities.

5.5 MONITORING PROGRAMME

5.5.1 Air

As referred in Chapter 4, the contribution of the increased traffic with the Project on air pollution will be insignificant. However, the prediction and interpretations of the results are based on logic without any support from data for the area. Therefore, it is recommended that this aspect should be monitored. The Environmental Protection Agency of Balochistan should entrust this assignment to appropriate department of the Province.

5.5.2 Wildlife

There are a number of endangered species of wildlife in the area, which are liable to be exposed to hunting due to improved accessability. Therefore, in addition to imposing strict embargo on hunting, the Wildlife Department should carry out periodic monitoring of the area to preserve their habitats and living conditions. The department should also increase the staff for the guard of national parks and wildlife sanctuaries in the area.

TABLE : 5.1
PROJECT IMPACT MATRIX

ENVIRONMENTAL COMPONENTS / PROJECT COMPONENTS	PHYSICAL ENVIRONMENT									
	AGRICULTURAL LANDS	SOIL EROSION	SLOPE STABILITY	ENERGY-MINERAL RESOURCES	SURFACE WATER QUANTITY	SURFACE WATER QUALITY	GROUND WATER QUALITY	GROUND WATER QUANTITY	AIR QUALITY	NOISE
PLANNING & DESIGN PHASE	PROJECT ALREADY DESIGNED NOT APPLICABLE									
CONSTRUCTION PHASE										
1. Project Road	LA	MA	MA	MA	O	O	LA	O	LA	LA
2. Structures	O	LA	O	M.	LA	MA	LA	O	L'	LA
3. Camps	LA	O	O	MA	O	LA	LA	O	O	O
4. Spoil and Borrow area	O	MA	MA	O	O	MA	O	O	O	O
Over All	LA	MA	MA	MA	LA	MA	LA	O	LA	LA
OPERATION PHASE										
Road Operation	HB	O	O	HB	O	O	O	O	LA	LA

ENVIRONMENTAL COMPONENTS / PROJECT COMPONENTS	BIOLOGICAL ENVIRONMENT									
	AQUATIC ECOSYSTEMS	WETLAND ECOSYSTEMS	TERRESTRIAL ECOSYSTEMS	ENDANGERED SPECIES	MIGRATORY SPECIES	BENEFICIAL PLANTS	BENEFICIAL ANIMALS	PEST PLANTS	PEST ANIMALS	DISEASE VECTORS
PLANNING & DESIGN PHASE										
CONSTRUCTION PHASE										
1. Project Road	O	NA	LA	O	O	O	LA	O	O	LA
2. Structures	LA	NA	O	O	O	O	O	O	O	O
3. Camps	LA	NA	MA	O	O	O	LA	O	O	O
4. Spoil and Borrow area	LA	NA	LA	O	O	O	O	O	O	LA
Over All	LA	NA	MA	O	O	O	LA	O	O	LA
OPERATION PHASE										
Road Operation	O	NA	MA	HA	LA	LA	LA	O	O	MB

ENVIRONMENTAL COMPONENTS / PROJECT COMPONENTS	SOCIAL ENVIRONMENT									
	PUBLIC HEALTH	RESOURCE/LAND USE	DISTRIBUTION SYSTEMS	EMPLOYMENT	AT-RISK POPULATION	MIGRANT POPULATIONS	COMMUNITY STABILITY	CULTURAL AND RELIGIOUS VALUES	TOURISM AND RECREATION	NUTRITION
PLANNING & DESIGN PHASE										
CONSTRUCTION PHASE										
1. Project Road	MA	O	LA	HB	MA	O	O	O	O	O
2. Structures	O	O	LA	HB	LA	O	O	O	O	O
3. Camps	MA	O	LA	HB	LA	O	O	O	O	O
4. Spoil and Borrow area	O	O	O	HB	LA	O	O	O	O	O
Over All	MA	O	LA	HB	MA	O	O	O	O	O
OPERATION PHASE										
Road Operation	HB	HB	HB	HB	MA	LB	O	O	LB	HB

NA : Not Applicable
ND : Not Determinable
HA : High Adverse
MA : Medium Adverse
LA : Low Adverse
O : None or Insignificent
LB : Low Beneficial
MB : Medium Beneficial
HD : High Beneficial

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TABLE 5.2

SPECIFIC ISSUES RAISED IN SCOPING SESSIONS
AND THEIR MITIGATION ACTIONS

ISSUES	DESCRIPTION	MITIGATION MEASURES	AGENCY RESPONSIBLE FOR IMPLEMENTATION
1. Disruption of Sailaba and Rainfed agriculture	- The proposed road alignment will not effect sailaba land but may affect barrani land in level area due to interruption of surface runoff (Section 4.1.3)	- Provision of additional cross drainage structures in level areas	Consultants
2. Interuption of surface water Resources	- The Project will provide bridges and culverts for avoid in obstruction to surface water resources (Section 1.3)	- Already incorporated in design	-
3. Concern about crossing of Kech River at four places	- This has been planned to meet the objections of the Government of Balochistan that the settlements presently served by the existing road track should not be deprived of the facility (Section 2.2)	- Already incorporated in design	
4. Concern about sharp turnings in the existing tracks	- The road geometrics have been designed according to AASHTO Rural Road Standard which takes care of this aspect	- Already incorporated in design	
5. Provision of by-passes for villages	- Generally the villages are at safe distance from the road except those of Jhal Jao, Awaran, Gishkaur, Hirok, Sami Shahpul and Shakrak. In the view of the present and projected traffic volume for the existing planning period of the road (10 years) and population concentration of these villages, by-passes have not been considered necessary. However, such facility should have to be included in the next planning stage.	- Facility to be included in the next planning stage.	Government of Baluchistan, C & W Department.
6. Concern about improved connection for Panjur, Gwadar and Mand.	- Balad Project has already improved the dirt roads connecting these towns with Turbat. Provision of metalled road for the referred towns is not in the scope of the present Contract.	- For the convenience of local population and regional economy a network of metalled road should be provided in the Makran Division.	Government of Baluchistan, C & W Department.

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TABLE 5.2

SPECIFIC ISSUES RAISED IN SCOPING SESSIONS
AND THEIR MITIGATION ACTIONS

ISSUES	DESCRIPTION	MITIGATION MEASURES	AGENCY RESPONSIBLE FOR IMPLEMENTATION
7. Provision of washroom/ latrine and water points facilities along the proposed road.	- The road will pass through almost a barren land tract with scarcity in water availability. Therefore, for the convenience of the road users the provision of such facilities is highly desirable. (Section 4.3.2.2).	- As the existing road plan does not include these facilities, Government of Baluchistan shall take up the matter on priority basis.	Government of Baluchistan, C & W Department and Public Health Engineering Deptt.
8. Provision to accommodate future development of utilities along the road.	- The right-of-way for the road has been proposed keeping in view of the future developments.	- No immediate action required.	--
9. Agro-based Industry Development.	- One of the objectives of the road is the overall economic development of Makran Division. This will encompass development in Agricultural and industrial sectors for which Government of Balochistan has to take initiative with regards the supply of inputs and provision of basic infrastructures.	- Actions required on part of Government of Balochistan.	Government of Balochistan, Department of Agriculture, Industry and other allied departments.
10. Water resource development/ Desalinization plant for irrigation.	- The economic base of the area is mainly agriculture and herding except for coastal area where fishing the main source. Due to slackness in the water resource development the agriculture is of subsistaqnce level. In spite of the fact that quite a few number of water resource development projects have been implemented under BALAD Project, the need for water for agriculture development demands the preparation and implementation of a master plan. Both surface and groundwater resources should be exploited. The economic viability of desalinization process for water supply for irrigation may also be explored.	- Priority level actions are required.	Government of Balochistan, Irrigation Department.

TABLE 5.2

SPECIFIC ISSUES RAISED IN SCOPING SESSIONS
AND THEIR MITIGATION ACTIONS

ISSUES	DESCRIPTION	MITIGATION MEASURES	AGENCY RESPONSIBLE FOR IMPLEMENTATION
11.Protection of ecosystem.	1. The effect of the road on plant ecosystem of the project corridor may be low adverse due to land clearing for additional right-of-way and wood cutting for fuel by work force during construction. (Section 4.2.1 & 5.3.1).	1. Imposition of strict regulations through including clauses in the Contract documents.	- Contract and Supervisory Engineers.
	2. Operation of the road will help reducing the pressure on ecosystem by easing the import of substitute fuel, like LPG, Kerosene etc.		
	3. The condition of wood land in the area is vary. This is attributed to arid climate, extensive cutting and lack of proper management and enforcement of Forestry Act.	3. Proper woodland management and strict endorcement of law and orders. - Strengthening of capabilities of Forestry Department.	- Government of Balochistan, Forestry Deptt.
12.Rangeland Management/ Development.	- A large treact of the study area (Makran Division and Awaran Sub-Division of Khuzdar District) comprises rangeland which supports livestock industry which is one of major occupations of the study area. The absence of any management practice and overgrazing have resulted in poor condition of the rangeland. The road project is expected to strengthen the livestock rearing, and thus increase pressure on rangeland.	1. Strengthening of rangeland management capabilities of Forestry Departments. 2. Adopting a project approach for rangeland development and management.	- Government of Balochistan, Forestry and Livestock Deptts.
13.Safety and health hazards during construction.	- Reference Sections 4.3.5 and 4.3.2.1.	1. Adoption of good engineering and management practices. 2. Provision of medical aid facilities at each camp. 3. Transportation facilities for patients to hospitals at Karachi and Turbat.	Contractors and Supervisory engineers.

TABLE 5.2

SPECIFIC ISSUES RAISED IN SCOPING SESSIONS
AND THEIR MITIGATION ACTIONS

ISSUES	DESCRIPTION	MITIGATION MEASURES	AGENCY RESPONSIBLE FOR IMPLEMENTATION
14. Impact on social structures.	- The impact is insignificant, for details see Section 4.3.3.1.	- No action.	--
15. Impact on employment.	- Highly beneficial (Section 4.3.1.2).	- Government of Balochistan should provide basic infra structure for agriculture and industrial development	Government of Balochistan, Department of Agriculture, Irrigation & Industry.
16. Impact on Education.	- The improved communication system for the area will help improving the socio-economic condition of local population which will result in changing their trend towards education. School enrolement is likely to increase	- Provision of more schools and institutions.	Government of Balochistan, Department of Education and C&W.
17. Women's role in the Project.	- Women's role in the project implementation will be insignificant. However, due to development in agricultural and industrial sectors, women will have ample employment opportunities. In addition to this, for the development of women in the study area facilities are needed for general and vocational education and health care.	- Provision of infrastructures for education and health care.	Government of Balochistan, Department of Education and Health.
18. Disposal of water material during construction.	- Reference Sections 4.1.3 and 4.1.4.	- Safe disposal of spoil and waste material.	Contractors and Supervisory engineers.

TABLE 5.2

SPECIFIC ISSUES RAISED IN SCOPING SESSIONS
AND THEIR MITIGATION ACTIONS

ISSUES	DESCRIPTION	MITIGATION MEASURES	AGENCY RESPONSIBLE FOR IMPLEMENTATION
19.Accidents/ Injuries during construction and operation of Road.	- Reference Sections 4.3.5 and 5.3.2.	1. Strengthening of police force and guards.	Government of Balochistan, Departments of Police and Health.
		2. Strict observation of traffic rules.	Government of Balochistan, Departments of Police and Health.
		3. Provision of hospital and casuality care units in the towns/ villages along the roads.	Government of Balochistan, Departments of Police and Health.
		4. Adopting precautionary measures during construction.	Contractors and Supervisory engineers.
		5. Providing dispensaries at construction camps.	Contractors and Supervisory engineers.
20.Early implementation of the Project and rescheduling of construction activities.	- Section 1.5.	- Attention for US AID	
21.Threat to Wildlife.	- A large tract of study area is the habitat of various wildlife species and national parks. This includes endangered specis. Building of road will increase hunting pressure and may seriously deplete wildlife stocks.	- Relevant laws regarding wildlife be strictly enforced.	Government of Balochistan, Department of Wildlife.
	- Tables 3.3, 3.6, 3.5 and 3.4 Sections 5.5.2 and 4.2.2	- Monitoring of wildlife stocks be carried out.	
		- Increase of staff.	

C:\123\BDC\SIRSS.WK1 & VERBATIM RELATED

FIGURES

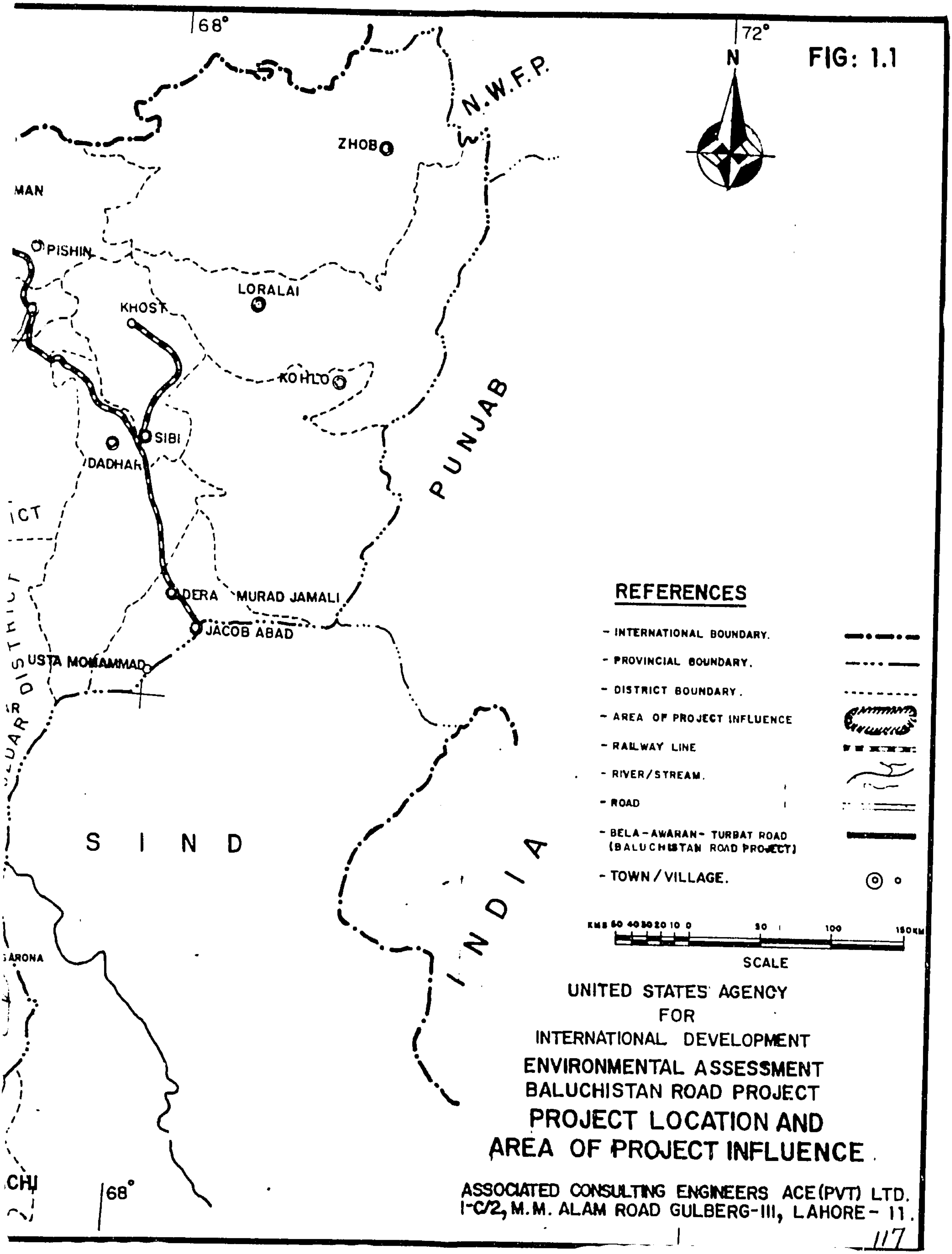
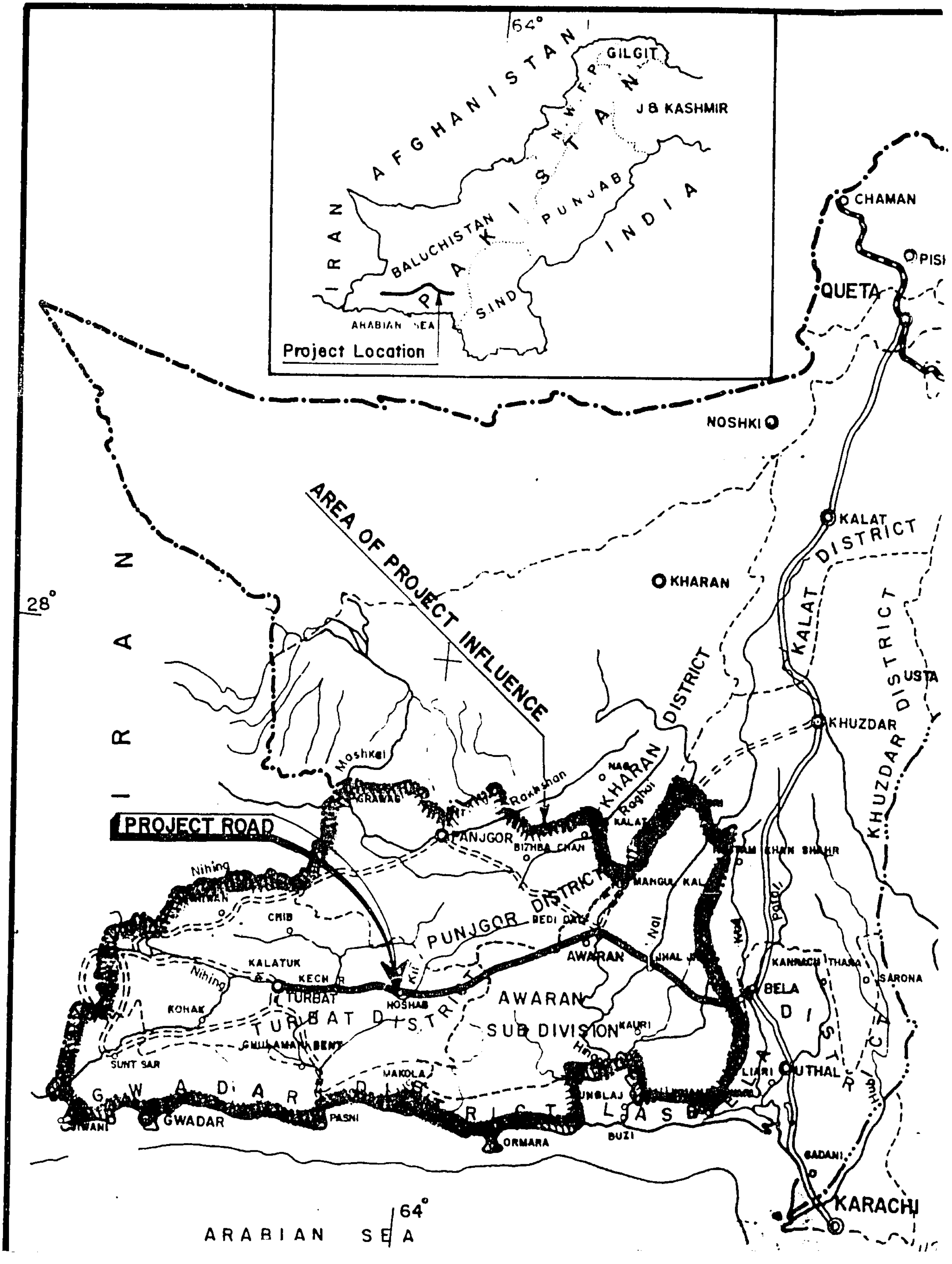
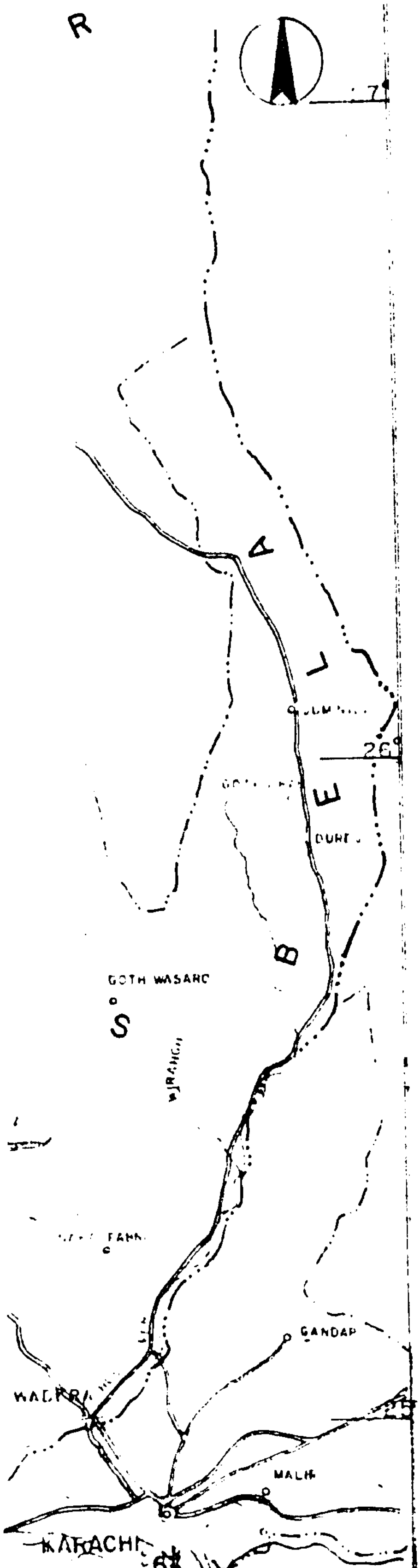


FIG: 1.1
N
68°
72°
N.W.F.P.
ZHOB
MAN
PISHIN
LORALAI
KHOST
KOHLO
SIBI
DADHAR
PUNJAB
DERA
MURAD JAMALI
JACOB ABAD
USTA MOHAMMAD
SIND
INDIA
REFERENCES
- INTERNATIONAL BOUNDARY.
- PROVINCIAL BOUNDARY.
- DISTRICT BOUNDARY.
- AREA OF PROJECT INFLUENCE
- RAILWAY LINE
- RIVER/STREAM.
- ROAD
- BELA-AWARAN- TURBAT ROAD (BALUCHISTAN ROAD PROJECT)
- TOWN / VILLAGE.
KMS 50 40 30 20 10 0 50 100 150 KM
SCALE
UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
ENVIRONMENTAL ASSESSMENT
BALUCHISTAN ROAD PROJECT
PROJECT LOCATION AND AREA OF PROJECT INFLUENCE
ASSOCIATED CONSULTING ENGINEERS ACE (PVT) LTD.
I-C/2, M.M. ALAM ROAD GULBERG-III, LAHORE - 11.



64°
AFGHANISTAN
GILGIT
N.W.F.P.
J & KASHMIR
PAKISTAN
IRAN
BALUCHISTAN
PUNJAB
INDIA
SIND
ARABIAN SEA
Project Location
CHAMAN
QUETA
NOSHKI
AREA OF PROJECT INFLUENCE
KALAT
KALAT DISTRICT
KHARAN
KHARAN DISTRICT
28°
IRAN
USTA
KHUZDAR
KHUZDAR DISTRICT
Moshkel
PROJECT ROAD
PANJGOR
BIZHBA CHAN
Rakhshan
Nihing
CHIB
PUNJGOR DISTRICT
MANGULI KALAT
KALATUK
KECH
TURBAT
HOSHAB
AWARAN
JHAL JAO
BELA
KANRACH
THANA
SARONA
KOHAK
TURBAT DISTRICT
AWARAN SUB DIVISION
KAURI
SUNT SAR
GHULAMANI BENT
MAKOLA
GWADAR DISTRICT
LAS BELA
LAS BELA DISTRICT
UTHAL
JIWANI
GWADAR
PASNI
ORMARA
BUZI
GADANI
KARACHI
64°
ARABIAN SEA

FIG: 1.2



REFERENCES

- INTERNATIONAL BOUNDARY
- PROVINCIAL BOUNDARY
- DISTRICT BOUNDARY / SUB DIVISION
- RIVER / STREAM
- ROAD
- BELA - AWARAN - TURBAT ROAD (BALUCHISTAN ROAD PROJECT)
- TOWN / VILLAGE.
- AREA OF PROJECT INFLUENCE.

MILES 0 10 20 30 40 50 60 MILES

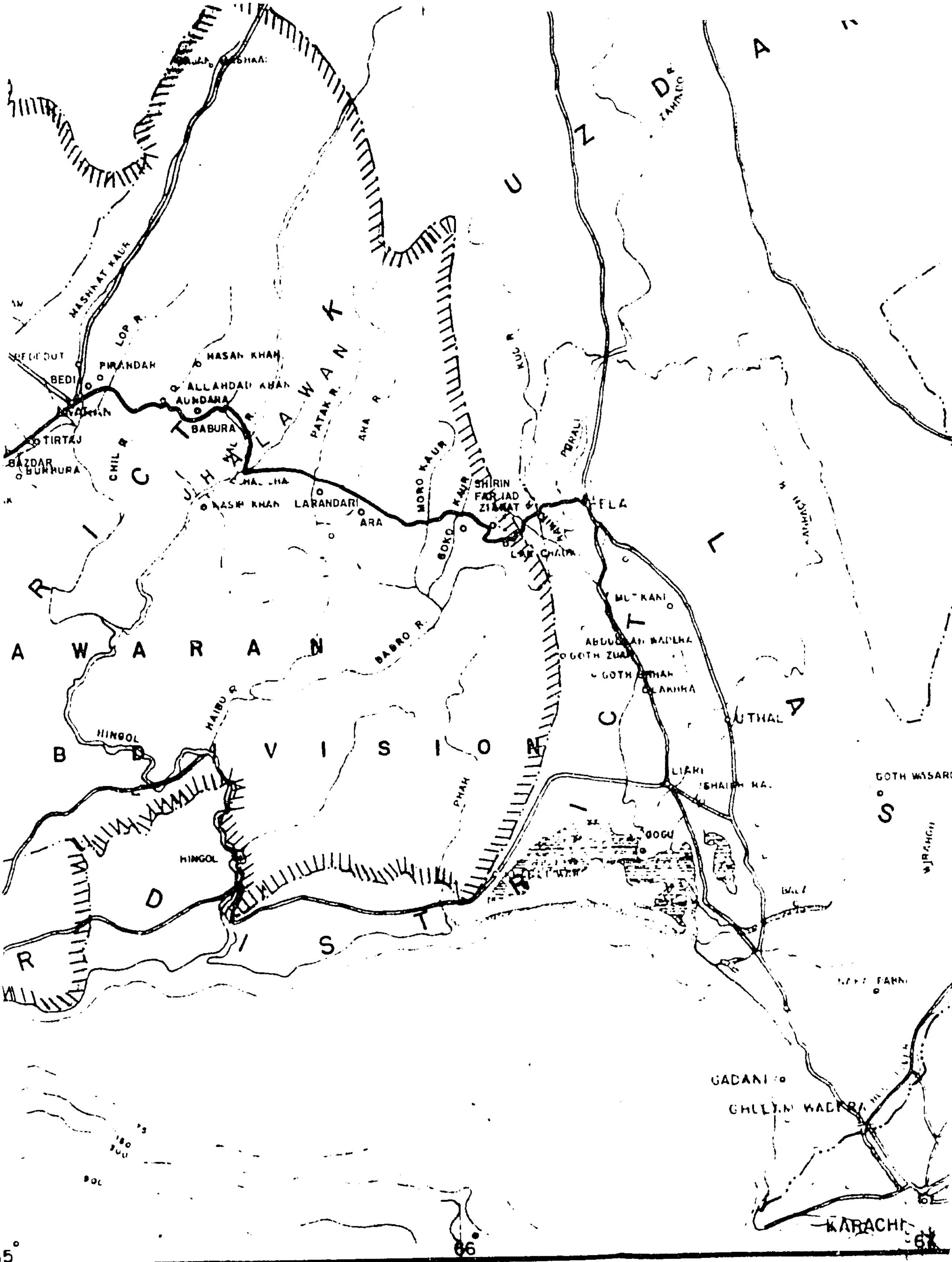
SCALE

UNITED STATES AGENCY
FOR
INTERNATIONAL DEVELOPMENT

ENVIRONMENTAL ASSESSMENT
OF
BALUCHISTAN ROAD PROJECT

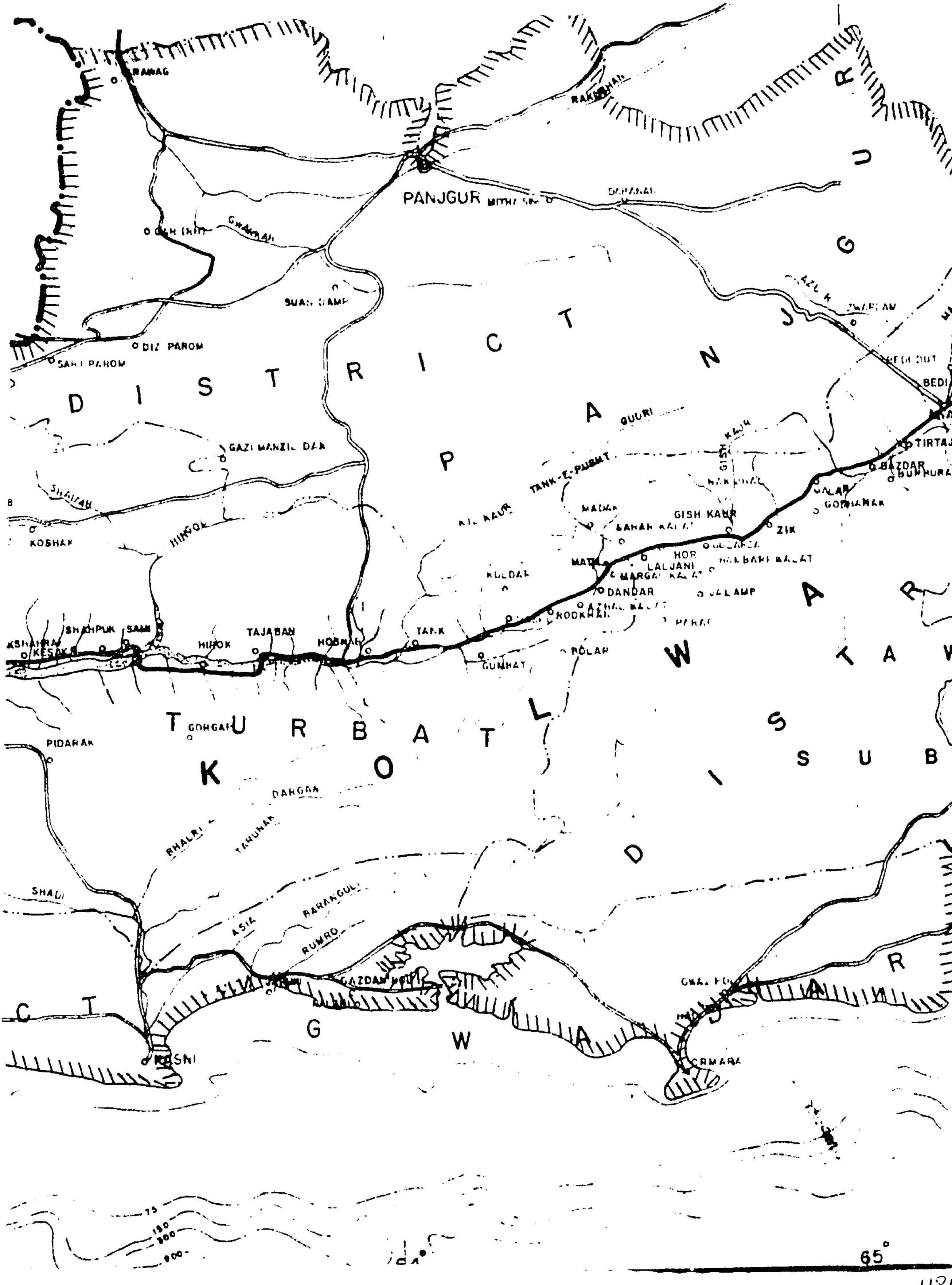
ADMINISTRATIVE AND SETTLEMENTS

ASSOCIATED CONSULTING ENGINEERS ACE (PVT) LTD



MASHKAT KAUR
LOP R.
BEDI
PIRANDAR
HASAN KHAN
ALLAHDAD KHAN
AUNDARA
BABURA
TIRTAJ
BAZDAR
CHIL R.
LARANDARI
ARA
PATAK R.
MORO KAUR
SHIRIN FARHAD ZIARAT
BOKO
BABRO R.
MUTKANI
ABDULLAH WADERA
LAKHRA
UTHAL
LIARI
GOTH WASARO
HINGOL
HAIBO R.
HINGOL
PHAR
GADANI
KARACHI
A W A R A N
B
D I V I S I O N
65°
66
67

118A



PANJGUR
DIZ PAROM
GAZI MANZIL DAN
D I S T R I C T
P A N J G U R
GISH KAUR
HOR
LALJANI
DANDAR
TIRTAJ
BAZDAR
ZIK
KOSHAK
SHAHPUK
SAMI
HIROK
TAJABAN
HOSHAB
TANK
BOLAR
GUNHAT
PIDARAK
T U R B A T
K O L W A
RUMRO
ASIA
ORMARA
SHADI
65°

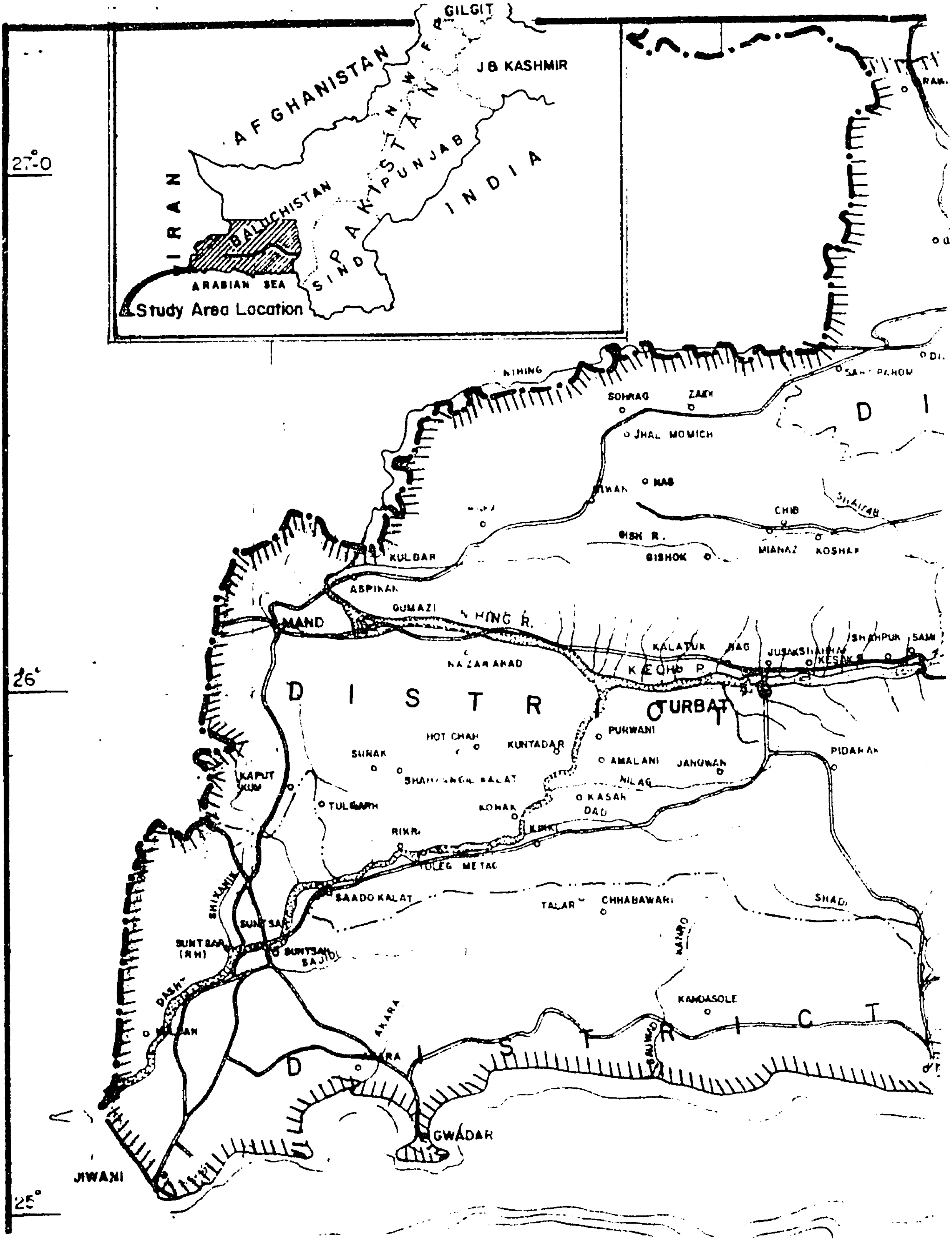
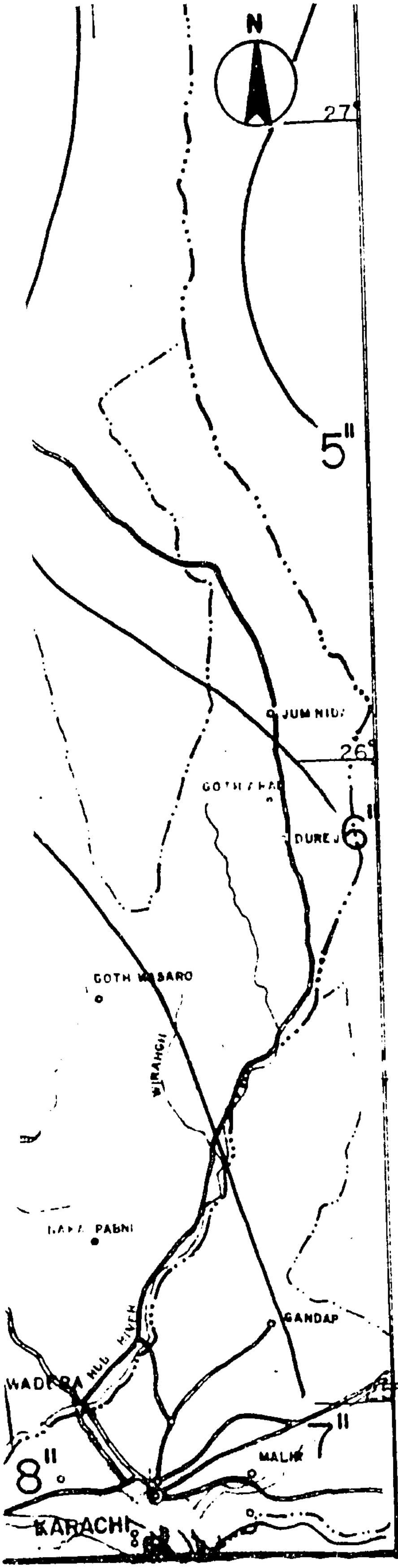

GILGIT
J B KASHMIR
AFGHANISTAN
N W F P
PAKISTAN
PUNJAB
INDIA
IRAN
BALUCHISTAN
SIND
ARABIAN SEA
Study Area Location
27°0
26°
25°
SOHRAG
ZAIN
JHAL MOMICH
KAS
CHIB
GISH R.
GISHOK
MIANAZ
KOSHAK
KULDAR
ASPIKAN
GUMAZI
NIHING R.
MAND
KALATUK
NAG
JUSAK
SHAHPUR
KESAK
KECH
TURBAT
DISTRICT
HOT CHAH
KUNTADAR
PURWANI
AMALANI
JANOWAN
PIDARAK
SURAK
KAPUT KUM
TULGARH
KOHAK
KASAR
DAD
NILAG
RIKRI
TULEG METAG
SAADO KALAT
TALAR
CHHABAWARI
SHADI
SHIKANIK
SUNTSAR
SUNTSAR (RH)
SAJIDI
KANDASOLE
DASHT
AKARA
GWADAR
JIWANI

FIG: 3.1



REFERENCES

- INTERNATIONAL BOUNDARY
- PROVINCIAL BOUNDARY
- DISTRICT BOUNDARY
- RIVER / STREAM
- ROAD
- BELA-AWARAN-TURBAT ROAD. (BALUCHISTAN ROAD PROJECT)
- TOWN / VILLAGE
- ISOHYETS 6" 6"

MILES 0 10 20 30 40 50 60 MILES

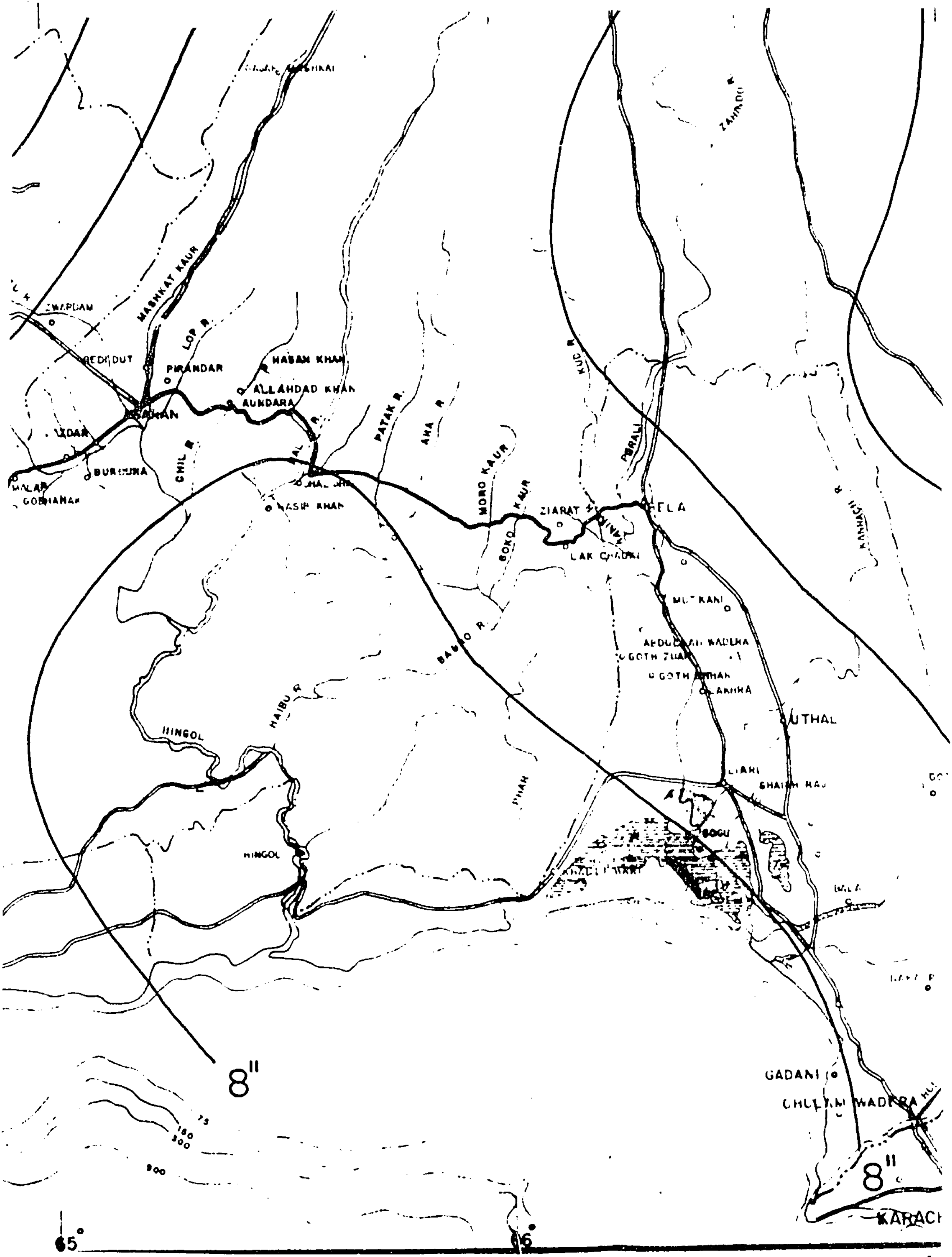
SCALE

UNITED STATES AGENCY
FOR
INTERNATIONAL DEVELOPMENT

ENVIRONMENTAL ASSESSMENT
OF
BALUCHISTAN ROAD PROJECT

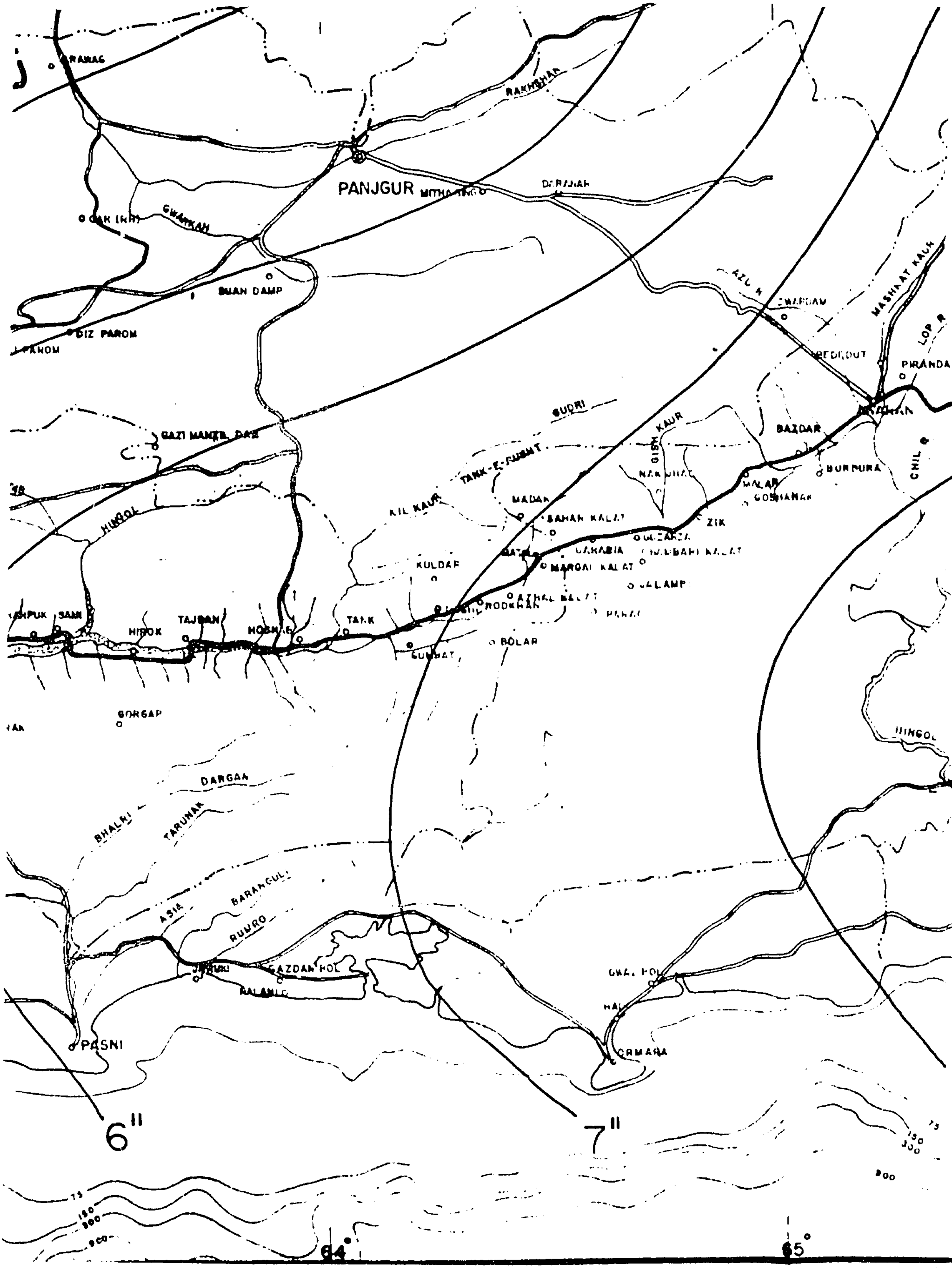
ANNUAL NORMAL ISOHYETS

ASSOCIATED CONSULTING ENGINEERS ACE (PVT) LTD

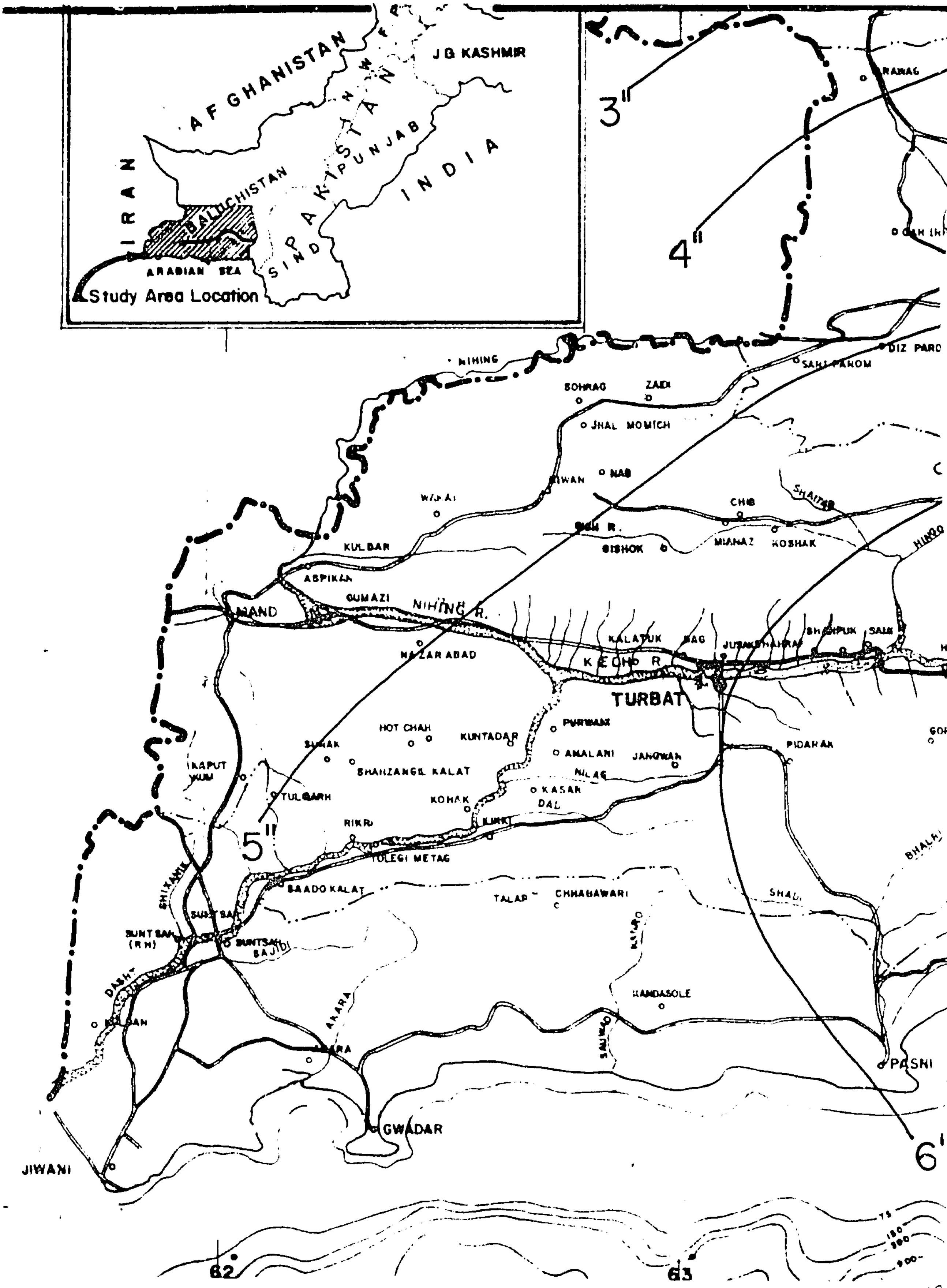


MASHKAT KAUR
LOP R.
PIRANDAR
HASAN KHAN
ALLAHDAD KHAN
AUNDARA
CHIL R.
NASIR KHAN
PATAK R.
MORO KAUR
SOKO KAUR
ZIARAT
LAK CHAUKI
KUD R.
PORALI
BELA
KANRACH R.
ZAHIRDO R.
ABDULLAH WADERA
GOTH SHAH
LAKHRA
UTHAL
LIARI
SHAIKH RAJ
GOGU
HINGOL
HINGOL
HAIBU R.
PHAH
GADANI
WADERA
KARACH
8"
8"
75
180
300
900
65°
66°

119A


PANJGUR
RAKHSHAN
GWARKAN
DIZ PAROM
GUDRI
TANK-E-ZURAT
KIL KAUR
GISH KAUR
MASHKAI KAUR
LOP R
PIRANDA
BAZDAR
BURRURA
CHIL R
MADAN
SAHAR KALAT
ZIK
GOSHANAK
KULDAR
MARGAI KALAT
HINGOL
SAMI
HIROK
TAJBAN
TANK
BOLAR
GORGAP
DARGAA
TARUNAK
BHALRI
ASIA
BARANGULI
RUMRO
GAZDAN KOL
PASNI
ORMARA
6"
7"
64°
65°
75
150
300
900

119B



J.G KASHMIR
AFGHANISTAN
IRAN
PAKISTAN
PUNJAB
INDIA
BALUCHISTAN
SIND
ARABIAN SEA
Study Area Location
3"
4"
5"
6"
NIHING
SOHRAG
ZAIDI
JHAL MOMICH
NAB
CHIB
MIANAZ
KOSHAK
DIZ PARO
KULBAR
ASPIKAN
GUMAZI
NIHING R.
MAND
KALATUK
BAG
KECH R
TURBAT
NAZAR ABAD
HOT CHAH
KUNTADAR
SHAHZANGE KALAT
TULGARH
KOHAK
KASAR
AMALANI
JANGWAN
PIDARAK
TOLEGI METAG
SAADO KALAT
TALAR
CHHABAWARI
SUNTSAR
BAJIDI
AKARA
HANDASOLE
PASNI
GWADAR
JIWANI
62
63

119C

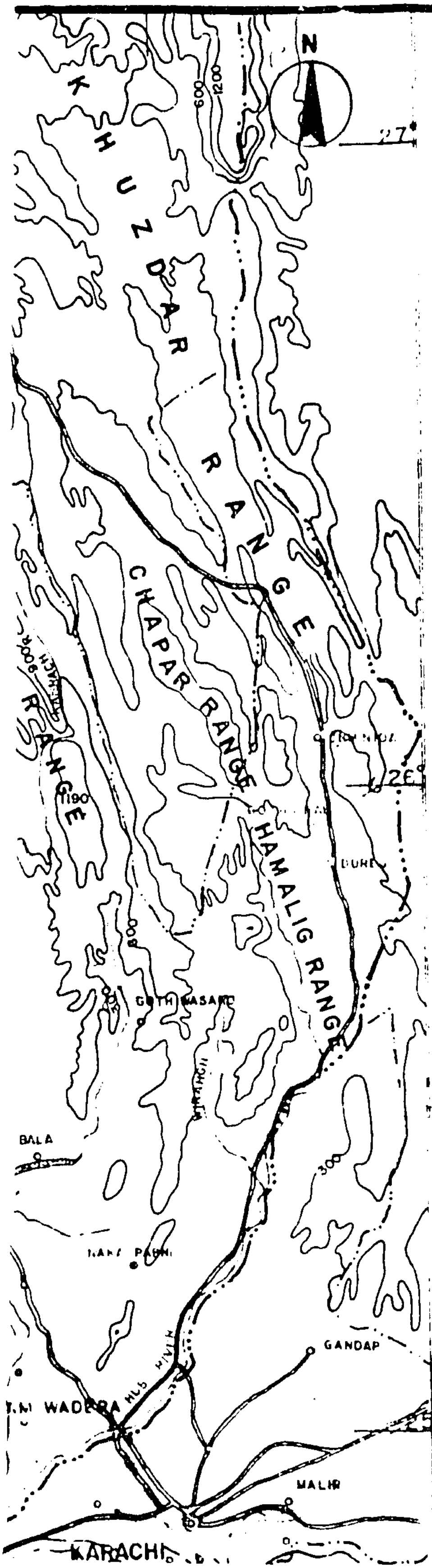


FIG: 3.2

REFERENCES

- INTERNATIONAL BOUNDARY
- PROVINCIAL BOUNDARY
- DISTRICT BOUNDARY
- RIVER / STREAM
- ROAD
- BELA - AWARAN - TURBAT ROAD. (BALUCHISTAN ROAD PROJECT)
- TOWN / VILLAGE
- SPOT LEVELS 1262
- CONTOURS 900

MILES 0 10 20 30 40 50 60 MILES

SCALE

UNITED STATES AGENCY

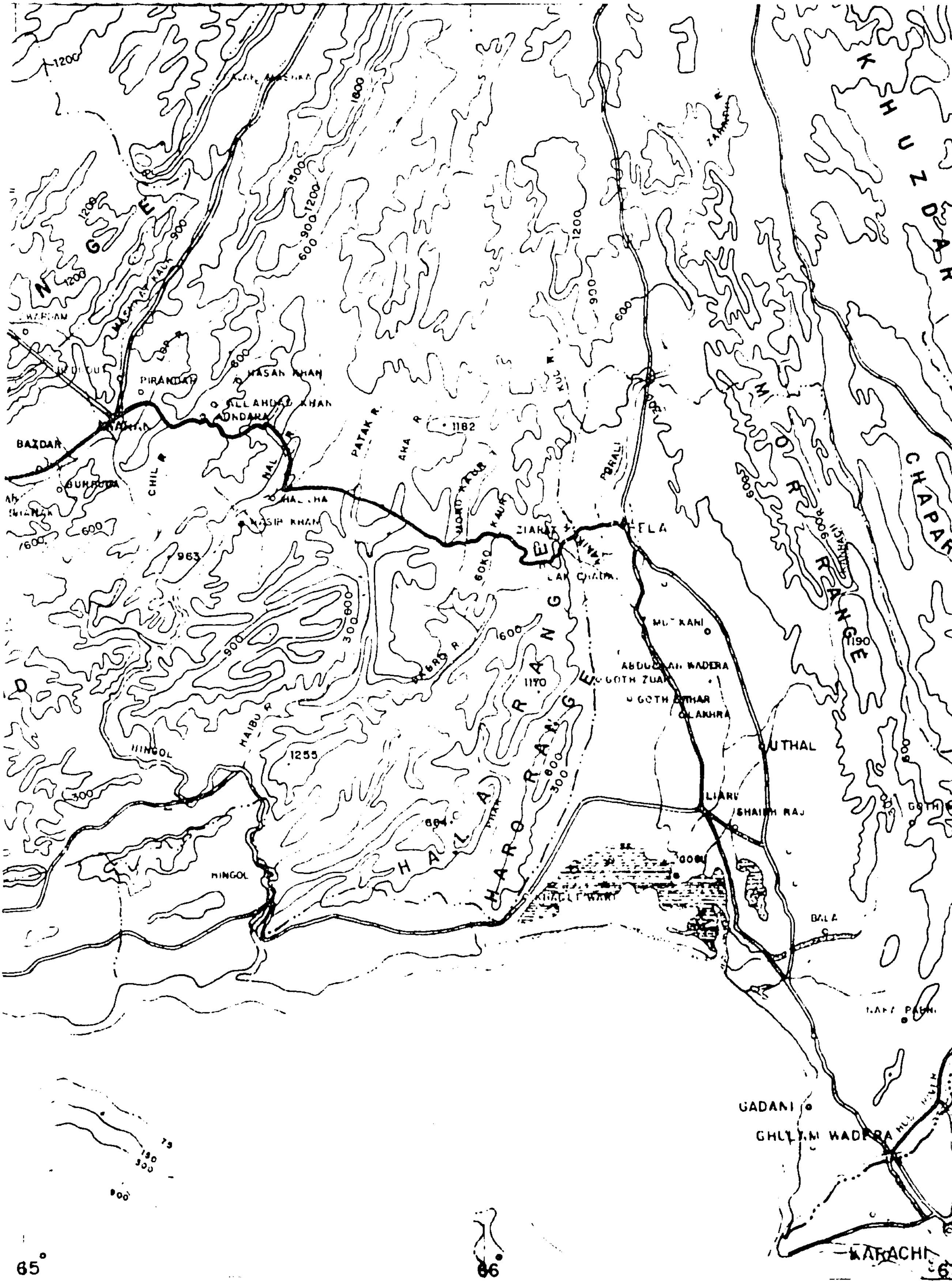
FOR

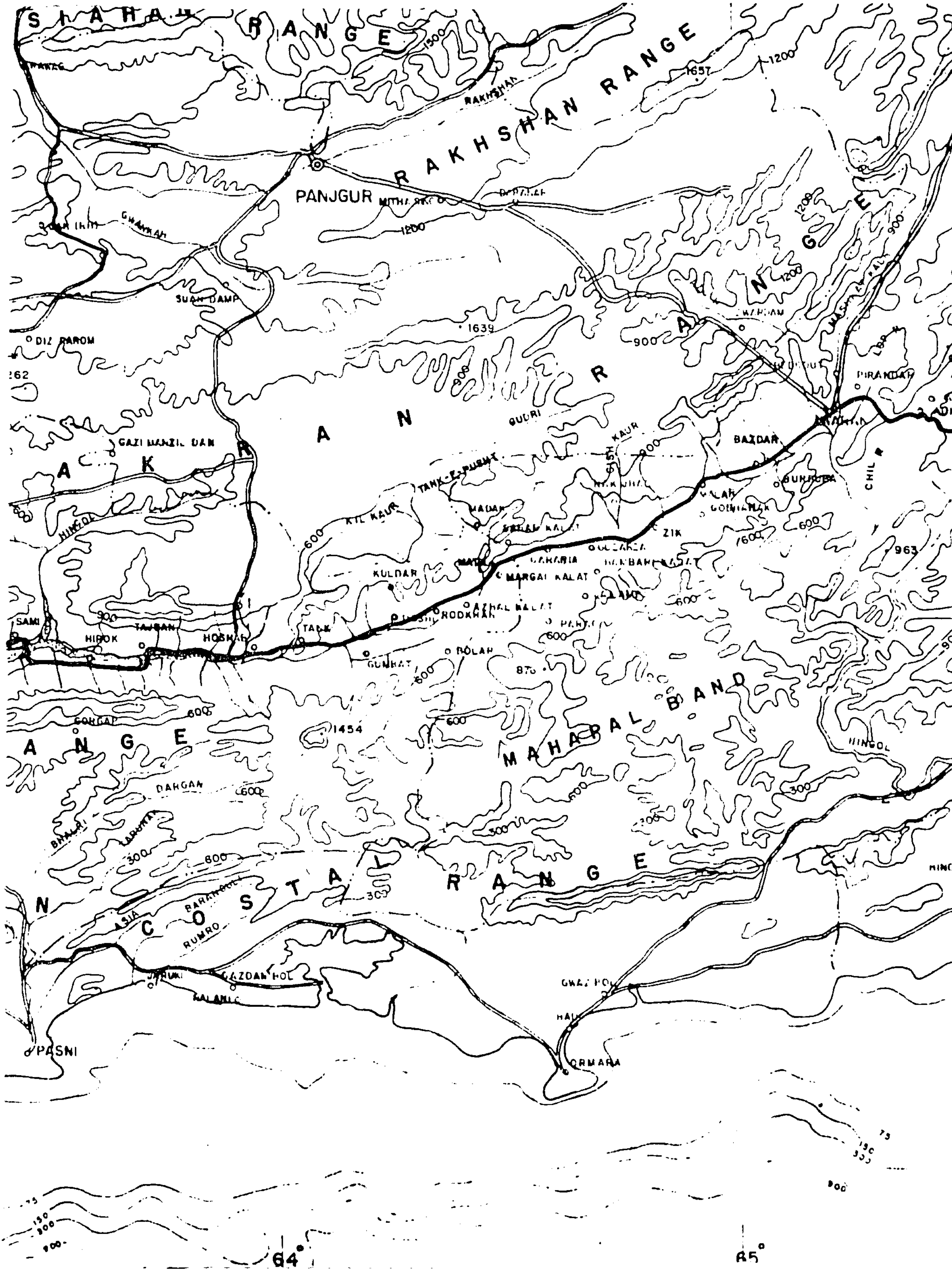
INTERNATIONAL DEVELOPMENT

ENVIRONMENTAL ASSESSMENT
OF
BALUCHISTAN ROAD PROJECT

PHYSIOGRAPHY AND TOPOGRAPHY MAP

ASSOCIATED CONSULTING ENGINEERS ACE (PVT) LTD


KHUZDAR
CHAPAR
MOR RANGE
HALA RANGE
HARO RANGE
BAZDAR
PIRANDAR
HASAN KHAN
ALLAHDAD KHAN
PATAK R.
1182
NASIR KHAN
CHIL R
NAL R
ZIARAT
BELA
PORALI
963
1255
1170
1190
684
HINGOL
HAIBU R
UTHAL
LIARI
SHAIKH RAJ
GADANI
KARACHI
1200
1800
1500
900
600
300
65°
66



RANGE
RAKHSHAN RANGE
RAKHSHAN
1657
1200
1500
PANJGUR
1639
SUAN DAMP
DIZ PAROM
GAZI MANZIL DAN
QUDRI
BAZDAR
KIL KAUR
TANK-E-PUSHT
MADAN
ZIK
KULDAR
MARGAI KALAT
AZHAL KALAT
BOLAR
GUNHAT
HOSHAB
TANK
TAJBAN
HIROK
SAMI
900
600
963
1454
875
GORGAP
DARGAN
MAHAPAL BAND
300
HINGOL
COSTAL RANGE
RUMRO
GAZDAN HOL
PASNI
ORMARA
64°
65°

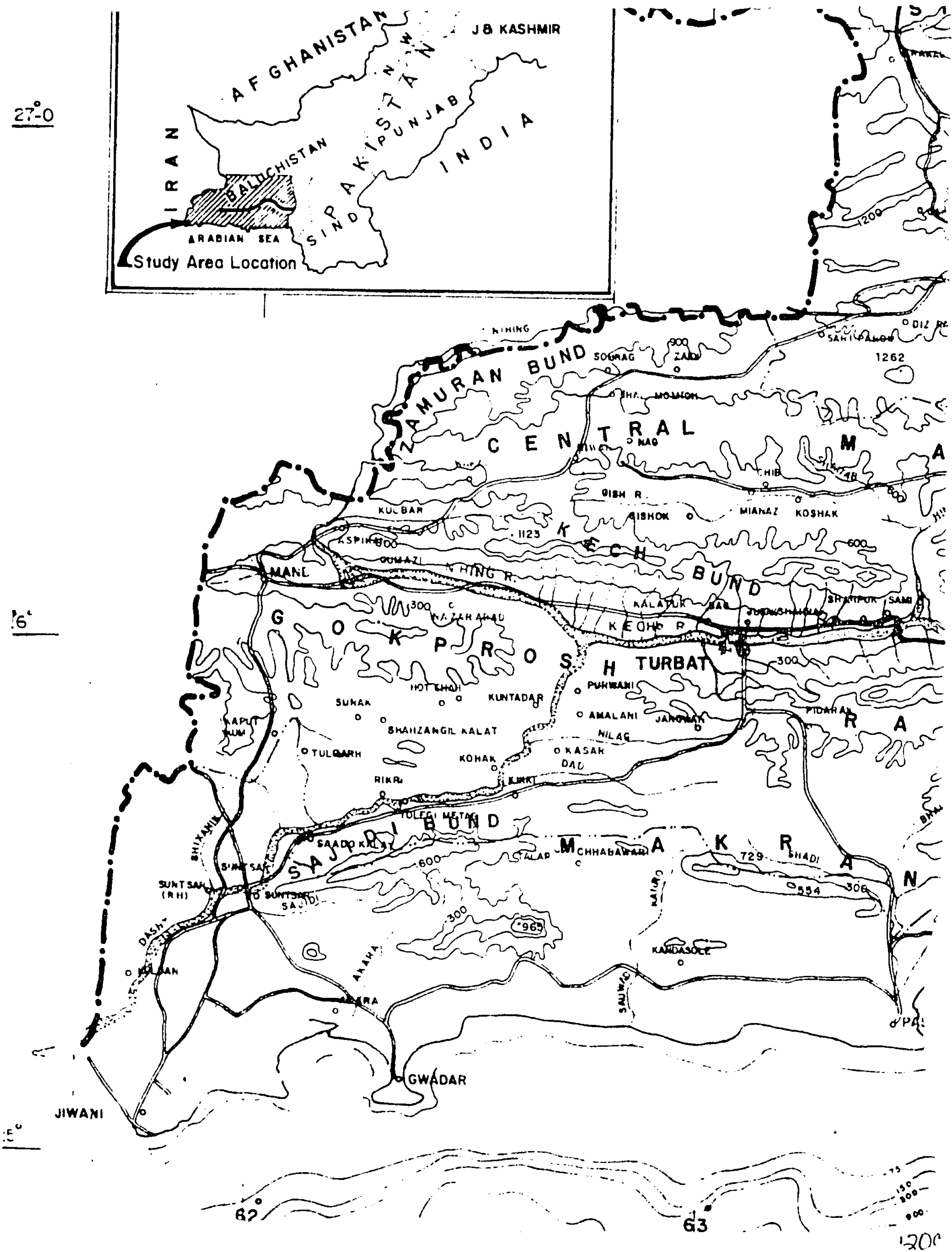
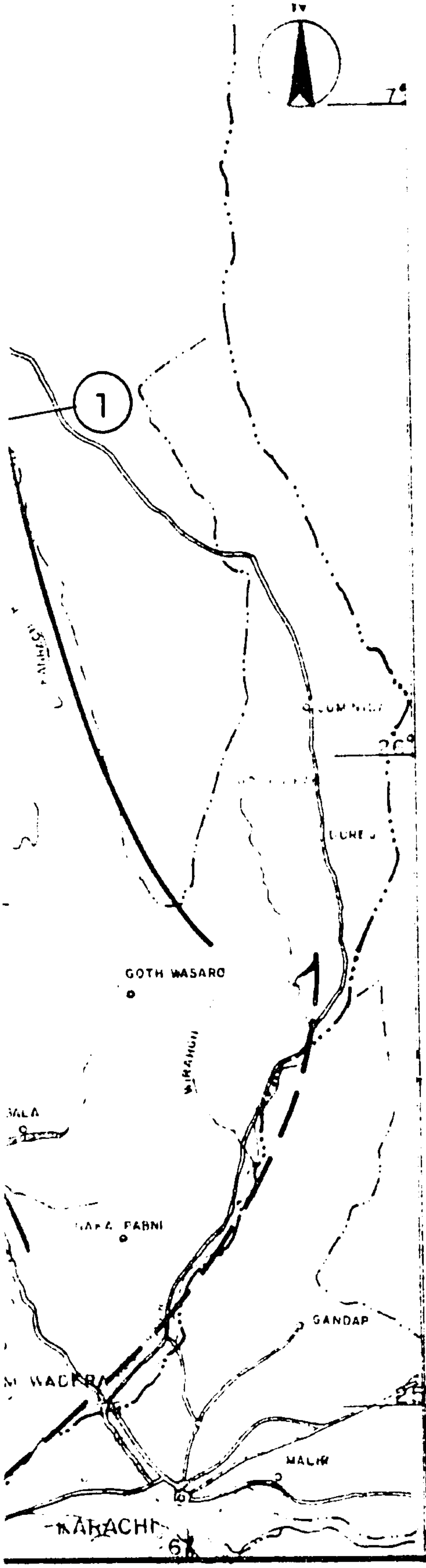

27°0
26°
25°
62°
63
AFGHANISTAN
J & KASHMIR
IRAN
BALUCHISTAN
PAKISTAN
PUNJAB
INDIA
SIND
ARABIAN SEA
Study Area Location
ZAMURAN BUND
CENTRAL
KECH BUND
GOKPROSH
TURBAT
SAJIDI BUND
MAKRAN
NIHING R.
KECH R.
GISH R.
KULBAR
MAND
ASPI
GUMAZI
NAG
CHIB
MIANAZ
KOSHAK
HOT CHAH
SUHAK
KUNTADAR
SHAHZANGIL KALAT
TULGARH
KOHAK
RIKR
PURWANI
AMALANI
KASAR
NILAG
SHAHPUR
SAMI
PIDARAK
SUNTSAR
SAADO KALAT
CHHABAWARI
SHADI
KANDASOLE
GWADAR
JIWANI
AKARA
1262
1123
1200
900
600
300
729
554
965

FIG: 3.3



REFERENCES

- INTERNATIONAL BOUNDARY
- PROVINCIAL BOUNDARY
- DISTRICT BOUNDARY
- RIVER / STREAM
- ROAD
- BELA-AWARAN-TURBAT ROAD. (BALUCHISTAN ROAD PROJECT)
- TOWN / VILLAGE
- FAULT. ACTIVE OR LIKELY TO HAVE BEEN ACTIVE.
- MAJOR LINEAMENTS OBSERVED ON AERIAL PHOTOGRAPHS OR LANDS AT IMAGERY.
- LINEAMENTS OBSERVED ON LANDS AT IMAGERY.
- FAULTS WHICH ARE VERY CLOSE TO THE SITE. 3

MILES 0 10 20 30 40 50 60 MILES

SCALE

UNITED STATES AGENCY

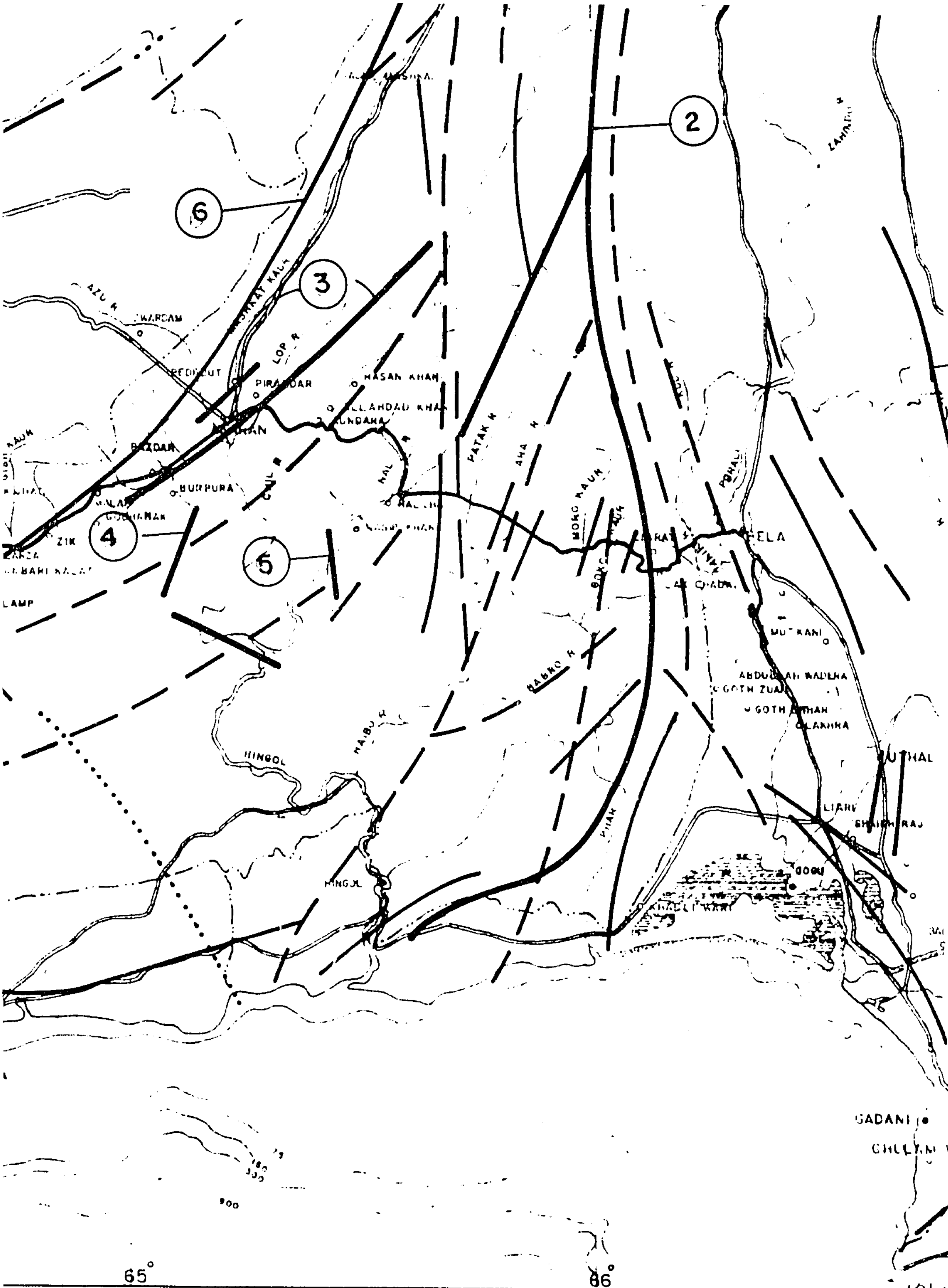
FOR

INTERNATIONAL DEVELOPMENT

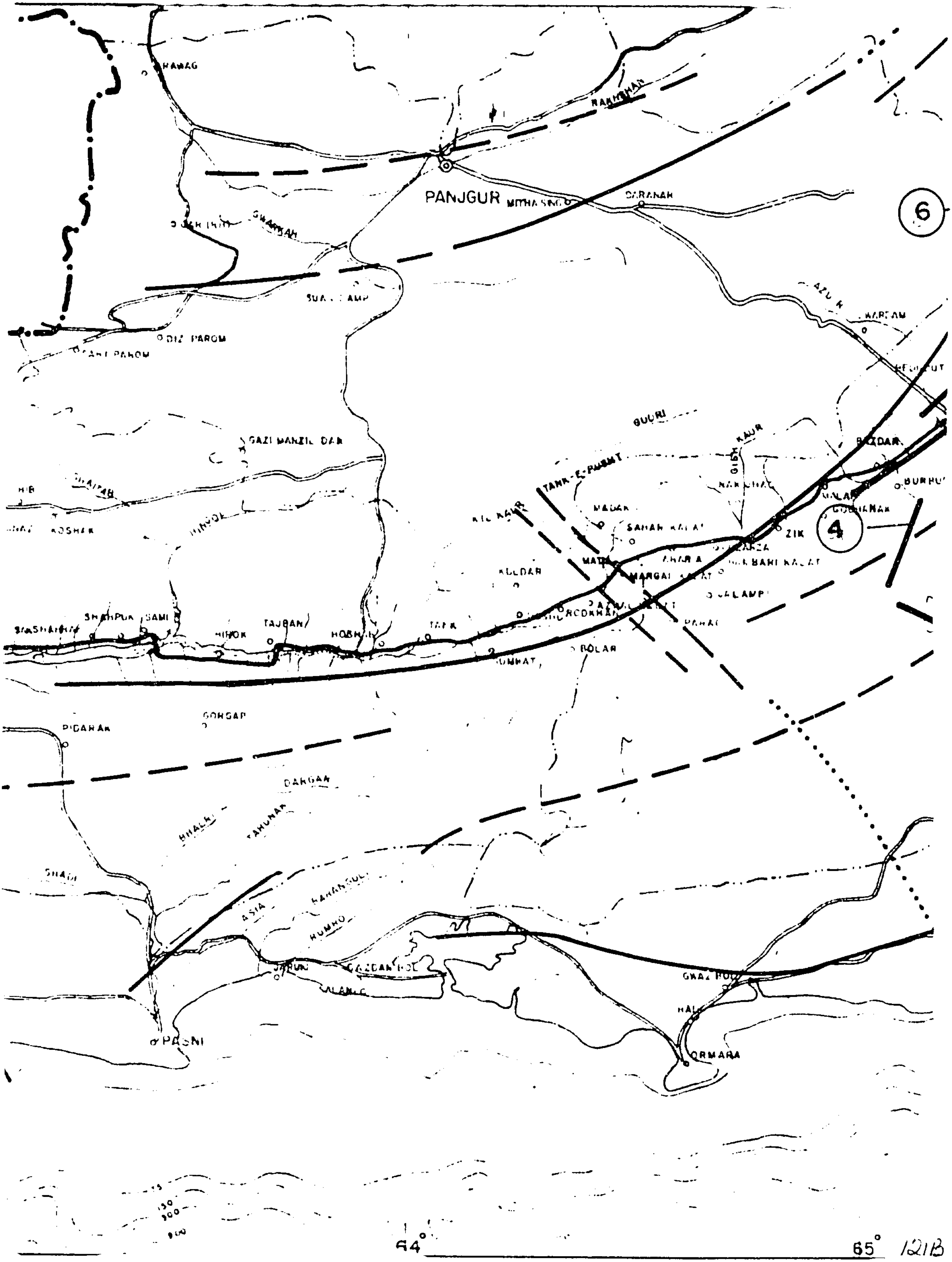
ENVIRONMENTAL ASSESSMENT
OF
BALUCHISTAN ROAD PROJECT

ACTIVE FAULTS AND LINEAMENTS

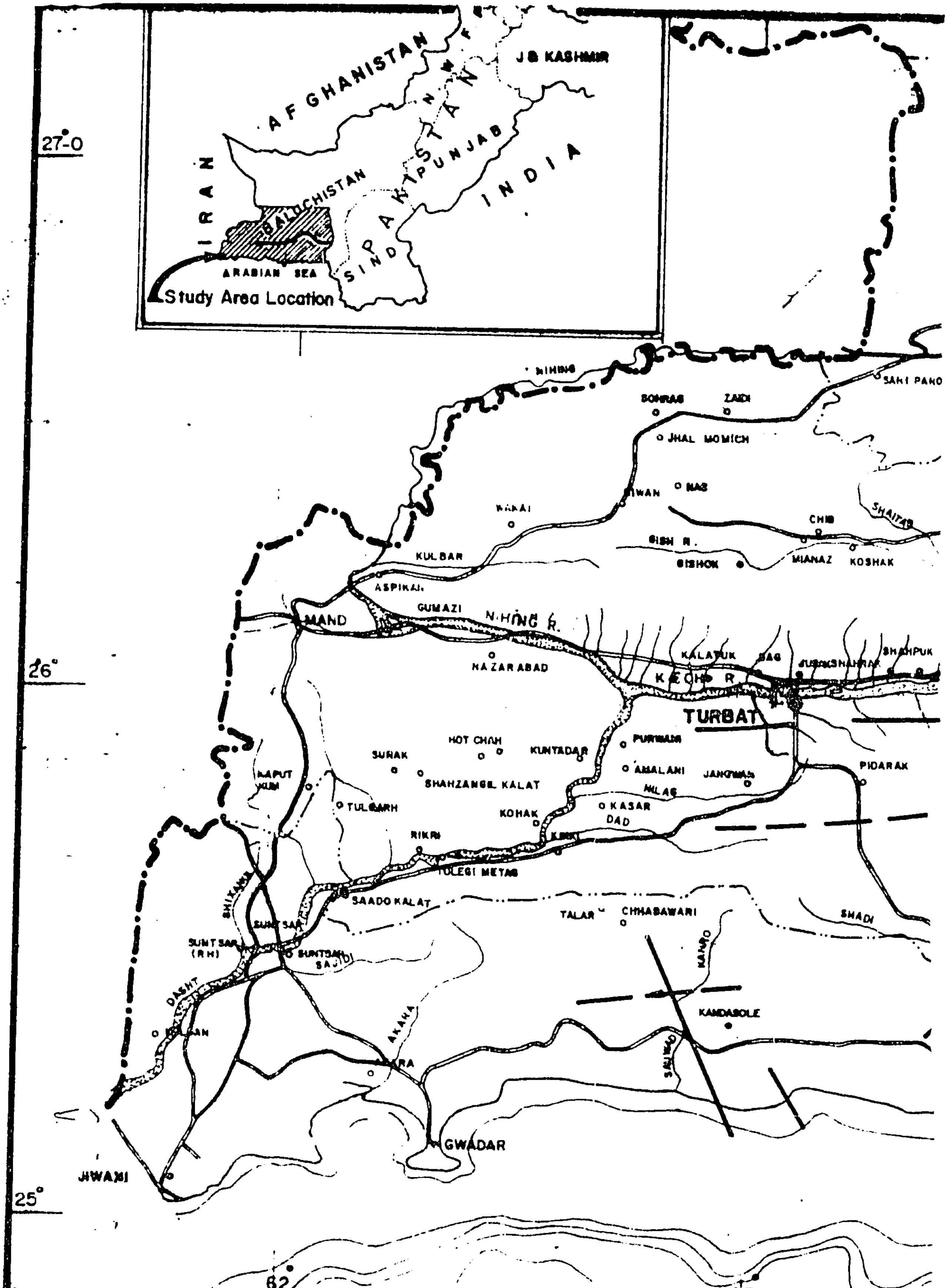
ASSOCIATED CONSULTING ENGINEERS ACE (PVT) LTD



2
6
3
4
5
WARDAM
LOP R
PIRANDAR
HASAN KHAN
BAZDAR
BURPURA
ZIK
LAMP
PATAK R
MORG KAUR
HINGOL
MUT KANI
LAKHRA
LIARI
GADANI
65°
66°

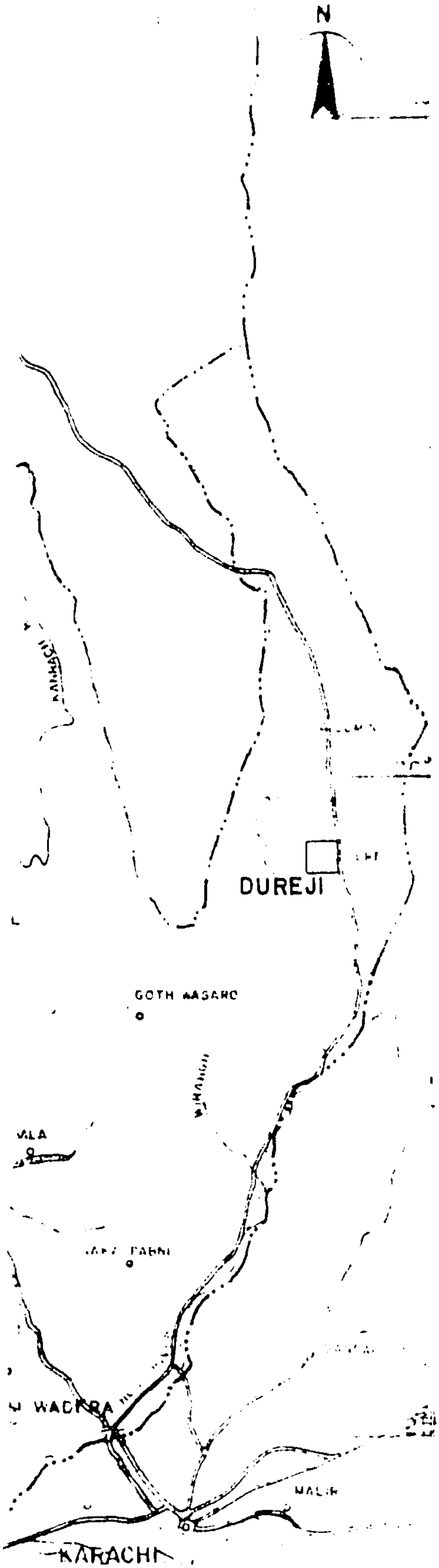


PANJGUR
RAKHSHAN
PARANAH
GWARGAH
DIZ PAROM
GAZI MANZIL DAR
GUDRI
TANK-E-PUSHT
MADAK
SAHAR KALAT
KOLDAR
ZIK
SHAHPUR
SAMI
HIROK
TAJBAN
TANK
BOLAR
PIDARAK
GORGAP
DARGAN
BHALEI
ASIA
HUMHO
GAZDAN HOL
PASNI
HAL
ORMARA
6
4
64°
65°



AFGHANISTAN
J & KASHMIR
IRAN
BALOCHISTAN
PAKISTAN
PUNJAB
INDIA
SIND
ARABIAN SEA
Study Area Location
27-0
26°
25°
62
NIHING
SONRAS
ZAIDI
SAHI PAHO
JHAL MOMICH
KAKAI
NAG
CHIB
SHAITAR
BISH R.
BISHOK
MIANAZ
KOSHAK
KULBAR
ASPIKAN
GUMAZI
MAND
NIHING R.
NAZAR ABAD
KALATUK
SHAHPUK
KECH R
TURBAT
HOT CHAH
SURAK
KUNTADAR
SHAHZANGE KALAT
TULGARH
KOHAK
RIKRI
KASAR
DAD
AMALANI
JANGWAN
PIDARAK
TOLEGI METAG
SAADO KALAT
SHIKANE
TALAR
CHHABAWARI
SHADI
SUNTSAR
SUNTSAR (RH)
SUNTSAR
SAJIDI
DASHT
KANDASOLE
AKARA
GWADAR
JIWANI

FIG: 3.4



REFERENCES

INTERNATIONAL BOUNDARY

PROVINCIAL BOUNDARY

DISTRICT BOUNDARY

RIVER / STREAM

ROAD

BELA-AWARAN-TURBAT ROAD.
(BALUCHISTAN ROAD PROJECT)

TOWN / VILLAGE.

NATIONAL PARKS.

WILDLIFE SANCTUARIES

MILES 10 20 30 40 50 60 MILES

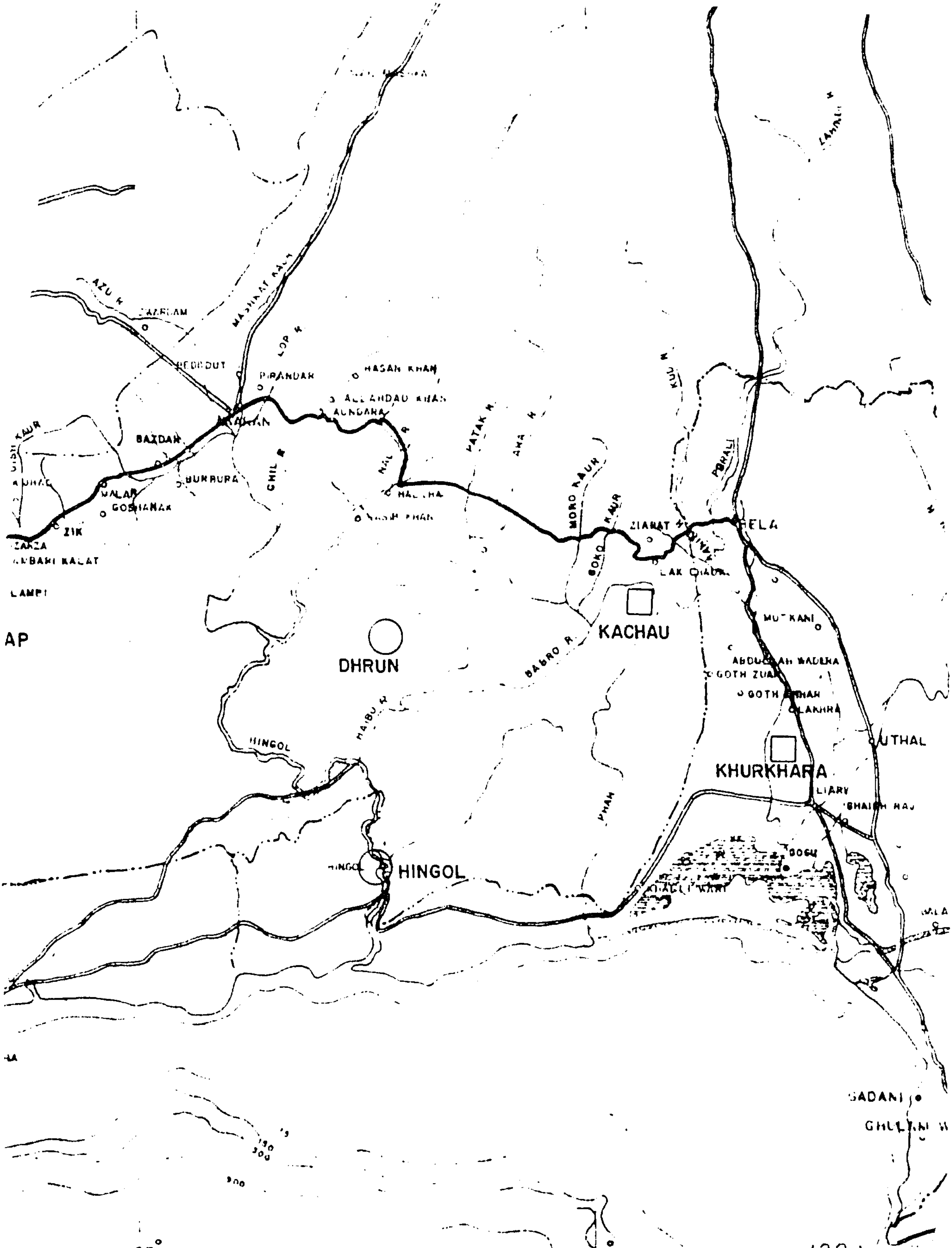
SCALE

UNITED STATES AGENCY
FOR
INTERNATIONAL DEVELOPMENT

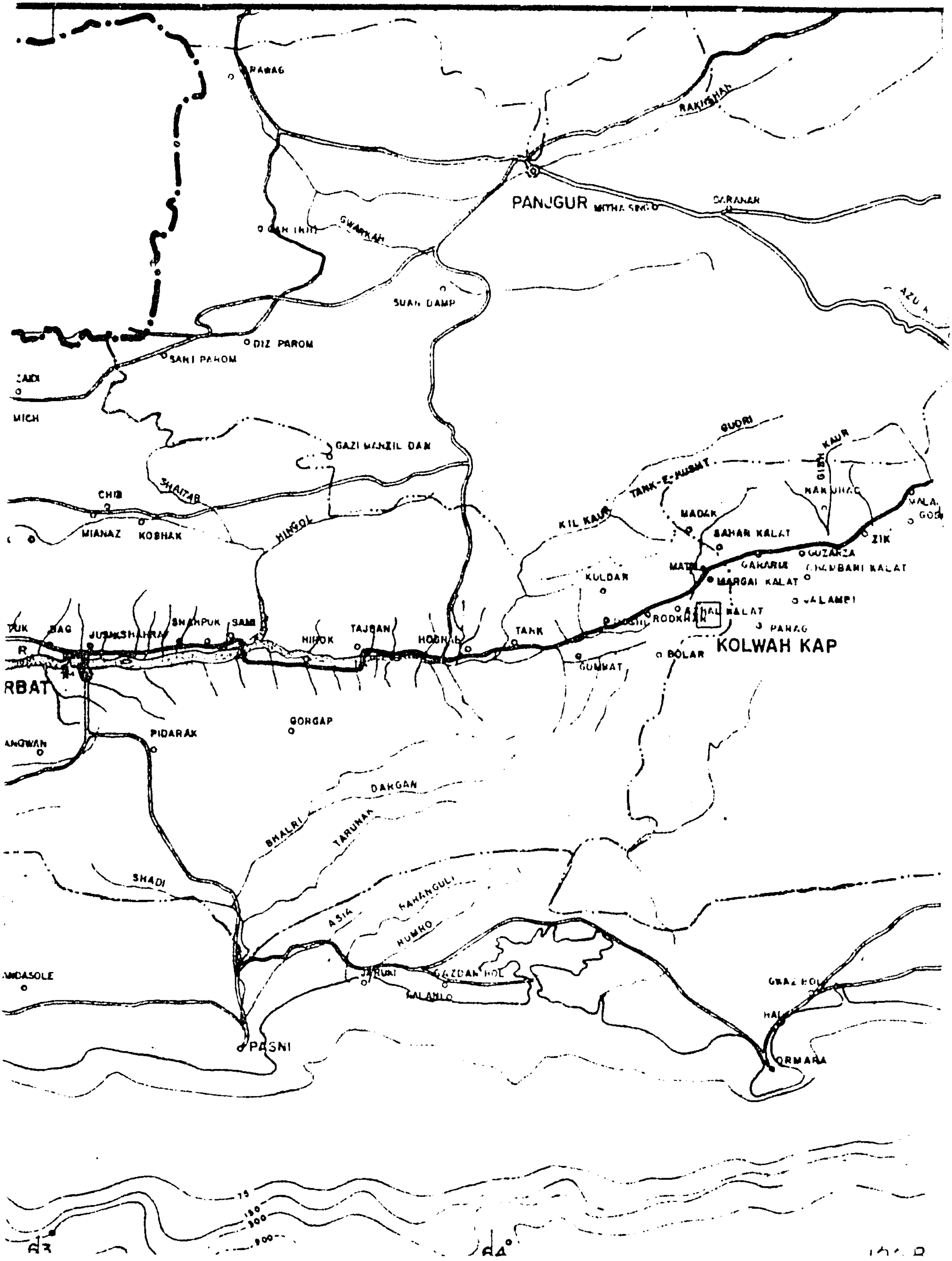
ENVIRONMENTAL ASSESSMENT
OF
BALUCHISTAN ROAD PROJECT

NATIONAL PARKS
AND
WILDLIFE SANCTUARIES

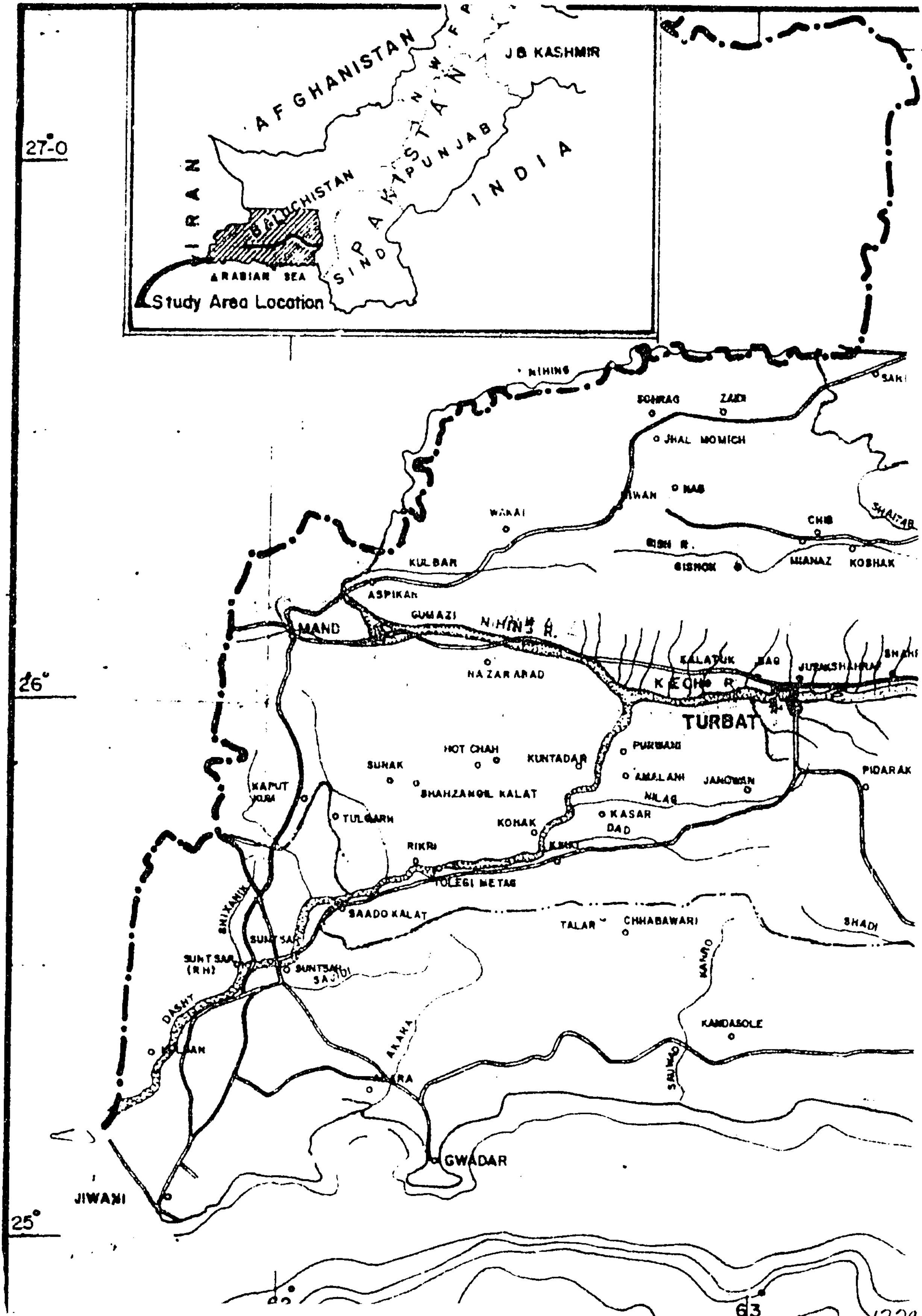
ASSOCIATED CONSULTING ENGINEERS ACE (PVT) LTD



DHRUN
KACHAU
KHURKHARA
HINGOL
BELA
UTHAL
ZIARAT
LAK OIAURA
MUTKANI
ABDULLAH WADERA
GOTH ZUAR
LAKHRA
LIARI
SHAIKH RAJ
SONMIANI
SADANI
PIRANDAR
HASAN KHAN
ALLAHDAD KHAN
AUNDARA
BAZDAR
BURBURA
GOBIANAR
ZIK
NASIR KHAN
MASHKAI KAUR
LOP R
PATAK R
MORO KAUR
SOKO KAUR
BABRO R
HAIBU R
HINGOL
PHAH
PORALI
KUD R
CHIL R
NAL R
AZU R
REDBOUT
ZARBAM
KHARI
BARI KALAT
LAMPI
AP



PANJGUR
SUAN DAMP
DIZ PAROM
GAZI MANZIL DAN
CHIB
MIANAZ
KOBHAK
SHAITAR
MICH
SHAHPUK
TAJBAN
HOSHAB
TANK
KIL KAUR
TANK-E-HUSHT
GUDRI
GISH KAUR
MADAK
SAHAR KALAT
ZIK
GUZARZA
MARGAI KALAT
KULDAR
RODKHAN
PARAG
KOLWAH KAP
BOLAR
GUMBAT
RBAT
GORGAP
PIDARAK
DARGAN
TARUMAK
SHADI
HUMHO
GAZDAN HOL
PASNI
ORMARA
RAKHSHAN


AFGHANISTAN
J & KASHMIR
IRAN
BALUCHISTAN
PAKISTAN
PUNJAB
INDIA
SIND
ARABIAN SEA
Study Area Location
27°0
26°
25°
63
NIHING
SOHRAG
ZAIDI
JHAL MOMICH
WAKAI
CHIB
KULBAR
KOSHAK
ASPIKAN
GUMAZI
MAND
NIHING R.
KALATUK
HAZAR ABAD
TURBAT
PIDARAK
HOT CHAH
SURAK
KUNTADAR
AMALANI
SHAHZANGIL KALAT
TULGARH
KOHAK
KASAR
DAD
RIKRI
TOLEGI METAG
SAADO KALAT
TALAR
CHHABAWARI
SHADI
SUNTSAR
KANDASOLE
DASHT
AKARA
GWADAR
JIWANI

122C

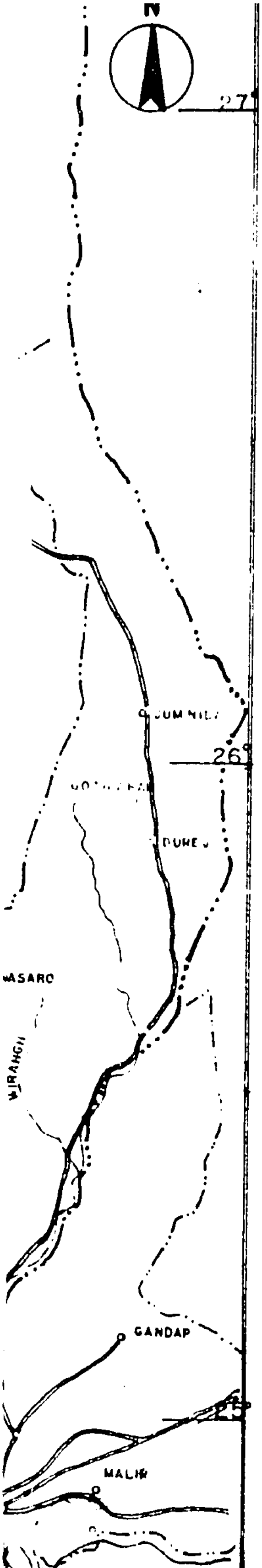


FIG: 3.5

REFERENCES

- INTERNATIONAL BOUNDARY
- PROVINCIAL BOUNDARY
- DISTRICT BOUNDARY
- RIVER/STREAM
- ROAD
- BELA-AWARAN-TURBAT ROAD (BALUCHISTAN ROAD PROJECT)
- TOWN/VILLAGE.
- MOSTLY BARREN LAND WITH SOME RAINFED AND RIVERAIN AGRICULTURE
- MOSTLY BARREN LAND WITH SOME RAINFED, RIVERAIN AND TUBEWELL AGRICULTURE.
- MODERATE CULTIVATION WITH RAINFED RIVERAIN AND TUBEWELL AGRICULTURE. (Mostly on the south side of the road)
- MODERATE CULTIVATION WITH RAINFED, WELL TUBEWELL AND SOME KAURJO AGRICULTURE. (Mostly on the south side of the road).
- MODERATE CULTIVATION WITH RAINFED KAREZES KAREZES AND KAURJO AGRICULTURE.
- MOSTLY BARREN HILL TRACTS WITH SOME BARRANI RIVERAIN AGRICULTURE.
- VALLEY WITH LITTLE AGRICULTURE, BUT MODERATE NATURAL VEGETATION.

MILES 0 10 20 30 40 50 60 MILES

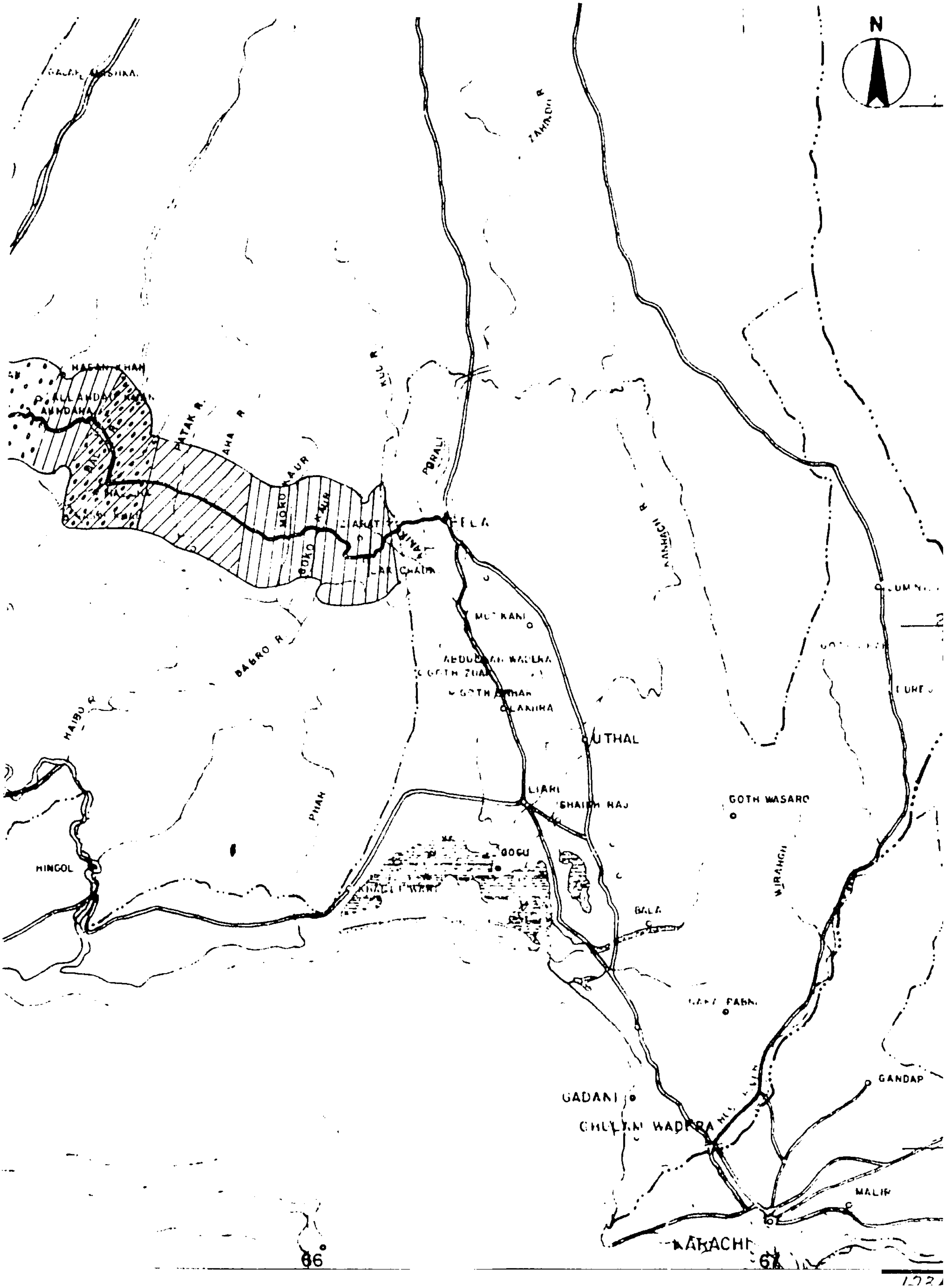
SCALE

UNITED STATES AGENCY
FOR
INTERNATIONAL DEVELOPMENT

ENVIRONMENTAL ASSESSMENT
OF
BALUCHISTAN ROAD PROJECT

LAND USE ALONG THE PROJECT CORRIDOR
(INDICATIVE)

ASSOCIATED CONSULTING ENGINEERS ACE (PVT) LTD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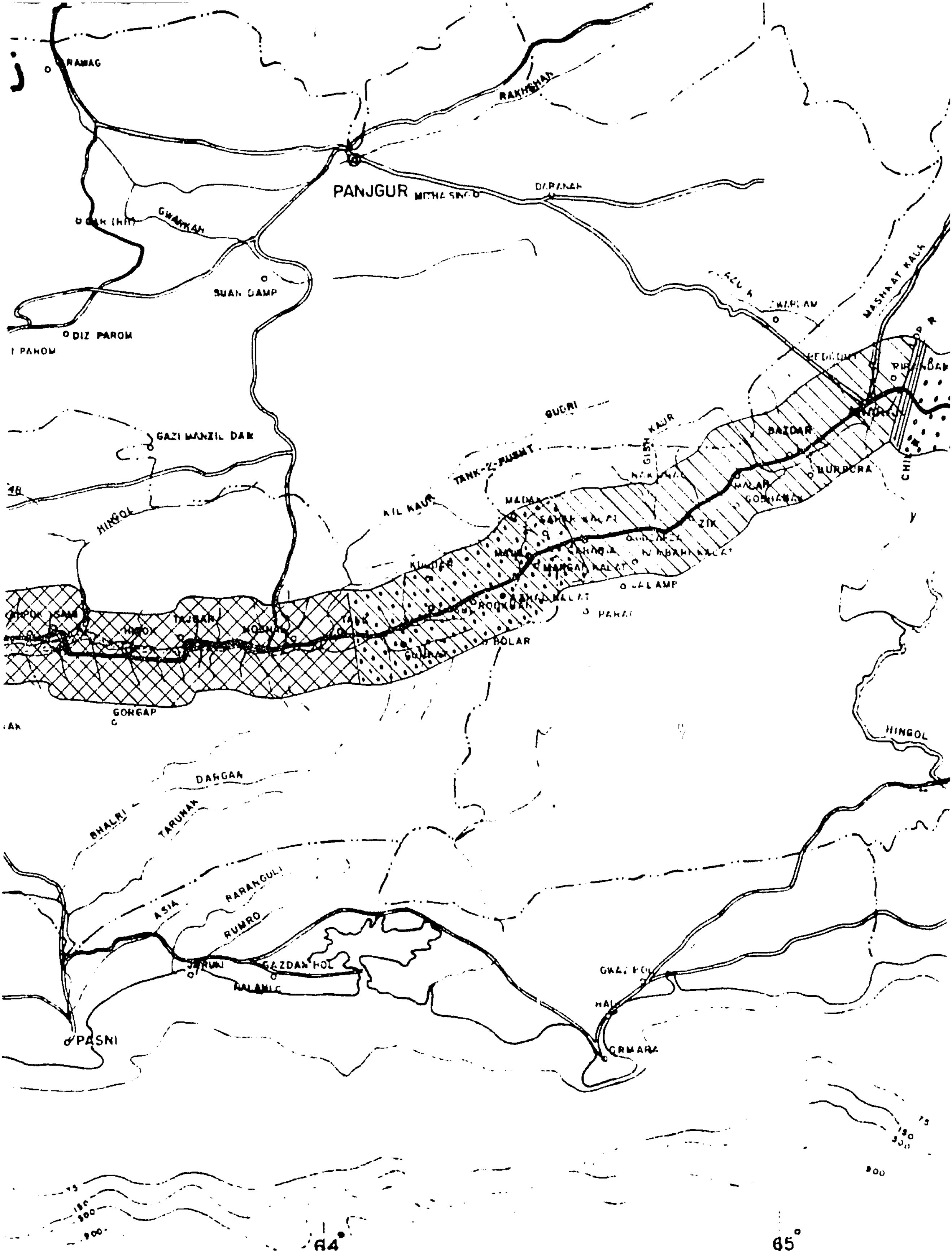
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DIZ PAROM
SUAN DAMP
GAZI MANZIL DAR
HINGOL
GUDRI
TANK-Z-PUSHT
KIL KAUR
GISH KAUR
MASHKAI KAUR
BAZDAR
MURPURA
GORGAP
BOLAR
DARGAN
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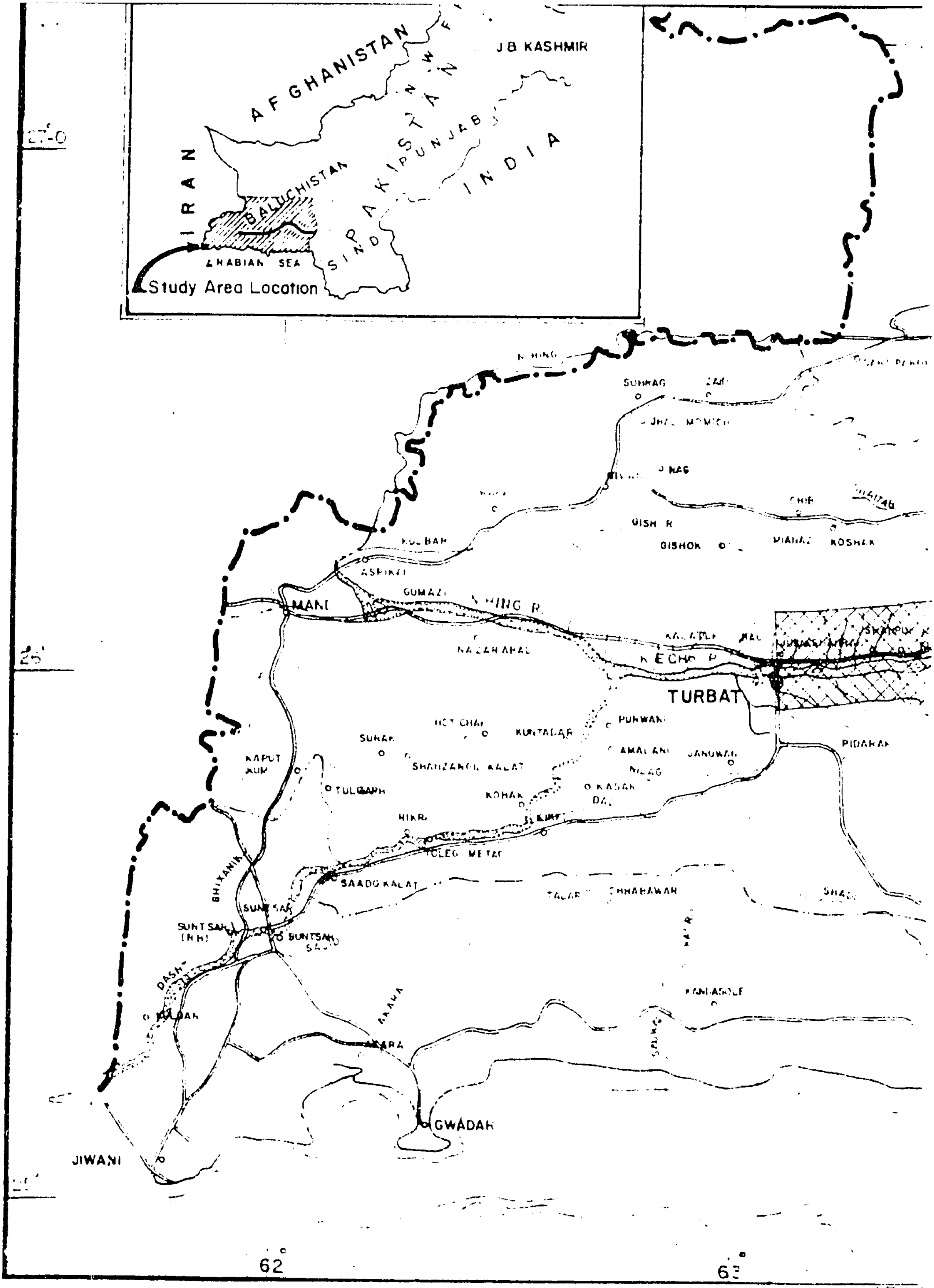

AFGHANISTAN
J B KASHMIR
IRAN
BALUCHISTAN
PAKISTAN
PUNJAB
INDIA
SIND
ARABIAN SEA
Study Area Location
MANI
GUMAZI
NIHING R.
KULBAR
GISHOK
KOSHAK
KECH R
TURBAT
PURWANI
PIDARAK
KUNTADAR
SHAHZANGI KALAT
TULGARH
KOHAK
SAADO KALAT
CHHABAWAR
SUNTSAR
KULDAN
GWADAR
JIWANI
62
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APPENDIX A

Traffic Related Environmental Impact Study

APPENDIX - A

TRAFFIC RELATED ENVIRONMENTAL IMPACT STUDY

1.0 PROJECT DESCRIPTION

1.1 Location of Project

Bela-Awaran-Turbat Road is located in southern part of Balochistan Province. The project road falls partly in the administrative limits of Bela and mostly in Awaran & Turbat. The starting point i.e. Bela located about 182 Km from karachi lies at the junction of Karachi-Quetta Highway (N-25) with the Project Road which runs towards west almost parallel to the coast line with harbour towns of Ormara, Pasni and Gwadar, at an approximate distance of 90 Km from the Arabian Sea. The proposed road almost follows the existing track connecting the two towns of Bela and Turbat.

1.2 Existing Road Conditions

The first 35 Km length of the existing road is black topped, but suffers from substandard vertical and horizontal alignment, poorly designed pavement and inadequate drainage structures and curve geometry.

The first 8.5 Km road alignment lies in a flat to gently rolling terrain. For the next 4.0 Km where the existing road alignment lies along the foot-hills of the mountains, the road is confined to a narrow strip with moderately steep slopes to the north and meandering stream to the south. From Km 12.5 to Km 16, the alignment passes through steep mountains with near extreme slopes to the north and deep valleys to the south. The next 19 Km lie in rolling to steep terrain. The remaining section of the project road except the last 22 Km towards Turbat, which is bloack topped, are "KACHA" or dirt track. The existing operating speeds are normally much less than 40 Km P.H. Sight distances are restricted on many sections due to lateral obstructions. There are a number of uni-directional curves with inadequate tangents and many reverse curves. Grades exceed 15% in the first 35 Km and elsewhere. Between Awaran and Turbat, however, the existing alignment follows a wide flat valley and features long tangents, acceptible curve radii and level to moderate grades. Some horizontal alignment adjustments would be required at approaches to stream crossings, and a few curve relocations around agricultural areas would have to be considered. There are numerous waterway crossings, but no drainage structures are existing.

1.3 Traffic Considerations

1.3.1 Existing Traffic

Since past historic traffic data was not available, the design consultants carried out their own field traffic surveys to determine the existing patterns of traffic. This forms the source of data for the subject study. The type of vehicles, volumes, loads, origins and destinations were determined. The summary of the field traffic studies is as follows:

AVERAGE DAILY TRAFFIC

	BELA AWARAN SECTION	AWARAN-SAMI SECTION	SAMI-TURBAT SECTION
Buses	10	14	12
Trucks	107	90	95
Pickups & Cars	18	17	75
Total :	135	121	182

After adjusting for daily and seasonal traffic variations, the annual daily traffic on the project road is as follows:

ANNUAL
AVERAGE DAILY TRAFFIC

	BELA AWARAN SECTION	AWARAN-SAMI SECTION	SAMI-TURBAT SECTION
Buses	9	13	11
Trucks	102	82	90
Pickups & Cars	17	15	74
Total :	128	110	175

It was observed that 52% of the total trucks going towards Karachi were empty while all trucks going towards Turbat were loaded. The percentage of empty and loaded trucks was 22% and 78% of ADT respectively.

1.3.2 Expected Traffic (Construction Period)

It was estimated that during the construction period of the project the growth rate of existing traffic would be 10% per annum. This would be purely due to the construction activities. The projected traffic to the base year is, therefore, expected to be as under :

	BELA AWARAN SECTION	AWARAN-SAMI SECTION	SAMI-TURBAT SECTION
Buses	13	19	16
Trucks	149	120	132
Pickups & Cars	25	22	108
Total :	187	161	256

1.3.3 **Existing and expected traffic with project**

The base year from which traffic volumes are to be projected begins when the road is opened to traffic. Construction work in the 56 Km length, out of 101 Km, Bela-Awaran, section was partly completed when the Contractor's work was terminated. Final design for the remaining Bela-Awaran Turbat portion was completed in March, 1990. The construction period for Bela-Awaran Turbat was 52 months. It is anticipated that the existing traffic would increase at the rate of 10% annually from Mid 1989 through 1993. During the construction of the road it is expected that the 10% annual increase in traffic on the project road shall purely be due to the construction activities. The projected traffic of the base year is, therefore, as follows:

PROJECTED TRAFFIC

BELA AWARAN SECTION

YEAR	BUSES	TRUCKS	PICKUP CARS	TOTAL
1989	9	102	17	128
1990	10	112	19	141
1991	11	123	21	155
1992	12	136	23	171
1993	13	149	25	187

AWARAN - SAMI SECTION

YEAR	BUSES	TRUCKS	PICKUPS/ CARS	TOTAL
1989	13	82	15	110
1990	14	90	17	121
1991	16	99	18	133
1992	17	109	20	146
1993	19	120	22	161

SAMI - TURBAT SECTION

YEAR	BUSES	TRUCKS	PICKUPS/ CARS	TOTAL
1989	11	90	74	175
1990	12	99	81	192
1991	13	109	89	211
1992	15	120	98	233
1993	16	132	108	256

After the road is completed and opened to traffic, in the first year development traffic, generated traffic and diverted traffic is added to the existing base year traffic. This also includes traffic anticipated from the development of Pasni and Gwadar mini-fish ports. Keeping all the factors in view it is estimated that development traffic would be 10%, generated traffic 20% and diverted traffic 15%. Total increase in base year traffic for the first year is 45%. Thereafter the increase is estimated to be 15% per year. The following table depicts the projected volumes of traffic from base year onwards for 10 years, project design life.

PROJECTED TRAFFIC

BELA AWARAN SECTION

YEAR	BUSES	TRUCKS	PICKUPS/ CARS	TOTAL
1993	19	216	36	271
1994	22	248	41	311
1995	25	286	48	359
1996	29	329	55	413
1997	33	378	63	474
1998	38	434	72	544
1999	44	500	83	627
2000	51	575	96	722
2001	58	661	110	829
2002	67	760	127	954
2003	77	874	146	1097

AWARAN - SAMI SECTION

YEAR	BUSES	TRUCKS	PICKUPS/ CARS	TOTAL
1993	28	174	32	234
1994	32	200	37	269
1995	37	230	42	309
1996	42	265	49	356
1997	49	304	56	409
1998	56	350	64	470
1999	65	402	74	541
2000	74	463	85	622

YEAR	BUSES	TRUCKS	PICKUPS/ CARS	TOTAL
2001	86	532	98	716
2002	98	612	113	823
2003	113	704	129	946

SAMI - TURBAT SECTION

YEAR	BUSES	TRUCKS	PICKUPS/ CARS	TOTAL
1993	23	191	157	371
1994	26	220	181	427
1995	30	253	208	491
1996	35	290	239	564
1997	40	334	275	649
1998	46	384	316	746
1999	53	442	363	858
2000	61	508	418	987
2001	70	584	481	1135
2002	81	672	552	1305
2003	93	773	635	1501

1.4 Design Features of Proposed Road:

The project road would ultimately be classified as National Highway. As such the width of Right of Way (R.O.W.) to be established would be 68 meter each side of the centerline of the road. However, in the built-up areas, R.O.W. would be restricted to a width sufficient to accommodate limits of construction. The design features of the proposed road will be as follows :

a)	Right of Way	136m
b)	Formation Width	9.6m
c)	Metalled Width	6.6m
d)	Side Slopes	2:1
e)	Camber	2%
f)	Slope on Shoulders	6%
g)	Max. Superelevation	10%
h)	Design Speed:	
	Level	80 KPH
	Rolling	65 KPH
	Mountainous	50 KPH
i)	Vertical Grades	7% Max.
j)	Roadway on Bridges	9.6m
k)	Sub-base for first 35 Km	14cm
	Next 101 Km	10cm
	Awaran-Turbat Section	NIL
l)	Base for first 35 Km	24cm
	Next 101 Km	16 to 20cm
	Awaran-Turbat Section	24cm
m)	Surface Course	DBST

2.0 ENVIRONMENTAL IMPACT OF THE PROPOSED ROAD

Since the present alignment of the road remains almost undistrubed, excepting a few minor local adjustments, the length would remain more or less unaffected except that from Awaran to Turbat the proper geometric design will result in saving of about 5 KM travel distance.

Since the project road follows the ages old track, and that the improvement is aimed at upgrading the existing route the traffic related environmental effects to lesser degree already exist. The road for most part of its length passes through the wide & flat valley or highland plateau and the prevailing winds is a prime factor in dispersing and diluting the pollutants.

From any listing of environmental effects of transportation, air and noise pollution are the focus of concern and complaint. Other factors include traffic induced vibration from rough pavements or vehicles and annoyances such as water pollution, dust, dirt, spill and litter.

2.1 Air Pollution

2.1.1 General

Air pollution from both fixed and mobile sources is a major concern. It results from discharges into the air of nonreactive pollutants including carbon monoxide (CO) sulphur dioxide (SO_2), sulphates (SO_4), particulate matter such as dust, smoke, and lead, with its long-range effects and reactive pollutants including hydro carbons (HC), carbon dioxide (CO_2) nitric oxide (NO), nitrogen dioxide (NO_2) and Ozone (O_3), which involve atmospheric transformation processes.

The highway air-pollution problem has two dimensions. The first deals with the area-wide effects of primarily reactive pollutants; the second with high concentrations of largely nonreactive pollutants at points or corridors along or near highways. The motor vehicle is a primary contributor to both forms, accounting for an estimated 70% of the CO, 50% of the HC, and 30% of the NO_x. Other transportation sources account for roughly 20% more of each.

Area-wide conditions become particularly bad when temperature inversions trap pollutants near the ground surface and there is little or no wind, so that concentrations become extremely high. For some individuals, eyes burn and breathing is difficult. It is charged that lives generally are shortened and some deaths actually result from these exposures. Also, certain kinds of vegetation are killed, stunted, or the foliage burned.

As stated above, nonreactive pollutants create the more serious difficulties at specific locations or along highway corridors. It follows that before and after analyses of proposed individual projects would take account of them. No attempt is made here to quantify the amounts of the various pollutants generated by specific operating conditions. This situation is changing too rapidly. However, Fig.I is given to illustrate the complexities. It shows how the outputs of CO, a nonreactive pollutant, and HC and NO_x, reactive ones, vary with average operating speed and therefore would be affected by improvements in traffic flow. However, it does not distinguish between the effects of constant slow speeds and congestion induced by slowing and accelerating. Neither are data nor procedures offered that go the next step and provide a time frame for dispersal over an area at various distances from the roadside. Such analyses are extremely comptex and usually rely on computer modelling, which is beyound the scope of this study.

2.1.2 Assessment of Impact

In the Assessment of Impact of the six pollutants described above, CO, HC, and NO_x are the three generally considered in an analysis of transportation related air quality impacts. The primary tools for assessing air quality impacts on transportation improvements at both a regional and a local area scale are predictive models.

The basic purpose of the models is to measure and predict changes in air quality associated with particular actions. To identify such changes in air quality, it is necessary to have current data on pollution levels, (i.e. without the proposed facility) either as part of the models or in addition to them. The models then quantitatively define changes in air quality which are attributable to improvement-generated alterations in traffic patterns and/or volumes. Model predictions may focus either on the total amount of pollutant generated by the transportation facility (burden), the atmospheric dispersion and chemical reactions of the pollutants, or on the concentrations of pollutants in the air at selected distances from the facility. The ambient air quality standards shown in Table-I establish the maximum permissible averages and peak concentrations of primary pollutants in the air.

U.S. Environmental Protection Agency has developed a set of emissions factors for various types of vehicles. These factors are generally expressed in grams per vehicle Km, and represent total emissions exhaust for each mile of vehicle travel at a given average speed. Included with these factors are speed adjustment factors and deterioration factors which adjust the emissions to allow for deterioration of emission control device efficiency. Also included in the adjustment are percent cold starts, percent hot starts, and ambient temperatures. Different emission factors have been developed for cars (light duty vehicles) and gasoline and diesel-fueled trucks (heavy duty vehicles). The factors for cars are further broken down by model year to account for the reduction in emissions in latest models.

The emission factors may be further modified according to driving conditions. Cars operate at more uniform speeds on freeways and rural roads than on urban streets. With emission factors, VMT, and average speed stratified in this manner, emission models can exhibit some sensitivity to highway system operating characteristics.

2.2 Noise and Noise Control

2.2.1 Noise Characteristics

Noise is defined as unwanted sound. One of the unfortunate consequences of transportation on our way of life has been an increase in noise levels. Today, serious efforts are well along on many fronts to reduce them. Highway and public transportation agencies are deeply involved.

Noise is measured in decibels, with the common unit being the dBA. This single unit combines the sound intensities from all frequencies, but gives greater weight to frequencies above 1000 per second because human beings react more strongly to them. Sounds at a level of 1 dBA can barely be detected by the human ear; but it can discriminate when pressures are 10 billion times as great. To apply a measuring scheme to this great range in hearing capacity, the measure of intensity, the decibel, has been set at ten times the logarithm of pressure to the base 10. Thus, an increase of 10 on the decibel scale means a tenfold increase in intensity.

The decrease in sound intensity with distance from the source is influenced by several factors. Measurements taken near highways show doubling the distance results in a lowering of 3 dBA over clean, level ground and 4.8 dBA over lush growth.

Some sustained (ambient) noise is always present. In a quiet residential neighborhood at night it is in the 32 to 43 dBA range; the urban residential daytime limits are about 41 to 53 dBA. In industrial areas the range is 48 to 66 dBA; in downtown commercial locations with heavy traffic it is 62 to 73 dBA. A notion of what these sound levels mean in terms of communication comes from such facts as the following: at 65 dBA a conversation is difficult at 3 ft.; at 75 dBA, you must plug a finger in the nonlistening ear to hear a telephone conversation.

A first approach to the control of highway noise is to limit or reduce noise emissions of the vehicles themselves by design and by enforcement of noise legislation. These vehicle noises have several sources: engine, drive train, fan, tyres, air inlet and exhaust, and, at times, horns. For automobiles, total noise and tyre noise, which is a major contributor, are generated at or near the road surface and increase as the third power of velocity. With diesel trucks, noise levels are almost constant with speed because engine speed is almost constant. Exhaust noise is the principal component and offers complexities because it is generated about 8 ft. above the pavement surface.

The first step in designing for noise control is to establish acceptable noise levels. Those proposed by the Federal Highway Administration are shown in Table-II.

The acceptable noise levels cited in Table-II are in terms of L_{10}, a level not to be exceeded more than 10% of the time. Another approach is to specify the peak noise, such as is generated by the passing of a diesel truck.

2.2.2 Predicting Highway Noise Levels

A variety of procedures for predicting noise levels at various distances form highways, with and without barriers, and for given numbers of vehicles of different types have been developed. The one proposed in NCHRP Report 174 for preliminary investigation is illustrated here by Figs.II. These nomographs consolidate the findings of many analyses and observations. In-depth prediction methods are far more complex.

2.2.3 Noise Prediction for the Project

Bela-Awaran-Turbat Road.

1. Design Speed

Level	=	80 KPH
Rolling	=	65 KPH
Mountainous	=	50 MPH
Average operating speed	=	65 KPH
	=	40 MPH
Peak Hour Factor	=	1.5

Vehicle per hour = $\frac{AADT}{24} \times 1.5$

Bela - Awaran = $\frac{1097}{24} \times 1.5 = 69$ VPH

Awaran - Sami = $\frac{946}{24} \times 1.5 = 60$ VPH

Sami - Turbat = $\frac{1501}{24} \times 1.5 = 94$ VPH

Average hourly traffic = 74 VPH.

Traffic characteristic comprising of mostly 73% of Buses and Trucks. Operating on the road.

Noise prediction/evaluation at a distance of 200 ft from roadway is considered. Use Figure-II, follow dotted line.

The noise prediction at 200 ft from roadway is 67 dBA on L_{10} scale.

This is well with in the desirable noise limit. The recommended noise level design criteria given in Table III and IV is comparable.

2.2.4 Impact Assessment

Impact Assessment defines a six step process for assessing noise impacts generated by a transportation improvement.

1. Using appropriate techniques, predict the improvement-generated noise level in accordance with procedures listed in FHPM 7-7-3.

2. Identify existing land uses or activities which may be affected by noise from the improvement.

3. Measure the existing noise levels for present land uses or activities.

4. Compare the predicted noise levels with the standards. Also compare the predicted noise levels with the existing noise levels identified in step 3. These comparisons then provide a basis for assessing the anticipated noise impact upon land uses and activities.

5. Based upon the noise impacts determined in the last step, evaluate alternative noise abatement measures for reducing or eliminating the noise impact on developed lands.

6. Identify those situations where an exception to the design noise levels may be required.

   FHWA design noise levels for specific receptors and land use types are identified in Table-V. Residential areas are typically more sensitive to noise impacts than commercial and industrial areas. Hospitals, Schools, Churches, and open tracts of land particularly where serenity is an important quality of that land are also sensitive to noise. Bela Awaran Turbat Road being rural route passing through sparsely populated area poses least impact.

3.0 MEASURES TO MINIMIZE IMPACT

3.1 Air Quality

One of primary means of minimizing air quality impacts is to insure smooth vehicle flow. Analyses of vehicle emissions increase as the level of service decreases. This is due to the greater number of accelerations, decelerations, and idles at the lower levels of service. Design measures which focus on better management of traffic flow can therefore be effective in reducing air pollution. Bela Awaran Turbat being a rural through road a steady flow of traffic is expected, which will aid in acceptable air quality along the route.

Right-of-way measures can be aimed at avoiding sensitive receptors. Adjustments in the horizontal alignment or choice of alternative alignments should be aimed at avoiding receptors sensitive to particulate and gaseous missions, such as schools, hospitals, and residential areas to be located at acceptable distance in future.

Vehicle-related measures which reduce levels of motor vehicle emissions are the most effective means of directly improving air quality. Continual research is being undertaken to increase the efficiency of engines or improve exhaust emission controls. Development of new and improved energy sources may also contribute to the improvement of air quality.

3.2 Dust

The Bela Awaran Turbat road in the present condition is a dirt track. The vehicle operating presently, although at a much lower speed then the design speed,generate excessive dust, which during the hot and dry weather most of the year around in the project influence area add dust particles to the air/atmosphere.

The black top improved facility of Bela-Awaran-Turbat road will not only permit higher operating speeds but significantly reduce the dust particulate pollutants due mostly to the paved bituminised travel surface.

The dust during construction stage needs careful consideration. As a rule the specification for road construction calls for maintenance of service roads and traffic diversons on safer routes. However the service road and construction sites be sprinkled with water as a routine to arrest and combat dust production. However at quarries and at crusher plants, the workers shall protect themselves with dust and noise mufflers mandatory against job related exposure.

3.3 Noise

The Bela-Awaran - Turbat road is an ages old transportation route. There is no appreciable alignment changes envisaged. The road passes through barren to sparsely populated areas. The villages are small by any standard. The dwellings/hutments are traditionally built of thick mud walls with small low level windows and thatched roof, hence itself mitigative in nature.

Any alternative would not have any appreciable effect on noise levels which are local in nature and related to daily activities of the population. The long term effects of improved roadway on noise levels would not be significant.

The use of newer vehicles and easier grades on the road would some what offset increased noise levels expected from increased traffic volumes.

3.4 Spill Prevention

To enhance safety for road and the public in general, protect water resources and preserve habitats, a plan must be developed to deal with the very probable occurrence that petroleum, oil or other chemical products used in road construction would spill. The use, storage and handling of all materials should be carried out in such a way so as to avoid or minimize the possibilities of pollution. The fist line of defense is to devise procedures to handle such products, build proper permanent storage facilities with spill containment and provide adequate temporary storage in mobile camps.

When appropriate, preventive measures can be taken to entrap spillage or discharge to prevent accidental pollution. Clean-up of spills once they occur can be achieved by use of having bales of straw and other materials at hand to mop-up residues.

List of Persons Contacted.

1. Mr. Dogar.
   Program Officer
   IUCN-Secretariat Karachi.

2. Ms. Methab Rashidee
   Director General
   EPA - Sindh.
   Karachi.

Bibliography

1. Technology Sharing Report 80-204
   U.S. Department of Transportation
   Federal Highway Administration
   Office of Research and Development
   Washington, D.C. 20590, USA.

2. Hand Book of Environmental Civil Engineering
   by Robart G. Zilly
   Von Nostrand Reinhold Co, USA.

3. Highway Engineering
by Clarkson H. Oglesby and
R. Gary Hicks. 4th Edition
John Wiley & Sons, USA.

4. Bela - Awaran Road
Preliminary Report Vol. I of II.
STV/Lyon - ACE (Pvt) Ltd.
Karachi.

5. Bela Awaran Turbat Road
PC-I.
Pakistan Consulting Services (Pvt) Ltd.
Lahore.

6. Environmental Guidelines for Selected
Infrastructure Projects.
Office of the Environment
Asian Development Bank 1990, Manila, Philippines.

7. Air Pollution Control
Guide book for Management
by A.T. Rossano, JR.
University of Washington, USA.

8. Environmental Impact Assessment
workshop - 1989
by Environmental and Urban Affairs Division
Government of Pakistan
and IUCN - The World Conservation Union.

9. Appropriate use of the Environmentil Impact
Assessment Process in Pakistan
Seminar - April 1991 at Karachi.
by Dr.Harvey Ludwig
Asian Development Bank.

10. First 35 KM, Bela - Awaran - Turbat Road
Preliminary Report, Vol. I of II.

11. Chitral Access Project
Environmental, Economic & Social Soundness
Assessment - Dec.1987 - TAMS Consultants Inc:

12. Proceedings of the Environmental Scoping
Sessions at Quetta - June 25, 1990
and at Turbat - August 21, 1990.

13. Environmental Planning for Design
and Construction
by
Martin N. Fabrick
Joseph J. O'Rourke
Publisher john wiley & Sons, U.S.A.

14. Environmental planning for Site Development
by
Anne R. Beer
E & F N. Spon - UK.

15. Environmental Effects of Automotive
Transport
The OECD Compass Project - Paris.

Table-I. Ambient Air Quality Standards

Pollutant	Type of Standard	Averaging Time	Frequency Parameter	Concentration µg/m³	ppm
Carbon monoxide	Primary[a] and Secondary[b]	1 hour	Annual maximum[c]	40,000	35
		8 hours	Annual maximum[c]	10,000	9
Hydrocarbons (nonmethane)	Primary and Secondary	3 hours (6-9 a.m.)	Annual maximum[c]	160[d]	0.24[d]
Nitrogen dioxide	Primary and Secondary	1 year	Arithmetic mean	100	0.05
Photo-chemical oxidants	Primary and Secondary	1 year	Annual maximum[c]	160	0.08
Particulate matter	Primary	24 hours	Annual maximum	260	--
		24 hours	Annual geometric mean	75	--
	Secondary	24 hours	Annual maximum	150	--
		24 hours	Annual geometric mean	60[e]	
Sulfur oxide	Primary	24 hours	Annual maximum	365	0.14
		1 hour	Arithmetic mean	80	0.03
	Secondary	3 hours	Annual maximum	1,300	0.5
		24 hours	Annual maximum	260[f]	0.1[f]
		1 hour	Arithmetic mean	60	0.02

Source:

a. Primary standards are those required to protect public health.
b. Secondary standards are those required to protect public welfare.
c. Not to be exceeded more than once per year.
d. As a guide in devising implementation plans for achieving oxidant standards.
e. As a guide to be used in assessing implementation plans for achieving the annual maximum 24-hour standard.
f. As a guide to be used in assessing implementation plans for achieving the annual arithmetic mean standard.

Table -11. Design Noise-Level and Land-Use Relationships*

Land-Use Category	*Design Noise Level, L_{10}†*	*Description of Land-Use Category*
A	60dBA (exterior)	Tracts of lands in which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks, or open spaces which are dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B	70 dBA (exterior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, picnic areas, recreation areas, playgrounds, active sports areas, and parks.
C	75 dBA (exterior)	Developed lands, properties or activities not included in categories A and B above.
D	—	Undeveloped lands. Requirements to be established in cooperation with local officials.
E	55 dBA (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

* Based on requirements of the Federal Highway Administration.
† L_{10} is noise level that will be exceeded 10% of the time.

The above table is for a developed urban area with high people awareness. The L_{10} design noise level as a comparison for Bela-Awaran-Turbat rural road is therefore a very stringent standard.

The noise prediction during the design life of Bela-Awaran-Turbat road is however with in the comfortable level even on L_{10} standards.

TABLE III RECOMMENDED NOISE LEVEL DESIGN CRITERIA

Observer Category	Structure		L_{50} (dBA)		L_{10} (dBA)	
			Day	Night	Day	Night
1	Residences	inside*	45	40	51	46
2	Residences	outside*	50	45	56	51
3	Schools	inside*	40	40	46	46
4	Schools	outside*	55	–	61	–
5	Churches	inside	35	35	41	41
6	Hospitals,	inside	40	35	46	41
7	convalescent homes	outside	50	45	56	51
8	Offices:					
	stenographic	inside	50	50	56	56
	private	inside	40	40	46	46
9	Theaters:					
	movies	inside	40	40	46	46
	legitimate	inside	30	30	36	36
10	Hotels, motels	inside	50	45	56	51

*Either inside or outside design criteria can be used, depending on the utility being evaluated.

TABLE IV FACTORS AFFECTING HIGHWAY NOISE HEARD BY AN OBSERVER

Traffic Characteristics:
- Volume (vehicles per hour)
- Mix (proportion of trucks)
- Average speed

Roadway Characteristics:
- Pavement width (distance across all lanes)
- Vertical configuration (elevated, depressed, at grade)
- Flow characteristics (flow interruption imposed by roadway design)
- Grade (%, if greater than 2)
- Surface condition (smooth, normal, rough)

Observer Characteristics:
- Distance from road (measured perpendicular to road)
- Element size (angle of exposure subtended at observer by roadway sound sources
- Shielding (acoustical shielding, buildings, landscaping)
- Observer height (vertical position with respect to road)

Table V FHWA Noise Levels

Land Use Category	Design Noise Level - Leq(h)	Design Noise Level - L10(h)	Description of Land Use Category
A	57 dBA (Exterior)	60 dBA (Exterior)	Tracts of lands in which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks, or open spaces which are dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B	67 dBA (Exterior)	70 dBA (Exterior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, picnic areas, recreation areas, playgrounds, active sports areas, and parks.
C	72 dBA (Exterior)	75 dBA (Exterior)	Developed lands, properties or activites not included in categories A and B above.
D	--	--	For requirements on undeveloped lands see paragraphs 5a(5) and (6), Ref. 6
E	52 dBA (Interior)	55 dBA (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

NOTE:

For highly developed Urban area with high level of awareness towards environment noise.

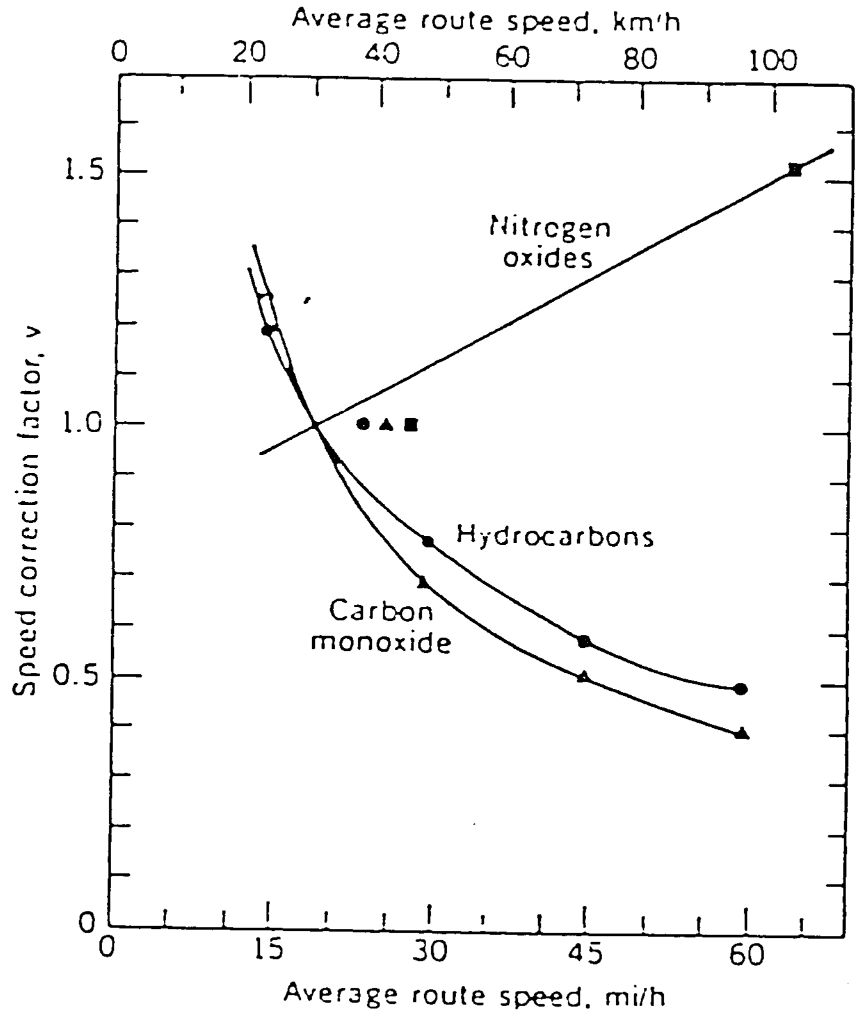

Fig. I. Average speed adjustment factors for pollutants produced by gasoline engine vehicles. (After E. C. Sullivan.)

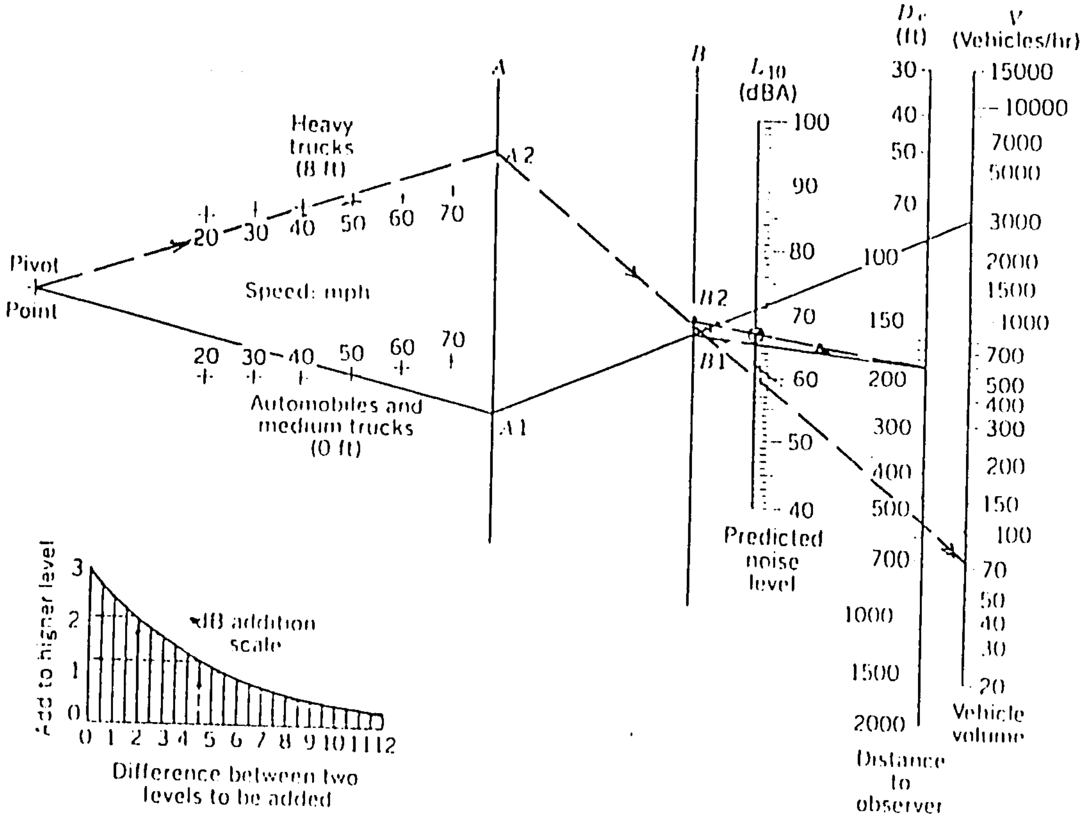

Fig.- 11. Nomograph for predicting noise levels produced by a stream of motor vehicles when the receiver is in the direct line of sight with the noise sources. (From *NCHRP Report 174* somewhat modified.) 1 ft = 0.30m; 1 mph = 1.6 km/h

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APPENDIX B

GOP Proforma For Environmental Impact Assessment

GOVERNMENT OF PAKISTAN'S
PROFORMA FOR ENVIRONMENTAL IMPACT ASSESSMENT

Types of Information		Information or Sections of Environmental and Social Soundness Assessment	
1.	GENERAL		
1.1	Name of the Project:	1.1	Balochistan Road Project
1.2	Official address at which correspondence can be made:	1.2	Government of Balochistan
1.3	Name and address of consultant appointed, if any:	1.3	See Section 1.1 of the EA Report.
1.4	Name, designation, and address of official authorised to deal with this Questionnaire/Proforma:	1.4	Government of Balochistan
1.5	Date on which letter of intent was issued.	1.5	Unknown
2.	PROCESS DETAILS		
2.1	Production Schedule:		
2.1.1	List of main products proposed to be produced with designed daily production or capacity:	2.1.1	Road facility for Makran Division.
2.1.2	List of by-products produced with designed daily product capacity:	2.1.2	None
2.1.3	Time phasing for achieving full production capacity:	2.1.3	52 months Construction period.
2.2	Raw Materials Consumption:	2.2	Not applicable
2.2.1	List all raw materials with daily consumption at full production capacity:		
2.2.2	List all process chemicals/materials consumed with approximate quantities:		

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Types of Information	Information or Sections of Environmental and Social Soundness Assessment
2.2.3 Is any recycled material from the waste of your project or any other project used in the process? If so, please specify quantities and source.	
2.2.4 Is any material salvaged from your waste stream re-usable economically for any other?	
2.3 Manufacturing Process:	2.3 Not Applicable
2.3.1 Source of process know-how:	
2.3.2 Give a brief description of the process technology utilized with a flow-chart. (Flow-chart of the process should be attached).	
2.3.3 Have you any foreign collaboration?	
2.4 Energy Consumption:	2.4 Not Applicable
2.4.1 Source of energy: a) In-plant generation. b) Public supply.	
2.4.2 If energy is generated in plant, type and quantity of fuel daily consumed:	

Types of Information		Information or Sections of Environmental and Social Soundness Assessment
3.	GENERAL ENVIRONMENT (Site/ climate settlement):	
3.1	Site:	
3.1.1	Where is the plant proposed to be sited? Attach map showing topographical features of the area.	3.1.1 See Section 1.1 of EA Report
3.1.2	Elevation above mean sea level.	3.1.2 See Section 3.2.2.1 of EA Report
3.1.3	Area of land proposed to be acquired:	3.1.3 See Section 4.3.4 of EA Report
3.1.4	Area proposed to be built up or developed:	3.1.4 376 Km road with 42 meter right of way.
3.1.5	Present use of the land: agriculture/forest/grazing/settlement/fallow	3.1.5 See Section 4.3.4 of EA Report
3.1.6	Indicate the nature of topography near the site: plains/valley/hilly	3.1.6 See Section 3.2.2.1 of EA Report
3.1.7	Specify site character: river basin/coastal/ estuarine/land-locked	3.1.7 See Section 3.2.2.5 of EA Report
3.1.8	Is the land situated within any municipal or corporation jurisdiction?	3.1.8 No
3.1.9	Is the land situated in an approved industrial zone or estate? If so, please specify.	3.1.9 No

Types of Information	Information or Sections of Environmental and Social Soundness Assessment
3.1.10 What, of the following features, exist within 30 km of the site?	3.1.10 See respective Sections of EA Report
i) Human settlements: specify population.	i) 3.4.2.1
ii) Agricultural land: specify crops.	ii) 3.4.1
iii) Grazing land:	iii) 3.4.1
iv) Fisheries:	iv) 3.4.2.2
v) Forest/sanctuary/ natural park:	v) 3.3
vi) Nullahs/streams/ rivers:	vi) 3.2.2.5
vii) Ponds/lakes/dams:	vii) 3.3.3
viii) Estuary/sea:	
ix) Hills/mountains:	ix) 3.3.2.1
x) Archaeological/Historic/ cultural/scenic sites/ Scientific Institutions/ Hospitals/Sanatoria/ Religious importance:	x) 3.4.4, 3.4.3 & 3.4.2.4
ix) Industries, specify:	xi) 3.2.1.3
3.1.11 Type of flora and fauna, especially wildlife, endangered species:	3.1.11 See Section 3.3 of EA Report
3.1.12 Present employment or occupational pattern in the area:	3.1.12 See Section 3.4.2.2 of EA Report
3.1.13 Prominent Endemic Disease (Fluorosis, Malaria, Filaria, Malnutrition, etc).	3.1.13 See Section 4.3.5 and Appendix G
3.1.14 Mortality rates: Infant, Material):	3.1.14 Not available from source
3.1.15 Any other observation regarding state of the environment?	

Types of Information		Information or Sections of Environmental and Social Soundness Assessment
3.2	Climate:	3.2 See Sections 3.2.1.1 & 3.2.1.2
3.2.1	Indicate the climatic conditions at the site (e.g., arid, semi-arid, etc.).	
3.2.2	Rainfall yearly average. Range:	
3.2.3	Temperature seasonal. Ranges:	
3.2.4	Provide information on speed and direction of wind.	
3.3	Settlement:	
3.3.1	Total number of persons proposed to be employed: (a) During construction: (b) After completion:	3.3.1 See Section 2.4 of EA Report
3.3.2	Do you propose to build a township/housing quarters for your employees?	3.3.2 See Section 2.3 of EA Report
3.3.3	Area allocated for above:	3.3.3 Section 2.3 of EA Report
3.3.4	Population to be accommodated:	3.3.4 Section 2.4 of EA Report
3.3.5	Distance from township to plant site:	3.3.5 Section 2.3 of EA Report
3.3.6	Services provided in township: i) Water - daily consumption: ii) Sewer system: iii) Sewage treatment: iv) Garbage disposal: v) Drainage: vi) Any other:	3.3.6 See Section 2.3, 4.3.2.1, and 4.3.2.2 of EA Report

	Types of Information	Information or Sections of Environmental and Social Soundness Assessment
4.	WATER REQUIREMENTS	
4.1	What treatment is given before use, if any?	4.1 Unknown
4.2	Average daily quantities and characteristics of water consumed: i) Process and wash: ii) Cooling: iii) Sanitary: iv) Total:	4.2 Unknown
4.3	Are adequate quantities of water available? i) At present: ii) For future expansion:	4.3 Yes
5.	WASTEWATER DISCHARGES	
5.1	Total quantity of wastewater discharged from the project per day:	5.0 Waste water will be generated by a few hundred people located at four site camps. There is no process oriented waste water. Therefore, not applicable, However, see Sections 4.1.3 and 5.5 of EA Report for proposed actions for disposal
5.2	Wastewater discharges per day from: i) Process and wash (with break up, where possible): ii) Cooling: iii) Sanitary: iv) Total:	
5.3	How do you propose to discharge the wastewater? i) Separate streams/combined: ii) Continuous/intermittent:	

	Types of Information	Information or Sections of Environmental and Social Soundness Assessment
5.4	Type of treatment proposed to be adopted: Give details and flow chart.	
5.5	What standards for treatment effluent do you propose to adopt? Does it conform to standards prescribed by State/Central Water Pollution Board, Local Authority, or other statutory authority?	
5.6	Mode of final discharge: (Open channel/pipeline/covered drains)	Not Applicable
5.7	Point of final discharge: fallow land/agricultural land/sewer/river/lake bay/estuary/sea. Give details of outfall design.	
5.8	Is any portion of the wastewater proposed to be recycled? If so, give details.	
5.9	What methods do you propose to adopt for handling and disposal of sludge from treatment plants?	
5.10	Indicate available information on wastewater characteristics before treatment as below.	

	Types of Information	Information or Sections of Environmental and Social Soundness Assessment
	a) <u>Physical Parameters:</u> Temperature, pH, colour, turbidity, odor, total solids, total suspended solids, and total volatile solids	
	b) <u>Chemical Parameters:</u> Acidity, total, and pH; Alkalanity, total and pH; Hardness, total; BOD; COD; Oil and Grease; total N; Phosphates, total; Chlorides; Sulphates; Sodium; Potassium; Calcium; and Magnesium.	
5.11	What other specific toxic substances are discharged? Please specify nature and concentration: (inorganics, organics, including pesticides and organic chlorine compounds, phenols, lignin, mercaptans, heavy metals, and radio-active substances).	
6.	<u>SOLID WASTES: PROCESS AND TREATMENT PLANTS</u>	6.0 Not Applicable as no large solid waste. However, see section 5.5 for proposed action for disposal of solid waste generated by construction colonies.
6.1	total quantity of solid wastes in tonnes per day:	
6.2	Nature of Wastes: lumps/ Granules/Dust/Slurry/Sludge	
6.3	Type of waste (organic, inorganic, ash, glass, natal, etc.).	

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Types of Information	Information or Sections of Environmental and Social Soundness Assessment
6.4 Method proposed for disposal, including treatment plant: Landfill/dumping/sea/lagoon/marsh/composting/incineration/sold	
6.4.1 If landfill, possibility of leaching of toxic compounds into soil, ground water, or surface water:	
6.4.2 If incinerated, details of incineration plant and procedures:	
6.5 Do you anticipate any problems regarding collection, handling, and transport of solid wastes?	
6.6 Are there any problems of subsequent pollution of air, water, or soil likely at the place of disposal of solid wastes?	
7. <u>ATMOSPHERIC EMISSIONS</u>	7.0 See Sections 3.2.1.3 and 4.1.1.
7.1 Emission from fuel burning:	
7.1.1 Anticipated quantity of stack emissions:	
7.1.2 Temperature of emission:	

	Types of Information	Information or Sections of Environmental and Social Soundness Assessment
7.1.3	Composition of emission: (a) Particulates and smoke nature and quantity: (b) Gases: Sulphur dioxide Nitrogen oxides Hydrocarbons Carbon mono oxide Moisture Other, specify.	
7.2	Emissions from process:	
7.2.1	Anticipated emissions, quantity:	
7.2.2	Temperature:	
7.2.3	Composition of emissions a) Particulates, nature and quantity: b) Gases: i) Sulphur dioxide ii) Nitrogen oxides iii) Carbon monoxide iv) Ammonia v) Acid Mists vi) Halogens vii) Hydrocarbons viii) Mercaptans ix) Others, specify:	
7.3	Height of stacks(s), for atmospheric emissions:	
7.4	Proposed air pollution control system:	
7.5	Proposed method of handling and disposal of wastes trapped by pollution arresting equipment:	

	Types of Information	Information or Sections of Environmental and Social Soundness Assessment
7.6	Are any standards of emission prescribed for or adopted by your industry?	
8.	OTHER TYPES OF POLLUTION	
8.1	Is your project industry likely to cause noise pollution?	8.1 See Section 4.1.2
8.2	Is your project industry likely to cause any odor pollution? If yes, what measures are proposed to be taken?	8.2 None
8.3	Is your project industry likely to cause any thermal pollution? If yes, what measures are proposed to be taken?	8.3 None
8.4	Is your project industry likely to cause radioactive pollution? If yes, what measures are proposed to be taken?	8.4 None
8.5	Describe the nature and extent of pollution nuisance caused during construction phases and measures taken to contain the same.	8/5 None

Types of Information		Information or Sections of Environmental and Social Soundness Assessment
8.6	Work Environment Hygiene and Housekeeping:	
8.6.1	What major health/safety hazards are likely in the working environment in your factors?	8.6.1 See Section 4.3.5 and Appendix G of EA Report
8.6.2	Describe the industrial hygiene measures you propose to adopt.	8.6.2 See Section 5.3 of EA Report
8.6.3	What provision have you made to confirm to health and safety requirements as per Factories Act?	8.6.3 See Section 5.3 of EA Report
9.	<u>MANAGEMENT OF POLLUTION CONTROL</u>	9.0 See Sections 5.5 & 5.6 of EA Report.
9.1	Give details of the organizational set-up you propose to have for pollution control.	
9.2	What is the level of expertise of the person in charge of pollution control?	
9.3	Do you propose to monitor the pollution from your industry? If yes, give details.	
9.4	What laboratory facilities do you propose to have for the above?	
9.5	Give details of operation and maintenance of facilities you propose to have for treatment plants and pollution monitoring and control equipment.	

Types of Information	Information or Sections of Environmental and Social Soundness Assessment

10. COST OF POLLUTION CONTROL

10.1 Total expenditure proposed for pollution monitoring and control:

Type of expenditure	Amount (Rs)	Percent age of total capital investment/operating expenditure of the industry
Capital		
Recurring (including monitoring)		

11.1 Climate and Air Quality: — 11.1 See Section 4.1.1 of EA Report

(i) Will the project modify the local wind behaviour?
(ii) Will the project have an impact upon the local precipitation/humidity pattern?
(iii) Will the project have an impact upon the local temperature pattern?
(iv) Will the project generate and disperse atmospheric pollutants?
(v) Will the project generate any intense odors?

11.2 Water: — 11.2 See Section 4.1.2 of EA Report

(i) Will the project alter the hydrological balance?
(ii) Will the project effect the ground water required in terms of quality/quantity, depth, and direction of flow?
(iii) Will dewatering methods be necessary to undertake excavation?

Types of Information	Information or Sections of Environmental and Social Soundness Assessment

(iv) Will the project induce a major sediment influx into area water bodies?

(v) Will the project impede the natural drainage pattern and/or induce alteration of channel form?

(vi) Will the project impair existing surface waters through filling, dredging, water extraction, or other detrimental practices?

(vii) Will recreation or aesthetic values be endangered?

11.3 Geotechnical: — 11.3 See Section 4.1.4 of EA Report

(i) Is there risk of damage or loss resulting from tectonic/ seismic activity and/or volcanic activity?

(ii) Are there mineral resources of potential value close to the project?

(iii) Will there be an increase in rock deposition/degradation as a result of the project?

(iv) Are there potential dangers related to slow failure or falling rock?

(v) Is there risk of major ground subsidence associated with the project?

	Types of Information	Information or Sections of Environmental and Social Soundness Assessment
11.4	Soil:	11.4 See Section 4.1.4 of EA Report
	(i) Will there be a substantial loss of soil due to construction or operational practices?	
	(ii) Will there be a risk of losses due to instability?	
	(iii) Will project cause or be exposed to liquefaction of soils in slopes or foundations?	
	(iv) In case of settlement/heave, will there be a risk of damage of structure or services?	
	(v) Will the project modify the property of impacted soil?	
11.5	Ecology:	11.5 See Section 4.2 of EA Report
	(i) Are there rare/endangered species which require protection?	
	(ii) Are there species which are particularly susceptible to human activities?	
	(iii) Would the loss of certain plants species deny food or habitat to wildlife species?	
	(iv) Are there any unusual population communities of plants that may be of scientific value?	
	(v) Will project activities impair natural productivity?	

Types of Information	Information or Sections of Environmental and Social Soundness Assessment

11.6 Land Use and Land Capability: — 11.6 See Section 4.3.4 of EA Report

(i) Will the project conflict with existing or proposed land use?

(ii) Will the project degrade land capability types?

11.7 Noise and Vibration: — 11.7 See Sectopm 4.1.2

i) Will the internal noise level present a potential risk to the hearing of workers?
ii) Will the safe operation of the project be affected?
iii) Will the project create noise levels which will cause annoyance or discomfort to nearby properties?
iv) Will the project cause damage to structures, both natural and manmade, due to vibration?
v) Will the vibration levels within the plant be such that there is a risk to employees safety?

11.8 Visual Quality: — 11.8 Insignificant

i) Will the content of the scene perceived by the residents of the surrounding area be adversely affected by the project?
ii) Will the coherence of the surrounding area be impaired by the project?

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APPENDIX C

Archaeological Aspects

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
MISSION TO PAKISTAN

Cable USAIDPAK
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18 - Sixth Avenue, Ramna 5,
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Islamabad, Pakistan

1074
23/9

September 17, 1991

Mr. Qamar A. Shaikh
Transportation Expert
Associated Consulting Engineer-ACE (Private) Ltd.
10, Banglore Town, Sharea Faisal
Karachi-8, Pakistan

Subject: Environmental and Social Soundness Assessment (ESSA) for Balochistan Road Project (BRP)

Reference:
1. Draft ESSA for BRP
2. USAID/ACE meeting of August 27, 1991
3. Niaz Rasool/Qamar A. Shaikh Letter of September 1, 1991
4. ACE/USAID Letter No. ACE/ENV/3219 of September 3, 1991

Dear Mr. Shaikh:

We have reviewed the draft ESSA Ref-1. As discussed in the meeting Ref-2, please address all issues/concerns identified in the Scoping Sessions, and revise the report accordingly. Also, please correct the list of report preparers.

We have received the letters Ref-3&4, concerning NOC from the Department of Archaeology. We have requested the Government of Balochistan to deal with this matter directly with the Department of Archaeology in Balochistan.

You are advised to send final ESSA report to us by September 26, 1991.

Regards.

Sincerely yours,

Chaudhary Laiq Ali
Mission Environmental Engineer
Office of Agriculture and
Rural Development

Chief Engineer (Highways)
23/9

22/9.

.SSOCIATED CONSULTING ENGINEERS-ACE (PRIVATE) LTD.

10, BANGLORE TOWN, SHAREA FAISAL, KARACHI - 8, PAKISTAN.

TELEX : 24688 PACE PK
CABLE : CONSULTANT
TELEPHONES : 432117 - 443317
FAX : 4 3 6 6 7 9

REF. NO. ACE/ENV/ 3219

DATE : September 3, 91

To
Mr.Pervaiz Gani,
Chief Infrastructure
USAID office of Engineering
18 - 6th Avenue, G-5,
ISLAMABAD

SUB: ENVIRONMENTAL ASSESSMENT OF THE BELA-AWARAN TURBAT ROAD IN BALOCHISTAN (USAID-FUND $ 392-0472 - ARCHAEOLOGICAL N.O.C.FOR THE -

Dear Mr.Gani.

Enclosed herewith please find copy of the letter # 39/25/91-Arch(P-II) dated September 1, 1991 on the above subject from the Department of Archaeology and Museums, Government of Pakistan for your information and further necessary action.

Since Bela Awaran Turbat Road is an ages old camel route with no appreciable change in alignment to date, as such one does not expect any archaeological heritage of significance with in the corridor of the road except what were identified as grave yards and (fake or real) sheren Farhad.

You may wish to consider waiving archaeological investigation to save time and effort.

Thank you.

Yours Sincerely,

Qamar Shaikh

QAMAR A. SHAIKH.
Transportation Expert

Encl:As above.

CC:
1. Mr.Anis A. Chaudhry
   Team Leader ACE Lahore
2. Chaudhry Laiq Ali
   Mission Environmental Engineer
   USAID - Islamabad.
3. Dr.Waldemar Albertin
   Mission Environmental Advisor,
   USAID - Islamabad

بسم اللہ الرحمن الرحیم

NIAZ RASOOL)
Director (HQs).

GOVERNMENT OF PAKISTAN
DEPARTMENT OF ARCHAEOLOGY
AND MUSEUMS
27 - A - CENTRAL
UNION COMMERCIAL AREA,
SHAHEED-E-MILLAT ROAD,

TELE: Phone : 431387
Grams : ARCHAEOLOGY

No.39/25/91-Arch(P-II)

Karachi - 8 the 1st September, ~~August~~, 1991.

Mr. Qamar A. Shaikh,
Chief Engineer (Highways)
Associated Consulting Engineers-Ace
(Pvt)Ltd. 10, Banglore Town,
Shahrea Faisal,
Karachi.

Subject:- ENVIRONMENTAL ASSESSMENT OF THE BELA-AWAN TURBAT ROAD IN BALUCHISTAN (USAID-FUND # 392-0472) - ARCHAEOLOGICAL N.O.C. FOR THE -

Dear sir,

Please refer to your letter No.ACE/ENV/3053 of August 5, 1991 on the above cited subject.

2. I am to inform you that your proposal as contained in the letter referred to above cannot be acceded. The expenditure involved for carrying out the archaeological investigations in the proposed area will have to be borne by your Organization as this is a pre-requisite for undertaking such works.

Yours faithfully,

(NIAZ RASOOL)
Director(HQs.) 3/1/91

Sm/PW/22/9

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UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
MISSION TO PAKISTAN

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18 - Sixth Avenue, Ramna 5,
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Islamabad, Pakistan

1048
15/9

ENG-867/91
August 18, 1991

Mr. Mohammad Ali Baloch
The Secretary,
Communications and Works
Government of Balochistan
Quetta

Subject: Balochistan Road Project (391-0510)
Bela-Awaran-Turbat (BAT) Road
Environmental Assessment

Dear Mr. Baloch:

We wish to take this opportunity to inform you that our Consultants, Associated Consulting Engineers (ACE), have submitted to USAID a draft report of the environmental assessment of the 376 Kms. BAT road, of which 56 Kms. is planned to be constructed under the subject project.

We are sending to you with this letter for your review and comment a copy of the above draft report.

15/9 C.E (High-way)

We would highly appreciate it if you can send us your comments, if any, by August 27, 1991. After receipt of your comments for this draft we will instruct ACE to submit the final report.

Yours Sincerely,

Harry G. Proctor
Deputy Chief Engineer
Office of Engineering

cc: Mr. Anis Ahmed Chowdary, ACE office Karachi
Laiq Ali, Environmental unit, ARD

ASSOCIATED CONSULTING ENGINEERS-ACE (PRIVATE) LTD.
10, BANGLORE TOWN, SHAREA FAISAL, KARACHI - 8. PAKISTAN.

TELEX : 24688 PACE PK
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TELEPHONES : 432117 - 443317
FAX : 4 3 6 6 7 9

REF. NO. ME/ENV-BAR/3053

DATE : [illegible] 5, 91

To,
Mr. Ahmed Nabi Khan,
Director General,
Directorate General of Archaeology & Museums,
27-A, Al-Asif,
Central Union Commercial Area,
Shaheed-E-Millat Road,
Karachi.

SUB: ENVIRONMENTAL ASSESSMENT OF THE BELA-AWARAN-TURBAT ROAD IN BALOCHISTAN (USIAD -FUND # 392-0470)
ARCHAEOLOGICAL N.O.C. FOR THE

Dear Mr.Khan.

Kindly refer your letter No 39/25/21/Arch (P-II) dated 17th July 1991 on the above subject. We had a meeting with USAID on 28th July 1991 in our Lahore office and the subject matter came under discussion.

The USAID officials clearly stated that under USAID - Funding # 392-0470, there is no financial provision under any time items, therefore the estimated amount of Rs.2,10,000/= could not be arranged.

However some logistic support in the form of USAID vehicle can possibly be arrange for a reconnaissance survey, if deemed necessary.

Consequently, the undersigned had a meeting with Mr.Niaz Rasool, Director (HQ) on 5th August, 1991, and as per advise we are waiting this letter requesting your good office for possible assistance in giving us a report as per requirements of the Antiquities Act-1975.

Contd....P/2

Thank you for your cooperation and assistance.

Yours Sincerely,

Qamar Shaikh

QAMAR A. SHAIKH
Chief Engineer
(Highways) ACE

CC:

1. Mr.Pervaiz Gani
   Chief Infrastructure
   Office Of Engineering
   USAID - Islamabad.

2. Chaudhry Laiq Ali
   Mission Environmental Engineer
   USAID - Islamabad.

3. Mr. Anis Ahmed Chaudhry
   Team Leader
   USAID Environmental Study
   ACE - Lahore.

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

MISSION TO PAKISTAN

Cable: USAIDPAK
Telex: 54270 PK
Telephones: 824071-79

18 Sixth Avenue, Ramna 5,
Post Office Box 1028
Islamabad, Pakistan

August 4, 1991

Mr. Niaz Rasool
Director (HQs)
Department of Archaeology and Museums
Government of Pakistan
27-A-Central Union Commercial Area
Shaheed-e-Millat Road, Karachi

Subject: Environmental and Social Soundness Assessment (ESSA) for Balochistan Road Project: N.O.C. from Department of Archaeology

Reference:
1. Niaz Rasool/Qamar A. Shaikh Letter No. 39/25/21/Arch(P-II) of July 17, 1991
2. Qamar A. Shaikh/Ch. Laiq Ali Letter No. ACE/EABAT/2095 of July 21, 1991
3. Dr. Fazal Dad Kakar, Dy. Director, Department of Archaeology, Quetta to Dr. Fazal Ahmad, Liaison Officer, USAID Quetta Letter No. 33-90-SRQ-3444 to 3446 of August 19, 1990
4. Ch. Laiq Ali/Dr. Fazal Dad Kakar meeting at Dr. Kakar's office on July 7, 1991 in Quetta
5. USAID/ACE meeting in Lahore on July 28, 1991
6. Route Map of Bela-Awaran-Turbat Road
7. The Department of Archaeology, Government of Pakistan Antiquities Act 1975

Dear Mr. Rasool:

This refers to the proposal for carrying out archaeological investigations of the Bela-Awaran-Turbat road project in Balochistan (Ref-1), forwarded to us through Mr. Qamar A. Shaikh of ACE (Ref-2).

It is USAID policy to ensure that the environmental consequences of USAID financed activities are identified and considered by USAID and the host country prior to a final decision to proceed with a project or activity and that appropriate environmental safeguards are adopted. It is also policy to identify possible impacts of USAID's actions which affect the common and cultural heritage of all mankind.

As you know, currently, USAID is in the process of conducting an Environmental and Social Soundness Assessment (ESSA) for the Balochistan Road Project (BRP). A map showing the route of the road (Ref-6) is attached for your information.

To preserve and protect the locations having historical, religious and archaeological importance, we follow the Antiquities Act of 1975, Ref-7. In addition, during the ESSA process we also request a No Objection Certificate (N.O.C.) from the Department of Archaeology for the specific area of activity. This document normally becomes part of the ESSA.

As we understand from the letter Ref-3, the Department of Archaeology has documents of a survey undertaken by Sir Aural Stein (1931), a field expedition by Dr. Henry (1955) and recent archaeological studies conducted by the Department of Archaeology and an Italian Archaeological Mission in the project area. Based on the above studies, we believe that the Department of Archaeology will have no problem in issuing a N.O.C., as there will be no new road construction, only improvement of the existing road.

In a recent meeting with Dr. Fazal Dad Kakar in Quetta (Ref-4), the matter was discussed. Dr. Kakar stated that a vehicle is required for about 2-3 days, for a field trip starting from Turbat via Awaran to Bela, to make field observations. USAID can arrange transport for that purpose when it is required.

We do not have funds to conduct specific archaeological research in Pakistan. However, future infrastructure projects in Pakistan, such as new constructions of roads, should be provided with specific funds for archaeological studies. It is customary in other countries to set aside a percentage of total project funds for possible archaeological interventions. One such planned project in Pakistan which should be provided with such reserve funds for archaeological research is the Indus Highway Project. USAID at this time does not support such new infrastructure projects in Pakistan.

Sincerely yours

Chaudhary Laiq Ali
Mission Environmental Engineer
Office of Agriculture and
Rural Development

cc: Dr. Fazal Dad Kakar, Dy. Director, Department of Archaeology, Government of Pakistan, Madrasa Road, Quetta

Mr. Qamar A. Shaihk, Transport Specialist, Associated Consulting Engineers (ACE), Private, Limited, 10-Banglore Town, Sharea Faisal, Karachi

بسم الله الرحمن الرحیم

No.39/25/21-Arch(P-II)

GOVERNMENT OF PAKISTAN
DEPARTMENT OF ARCHAEOLOGY
AND MUSEUMS
27 - A - CENTRAL
UNION COMMERCIAL AREA,
SHAHEED-E-MILLAT ROAD,

TELE: | Phone : 431387
| Grams : ARCHAEOLOGY

Karachi, 8 the 12th July, 1991.

Mr. Qamar A. Shaikh,
Chief Engineer (Highways),
Associated Consulting Engineers ACE(Pvt)Ltd.
10, Banglore Town,
Sharea Faisal, Karachi.

Subject:- ENVIRONMENTAL ASSESSMENT OF THE BELA-AWARAN TURBAT ROAD IN BALOCHISTAN (USAID-FUND $ 392-0470) ARCHAEOLOGICAL N.O.C. FOR THE -

Sir,

Please refer to your letter No.ACE/HWAYS/897 dated 29th May, 1991 on the above cited subject.

2. As desired by you in your letter referred to above the Department of Archaeology has prepared a comprehensive proposal indicating the work plan and the cost estimates for undertaking the required archaeological investigations at the site. It is therefore, requested that the amount of Rs.2,10,000/- may please be placed at the disposal of the Department so as to enable us to make necessary arrangements to depute the archaeologists to start the work in question.

Your obedient servant,

(NIAZ RASOOL)
Director (HQs)
16/7/91

COST ESTIMATES TO CARRY OUT ARCHAEOLOGICAL INVESTIGATIONS OF THE BELA-AWARAN-TURBAT ROAD IN BALOCHISTAN.

The project area is well known for sporadic discoveries of localities, mounds and monuments. The present evidence tends to support the assumption that there might be a number of other sites still lying unnoticed in and around the project area. Therefore, only a systematic archaeological survey can help to locate and identify these sites in the area. The following is the requirement of the staff and the financial implications:-

STAFF REQUIRED FOR THE PROPOSED WORKS

S.No.		Working No.	Working man Months.
1.	Senior Archaeologist	1	1
2.	Field Archaeologists	2	2
3.	Supporting Staff:		
4.	Photographers	1	2
5.	Surveyors	2	2
6.	Typist	1	2
7.	Labourers	10	2
		17	11

Financial Implications:-

1.	Boarding and Lodging of Archaeologists at Base Camp and at field.	Rs.	50,000/-
2.	Boarding and Lodging of supporting staff.	Rs.	20,000/-
3.	Cost of typists.	Rs.	10,000/-
4.	Cost of labourers	Rs.	30,000/-

Contd..P/2....

5.	Contingent Expenditure on consumable items like films slides, printing, developing, papers and stationary.	Rs. 20,000/-
6.	Composing and copying of report.	Rs. 10,000/-
7.	Honourarium to archaeologists.	Rs. 40,000/-
8.	Honourarium to supporting staff.	Rs. 30,000/-
		Rs. 2,10,000/-

The Department of Archaeology shall provide necessary equipment like cameras, binoculars, p-dometerers, eye-levles, composes, survey and drawing equipment etc. and also storage space at base camp to be set up at Karachi. The antiquities and other objects of interest collected during the course of archaeological survey of the project area shall be deposited with the senior Archaeologist.

ASSOCIATED CONSULTING ENGINEERS-ACE (PRIVATE) LTD.

10, BANGLORE TOWN, SHAREA FAISAL KARACHI - 8, PAKISTAN.

TELEX : 24688 PACE PK
CABLE : CONSULTANT
TELEPHONES : 432117 - 443317
FAX : 4 3 8 8 7 9

REF. NO. ACE/HWAYS/897

DATE : May 29, 1991

To,
Mr. Ahmed Nabi Khan,
Director General,
Directorate General of Archaeology & Museums,
27-A, Al-Asif,
Central Union Commercial Area,
Shaheed-E- Millat Road,
Karachi.

SUB: ENVIRONMENTAL ASSESSMENT OF THE BELA-AWARAN-TURBAT ROAD IN BALOCHISTAN (USAID - FUND # 392-0470) ARCHAEOLOGICAL N.O.C. FOR

Dear Mr.Khan,

As you are aware we have been selected by USAID - Islamabad to conduct the Environmental Assessment Study of the Bela-Awaran-Turbat (376 KM) Road in Balochistan; which includes archaeological component relating to the identification and assessment of archaeological, historic, cultural and religious sites of importance. The coverage will generally include the coastal area but specifically within the right of way of the proposed road, which is 68 meter on either side of the central line of the existing road track (map attached).

In this respect we had a meeting with you on May 7, 1991 in your office. We thank you with profound gratitude for the assistance and help extended to us by providing a report on archaeology of District Turbat and Gwadar prepared by an Italian Archaeological and Ecological Mission in Makran. We are also thankful for your assistance in carrying out a reconnaissance of the project corridor to meet the requirement of Anticuities Act 1975 and issue of clearance certificate. In this regard, a schedule of visit of your staff will be required so that we could make arrangement of vehicle from USAID accordingly.

Contd.....p/2

It may be worth mentioning that the duration of our assignment is very short and we have to submit our preliminary report by the third of week of June 1991, therefore, it is requested that the reconnaissance of the area may be carried out within stipulated time period.

Thanking you in anticipation.

Yours Sincerely,

Qamar Shaikh

QAMAR A. SHAIKH
Chief Engineer (Highways)

CC:

1. Mr. Raja Rehan Arshed
   Office of Engineering
   USAID - Islamabad.

2. Ch: Laiq Ali
   Mission Environmental Engineer
   USAID - Islamabad

3. Mr. Anis Ahmed Chaudhry,
   Team Leader Study,
   ACE-Lahore

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REF. NO. ACE/EARP/
DATE : 28-05-91

Mr. Pervaiz Gani,
Chief Office of Engineering,
USAID,
18-6th Avenue, G-5,
ISLAMABAD.

SUB: ENVIRONMENTAL ASSESSMENT OF BALOCHISTAN ROAD PROJECT (# 391-0470) - OVERVIEW OF PROGRESS

Dear Mr.Gani,

We are please to submit overview of the study progress as under:

1. The study team conducted the field visit according to the schedule transmitted to you through Fax on 7th May 1991. The field visit was started on 18th may instead of 6th May as scheduled previously. This has caused a delay of about 12 days in the study schedule. In the mean while, however, we have collected district-wise data an various aspects (agriculture, forestry, health facilities and population) from Quetta. Our effort was to acquire data for the lowest possible administration unit. In this regard, effort was also made during our field visit to acquire data from Bela, Jhal Jhao, Awaran and Turbat, but could not succeed. Consequently we have to rely on district-wise data and extrapolate this for the project corridor on the basis of our field observations.

2. In addition to general observation of the Project Corridor, the field team also recorded the following information during the field visit:

   - Socio-Economic condition of local population though informal interviews of individuals.
   - Archaelogical site in the near vicinity of the road alignment
   - Water Supply Condition (surface and ground water)
   - Agricultural Activities

Contd....p/2

- Flora & Fauna
- Traffic load and its economics
- Fisheries in the coastal area

3. Search for information on meterology, water resources (Surface & ground water) geology, village-wise population, infrastructure facilities, land use, ecology, mini port and fisheries harbour at Gwador, air pollution and its standards etc is in progress.

4. A review meeting was held with USAID team, comprising M/s W. Albertin, Raja Rehan Arshad and Ch. Laiq Ali, in ACE office, Karachi on 23rd May 1991.

   Overview of the field visit and study progress was presented in the meeting. Shortfalls in the data particularly in the fields of agriculture, landuse, air pollution data and standards, population and social infrastructure was indicated.

5. Responding to discision taken in the above referred review meeting, we have contacted Archaeology Department requesting to proceed with the reconnaissance survey of the project corridor to meet the formality of the Department before issuing a clearance certificate as per Antiquity Act 1975 (as it was indicated in our previous Fax dated May 7, 1991). In the review meeting it was also agreed that USAID will provide a vehicle for the reconnaissance Survey. The schedule of the survey will be intimated to you as soon as we receive it from the Archaeology Department.

6. We have collected the following publications from the BALAD Project:

   - BALAD - Work Plan Oct. 1990 through Sept. 1992
   - BALAD - Water Section Third Interim Report. Feb. 1989
   - Gwadar Area Plan
   - Dasht Area Plan
   - Dasht Dam Project
   - Socio-Economic Survey of the Makran Division

Contd....p/3

7. We have prepared initial E.I. Matrix on the base of the available information and field observations.

We shall be obliged if other information/reports regarding BALAD may be made available to us particularly the followings:

- Meterological Data of met-stations established under BALAD Project.
- Overall development targets of the Makran Division under the BALAD Project and uptodate achievements.

It is also requested that a copy of Feasibility Report/PC-1 of Pasni Fisheries Harbour prepared by Scandi Consultants (1981) may be obtained from P&D Department, GOB through your Liaison Office at Quetta.

Thanking you in anticipation.

Yours Sincerely,

ANIS AHMED CHAUDHRY
Principal Environmentalist

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CONSULTING
ENGINEERS ACE (PVT) LTD.

10, BANGLORE TOWN SHARAE FAISAL KARACHI-8, PAKISTAN.

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TELEX: 24600 PACE PK

USAID- Islamabad.
(92)-51-824086

FAX TRANSMITTAL ACTION MESSAGE

PLEASE DELIVER TO: PERVAIZ GANI, CHIEF	DATE: 7-5-91 TIME: ☐ AM ☑ PM
DEPARTMENT: OFFICE OF ENGINEERING	FROM: ANIS AHMED CHAUDHRY
COMPANY: USAID-ISLAMABAD	DEPARTMENT: ACE-KARACHI.
PLEASE RESPOND:	VIA FAX ☐ PHONE ☐ STD ☐ MAIL ☐ NEXT DAY ☐

MESSAGE

Subject: Environmental Assessment of Balochistan Road Project # (391-0470)
Progress Briefing

1. The study has been initiated on May 1, 1991.

2. Team leader visited USAID, Islamabad to have discussions with engineering and environmental groups of USAID and collect Preliminary Project Reports, Plans and other information. Due to non-availability of Chief, Office of Engineering, the trip was not very successful as regards the reports, but had fruitful discussions with M/s Raja Rehan Arshed, Laiq Ali and Waldemer Albertin.

3. According to arrangement, Preliminary Report and Maps of Awaran-Turbat Road section have been collected from E.C. Karachi.

4. The team has started reviewing the project reports, minutes of scoping sessions and Social Soundness Analysis Report, and identified further data collection and need of contacts.

5. After internal discussion and review of existing reports, it has been foreseen that following data will be needed:

 - Settlements and population in the Project Corridor and environs.
 - Civil adminstration maps.
 - Land use and agricultural data/maps.
 - Forestry and wildlife data/maps.
 - Archaeological information.
 - Existing Infrastructure facilities, like health, schools, water supply, electricity, etc.

6. It was planned that the team will try to acquire these data/information primarily from District/Tehsil headquarters during field visit and fill in the gap later by collecting further data/information from Quetta. The field trip was initially scheduled from 6th May 1991 to 12th May 1991.

TOTAL NUMBER OF PAGES INCLUDING COVER SHEET THREE (3).
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FROM

DEPARTMENT

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MESSAGE

7. Now due to security problems at Turbat, hence non-availibility of USAID vehicle, the field visit programme has been changed according to your advice. Instead of proceeding to the field on 6th May, the team will now move on 18th May 1991. The programme, which has been scheduled according to availability of associate members of the team, will be as follows:

FIELD VISIT PROGRAM

May 18 Saturday	-	Team proceed to field to cover Bela-Awaran Section
	-	Stay at Awaran
May 19 Sundary	-	Team proceed to visit Awaran-Turbat Section
	-	Stay at Turbat
May 20 Monday	-	Data collection at Turbat regarding - Agriculture/land use - Area development - Traffic & its economics - Forestry - Population. - Public Health & Hazard aspects.etc.
May 21 Tuesday	-	T/L & Ecologist travel to coastal area remaining team - further data collection
	-	Remaining team proceed to Karachi in the afternoon
	-	T/L & Ecologist stay at Pasni/Gawadar
May 22 Wednesday	-	T/L and Ecologist visit coastal area
		Return to Turbat and fly back to Karachi.

Page #2.

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MESSAGE

8. The change in field trip schedule may affect the overall study schedule as intimated to USAID Islamabad on the phone.

9. Meanwhile, we are planning to collect data/information from Quetta. In this respect our Agronomist, Mr. Ghulam Dastgir is proceeding to Quetta on May 8, 1991 (The latest available flight). In this regard it is requested that USAID liaison office, Quetta may be instructed to provide possible assistance to our Agronomist.

10. We had a useful meeting in Karachi with Dr.Nabi Ahmed Khan, Director General, Department of Archaeology and Museums. He has promised to extend every possible assistance on archaeological aspects. He is of the view that the available reports deal with the Makran Coast in general, but to meet the requirements of Antiquities Act 1975 and for clearance certificate from the Department, a specific survey of the Project Corridor would be required under the supervision of the Department. This assignment is out of the scope of the present study. In this regard a separate arrangement will have to be made with the Archaeology Department as we had in the case of our Ghazi-Gariala-Hydropower Project. Your advice is solicited so that further step would be taken in this regard.

(Anis Ahmed Chaudhry)
ACE - Karachi.

Above fax sent on 7/5/91
PS

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APPENDIX D

Record Of Scoping Sessions

BALOCHISTAN ROAD PROJECT

PROCEEDINGS OF
ENVIRONMENTAL SCOPING SESSION AT QUETTA
JUNE 25, 1990

Chairman:	Mir Abdul Majeed Bezinjo Minister of Revenue Government of Balochistan
Co-Chairman:	Ata Muhammad Jafar Additional Chief Secretary, Planning and Development, Government of Balochistan
Place:	Block-8, Civil Secretariat, Government of Balochistan, Quetta
Time:	0900 - 1300 hours.
Lunch:	Lunch hosted by Additional Chief Secretary, Planning and Development, Government of Balochistan at Hotel Serena, Quetta from 1330 - 1500 hours.
Prepared by:	Chaudhary Laiq Ali, Mission Environmental Engineer USAID/Islamabad

Recitation from Holy Quran was done by Mr. Zulfiqar Ali Khan, Director General Agriculture, Government of Balochistan.

The Co-chairman, Mr. Ata Muhammad Jafar, in his opening address, welcomed the participants, Government of Balochistan (GOB) had extended invitations to a diverse group of people which included GOB officials, political and social leaders, non-governmental organizations (NGO's) and other interested groups. Mr. Jafar hilighted the importance and need for constructing the Bela-Awaran-Turbat road and its impact on the local economy including the positive effect on the private sector fishing industry in Makran area.

Chaudhary Laiq Ali, Mission Environmental Engineer, USAID/Islamabad, briefed the participants about the Environmental Scoping Sessions and subsequent Environmental and Social Soundness Assessment (ESSA) process. In his address Mr. Ali told the participants that it is AID policy to ensure that the environmental consequences of AID-financed activities are identified and considered by AID and the host country prior to a final decision to proceed and that appropriate environmental safeguards are adopted. A copy of the 22 CFR Part 216, "AID Environmental Procedures" was given to the participants. He stressed that the environmental assessment for the Balochistan Road Project must satisfy the requirements of AID Environmental Procedures in full.

Mr. Ali also referred to Government of Pakistan's Ordinance No. XXXVII of 1983: "Control of Pollution and Preservation of Living Environment", and drew the attention of participants towards paragraph-8 of this ordinance which requires the submission of environmental impact statements for major development projects.

Mr. Pervaiz Gani Chief Infrastructure Division, Office of Engineering, USAID/Islamabad presented an overview and benefits of this road construction project. In his address, Mr. Gani briefed the participants with the help of maps, charts and handouts, about the location of the Balochistan Road Project. He also described the road alignment and said that the alignment of the proposed road follows the existing Bela-Awaran-Turbat road alignment throughout its length. He told that during the road survey stage, the Consultants recommended two alternate alignments between Hoshab and Turbat to avoid the three times crossing of the Kech River at Sami Village, but in order to serve the major towns, the Government of Balochistan approved the existing alignment.

Mr. Gani also explained the participants with the help of handouts, the plans for road construction. In addition, he told that this will be an all weather 6.6 meter wide paved road with 1.5 meter hard shoulders on the existing 4 meter gravel track. He said for this road 29 RCC bridges (ranging from 40 meter to 200 meter) and 250 box and pipe culverts will also be constructed.

At the end he enumerated some of the benefits of this road construction project. He said that this all weather road will accelerate the integration of Makran area into the socio-economic main stream of Pakistan, it will improve the quality of life and will increase the flow of Makran produced commodities to external markets.

Dr. Nek Buzdar, a social scientist by profession and well versed with the socio-economic structure of Makran Division, talked about the socio-economic impacts of the project on Makran. While assessing the social soundness of the project, he looked into its compatibility with the locally prevailing socio-cultural environment. He divided the assessment into three parts. In the first part he looked into the local people's customs, traditions, beliefs and groupings as well as their socio-economic organizations. In the second part he discussed the social feasibility of the project. In the third part he explored the likely impacts of the project on various socio-economic groups and the distribution of its benefits.

He said small land holding, flock sizes and subsistence fishing engage an overwhelming majority of Kolwa/Makran population. These groups will be the main beneficiaries of the project. The main reason behind the non-availability of health and education services in the region is the lack of reasonable communication and transportation facilities. The construction of the road will help those low income groups the most who could least afford these social services in the past.

Dr. Naimat Ullah Ghichki, Medical Superintendent, Fort Sundemun Hospital, Quetta talked about health-hazard-safety related issues. In his address, Dr. Ghichki briefed the participants about the expected health-hazard-safety related issues during and after the road construction. He specifically emphasised that during construction dust/odors/fumes which are hazardous or nuisance to the workers, safety of workers is important they should be properly guided for handling of tar drums, cement, machinery, precautions during blasting etc.

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For communicable disease hazards, water borne diseases, vector borne diseases, malaria/tropical ulcer and typical sand fly problem in the project area, he advised for proper camping places with adequate sanitation, water supply, excreta management and medical facilities. He also mentioned about proper disposal of construction waste, filling of borrow pits to avoid future nuisance and water collection.

Dr. Ghichki said that proper plan should be prepared to take care for noise, vibration, disturbance to ecosystems, spread of communicable diseases, expected road accidents, dust control - plantation of trees on road shoulders and enforcement of law.

Mr. Muhammad Moazzam Khan, Principal Planning Officer, Marine Fishries Department, Government of Pakistan, Karachi spoke about biological-ecological-marine and coastal resources in the proposed project area. Mr. Khan had a lot of data available with him concerning to the project area in the form of slides and transparancies which he wanted to show to the participants but could not show due to unexpected power failure. In his address Mr. Khan briefed the participants about the natural resources in Makran Division. He said the most important economic activity in the area is agriculture despite that most of Makran consists of unproductive mountains except for valleys between the ranges which are fertile and productive when irrigated. In the coastal area major part of the population is either engaged directly in fisheries or their economy is based on the ancillary fisheries industry. Coastal towns and settlements are not directly linked with Karachi (the main fisheries centre of Pakistan), therefore fish and other fisheries products from the area are transported through Turbat Bela Road. He also told that most important exported crop of Makran Division besides fish is date. The main market for Makran dates has always been Karachi. The date from crops is transported to main centres like Turbat and Punjgur from where it is transported to Karachi through Bela Turbat Road.

He said renovation and upgradation of the Bela-Awaran-Tubat road will bring a change in the socio-economic, environmental and other conditions of Makran Division.

Mr. Khan briefed the participants about the meterology of the project area. He explained the location of Makran, the weathers, the wind petterns and the topoghraphy of the area. He also presented the rain fall data in the project area and the coastal Makran.

Mr. Khan told that there are no apparant sources of air pollution in the project area except for burning of wood and other fuels (mostly Kerocine oil) and exhaust fumes from diesel and gasoline engines of the vehicular trafic. He siad the dust from roads is a noticeable source of air pollution.

Mr. Khan also explored the geology of the project area. He said the area lies in tectonically active seismic zone. He also briefed the participants about the surface and ground water resources in the project area. Talking about terrestial ecology of the area he said that Bela-Awaran-Turbat road lies in two major vegetation zones i.e.

Tropical Thorn Forest Zone in part of the Bela sector and Arid Subtropical Forest Zone in the remaining part. He also talked about the wildlife and gave a list of important mammels found in the area. In addition he said a well diversified bird fauna is also found in the area. About aquatic ecology, he said although there are no perennial rivers in the area of Bela-Awaran-Turbat road but the pools of water in river beds are known to be inhabited by typical fish fauna of the Balochistan and Persian origin. He said the information on mineral resources of the area is limited and mentioned that some part of the area in the vicinity of Bela Turbat road are known to have deposits of calcites, marbles and some other non precious minerals.

He also touched the aesthetics of the area and said that almost entire area around Bela-Awaran-Turbat road is under developed with very few architechtural or man made elements. It has low to high quality landscape with great topographical relief and diversity. Natural landscape is dominant. At the end Mr. Khan explained the future potential of fisheries resources along the coastal Makran and pointed that existing road has played a key role in the marketing of fish in Balochistan. Through this road, fish and fisheries products are now transported to potential markets. Upgradation of the Bela-Awaran-Turbat road will, further, strengthen the marketing system of fish from Makran Division.

OPEN QUESTION AND ANSWER SESSION

Co-Chairman Mr. Ata Muhammad Jafar, Additional Chief Secretary, Planning and Development, Government of Balochistan, invited the audience to ask questions and seek clarification about whatever concerns they had. Starting from one side of the table every participant in the forum was given the chance to ask the questions.

Mr. Nahad Pervez
Planning and Development, Government of Balochistan

Q. With the construction of road, it is evident that there will be disturbance in the existing ecosystems. What are the trade offs involved, particularly with the road construction the area will open to the outside markets. The people who earn their living on livestock can start business by increasing livestock that can directly effect the range lands, water rescurces etc. which are likely to deplete?

A. Whenever some new technology is introduced and/or there are some new developments, it has its own positive and negative impacts. There is no doubt that animal raisers will increase, but with this development there will be change in socio-economic conditions also. With the help of law enforcing agencies and with the introduction of new technologies range lands can be protected.

RAIS IQBAL
Chief of Agriculture, Planning and Development
Government of Balochistan

Mr. Iqbal gave the general comments and said that during road construction proper attention should be given to health-hazard-safety related issues, labour mortality and a typical sandfly problem in the project area.

TAJ MUHAMMAD FAIZ
Chief Industries, Planning and Development
Government of Balochistan

Q. Have you done cost benefit analysis of the project?

A. USAID hired Consultant to carry out economic and financial analysis of the 376 km Bela-Awaran-Turbat road. This included the cost benefit analysis, and the Consultants have submitted a report. Relevant portions of this report are included in the PC-1, submitted by the GOB to the Planning Commission, GOP.

MUHAMMAD FAZAL DURRANI
Secretary Forests
Government of Balochistan

Q. Bela-Awaran-Turbat road passes through such a section which is called "Salaba Land", most of the poor farmers use rain water for their agriculturing. Although there will be construction of bridges/culverts etc., but construction of road will directly affect small farmers share of rain water. With the new alignment of road there are chances that Salaba Land will be affected. What remedial measures are being adopted?

A. Alignment of the road remains the same, the new road will be constructed on the existing track. During the design phase the criteria has been to minimize the encroachment of agricultural land and household property. A list of agricultural land and household property affected by the road construction has already been submitted by the Consultants to the GOB. A number of bridges and culverts have been designed to ensure a free flow of water. After the construction of these bridges and culverts, the GOB will have to carry out regular maintenance activities to ensure a free flow of water in these channels.

Q. Since the road is being constructed on the U.S. pattern/standards. What satndards would be adopted for its maintenance/repairs? The forum recommended to add funds for maintenance of road.

A. A technical assistance team will be engaged under the project by USAID, which will set up a maintenance management system in the GOB's C&W department. By this system the maintenance funds will be used more effectively. We also have provision in the budget to train the C&W staff in Pakistan and overseas on short term training. A road toll tax system will also be considered to generate additional funds for road maintenance through the private sector.

Q. There is a vast area, very rich in wildlife, between Bela-Awaran-Turbat road and the coastline. Particularly south of Awaran which has been declared as National Park. T.J. Roberts (1977) has identified 40/42 mammel species in this area. With the construction of road this area will be easily accessable to the hunters and poachers etc. from other parts of the country for hunting. This area being very vast, and considering present man-power, watchmen/guards/vehicles etc in the forest department which are insufficient to meet the requirements. More forest staff, check posts at important check points (at least two) and some vehicles for anti-poaching staff are needed. How can the project help in this regard?

A. In environmental assessment study wildlife aspect will be considered very closely. Attention of Government of Balochistan will be drawn towards strengthening the forest department for proper protection of wildlife.

Q. Is it possible to construct latrines/washrooms for ladies at appropriate distances (at the rest stops) on the same pattern as already existing on RCD road?

A. If there is a proper recommendation from Government of Balochistan for latrines/washrooms, a positive consideration can be given to this aspect also.

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ALI AHMAD BALOCH
Chief Engineer, Department of Communications and Works
Government of Balochistan

Mr. Baloch thanked USAID for helping GOB in the construction of this road and specifically mentioned that he belongs to Makran area and is a direct beneficiary of this road.

Q. He showed the concern that Consultants have not paid full attention towards the alignment of the road. By paying some attention they would have avoided crossing of Kech River at four places, that is at Pirkot, Tajaban, Sami and Turbat. He mentioned at Turbat already bridge exists, the alignment could have been planned to the north side of Tajaban by constructing a bridge on tributary river Kech Kaur for connection to Turbat. This way road distance could have been decreased. He also showed the concern that about 4-months before, in a presentation about Bela-Awaran-Turbat road, it was mentioned that some low level bridges have been planned near Sami. He mentioned that during flood season these low level bridges will be over-topped with flood water and the chances are that road will be under water.

A. The Consultants did pay full attention to the study of alternative routs. With the help of handouts three alternate road alignments proposed by the Consultants were explained. The alignment proposed by Mr. Baloch was one of the three alignments recommended by the Consultants. Mr. Baloch was told that it was GOB decision to follow the existing alignment to avoid some expected political problems. Regarding concern on low level bridges, Mr. Baloch was told that no such bridges exist in the final design. All the drainage crossings are either bridges ranging 40 meters to 200 meters or culverts.

Q. Mr. Baloch asked that construction on Bela-Awaran road started about 4-years back but the progress is not more than 5%. He said USAID has all the technical expertise and resources etc., what are the steps being taken by USAID to expedite the work?

A. In response to this question, the reasons for slow progress of the construction contractor were explained. Participants were told that a joint venture of a U.S. and Pakistani construction firms will be contracted for the BAT road in order to avoid such happenings in future.

Q. What about the maintenance of the road? He suggested that C&W staff be involved during construction phase for training purposes, which will be helpful during maintenance.

A. Responding to this question Dr. Fazal, Liaison Officer, USAID/Quetta said that with the help of Additional Chief Secretary, four persons from C&W department were nominated for training to participate in the Bela-Awaran road construction. Unfortunately two of them did not report to the site and two did not complete their training. The participants were told that on the job training for C&W staff during proposed Bela-Awaran-Turbat road construction is already included in the project.

DR. NEK MUHAMMAD BUZDAR
USIAD/Consultant

Q. Because of road construction, there will be a lot of spills of Tar, empty drums, problem of slums, a lot of workers, number of employees etc. how this will be handled?

A. There will be proper construction camps equipped with all the daily needs and medical facilities. It will be responsibilty of construction contractor to clear the site from constructional waste and clean it.

DR. ABDUL REHMAN QAISRANI
Secretary Health, Government of Balochistan

Q. Dr. Qaisrani expressed the concern that with the construction of road, there will be an increase in traffic load, and number of accidents will increase. He recommended that proper speed control measures and arrangements for implementing the established traffic rules be made, i.e. proper marking of traffic signals, traffic speed check points, strengthening of implementing agencies, etc. In addition, he suggested that to meet traffic accident emergencies, medical centers and ambulance facilities should also be made available for transportation of patients to nearby hospitals.

A. The project provides road signs for the warning and information of road users to avoid accidents. The road has been designed in such a way that if the users drives within the design speed limit, accidents will be minimized. However, GOB being the law enforcing agency should ensure that the road users do not over speed.

DR. NAIMAT ULLAH GHICHKI
Medical Superintendent, Fort Sundemun Hospital, Quetta

Q. Normally during road construction a heavy amount of dust is created and nearby villages in the close vicinity of the road site will always be under dust clouds. Also there are health hazards for the labour because of bitumen burning, the smoke of the bitumen is cause of diseases. He told that although there are no immediate effects of bitumen on the hands or body but in long run, it can be dangerous. He recommended that proper safety guidelines for handling the machinery and/or materials such as bitumen should be provided and explained to the labour. He said, while placing temporary labour camps, a proper attention should also be given to drainage of the used water which causes numerous diseases. He also mentioned, when road is completed, there will be a heavy flow of traffic which will create heavy noise. To tackle noise pollution he said, some kind of noise barriers can be considered.

A. Thank you very much for the good suggestions. All such issues will be addressed in the environmental assessment and necessary measures will be taken. It will be obligation of the construction contractor to construct the labour camps with all the necessary needs in them along with the provision of medical facilities for the labour. Contractor will also be under obligation to clear and clean the site before leaving the project area after completion. Contractor will not be paid final payment until all such conditions are met.

MRS. D.J. KAIKOBAD
General Secretary, All Pakistan Women Association (APWA), Quetta

Q. She thanked USIAD for helping GOB and admired for this excellent effort, and said that she hopes more similar roads will be constructed in the near future. She asked if desalinization of sea water is possible to overcome the water shortage to expand agriculture in this environmental area. She recommended to preserve the forests and develop grassy plots and grazing areas. She asked for a total prohibition of hunting in any area of Pakistan and to preserve wildlife. She also recommended to develop National Parks and tourism at large scale. She also told that in Balochistan mountains special kind of stones are found which are good curing various diseases. Salajit is one of them which cures arthritis. She asked for exploration of these medical stones from the existing natural resources. She recommended to develop agricultural fields and tree plantation along the road shoulders instead of new settlements which are likely to occur due to natural human behaviour. She said proper laws should be made to avoid this. She also showed the concern that during the design stage provisions should be made to facilitate the future requirements for water, drainage, electricity, gas and telephone etc. to avoid repeated digging of the road in future.

A. Thank you very much for the good suggestions. Your concerns will be considered in the environmental assessment. Wherever possible appropriate recommendations will be made.

MRS. WAHIDA RIAZ
Association for Women in Agriculture (Private Sector)
Quetta

Q. She showed the concern about underground drainage system along the road, she said a proper drainage system should be designed to protect the road from rain water. She recommended for tree plantation along the road shoulders, protection of wildlife and a road maintenance system.

A. She was told that a proper drainage system has been designed for the road, and the recommendations for tree plantation and protection of wildlife will be made in the EA. For effective road maintenance, training to C&W staff will be provided.

Q. She asked for proper role of women in the development activities and pointed out some of the constraints being faced by women. She specifically mentioned about the provision of toilet facilities for women. At this point Dr. Ghichki also stressed for proper provision of facilities along the road i.e., water availability, latrines etc. She emphasised that some study should be performed to identify the role of women in development?

A. In response Co-Chairman, Ata Muhammad Jafar asked the participants to identify the role of women particularly in the project under discussion. It was told, currently nothing comes in mind regarding role of women on this project. Dr. Fazal/L.O. Quetta said, we do not see a direct involvement of women on this project. But there will be indirect benefits to women with the improvement of local economy with road construction. However, there is a USAID sponsored project "Women in Development", you are welcome to contribute in this activity. She said that she will be sending a proposal on this matter. For water availability along the road the forum recommended that water pipeline at selected points along the road may be considered. It was discussed that water can be made available with less cost by laying a pipeline from available water sources at selected points on the road.

DR. SAIF-UR-REHMAN SHERANI
Department of Sociology, University of Balochistan, Quetta,

Q. Indigenous resource management institutions survive despite changes in land tenure and production for the market. Particularly the water and posture are managed by the indigenous institutions. What are the prospects for migration of people from other area to Makran? Large number of males from Makran are working in Gulf States. What are the possibilities for development of irrigation, exploitation of underground water and construction of tube wells due to improved communications? Physical mobility will generate social mobility. What kind of political and social problems will emerge from it?

A. Thank you very much for raising these concerns. All these issues will be studied under the Environmental and Social Soundness Assessment study.

PERVAIZ RANA
Head of Technical Section, GTZ Quetta

Q. He inquired what percentage of the project cost has been set aside for environmental protection? Has the proposed road been designed to by-pass villages, rather that passing through the villages, to prevent noise pollution and traffic hazards?

A. Appropriate recommendations for environmental protection will be refered to the concerned agencies. Whatever is possible for environmental protection by design changes that will be incorporated in the project during the design review stage. As such there is no line item for environmental protection. As for as the by-passes to the villages are concerned, at present the road has been designed to pass through the villages, considering the fact that there is no other road link to the villages. At later stage with increased traffic this may be taken into consideration by the GOB.

- Areas of concern related to project location i.e., disruption to hydrology, resettlement, depriciation/appreciation of nearby land values, environmental aesthetics degradation, inequitable locations for rural roads, loss of terrestrial ecology including wildlife, preservation of archaeological, cultural and historical sites etc.

- Area of concern during construction phase i. e., silt runoff from cut-and-fill areas, safety of workers from construction accidents, communicable disease hazards including enteric diseases and malaria, cultural differences, uncontrolled escape of hazardous materials into the environment, escape of air pollutants (including dust), noise and vibrations, disruption of utilities along the road, disruption of traffic along the road etc.

- Areas of concern during project operational activities, i.e., noise and vibration disturbance, air pollution, continuing climatic erosion, highway runoff contamination, highway spills of hazardous materials, uncontrolled sanitary wastes, congestion at access/exit points, inadequate highway maintenance, groundwater pollution from fills.

- Road alignment alternate analysis, where possible. The high intensity seasonal rainfall and related construction and maintenance requirements. The sustainable nature of fisheries industry at Pasni and the 850 km of Makran Coast. Renewable natural resources, vegetation and animals that could be adversely affected by the construction of the road. Present state of conservation or depletion of the local resources and possible causes. Social organizations which provide and enforce conservation and sustainability of traditional customs and culture, which may be in danger of disintegration with the area and its people being more exposed to the outside world and the markets. State of awareness of local people regarding depletion of resources, e.g. do they know that overstocking, overgrazing results in erosion and degradation of land often irreversibly? Are people concerned about it? How the road construction may effect attitudes? Study of any endangered plant or animal species in the project area.

- Analysis of primary and secondary infrastructure requirements and costs.

- Analysis of impacts and mitigation strategies.

- Development of environmental impact mitigation plan.

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CONCLUDING REMARKS

Mr. Ata Muhammad Jafar, Additional Chief Secretary, Planning and Development, Government of Balochistan in his concluding remarks thanked the participants for their valuable contribution and said that the objective of today's meeting was to identify and/or further clarify important issues and/or concerns which are likely to occur as a result of Bela-Awaran-Turbat road construction. The purpose was to determine the scope and significance of the issues to be analysed in the Environmental and Social Soundness Assessment and to discuss the adverse environmental impacts to minimize the adverse effects and also to improve the quality of environment in the project area. He praised the active discussions of today's meeting and said that it was a very successful meeting, a lot of useful information was unveiled which is really helpful for project formulators.

Mr. Jafar said, under the proposed Balochistan Road Project 376 km long road from Bela to Turbat via Awaran will be constructed. On its way, it will cross rivers, and will also pass through hills and agriculturing areas. It is normal that due to the construction of the road there will be some disturbance to the existing ecosystems. Livestock population, water resources, wildlife and social setup in the area will be effected. He said why we want to upgrade this road, we want to improve the quality of life and the socio-economic conditions of the people living in this region. With the construction of road this region will be integrated into the main stream of open markets of the country. This road will increase the flow of Makran produced commodities to the external markets.

He said, besides the benefits of this road project we would like to account for the negative impacts also. Different issues and concerns have been identified by the participants today. I would request the project formulators to quantify the issues and concerns which were raised today and make them part of the project. Particularly a lot of concern in the agriculture and wildlife sectors has been expressed. He said the concerns expressed today in the forum can easily be accounted for in the project.

He said in the overall interest of the project it is important that while looking into the project cost benefit analysis, the advantages, disadvantages and the environmental positive and negative aspects are also considered. In advance countries environmental study is essential for every new project. Some of you who are involved with GOP's Ministry of Economic Affairs, they know, all those projects which are sent for Federal Government's approval, they require prior clearance from GOP's Environment and Urban Affairs Division. He refered to Mr. Taj that during today's discussions he said survival instead of environment, it is important but I think we should not support any such project which spoils the environment. This road project does not fall under that category, as Dr. Nek Buzdar said with the construction of this road there will be a positive change in the socio-economic conditions of the area. We want this change, that is the reason we are

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in favour of this project. He said, I may tell you that at present in Makran there is no good road. Government employees hesitate to serve in Makran, there is no proper implementation of laws by law enforcing agencies. Everybody is scared from the feel of isolation, once you are in Makran you are cut of from rest of the world, because of missing road network.

With the construction of this road, a large scale development in this area is expected. The people from government will have adequate network to go into the area, the law and order situation will improve and fish industry along the coastal Makran will develop. At the end he again pointed out that he would like to request the project formulators to provide adequate provision in the project to take care of the issues and concerns expressed by the participants in the session today.

CLOSING ADDRESS

Chairman of the session, Mir Abdul Majeed Bizenjo, Minister of Revenue, Government of Balochistan at the end of the session addressed the participants and said, the road network plays a very important role in a nations economy and socio-economic development. He said wherever the roads have been built, they have revolutionized the social, financial and political sectors in the life of the people of that area.

He said as you all know that there are no roads in Balochistan's Makran Division. USAID is assisting Government of Pakistan and Government of Balochistan in different development sectors, the construction of roads in far flung areas of Makran is also part of this development effort. He said why we call Makran far flung area, the reason is that there is no road network and access to Makran is extremely difficult. With the construction of roads the transport system will get better, access to area will be easy, a lot of development activities will open up, there will be social and economic development in the area, then this far flung area will not be that far.

I am pleased to learn this that USAID has taken up this work of constructing a road in this far flung area of Makran to bring it closer to the social life of Pakistan. Constructing a 376 km long Bela-Awaran-Turbat road is not an easy task, but it is not impossible. After completion of this road there will be a pleasant change in the lives of the people of this area and there will be a sudden change in the socio-economic conditions.

At the end the Minister thanked the participants for participating in this environmental scoping session on Bela-Awaran-Turbat road. He also requested the engineers of USAID to give proper attention to the environmental, social and political concerns of this area during the construction of this road. He said that he belongs to that area and would like to extend all possible help from Government of Balochistan side for the accomplishment of this task.

BALOCHISTAN ROAD PROJECT
ENVIRONMENTAL SCOPING SESSION AT QUETTA
JUNE 25, 1990

LIST OF INVITEES

Sr. No.	Name	Title/Organization/Address
1.	Mr. S.R. Poonegar	Chief Secretary Government of Balochistan
2.	Mr. Ata Mohammad Jafar	Additional Chief Secretary Planning and Development Government of Balochistan
3.	Mr. Manzoor Gichki	Member National Assembly
4.	Mr. Mohammad Akram Baloch	Member Provincial Assembly
5.	Dr. Abdul Malik Baloch	Member Provincial Assembly
6.	Mr. Yousuf Niazi	Secretary Finance, GOB
7.	Mr. Saleem Durrani	Secretary C&W, GOB
8.	Mr. Faridon Abadan	Member Provincial Assembly Minister without Portfolio, GOB
9.	Mr. Abdul Razik	Secretary Irrigation & Power, GOB
10.	Mr. Taj Naeem	Secretary Agriculture, GOB
11.	Mr. Fazil Durrani	Secretary Forest, GOB
12.	Mr. Ghiasuddin	Chief Conservator Forests, GOB
13.	Mr. Abdul Rehman Qaisrani	Secretary Health, GOB
14.	Sardar Mohammad Sharif	Secretary Public Health Engineering, GOB
15.	Mr. Mohammad Azam Baloch	Chief Engineer Public Health Engineering
16.	Maj. Mohammad Ashraf	Secretary Local Government, GOB
17.	Mr. Saadullah Khan Marri	Secretary Industries, GOB
18.	Mr. Anwar Zaman	Secretary Livestock, GOB

Sr. No.	Name	Title/Organization/Address
19.	Agha Anwar Shah	Secetary Food & Fisheries, GOB
20.	Mr. Abdul Hakeem Baloch	Secretary Labour and Social Welfare, GOB
21.	Rana Ata Ullah Khan	Collector Land Customs, Quetta
22.	Mr. Pervez Kasi	Dy. Collector Customs
23.	Mr. Niaz Jafar	Commissioner, Makran Division
24.	Mr. Karam Khan Jogezai	Chief Engineer (South) Khuzdar
25.	Mr. Humayun Khan Marri	Minister for C&W, GOB
26.	Mir Abdul Majeed Bizenjo	Minister for Revenue, GOB
27.	Mr. Ghaffar Nadeem	Secretary S&GAD, GOB
28.	Mr. Shaukat Hussain Baloch	Vice Chancellor University of Balochistan
29.	Mr. Bashir Ahmed Baloch	Secretary Information, GOB
30.	Mr. Surat Khan Marree	Director Information
31.	Mir Yakoob Beezenj,	Director Resource Development Corp.
32.	Dr. Abdul Hameed Bajoi	Director Agriculture Research Institute
33.	Dr. Bakht Roidar	Director Arid Zone Research Institute
34.	Syed Saadat Hussain Naqvi	Dy. Secretary Agriculture
35.	Qazi Bashir Ahmed	Economist ARI, Quetta
36.	Mr. Frank Van Steenbergen	Sociologist, BMIAD
37.	Qazi Mohammad Yakoob	Director Agri. Machinery Maintenance
38.	Dr. Naimat Ullah Gichki	Medical Superintendent Fort Sundemun Hospital, Quetta
39.	Mr. Tahir Mohammad Khan	President BAR Association

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Sr. No.	Name	Title/Organization/Address
40.	Prof. Saifur-Rehman	Department of Sociology, University of Balochistan
41.	Prof. Abdul Rehman	Deptt. of Sociology, University of Balochistan
42.	Mr. Ali Ahmed Baloch	Chief Engineer, C&W
43.	Mr. Mohammad Amin	Chief Engineer, Irrigation
44.	Ms. Nahida Safdar	USIS-Quetta
45.	Prof. Shukrullah	Deptt. of Economics, University of Balochistan
46.	Prof. Bahadur Khan	University of Balochistan
47.	Mr. Pervaiz Saleem	Commissioner, Quetta
48.	Mir Tariq Mahmood Ketheran	Minister for Food & Fisheries
49.	Mir Bezen Beezenjo	Member Provincial Assembly Tribal & Political Leader from Makran
50.	Nawab Mohammad Aslam Raisani	Member Provincial Assembly
51.	Mir Afzal Khan	President Chamber of Commerce
52.	Mr. Nek Mohammad	Director Fruit Dev. Agriculture Deptt.
53.	Mr. Mohammad Saleem Chishti	Additional Secretary, P&D
54.	Mir Lashkari Raisani	Tribal Leader
55.	Mr. Nasir Mehmood	Deputy Commissioner, Quetta
56.	Ms. Rukhsana Malik	Planning and Development, GOB
57.	Ms. Salima Bano	Planning and Development, GOB
58.	Qazi Amanullah	Planning and Development, GOB
59.	Mr. Inayatullah Babai	Superintending Engineer
60.	Mr. Saifullah Khan Paracha	Former Minister for P&D, GOB Mine Owner/Businessman/Transporter
61.	Mr. Younus Khan Mendokhel	Chairman, Balochistan Development Authority

Sr. No.	Name	Title/Organization/Address
62.	Ch. Zulfiqar Ali	Director General, Agriculture
63.	Mr. S.M. Amjad Durrani	Director WASA
64.	Mr. A.D. Ahmed	Protocol Officer, CC
65.	Mr. Abdul Hussain	Senior Vice President, Chamber of Commerce
66.	Mr. Athar Hussain Zaidi	Chief Engineer (Design), C&W
67.	Dr. Mohammad Akbar Khan	Former Secretary Health, GOB
68.	Mr. Saeed Hashmi	Minister for Agriculture, GOB
69.	Dr. M.A. Baloch	Provincial Chief Malaria Control Program
70.	Dr. Mohammad Iqbal	Director Health Services
71.	Mr. Naqvi	Dy. Secretary, Agriculture
72.	Ms. Rima Salah	UNICEF
73.	Mr. Michael P. Mulcahy	ILO
74.	Dr. Michael Gabaudan	UNHCR
75.	Mr. Martin Huebner	German AID
76.	Mr. Vandijk	WFP
77.	Mr. Weng Zhigang	WFP
78.	Mr. Abdullah Jan	Chairman Area Electricity Board, WAPDA
79.	Mr. Abdul Karim Nayani	BALAD Project Officer USAID/Quetta
80.	Dr. Nek Buzdar	Sociologist, USAID/Quetta
81.	Mr. Gene V. George	Chief, O/ENG, USAID-Islamabad
82.	Mr. Waldemar Albertin	O/ENG, USAID-Islamabad
83.	Mr. Fazal Dad Kakar	Director Department of Archeology, GOB
84.	Mrs. Wahida Riaz	Association for Women in Agriculture, Quetta

Sr. No.	Name	Title/Organization/Address
85.	Mrs. D.J. Kaikobad	General Secretary All Pakistan Women Association
86.	Ms. Shagufta	Section Officer Department of Law, GOB
87.	Ms. Riffat	Lecturer of Economics University of Balochistan, Quetta
88.	Dr. Shanaz Baloch	Civil Hospital, Quetta
89.	Mrs. Markar	Chairperson APWA (NGO)
90.	Dr. Shamim Qureshi	Principal School of Public Health (Social Worker)
91.	Mrs. Suraya Allahdin	Member APWA and Women Helpers Association (NGO)
92.	Mrs. Yasmin Mendokhel	Demonstrator Bolan Medical College, Quetta
93.	Ms. Nelofar Abadan	NGO
94.	Mrs. Hassan Baloch	President, Girls Guide Member, APWA & Social Worker (From Makran)

BALOCHISTAN ROAD PROJECT
ENVIRONMENTAL SCOPING SESSION AT QUETTA
JUNE 25, 1990

LIST OF PARTICIPANTS

Sr. No.	Name	Title/Organization/Address/Telephone
1.	Ch. Laiq Ali	Mission Environmental Engineer, USAID/Islamabad - 824071
2.	Dr. Waldemar Albertin	Mission Environmental Advisor, USAID/Islamabad - 824071
3.	Dr. Nek Buzdar	Consultant c/o USAID/Islamabad
4.	Mr. Mohammad Moazzam Khan	Marin Fisheries Department, Karachi.
5.	Mr. Sardar M. Yusuf	Program Assistant, RDD, USAID/Quetta
6.	Dr. Fazal Ahmed	Liaison Officer, USAID/Quetta
7.	Mr. Abdul Waheed	Secretary, USAID/Quetta
8.	Raja Rehan Arshad	Project Engineer, USAID/Islamabad
9.	Mr. Pervaiz Gani	Chief, Infrastructure Division, ENG, USAID, Islamabad
10.	Mr. Zulfiqar Ali Khan	Director General Agriculture Government of Balochistan
11.	Dr. Abdul Rehman Qaisrani	Secretary Health Services, GOB
12.	Dr. Mohammad Bashir	Director Livestock, GOB
13.	Dr. Mohammad Iqbal	Director Health Services, GOB
14.	Mrs. D.J. Kaikobad	General Secretary, APWA, Quetta
15.	Mr. Pervaiz Rana	Head of Technical, GTZ, Quetta
16.	Mr. Saleem Durani	Secretary, Communication & Works (C&W) Department, GOB
17.	Dr. Saif Sherani	Department of Sociology University of Balochistan
18.	Mr. Sabahuddin	Information Officer (DPR)

Sr. No.	Name	Title/Organization/Address/Telephone
19.	Mrs. Wahida Riaz	Association for Women in Agriculture (Private Sector)
20.	Dr. Bakht Roidar	Director Arid Zone Research Institute, Quetta
21.	Dr. Naimat Ullah Gichki	Medical Superintendent Fort Sundemun Hospital, Quetta
22.	Mr. Abdul Majeed Bizenjo	Minister for Revenue Government of Balochistan
23.	Mr. Fazal Durrani	Secretary Forest, GOB
24.	Mr. Ata Mohammad Jaffar	Additional Chief Secretary, Planning and Development, GOB
25.	Ms. Rukhsana	Planning and Department, GOB
26.	Ms. Salma	Planning and Department, GOB
27.	Ms. Shugafta	Planning and Department, GOB
28.	Mr. Inayatullah	Superintending Engineer, C&W, Quetta
29.	Mr. Ali Ahmed	Chief Engineer, C&W
30.	Qazi Amanullah	Chief of Road, P&D
31.	Mohammad Azam Kasi	Chief of Education, P&D
32.	Mr. Taj Faiz	Planning and Development, GOB
33.	M.A. Rashid	Planning and Development, GOB
34.	Karam Khan Jogezai	Chief Engineer (South), C&W, Khuzdar
35.	Mr. Saleem Chishti	Additional Secretary, P&D, GOB
36.	Mr. Anwar-ul-Haq Badar	Chief of Section, P&D
37.	Mr. Raees Iqbal	Chief of Section, P&D
38.	Mr. Nahad Pervez	Planning and Development, GOB
39.	Mr. Yousuf Niazi	Secretary Finance, GOB
40.	Mr. Adwin Pasha	Chief of Section, P&D

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BALOCHISTAN ROAD PROJECT

PROCEEDINGS OF
ENVIRONMENTAL SCOPING SESSION AT TURBAT
AUGUST 21, 1990

Chairman:	Muhammad Irfan Kasi Commissioner, Makran Division Government of Balochistan
Place:	Town Committee Hall, Turbat
Time:	0900 - 1300 hours.
Language:	The Scoping Session was conducted in Urdu language.
Lunch:	Lunch hosted by USAID/Islamabad at BALAD Head Quarters, Turbat from 1330 - 1500 hours.
Prepared by:	Chaudhary Laiq Ali, Mission Environmental Engineer USAID/Islamabad

Recitation from Holy Quran was done by Mr. Hafeez-ur-Rehman, Deputy Commissioner, Turbat, Government of Balochistan.

The Chairman, Mr. Muhammad Irfan Kasi, in his opening address, welcomed the participants. A diverse group of people had been invited by the Government of Balochistan (GOB) which included GOB officials, political and social leaders, non-governmental organizations (NGO's), local village representatives, transporters, fishermen from the coastal areas and other interested groups. Mr. Kasi hilighted the importance and need for constructing the Bela-Awaran-Turbat road and its impact on the iocal economy including the positive effect on the private sector fishing industry in Makran area. He clearly identified the benefits of this road which it will have for the economic up-lift of the people of Makran

Chaudhary Laiq Ali, Mission Environmental Engineer, USAID/Islamabad, briefed the participants about the Environmental Scoping Sessions and subsequent Environmental and Social Soundness Assessment (ESSA) process. In his address Mr. Ali told the participants that it is AID policy to ensure that the environmental consequences of AID-financed activities are identified and considered by AID and the host country prior to a final decision to proceed and that appropriate environmental safeguards are adopted. A copy of the 22 CFR Part 216, "AID Environmental Procedures" was given to the participants. He stressed that the environmental assessment for the Balochistan Road Project must satisfy the requirements of AID Environmental Procedures in full.

Mr. Ali also referred to Government of Pakistan's Ordinance No. XXXVII of 1983: "Control of Pollution and Preservation of Living Environment", and drew the attention of participants towards paragraph-8 of this ordinance which requires the submission of environmental impact statements for major development projects.

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Mr. Ali told the participants that already a similar scoping session had been conducted in Quetta on June 25, 1990 and that the following issues/concerns had been raised:

- Protection of ecosystems, rangelands and water resources.
- Concerns about health-hazard-safety, labour mortality and typical sand fly problem.
- Concerns about maintenance/repair of road. Proposal of training for C&W staff.
- Protection of "Salaba Land", rain fed agriculture.
- Protection of wildlife in the project area and strengthening of wildlife protection agencies.
- Provision of washroom/latrine facilities at selected points along the road, particularly for ladies.
- Concerns about the road alignment.
- Concerns about spills of tar, empty drums, slum creation, disposal of construction waste.
- Concerns about increased traffic load, number of accidents, implementation of estabilished traffic rules, proper marking of traffic signals, strengthening of implementing agencies, provision of medical facilities.
- Control of dust and noise pollution.
- Protection of workers from bitumen smoke, numerous water-borne and vector-borne diseases, requirement of safety guidelines.
- Need for de-salinization plants along the coast for agriculture.
- Development of grassy plots, grazing lands and protection of forests.
- Provision to accommodate future requirements for water, drainage, electricity, gas and telephone in the road design.
- Protection of road shoulders and tree plantation along the road shoulders.
- Need to explore the water resources along the road and water availability along the road. Installation of water pipeline at selected points along the road.
- Development of Agrobase industry.
- Impacts on employment, education, communication network, social structure.
- Role of women.
- Requirement of by-passes for the villages.

Mr. Ali told the participants that they have all the freedom to ask for any clarification concerning the above issues/concerns and would appreciate discussion on all related issues/concerns of localized nature in today's forum. He also encouraged the participants to discuss the possible mitigative measures for the above concerns.

Mr. Pervaiz Gani Chief Infrastructure Division, Office of Engineering, USAID/Islamabad presented an overview and benefits of this road construction project. In his address, Mr. Gani briefed the participants with the help of maps, charts and handouts, about the location of the Balochistan Road Project. He also described the road alignment and said that the alignment of the proposed road follows the existing Bela-Awaran-Turbat road alignment throughout its length. He emphasized that during the road survey stage, the Consultants recommended two alternate alignments between Hoshab and Turbat to avoid crossing of the Kech River at Sami Village three times, but in order to serve the major towns, the Government of Balochistan approved the existing alignment.

Mr. Gani also explained to the participants with the help of handouts, the plans for road construction. In addition, he pointed out that this will be an all weather, 6.6 meter wide paved road with 1.5 meter hard shoulders on the existing 4 meter gravel track. He said for this road 29 RCC bridges (ranging from 40 meter to 200 meter) and 250 box and pipe culverts will also be constructed.

He enumerated some of the benefits of this road construction project. This all weather road will accelerate the integration of Makran area into the socio-economic main stream of Pakistan, it will improve the quality of life and will increase the flow of Makran produced commodities to external markets.

Dr. Nek Buzdar, a social scientist by profession and well versed with the socio-economic structure of Makran Division, talked about the socio-economic impacts of the project on Makran. While assessing the social soundness of the project, he looked into its compatibility with the locally prevailing socio-cultural environment. He divided the assessment into three parts. In the first part he looked into the local people's customs, traditions, beliefs and groupings as well as their socio-economic organizations. In the second part he discussed the social feasibility of the project. In the third part he explored the likely impacts of the project on various socio-economic groups and the distribution of its benefits.

He said that agriculture on small land holdings, ownerships of small flocks of sheep and goats and subsistence fishing engage an overwhelming majority of Kolwa/Makran population. These groups will be the main beneficiaries of the project. The main reason behind the non-availability of health and education services in the region is the lack of reasonable communication and transportation facilities. The construction of the road will help those low income groups the most who could least afford these social services in the past.

Dr. Musa Baloch, Deputy Director, Health Services, Turbat talked about health-hazard-safety related issues. In his address Dr. Baloch said, that the Balochistan Road Project Environmental Scoping Session, in his opinion, is a historical event, very important and one of its kind. He said that other spaeakers have talked a lot, there is nothing to add to it any more. However, he being a Doctor, would like to express his views only on health related aspects.

He said, once the road construction is complete, it will have a lot of advantages, socio-economic conditions of the people would be improved and there will be easy communication between the people of different areas. But, at the same time there would be some negative effects also. He said we have to look into the negative impacts before the project starts. He told the participants that this kind of project is for the benefit of the people. Before carrying out any new project, the positive and negative

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environmental impacts are taken into consideration. Therefore, it is essential that we pay careful attention to overcome the negative impacts, before implementation of this project. He said, when this road will be constructed, thousands of laborers will be employed. We need to take care of their health. After road construction, the traffic will be considerably increased. As a result of fuel, gas and heavy traffic, the people of the area will suffer from air pollution. In road construction, cement, sand and bitumen are used which also pollute the air, which is injurious to human health. He suggested that there should be close coordination between health department and construction engineers to control the air pollution according to the international methods to avoid any affects, not only on the laborers but also on locals. During construction the water stagnates in the borrow pits along the road site which causes diseases. It is urged to have close coordination among health department, irrigation department and construction contractor. After road construction, the rate of accidents will increase. Special attention should be paid to this aspect. Signals need to be installed at different locations. Sharp turns need to be avoided. In case any vehicle slips away and causes injuries to the travellers there must be arrangements to remove the vehicle and evacuation of the injured persons. To provide first aid, there must be some emergency medical centers. To meet any emergency state of affair, there must be ambulances at the medical centers. He said, the health department will also consider some appropriate measures. He said, that these are some of the precautionary measures. In no way would these problems hinder the construction of the road. At last I would say, that the road is a must and we need this road.

Mr. Muhammad Moazzam Khan, Principal Planning Officer, Marine Fisheries Department, Government of Pakistan, Karachi spoke about biological-ecological-marine and coastal resources in the proposed project area. Mr. Khan had a lot of data available concerning the project area in the form of slides and transparancies which he wanted to show to the participants but could not show due to unexpected power failure. In his address Mr. Khan briefed the participants about the natural resources in Makran Division. He said the most important economic activity in the area is agriculture despite the fact that most of Makran consists of unproductive mountains except for valleys between the ranges which are fertile and productive when irrigated. In the coastal area, a major part of the population is either engaged directly in fisheries or their economy is based on the ancillary fisheries industry. Coastal towns and settlements are not directly linked with Karachi which is the main fisheries centre of Pakistan. Therefore, fish and other fisheries products from the area are transported on Turbat-Bela Road to Karachi. He also said that the most important exported crop of Makran Division, besides fish, is date. The main market for Makran dates has always been Karachi. The date fruit from crops is transported to main population centers like Turbat and Punjgur, from where it is transported to Karachi on the Bela-Turbat Road.

Renovation and upgradation of the Bela-Awaran-Tubat road will bring a change in the socio-economic environmental and other conditions of Makran Division.

Mr. Khan briefed the participants about the meteorology of the project area. He explained the location of Makran, its weather, the wind patterns and the topoghraphy of the area. He also presented the rain fall data in the project area and that of coastal Makran.

Mr. Khan informed that there are no apparant sources of air pollution in the project area, except for burning of wood and other fuels, mostly Kerocine oil, and exhaust fumes from diesel and gasoline engines of the vehicular trafic. He said that the dust from roads is a noticeable source of air pollution.

Mr. Khan also explored the geology of the project area. He said the area lies in a tectonically active seismic zone. He also briefed the participants about the surface and ground water resources in the project area. Talking about terrestial ecology of the area, he said that the Bela-Awaran-Turbat road lies in two major vegetation zones, the Tropical Thorn Forest Zone in part of the Bela sector, and the Arid Subtropical Forest Zone in the remaining part. He also talked about the wildlife, and gave a list of important mammels found in the area. In addition, he said, a well diversified bird fauna is also found in the area. About aquatic ecology, he said, although there are no perennial rivers in the area of Bela-Awaran-Turbat road, the pools of water in river beds are known to be inhabited by typical fish fauna of Balochistan and Persian origin. He said the information on mineral resources of the area is limited and mentioned that some part of the area in the vicinity of Bela Turbat road is known to have deposits of calcites, marbles and some other non-precious minerals.

He also touched on the aesthetics of the area and said that almost the entire area around Bela-Awaran-Turbat road is under developed with very few architechtural or man-made elements. It has low to high quality landscape with great topographical relief and diversity. The natural landscape is dominant. At the end Mr. Khan explained the future potential of fisheries resources along coastal Makran and pointed out that the existing road has played a key role in the marketing of fish in Balochistan. Through this road, fish and fisheries products are now transported to markets. Upgradation of the Bela-Awaran-Turbat road will further strengthen the marketing system of fish from Makran Division.

OPEN QUESTION AND ANSWER SESSION

Chairman of the session, Muhammad Irfan Kasi, Commissioner, Makran Division, Government of Balochistan, invited the audience to ask questions and seek clarification about whatever concerns they had. He opend the forum for open questions and answers.

HAFEEZ-UR-REHMAN
Deputy Commissioner, Turbat
Government of Balochistan

He thanked the speakers for identfying the merits and demerits of the proposed Balochistan Road Project. He said the people of this area are waiting for an early start on this road project. He further said that he admits that USAID has carried out a lot of development activities under BALAD project. The activities covered under BALAD do not meet direct requirements of the people of this area, although they are being benefited indirectly. With this road, there will be a direct impact on the people, which will be evident and visible. He stressed that construction of this road should be started as early as possible.

MUHAMMAD AYUB GHICHKI
General Secretary, Pakistan National Party, Turbat

Q. He said that, as the Deputy Commissioner from Turbat has already expressed his views about the advantages of the road, the benefits of the road cannot be denied at all. The people of this area also know the importance of the roads since 1927-28, when Khuzdar road was constructed. This was their requirement at that time also. This project would definitely improve the socio-economic conditions of the people which is of collective benfit to the people of this area.

He refered to the hand-out and said that the location of Tajaban is shown in the South of Kech river whereas actually, it is in the North. It should be corrected accordingly. He further said that the old road from Tajaban to Turbat is situated in the South, which was planned with defence point of view, as the borders of Iran and Afghanistan are very close. The people of Shahrak and Sami demand that this should be shifted to the North side. The construction of road from Tajaban to Turbat is not acceptable to us at all. If the plan stands as is, there would be a chaos and great tension in the area. Quarrels among the people can take place. As a result the project can be jeoperdized.

A. Mr. Ghichki was told that the road shall be constructed on the existing old track as advised by the GOB. The construction of road from Tajban to Turbat was only aproposed alternative, which was not accepted by the GOB. He was further told that his suggestions are welcome, in fact this road is meant for use of local people and it is our desire that the construction of the road is done according to the wishes of locals.

SAGHIR AHMAD BALOCH
Deputy Commissioner, Gwadar, Government of Balochistan

Q. He showed the concern that there is a general fear in the local public that the construction of Bela-Awaran-Turbat road may be postponed as it has been happening in the past. He quoted the examples of Kalat and Gwadar road projects. He poited out that without a good road between Gawadar and Turbat the transportation of fish can not be improved. He suggested that this should also be taken into consideration.

A. He was told that a formal agreement between GOP and USAID has already been signed to construct this road and there is no doubt about the implementation of this road construction program. He was further told that an American Contractor will be contracted for the construction of this road and assured that this road will be constructed well in time.

CHHOTA MUHAMMAD YOUSAF
President, Transporter's Association, Kalat

Q. He showed the concern that present Bela-Awaran-Turbat road condition is in real bad shape due to which transporters are facing a lot of difficulties. He requested that road maintenance machinery which is under control of USAID, should be handed over to B&R Department of GOB. He further said, we are happy that USAID is constructing Bela-Awaran-Turbat (BAT) road which will change the socio-economic conditions of the area and requested that once USAID starts the construction of the road, they should be given an opportunity to provide local manpower and transport. He also inquired when this road is going to be started? What is the completion date of this BAT road? When is USAID planning to construct the road between Turbat and Mand?

A. Concerns regarding maintenance of existing roads belong to BALAD. BALAD Project Officer was requested to see and resolve the concerns. He was told that USAID will consider to employ local manpower, the BAT road will be started in September 1991 and will be completed in 50 months. As far as the Turbat-Mand section is concerned, we have not received any proposal from the GOB in this connection. Under the current agreement only BAT section is covered.

MULLAH AHMAD DASHTI
Amir Jamat Islami, Turbat

Q. He showed the concern that in the past ten-eleven years, USAID has not completed any significant project except for Kech River Bridge. Each and every Makrani is frustrated and disappointed. He stressed that BAT road project should be completed as early as possible and it should follow the existing track.

A. He was told that he is right, there is disappointment in the people, the reason for disappointment is, the poor performance of Bela-Awaran road contractor. He was assured that USAID has taken appropriate action, it will not happen again in the future and BAT section will be completed in time.

KOHDA AZA
Fisherman, Sur Bandar, Gwadar

He introduced himself as a fisherman of Gwadar area and said that he is really pleased to learn that USAID is constructing Bela-Awaran-Turbat road. He mentioned that at present, they transport fish to Karachi via sea on launches, some of the fish is also transported on trucks on the existing BAT road which is extremly difficult. With the construction of this road the transportation of fish to Karachi will become very easy and bussiness in fish marketing will flourish. He said the construction of BAT raod is going to be of great benefit for them.

AHMAD ALI
Chairman, Disrtict Council, Panjgur

Q. He said that we are very pleased that USAID is giving importance to Makran Division. This is an under-developed area and it is being uplifed equivalent to the developed ones. He mentioned that the main crop of this area is date. Because of missing road network, most of the date fruit is rotting and it can not reach the market in Karachi. He said most of the people in this area are poor and they normally travel by road. He suggested that there is a shortcut route which connects Panjgur to BAT road, that is through Kachh Wali. Proper attention should also be given to this road for the benefit of people in Panjgur area. He said due to the construction of BAT road the people will be able to transport their crops to Karachi Market easily.

A. He was told several development schemes are underway through the BALAD project in Makran Division. Presently, under Balochistan Road Project only BAT section will be constructed. In the future after the completion of BAT road, there will be a number of development schemes. It will be appropriate to consider a Panjgur connection to BAT road at that time when the opportunity arises.

YOUSAF MUJAHID
Gwadar

Q. He said, we are happy that Bela-Awaran-Turbat road is being constructed. Today, all the speakers have given very useful information concerning to environment. He said, as he belongs to Gwadar, he would request USAID to include Turbat-Gwadar road sector also. He stressed for improvement in maintenance of Turbat-Gwadar section.

A. He was told that under the current project only BAT section is being constructed. Turbat-Gwadar section is on the priorities list of GOB. It will also be considered at the appropriate time in the future. For maintenance of the Turbat-Gwadar road, the BALAD project officer assured that things will get better in the next 2-3 months

BASHIR AHMAD BALOCH
Director, Planning and Development, Makran, GOB

Q. He showed the concern that almost all the people of this area are disappointed. We request that the construction of the road should be started from Turbat side, instead of Bela-Awaran-Turbat side. That way level of satisfaction in people will be revived.

A. He was told that if we can not plan a construction program for the construction contractor. Generally, this is left to the contractor. However, we will suggest to the contractor to consider the possibility of constructing bridges, culverts, etc. from Turbat end.

MIRZA MASOOD
Deputy Director, BALAD, Turbat

Q. USAID is constructing temporary housing for the contractor's staff. It is requested that, after completion of the project, these housing facilities should be transferred to C&W Department for their use. Another suggestion is that basic necesseties like bus stops, public latrines and drinking water (wells) be provided for the people at different appropriate places.

A. He was told that the suggestion about basic necesseties could be considered. Regarding Engineer's camps, he was told that after the completion of BAT road construction they will be handed over to C&W department of GOB.

SCOPING STATEMENT

Closing Comments of the Commissioner, Makran:

The main objective of this scoping session was to obtain proposals/ suggestions from the locals. Thank you for your valuable suggestions. I would like to assure you that this road shall be constructed. This will bring the tremendous change in socio-economic structure of the people.

I once again thank to USAID staff and all participants of the session.

APPENDIX E

Climatological Data

TABLE - I

LASBELLA

NORMALS OF CLOUD AND PRECIPITATION

LAT: 26° 14' N LONG: 66° 19' E PERIOD: 1961 - 1989

MONTH	CLOUD AMOUNT (Oktas) All cloud 00	03	12	Low cloud 00	03	12	PRECIPITATION (mm) Mean Monthly Total 03-12	12-03	03-03	Mean No of rainy days	Extremes Wettest 1931-60 Amt	Year	1961-90 Amt	Year	to 1990 Amt	Year	Driest 1931-60 Amt	Year	1961-90 Amt	Year	to 1990 Amt	Year	Heaviest falls in 24 hrs 1931-60 Amt	Date	1961-90 Amt	Date	to 1990 Amt	Date
48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
JAN	---	---	---	---	---	---	---	---	0.8	---	36.1	1944	6.0	1983	36.1	1944	0.0	+	0.0	(7)	0.0	+	19.1	4/1945	2.0	4/1989	19.1	4/1945
FEB	---	---	---	---	---	---	---	---	4.8	---	75.9	1939	23.9	1983	75.9	1939	0.0	+	0.0	(5)	0.0	+	41.9	27/1939	18.1	13/1983	41.9	27/1939
MAR	---	---	---	---	---	---	---	---	1.8	---	174.2	1939	8.6	1982	174.2	1939	0.0	+	0.0	(5)	0.0	+	69.6	29/1939	4.0	25/1989	69.6	29/1939
APR	---	---	---	---	---	---	---	---	9.5	---	63.0	1943	42.0	1985	63.0	1943	0.0	+	0.0	(5)	0.0	+	50.5	11/1943	36.0	2/1985	50.5	11/1943
MAY	---	---	---	---	---	---	---	---	15.6	---	94.2	1953	94.0	1987	94.2	1953	0.0	+	0.0	(5)	0.0	+	36.8	23/1954	40.0	30/1987	40.0	30/1987
JUN	---	---	---	---	---	---	---	---	---	---	98.3	1948	23.0	1985	98.3	1948	0.0	+	0.0	(3)	0.0	+	44.5	10/1948	17.0	16/1985	44.5	10/1948
JUL	---	---	---	---	---	---	---	---	42.8	---	225.0	1932	130.8	1988	225.0	1932	0.0	+	0.0	1987	0.0	1987	83.8	25/1956	59.0	28/1988	83.8	25/1956
AUG	---	---	---	---	---	---	---	---	30.3	---	256.5	1944	115.8	1983	256.5	1944	0.0	+	0.0	(3)	0.0	+	62.7	3/1947	26.0	19/1983	62.7	3/1947
SEP	---	---	---	---	---	---	---	---	5.7	---	82.5	1933	48.4	1983	82.5	1933	0.0	+	0.0	(7)	0.0	+	82.5	13/1933	48.0	4/1983	82.5	13/1933
OCT	---	---	---	---	---	---	---	---	0.0	---	32.3	1947	0.0	----	32.3	1947	0.0	+	0.0	(10)	0.0	+	32.3	22/1947	0.0	----	32.3	22/1947
NOV	---	---	---	---	---	---	---	---	3.3	---	13.2	1957	18.0	1989	18.0	1989	0.0	+	0.0	(8)	0.0	+	13.2	18/1957	18.0	24/1989	18.0	24/1989
DEC	---	---	---	---	---	---	---	---	2.4	---	84.8	1936	15.8	1989	84.8	1936	0.0	+	0.0	(7)	0.0	+	81.5	8/1936	15.8	19/1989	81.5	8/1936
YEAR	---	---	---	---	---	---	---	---	---	---	612.9	1944	246.5	1983	612.9	1944	17.5	1960	0.0	1981	0.0	1981	83.8	25 JUL 1956	59.0	28 JUL 1988	83.8	25 JUL 1956
Begin	1961	1961	1961	1961	1961	1961	1961	1961	1971	1961			1971						1971						1961			
No.of Years	29	29	29	29	29	29	29	29	12	29	30		12		42		30		12		42		30		29		59	

TABLE- II

LASBELLA

NORMALS OF MAXIMUM AND MINIMUM TEMPERATURE (°C)

LAT: 26° 14' N LONG: 66° 19' E Height ground at stevenson screen amsl = 0290 ft (0088 m) Height ss agl = 12.2 m PERIOD: 1961 - 1989

MAXIMUM TEMPERATURE

MONTH	Mean Daily Max	Mean Monthly High Max	Mean Monthly Low Max	Extremes Highest recorded 1931 - 60 Val	Extremes Highest recorded 1931 - 60 Date	Extremes Highest recorded 1961 - 90 Val	Extremes Highest recorded 1961 - 90 Date	Extremes Highest recorded to 1990 Val	Extremes Highest recorded to 1990 Date	Extremes Lowest 1961 - 90 Val	Extremes Lowest 1961 - 90 Date
25	26	27	28	29	30	31	32	33	34	35	36
JAN	---	---	---	34	24/1932	36	6/1967	36	6/1967	4	17/1974
FEB	---	---	---	40	14/1934	37	18/1970	40	14/1934	5	14/1983
MAR	---	---	---	44	30/1946	43	30/1984	44	30/1946	9	7/1983
APR	---	---	---	46	16/1959	46	28/1983	46	16/1959	14	3/1983
MAY	---	---	---	51	31/1944	48	26/1989	51	31/1944	21	14/1983
JUN	---	---	---	50	26/1951	50	4/1988	50	4/1988	4	27/1989
JUL	---	---	---	47	3/1960	49	4/1964	49	4/1964	25	25/1983
AUG	---	---	---	48	23/1957	47	8/1968	48	23/1957	23	5/1983
SEP	---	---	---	45	2/1958	44	17/1969	45	2/1958	22	5/1983
OCT	---	---	---	45	5/1938	44	4/1968	45	5/1938	12	23/1983
NOV	---	---	---	41	2/1942	41	5/1965	41	2/1942	11	30/1983
DEC	---	---	---	37	13/1953	39	1/1969	39	1/1969	5	28/1983
YEAR	---	---	---	51	31 MAY 1944	50	4 JUN 1988	51	31 MAY 1944	4	29 JUN 1989
Begin	1961	1961	1961			1961	1961			1961	1961
No. of Years	29	29	29	30		29		59		29	

MINIMUM TEMPERATURE

MONTH	Mean Daily Min	Mean Monthly High Min	Mean Monthly Low Min	Extremes Highest 1961 - 90 Val	Extremes Highest 1961 - 90 Date	Extremes Lowest recorded 1931 - 60 Val	Extremes Lowest recorded 1931 - 60 Date	Extremes Lowest recorded 1961 - 90 Val	Extremes Lowest recorded 1961 - 90 Date	Extremes Lowest recorded to 1990 Val	Extremes Lowest recorded to 1990 Date
25	37	38	39	40	41	42	43	44	45	46	47
JAN	---	---	---	19	8/1983	-5	17/1935	-1	24/1964	-5	17/1935
FEB	---	---	---	19	22/1983	1	1/1946	2	1/1970	1	1/1946
MAR	---	---	---	24	31/1963	5	6/1945	6	5/1971	5	6/1945
APR	---	---	---	27	9/1989	8	3/1940	13	3/1989	8	3/1940
MAY	---	---	---	31	20/1986	16	8/1960	14	4/1989	14	4/1989
JUN	---	---	---	32	6/1964	18	3/1935	19	4/1969	18	3/1935
JUL	---	---	---	31	20/1984	19	9/1949	22	23/1969	19	9/1949
AUG	---	---	---	29	18/1970	21	31/1940	20	30/1969	20	30/1969
SEP	---	---	---	32	16/1963	14	29/1943	16	16/1969	14	29/1943
OCT	---	---	---	27	1/1983	6	30/1949	10	22/1964	6	30/1949
NOV	---	---	---	22	6/1963	2	30/1938	3	27/1969	2	30/1938
DEC	---	---	---	19	9/1982	-1	25/1942	-1	14/1986	-1	14/1986
YEAR	---	---	---	32	16 SEP 1963	-5	17 JAN 1935	-1	14 DEC 1986	-5	17 JAN 1935
Begin	1961	1961	1961	1961	1961			1961	1961		
No. of Years	29	29	29	29		30		29		59	

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TABLE - III

PASNI

NORMALS OF CLOUD AND PRECIPITATION

LAT: 25° 16' N LONG: 63° 29' E

PERIOD: 1961 - 1989

MONTH	CLOUD AMOUNT (Oktas)						PRECIPITATION (mm)																					
	All cloud			Low cloud			Mean Monthly Total			Mean No of rainy days	Extremes																	
											Wettest						Driest						Heaviest falls in 24 hrs					
											1931-60		1961-90		to 1990		1931-60		1961-90		to 1990		1931-60		1961-90		to 1990	
	00	03	12	00	03	12	03-12	12-03	03-03	days	Amt	Year	Amt	Year	Amt	Year	Amt	Year	Amt	Year	Amt	Year	Amt	Date	Amt	Date	Amt	Date
48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
JAN	---	1.7	1.8	---	0.6	0.5	13.4	8.2	19.3	1.1	171.2	1935	133.6	1970	191.5	1926	0.0	+	0.0	(7)	0.0	+	79.2	7/1944	78.2	1/1965	151.1	15/1926
FEB	---	1.7	1.7	---	0.6	0.7	9.0	8.8	19.1	0.8	205.2	1944	174.9	1982	205.2	1944	0.0	+	0.0	(10)	0.0	+	89.9	2/1944	58.7	0/1982	89.9	2/1944
MAR	---	1.7	1.7	---	0.6	0.6	5.2	4.0	13.8	0.6	44.2	1948	197.9	1984	197.9	1984	0.0	+	0.0	(16)	0.0	+	26.3	10/1948	76.2	2/1984	87.1	18/1918
APR	---	1.2	1.0	---	0.4	0.3	2.4	2.0	4.0	0.2	136.4	1933	59.7	1961	136.4	1933	0.0	+	0.0	(21)	0.0	+	129.0	4/1933	45.0	1/1961	129.0	4/1933
MAY	---	0.9	0.6	---	0.5	0.2	0.0	0.0	0.1	0.0	46.7	1944	1.5	1974	46.7	1944	0.0	+	0.0	(25)	0.0	+	25.9	15/1949	0.6	3/1979	25.9	15/1949
JUN	---	1.8	0.7	---	1.0	0.2	0.4	0.0	0.5	0.1	145.5	1948	8.5	1978	185.9	1914	0.0	+	0.0	(25)	0.0	+	117.3	8/1948	6.3	3/1972	127.0	25/1914
JUL	---	4.2	2.1	---	2.1	1.0	5.0	1.6	8.2	0.8	159.5	1956	63.0	1978	159.5	1956	0.0	+	0.0	(16)	0.0	+	119.4	14/1933	17.3	2/1961	119.4	14/1933
AUG	---	4.3	1.9	---	2.4	0.9	10.5	3.1	10.0	0.5	70.1	1944	153.8	1983	153.8	1983	0.0	+	0.0	(17)	0.0	+	38.1	5/1944	140.7	1/1983	140.7	1/1983
SEP	---	2.1	0.4	---	1.2	0.2	0.5	0.0	0.5	0.2	13.0	1959	12.4	1976	13.0	1959	0.0	+	0.0	(26)	0.0	+	10.4	17/1959	5.0	1/1976	10.4	17/1959
OCT	---	0.7	0.2	---	0.4	0.1	0.9	1.7	2.2	0.1	3.6	1954	56.5	1980	56.5	1980	0.0	+	0.0	(25)	0.0	+	3.6	30/1954	50.9	3/1980	50.9	3/1980
NOV	---	0.7	0.7	---	0.2	0.2	0.1	0.0	0.3	0.1	55.4	1937	3.4	1982	55.4	1937	0.0	+	0.0	(22)	0.0	+	42.9	19/1957	13.5	3/1975	50.8	27/1928
DEC	---	1.6	1.6	---	0.6	0.9	10.7	13.1	19.7	1.2	55.4	1944	100.9	1982	148.1	1929	0.0	+	0.0	(11)	0.0	+	41.7	4/1957	264.2	1/1973	264.2	1/1973
YEAR	---	1.9	1.2	---	0.9	0.5	58.2	42.5	97.5	5.6	520.4	1944	356.2	1982	520.4	1944	7.6	1941	0.0	1989	0.0	1989	129.0	4 APR 1933	264.2	1 DEC 1973	264.2	1 DEC 1973
Begin		1961	1961		1961	1961	1961	1961	1961	1961			1961						1961						1961			
No.of Years		29	29		29	29	29	29	29	29	29		29		78		30		29		79		29		29		78	

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TABLE - IV

PASNI

NORMALS OF MAXIMUM AND MINIMUM TEMPERATURE
(^{o}C)

LAT: 25^{o} 16' N LONG: 63^{o} 29' E Height ground at stevenson screen amsl = 0025 ft (0008 m) Height ss agl = 1.3 m PERIOD: 1961 - 1989

MONTH	MAXIMUM TEMPERATURE: Mean Daily Max	Mean Monthly High Max	Mean Monthly Low Max	Extremes Highest recorded 1931 - 60 Val	1931 - 60 Date	1961 - 90 Val	1961 - 90 Date	to 1990 Val	to 1990 Date	Lowest 1961 - 90 Val	Lowest 1961 - 90 Date	MINIMUM TEMPERATURE: Mean Daily Min	Mean Monthly High Min	Mean Monthly Low Min	Extremes Highest 1961 - 90 Val	Highest 1961 - 90 Date	Lowest recorded 1931 - 60 Val	1931 - 60 Date	1961 - 90 Val	1961 - 90 Date	to 1990 Val	to 1990 Date
25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
JAN	24.8	28.4	19.9	30	23/1932	34	2/1966	34	2/1966	7	2/1968	---	---	---	21	1/1978	4	17/1935	5	10/1989	4	17/1935
FEB	26.3	---	---	35	17/1934	35	2/1980	35	2/1980	16	2/1984	13.9	---	---	21	2/1966	7	2/1951	4	2/1984	-1	5/1916
MAR	29.7	34.1	25.4	38	29/1945	40	3/1974	40	3/1974	21	1/1979	17.3	20.5	13.6	24	2/1961	9	2/1945	10	0/1985	8	23/1918
APR	32.6	38.7	28.1	42	18/1952	44	3/1987	44	3/1987	23	1/1965	20.9	24.5	16.5	27	3/1964	14	1/1953	12	0/1969	10	5/1920
MAY	35.2	42.0	31.6	47	20/1950	47	25/1989	47	25/1989	29	1/1969	24.2	---	---	31	2/1986	18	8/1960	17	0/1979	13	21/1924
JUN	35.0	40.1	32.6	46	8/1956	47	1/1979	47	1/1979	31	1/1967	26.7	28.9	24.4	31	3/1980	21	3/1958	19	1/1987	16	1/1924
JUL	33.4	36.8	31.1	41	3/1937	43	2/1968	43	2/1968	29	2/1973	27.1	29.0	24.9	32	2/1966	21	10/1951	21	1/1966	18	30/1925
AUG	32.4	34.8	30.4	39	19/1944	38	3/1972	41	21/1921	28	2/1978	25.8	27.6	23.2	30	9/1988	22	26/1955	15	3/1968	15	3/1968
SEP	32.5	37.6	30.7	41	26/1955	42	25/1988	42	25/1988	29	2/1973	23.7	26.0	21.0	27	1/1983	17	27/1954	18	3/1982	14	27/1924
OCT	33.3	36.8	29.4	42	4/1955	42	1/1983	42	4/1955	26	3/1980	20.2	---	---	26	1/1982	11	30/1949	10	3/1984	10	3/1984
NOV	30.6	35.1	26.7	37	2/1942	40	9/1988	40	9/1988	22	3/1963	16.3	19.7	11.9	24	2/1967	9	30/1938	7	3/1975	3	30/1916
DEC	26.2	29.9	[illegible]	34	2/1943	33	2/1968	34	2/1943	17	3/1972	---	---	---	21	2/1979	6	30/1932	2	1/1986	2	1/1986
YEAR	31.0	---	---	47	20 MAY 1950	47	1 JUN 1979	47	1 JUN 1979	7	2 JAN 1968	---	---	---	32	2 JUL 1966	4	17 JAN 1935	2	1 DEC 1986	-1	5 FEB 1916
Begin	1961	1961	1961			1961	1961			1961	1961	1961	1961	1961	1961	1961			1961	1961		
No.of Years	29	29	29	29		29		73		29		29	29	29	29		29		2°		73	

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TABLE - V

PASNI

WMO NO: 41759 ICAO ID: OPPI CLICOM ID: PAS41759

NORMALS OF PRESSURE, TEMPERATURE, HUMIDITY AND VAPOUR PRESSURE

ESTAB: 1911

LAT: 25° 16' N LONG: 63° 29' E Height of barometer cistern amsl = 0028 ft (0009 m) PERIOD: 1961 - 1989

	PRESSURE (mb or gpm)						TEMPERATURE (°C)											RELATIVE HUMIDITY (%)			VAPOUR PRESSURE (mb)		
	STATION LEVEL			REDUCED TO MEAN SEA LEVEL/GPM			DRY BULB			WET BULB			DEW POINT			MEAN TEMP	MEAN DAILY RANGE						
MONTH	00	03	12	00	03	12	00	03	12	00	03	12	00	03	12			00	03	12	00	03	12
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
JAN	----	1015.6	1013.4	----	1016.4	1014.2	---	14.7	22.9	---	12.2	16.9	---	8.7	12.4	---	---	40	59	45	----	11.9	14.8
FEB	----	1013.8	1011.7	----	1014.7	1012.6	---	15.9	24.4	---	13.6	18.5	---	10.7	13.5	---	---	42	61	45	----	13.6	16.3
MAR	----	1010.7	1008.9	----	1011.5	1009.4	---	19.5	27.5	---	17.0	21.0	---	14.7	16.2	---	---	51	64	45	----	17.2	19.7
APR	----	1007.3	1005.5	----	1008.1	1006.3	---	23.9	29.9	---	21.2	23.7	---	19.0	20.1	26.9	11.8	52	69	50	----	22.8	24.3
MAY	----	1003.8	1001.5	----	1004.6	1002.3	---	27.5	32.1	---	24.1	26.2	---	22.2	22.9	29.8	11.0	56	70	55	----	27.5	29.2
JUN	----	998.7	996.0	----	999.9	996.8	---	29.3	32.5	---	26.9	27.8	---	25.7	25.7	30.9	8.3	54	76	64	----	33.5	33.5
JUL	----	997.4	995.2	----	998.3	996.0	---	28.9	31.7	---	26.4	27.2	---	25.6	25.5	30.2	6.3	58	77	65	----	32.7	32.2
AUG	----	999.3	997.1	----	1000.1	997.9	---	27.5	30.2	---	25.3	26.2	---	24.2	24.3	29.0	6.8	44	69	58	----	30.2	30.6
SEP	----	1004.8	1002.0	----	1005.3	1002.8	---	25.8	30.1	---	23.8	25.3	---	22.6	23.4	28.2	9.8	43	69	56	----	27.7	28.4
OCT	----	1009.8	1007.1	----	1010.7	1007.9	---	23.2	30.4	---	20.5	23.9	---	18.1	20.3	26.8	13.4	43	63	48	----	21.6	24.8
NOV	----	1013.7	1011.3	----	1014.6	1012.1	---	19.1	28.0	---	16.3	21.1	---	13.0	16.3	23.4	13.6	37	54	40	----	15.6	19.3
DEC	----	1015.6	1013.2	----	1016.4	1014.1	---	15.6	24.4	---	13.1	18.4	---	10.0	13.8	---	---	43	63	47	----	12.8	16.1
YEAR	----	1007.5	1005.2	----	1008.4	1006.0	---	22.6	28.7	---	20.0	23.0	---	17.9	19.5	---	---	47	66	52	----	22.3	24.1
Begin	----	1961	1961	----	1961	1961		1961	1961		1961	1961		1961	1961	1961	1961	1961	1961	1961		1961	1961
No. of Years		29	29		29	29		29	29		29	29		29	29	29	29	29	29	29		29	29

TABLE - VI

TURBAT

NORMALS OF CLOUD, WIND SPEED AND PRECIPITATION

LAT: 25 59 N LONG: 63 04 E Height of anemometer above ground = 22 ft (7 m) PERIOD: 1931 - 60

MONTH	WIND SPEED (Knots)				CLOUD AMOUNT (Oktas)						PRECIPITATION (mm)															
				Ave past 24 Hrs	ALL CLOUDS			LOW CLOUDS			Mean Monthly Total			Mean No of rainy days	Extremes											
															Wettest				Driest				Heaviest fall			
															1931-60		to 1940		1931-60		to 1940		1931-60		to 1940	
	00	03	12		00	03	12	00	03	12	03-12	12-03	03-03		Amt	Year	Amt	Year	Amt	Year	Amt	Year	Amt	Date	Amt	Date
44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
JAN	2.7	2.9	4.5	4.5	1.3	1.7	1.9	1.3	1.3	1.4	13.2	29.0	41.1	2.5	136.4	1943	-	-	0.0	-	-	-	58.4	07/44	-	-
FEB	2.4	2.9	5.4	4.7	0.9	1.5	1.7	0.7	0.9	0.8	10.7	14.5	21.3	1.2	162.6	1954	-	-	0.0	-	-	-	79.5	11/54	-	-
MAR	2.1	2.4	6.7	5.4	1.2	1.3	1.3	0.3	0.4	0.4	3.8	19.8	17.5	0.9	99.3	1960	-	-	0.0	-	-	-	52.3	10/48	-	-
APR	1.8	2.0	6.6	5.5	0.5	0.6	0.9	0.2	0.1	0.3	2.3	7.6	5.8	0.6	42.2	1960	-	-	0.0	-	-	-	22.9	21/60	-	-
MAY	1.5	2.1	6.9	6.1	0.4	0.4	0.9	0.1	0.1	0.4	0.0	10.2	10.4	0.7	67.3	1955	-	-	0.0	-	-	-	47.0	26/55	-	-
JUN	1.7	2.2	6.7	6.7	0.9	1.1	0.5	0.5	0.6	0.2	0.5	7.1	6.1	0.6	44.5	1952	-	-	0.0	-	-	-	30.5	22/52	-	-
JUL	2.2	2.7	6.6	7.3	3.2	3.3	1.9	2.2	2.0	1.0	11.4	22.4	24.9	1.7	238.0	1956	-	-	0.0	-	-	-	72.6	16/56	-	-
AUG	2.3	2.3	6.5	7.0	3.2	3.5	1.3	1.2	1.4	0.7	0.3	0.3	8.9	0.3	148.1	1944	-	-	0.0	-	-	-	59.4	04/44	-	-
SEP	1.8	2.0	5.7	6.1	1.4	1.9	0.4	1.0	0.9	0.1	0.0	4.3	2.3	0.2	39.6	1959	-	-	0.0	-	-	-	24.1	15/59	-	-
OCT	2.3	2.0	4.9	4.8	0.1	0.4	0.3	0.1	0.2	0.2	0.0	2.5	1.3	0.1	23.1	1954	-	-	0.0	-	-	-	21.6	30/54	-	-
NOV	2.3	2.5	3.8	4.7	0.3	0.7	0.7	0.2	0.2	0.2	0.5	2.3	1.5	0.2	15.5	1959	-	-	0.0	-	-	-	15.5	03/59	-	-
DEC	3.0	3.1	4.2	4.4	0.7	1.1	1.3	0.5	0.5	0.6	5.1	13.2	14.2	0.9	68.6	1957	-	-	0.0	-	-	-	50.0	04/57	-	-
YEAR	2.2	2.4	5.7	5.6	1.2	1.5	1.1	0.7	0.7	0.5	47.8	133.1	155.4	9.9	476.0	1944	-	-	14.5	19- 0	-	-	79.5	11th FEB	-	-
No of Years	10	17	17	17	10	17	17	10	17	17	10	10	17	17	17				17				17	1954	-	-

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TABLE - VII

TURBAT

NORMALS OF MAXIMUM AND MINIMUM TEMPERATURES
(°C)

LAT: 25 59 N LONG: 63 04 E Height of ground at Stevenson Screen amsl = 507 ft (155 m) PERIOD: 1931 - 1960

MONTH	MAXIMUM TEMPERATURE Mean Daily Max	Mean Monthly High Max	Mean Monthly Low Max	Extremes Highest recorded 1931 - 60 Val	Extremes Highest recorded 1931 - 60 Date	Highest recorded to 1940 Val	Highest recorded to 1940 Date	Lowest 1931 - 60 Val	Lowest 1931 - 60 Date	MINIMUM TEMPERATURE Mean Daily Min	Mean Monthly High Min	Mean Monthly Low Min	Extremes Highest 1931 - 60 Val	Extremes Highest 1931 - 60 Date	Lowest recorded 1931 - 60 Val	Lowest recorded 1931 - 60 Date	Lowest recorded to 1940 Val	Lowest recorded to 1940 Date	Mean Temp (X+N)/2	Mean Daily Range
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
JAN	24.7	28.7	18.9	32	27/1953	-	-	14	01/1950	11.6	16.7	6.2	19	23/1944	01	31/1950	-	-	18.1	13.1
FEB	27.9	32.3	20.8	37	25/1953	-	-	11	01/1950	12.7	17.7	7.3	20	07/1950	-01	02/1950	-	-	20.3	15.2
MAR	33.7	39.3	25.9	44	29/1946	-	-	18	10/1948	16.8	21.7	11.7	24	23/1958	09	05/1945	-	-	25.3	16.9
APR	38.8	44.1	30.0	46	23/1949	-	-	21	08/1956	21.1	26.2	15.6	28	30/1953	11	01/1945	-	-	29.9	17.7
MAY	43.7	48.0	38.6	51	30/1949	-	-	33	08/1944	25.9	31.1	22.1	37	28/1960	19	30/1942	-	-	34.8	17.8
JUN	44.8	49.2	39.5	51	22/1953	-	-	33	09/1948	28.1	31.6	24.9	34	10/1950	21	09/1948	-	-	36.5	16.7
JUL	40.7	46.0	34.4	50	20/1957	-	-	27	15/1956	27.6	30.4	25.0	37	24/1951	23	10/1944	-	-	34.1	13.1
AUG	40.4	44.9	34.7	48	06/1954	-	-	26	05/1945	26.4	28.4	24.4	30	06/1954	22	26/1953	-	-	33.4	14.0
SEP	40.0	43.9	36.1	46	25/1960	-	-	33	04/1959	24.2	27.0	20.6	28	09/1954	16	22/1953	-	-	32.1	15.8
OCT	38.2	41.9	30.0	46	03/1951	-	-	29	30/1949	20.7	25.2	15.3	32	04/1942	09	30/1949	-	-	29.5	17.5
NOV	32.8	37.3	27.4	40	01/1943	-	-	21	29/1946	16.2	19.6	12.2	23	03/1943	09	29/1946	-	-	24.5	16.6
DEC	27.3	32.5	20.3	37	01/1953	-	-	17	21/1948	12.3	17.3	6.9	21	03/1948	04	25/1942	-	-	19.8	15.0
YEAR	36.1	49.5	17.1	51	22nd JUN	-	-	11	1st FEB	20.3	32.6	5.4	37	28th MAY	-01	22nd FEB	-	-	28.2	15.8
No of Years	17	17	17	17	1953			17	1950	17	17	17	17	1960	17	1950			17	17

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TABLE - VIII

TURBAT

WMO No: 41738 ICAO ID: OPTU CLICOM ID: TUR41738

NORMALS OF PRESSURE, TEMPERATURE, HUMIDITY AND VAPOUR PRESSURE

ESTAB: 1942

LAT: 25 59 N LONG: 63 04 E Height of barometer cistern amsl = 510 ft (155 m) PERIOD: 1931 - 1960

	PRESSURE (mb or gpm)						TEMPERATURE (°C)									RELATIVE HUMIDITY (PERCENT)			VAPOUR PRESSURE (mb)		
	STATION LEVEL			REDUCED TO MEAN SEA LEVEL/GPM			DRY BULB			WET BULB			DEW POINT								
MONTH	00	03	12	00	03	12	00	03	12	00	03	12	00	03	12	00	03	12	00	03	12
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
JAN	999.2	1000.6	997.7	1017.8	1019.1	1015.5	13.7	13.6	23:4	10.7	11.0	16.1	6.8	8.4	11.1	69	71	45	10.7	11.0	13.0
FEB	997.7	998.9	995.8	1016.0	1017.3	1013.4	15.2	15.4	26.8	11.7	11.7	16.9	7.6	8.0	11.1	64	61	37	11.1	10.9	13.2
MAR	994.8	996.0	992.7	1012.9	1014.0	1009.6	18.6	20.1	32.3	14.1	15.2	19.7	9.3	10.8	11.1	57	56	28	12.5	13.1	13.5
APR	992.4	993.1	989.6	1010.2	1011.0	1006.2	22.2	25.4	37.5	17.1	18.7	23.3	12.6	12.9	16.4	57	46	28	15.4	15.1	18.5
MAY	986.9	988.8	984.8	1004.1	1005.8	1000.7	26.9	29.9	41.9	21.1	23.2	26.3	17.1	19.7	19.1	57	54	27	20.3	22.9	22.5
JUN	982.4	984.1	979.7	999.8	1001.2	996.0	28.8	31.3	43.3	24.1	25.7	28.5	21.2	23.1	23.3	66	63	33	26.1	28.2	28.8
JUL	982.1	982.9	979.0	999.5	1000.1	995.6	27.8	29.6	39.3	24.9	26.3	28.8	23.5	24.7	24.8	78	76	45	29.2	31.5	31.4
AUG	983.2	984.7	980.7	1000.4	1001.9	997.2	26.7	28.3	39.0	24.1	25.4	28.0	22.9	23.9	24.0	79	77	41	27.0	29.7	30.1
SEP	988.1	989.3	985.1	1005.7	1006.7	1001.7	25.1	26.9	38.9	21.7	23.3	25.8	19.4	21.4	20.6	72	72	35	23.7,	25.8	24.1
OCT	993.8	995.3	991.6	1011.3	1012.9	1008.4	21.3	24.4	36.2	15.6	18.6	22.4	9.8	14.4	15.6	51	54	29	13.2	16.7	17.5
NOV	997.5	998.9	995.5	1015.7	1016.8	1012.9	16.8	19.3	31.1	11.8	13.7	18.8	5.6	8.1	11.7	51	48	30	10.1	10.8	13.7
DEC	998.5	1001.1	997.7	1016.9	1019.5	1015.3	14.8	14.9	25.6	10.5	10.6	15.8	4.9	5.4	8.1	56	54	34	9.4	9.2	11.0
YEAR	991.4	992.8	989.1	1009.2	1010.5	1006.0	21.5	23.3	34.6	17.3	18.6	22.6	13.4	15.1	16.4	63	61	34	17.4	18.7	19.8
No of Years	10	17	17	10	17	17	10	17	17	10	17	17	10	17	17	10	17	17	10	17	17

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TABLE - IX

PANJGUR

NORMALS OF CLOUD AND PRECIPITATION

LAT: 26° 58' N LONG: 64° 06' E

PERIOD: 1961 - 1989

MONTH	CLOUD AMOUNT (Oktas) All cloud 00	All cloud 03	All cloud 12	Low cloud 00	Low cloud 03	Low cloud 12	PRECIPITATION (mm) Mean Monthly Total 03-12	Mean Monthly Total 12-03	Mean Monthly Total 03-03	Mean No of rainy days	Extremes: Wettest 1931-60 Amt	Wettest 1931-60 Year	Wettest 1961-90 Amt	Wettest 1961-90 Year	Wettest to 1990 Amt	Wettest to 1990 Year	Driest 1931-60 Amt	Driest 1931-60 Year	Driest 1961-90 Amt	Driest 1961-90 Year	Driest to 1990 Amt	Driest to 1990 Year	Heaviest falls in 24 hrs 1931-60 Amt	Heaviest falls in 24 hrs 1931-60 Date	Heaviest falls in 24 hrs 1961-90 Amt	Heaviest falls in 24 hrs 1961-90 Date	Heaviest falls in 24 hrs to 1990 Amt	Heaviest falls in 24 hrs to 1990 Date
48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
JAN	1.5	1.7	2.1	0.6	0.7	0.9	10.3	6.9	16.2	1.4	111.5	1943	72.6	1964	111.5	1943	0.0	+	0.0	(5)	0.0	+	41.1	30/1940	61.2	31/1972	80.8	15/1926
FEB	1.6	2.0	2.2	0.6	0.6	0.8	9.7	16.3	14.3	1.6	63.0	1935	53.3	1982	138.2	1914	0.0	+	0.0	(9)	0.0	+	38.1	8/1951	27.7	1/1972	64.5	13/1914
MAR	1.4	1.8	2.5	0.5	0.5	1.0	18.0	5.8	15.6	1.2	87.9	1949	68.8	1976	87.9	1949	0.0	+	0.0	(7)	0.0	+	27.9	2/1931	38.5	5/1979	45.2	10/1915
APR	0.9	1.2	2.3	0.5	0.3	1.0	6.3	1.4	7.6	0.9	52.3	1935	46.6	1982	61.5	1915	0.0	+	0.0	(12)	0.0	+	35.6	16/1935	28.4	22/1982	47.2	10/1915
MAY	0.4	0.5	1.5	0.1	0.1	0.8	1.2	1.6	2.8	0.4	40.6	1944	21.6	1967	40.6	1944	0.0	+	0.0	(18)	0.0	+	29.2	14/1944	21.6	29/1967	29.2	14/1944
JUN	0.5	0.6	1.1	0.2	0.2	0.7	2.8	0.6	3.4	0.3	16.8	1946	74.4	1972	74.4	1972	0.0	+	0.0	(21)	0.0	+	16.8	16/1946	66.8	28/1972	66.8	28/1972
JUL	1.5	1.7	2.0	0.7	0.7	1.0	17.2	7.3	26.0	1.7	144.0	1945	114.2	1988	144.0	1945	0.0	+	0.0	(8)	0.0	+	54.6	4/1958	68.6	2/1977	68.6	2/1977
AUG	1.0	1.3	1.4	0.4	0.3	0.6	6.6	3.4	9.5	0.5	153.4	1944	53.9	1986	153.4	1944	0.0	+	0.0	(16)	0.0	+	87.1	4/1944	46.7	2/1967	87.1	4/1944
SEP	0.2	0.3	0.6	0.1	0.1	0.3	0.9	0.0	1.3	0.1	28.4	1959	24.1	1984	28.4	1959	0.0	+	0.0	(25)	0.0	+	19.3	13/1959	24.1	--/1984	24.1	--/1984
OCT	0.1	0.2	0.5	0.1	0.0	0.3	0.4	0.4	0.8	0.1	3.6	1940	18.0	1980	18.0	1980	0.0	+	0.0	(26)	0.0	+	3.6	10/1940	11.4	29/1980	11.4	29/1980
NOV	0.3	0.6	0.9	0.1	0.1	0.3	1.0	0.5	0.8	0.2	18.3	1957	6.1	1977	21.1	1914	0.0	+	0.0	(23)	0.0	+	10.2	20/1957	6.1	18/1977	16.3	20/1914
DEC	1.1	1.5	1.8	0.5	0.6	0.6	5.3	3.5	8.2	1.1	68.1	1934	43.8	1982	97.3	1921	0.0	+	0.0	(12)	0.0	+	33.5	31/1956	26.4	16/1962	37.8	18/1921
YEAR	0.9	1.1	1.6	0.3	0.4	0.7	79.6	47.8	106.6	9.3	443.2	1944	238.7	1982	443.2	1944	22.4	1953	16.3	1971	16.3	1971	87.1	4 AUG 1944	68.6	2 JUL 1977	87.1	4 AUG 1944
Begin	1961	1961	1961	1961	1961	1961	1961	1961	1961	1961			1961						1961						1961			
No.of Years	29	29	29	29	29	29	29	29	29	29	30		29		79		30		29		79		30		29		79	

TABLE - X

PANJGUR

NORMALS OF MAXIMUM AND MINIMUM TEMPERATURE
(^{o}C)

LAT: 26^{o} 58' N LONG: 64^{o} 06' E Height ground at stevenson screen amsl = 3177 ft (0968 m) Height ss agl = 1.2 m PERIOD: 1961 - 1989

MAXIMUM TEMPERATURE

MONTH	Mean Daily Max	Mean Monthly High Max	Mean Monthly Low Max	Highest recorded 1931 - 60 Val	Highest recorded 1931 - 60 Date	Highest recorded 1961 - 90 Val	Highest recorded 1961 - 90 Date	Highest recorded to 1990 Val	Highest recorded to 1990 Date	Lowest 1961 - 90 Val	Lowest 1961 - 90 Date
25	26	27	28	29	30	31	32	33	34	35	36
JAN	17.4	23.0	9.6	28	29/1932	27	30/1963	28	29/1932	1	14/1974
FEB	19.8	26.2	11.1	33	13/1934	29	28/1967	33	13/1934	1	3/1972
MAR	25.6	31.5	17.0	36	31/1942	35	31/1984	36	31/1942	11	8/1979
APR	31.2	36.5	23.7	39	24/1958	39	30/1987	41	22/1925	17	12/1965
MAY	36.3	41.1	29.7	43	30/1956	44	22/1970	44	22/1970	20	2/1989
JUN	39.4	43.1	34.8	45	22/1934	45	26/1988	45	26/1988	31	10/1965
JUL	38.8	42.6	33.2	44	4/1940	45	8/1968	46	9/1926	27	16/1978
AUG	38.0	41.6	33.3	45	7/1931	43	6/1966	45	7/1931	25	11/1986
SEP	35.3	38.7	29.2	42	6/1936	42	8/1988	42	6/1936	17	13/1987
OCT	30.7	35.4	24.4	41	1/1947	38	8/1980	41	1/1947	17	30/1961
NOV	24.7	30.0	17.8	33	1/1947	34	1/1977	34	1/1977	14	27/1966
DEC	19.5	24.6	10.7	31	4/1953	29	10/1978	31	4/1953	3	11/1964
YEAR	29.7	34.5	22.9	45	22 JUN 1934	45	8 JUL 1968	46	9 JUL 1926	1	3 FEB 1972
Begin	1961	1961	1961			1961	1961			1961	1961
No.of Years	29	29	29	30		29		79		29	

MINIMUM TEMPERATURE

MONTH	Mean Daily Min	Mean Monthly High Min	Mean Monthly Low Min	Highest 1961 - 90 Val	Highest 1961 - 90 Date	Lowest recorded 1931 - 60 Val	Lowest recorded 1931 - 60 Date	Lowest recorded 1961 - 90 Val	Lowest recorded 1961 - 90 Date	Lowest recorded to 1990 Val	Lowest recorded to 1990 Date
25	37	38	39	40	41	42	43	44	45	46	47
JAN	3.5	9.8	-1.5	13	6/1964	-6	13/1935	-7	10/1967	-7	30/1929
FEB	5.6	11.6	-0.3	25	23/1983	-5	1/1946	-4	27/1972	-6	1/1928
MAR	10.7	16.4	4.1	19	24/1969	-1	23/1960	0	12/1973	-1	23/1960
APR	16.0	21.2	10.3	26	30/1983	3	1/1953	5	2/1989	3	1/1953
MAY	20.6	25.6	15.3	29	29/1983	11	7/1960	6	3/1989	6	3/1989
JUN	23.9	28.1	19.4	31	18/1973	14	4/1953	14	17/1989	14	17/1989
JUL	24.6	28.3	20.8	31	14/1969	18	8/1944	14	30/1968	14	30/1968
AUG	23.4	27.1	18.8	29	8/1971	13	28/1951	14	31/1972	13	28/1951
SEP	19.3	23.5	14.0	28	9/1988	10	21/1940	9	29/1962	8	30/1924
OCT	13.7	18.5	8.4	22	4/1982	3	21/1952	3	23/1975	3	23/1975
NOV	8.6	13.1	3.6	17	11/1978	-3	20/1946	-3	30/1962	-3	30/1962
DEC	4.7	10.4	-1.6	14	19/1962	-6	30/1932	-8	28/1972	-8	28/1972
YEAR	14.5	19.5	9.3	31	14 JUL 1969	-6	13 JAN 1935	-8	28 DEC 1972	-8	28 DEC 1972
Begin	1961	1961	1961	1961	1961			1961	1961		
No.of Years	29	29	29	29		30		29		79	

TABLE -XI

PANJGUR

WMO NO: 41739 ICAO ID: OPPG

CLICOM ID: PUN41739

NORMALS OF PRESSURE, TEMPERATURE, HUMIDITY AND VAPOUR PRESSURE

LAT: 26° 58' N LONG: 64° 06' E

Height of barometer cistern amsl = 3177 ft (0968 m)

ESTAB: 1911
PERIOD: 1961 - 1989

MONTH	PRESSURE (mb or gpm)						TEMPERATURE (°C)											RELATIVE HUMIDITY (%)			VAPOUR PRESSURE (mb)		
	STATION LEVEL			REDUCED TO MEAN SEA LEVEL/GPM			DRY BULB			WET BULB			DEW POINT			MEAN TEMP	MEAN DAILY RANGE						
	00	03	12	00	03	12	00	03	12	00	03	12	00	03	12			00	03	12	00	03	12
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
JAN	906.7	907.7	905.7	1498.8	1507.3	1509.0	5.4	5.3	16.4	3.3	3.8	9.8	-0.2	-0.2	1.7	10.5	13.8	69	69	41	6.3	6.3	7.5
FEB	905.3	906.2	904.0	1490.8	1498.7	1499.3	7.7	7.6	19.1	5.2	5.1	11.5	1.6	1.4	3.1	12.8	14.2	67	66	38	7.1	7.0	8.1
MAR	903.6	904.7	902.3	1483.9	1494.4	1492.4	12.6	13.3	24.7	9.1	9.5	15.6	5.3	5.3	7.7	18.2	14.6	63	61	37	9.2	9.3	11.1
APR	901.7	902.8	899.9	1474.7	1487.9	1482.2	17.5	19.3	30.4	12.8	13.7	18.5	8.3	8.6	9.5	23.6	15.1	56	52	31	11.3	11.2	12.7
MAY	899.3	900.8	897.8	1458.2	1473.2	1467.8	22.1	24.7	34.8	16.1	17.5	22.1	11.4	12.2	13.3	28.5	15.2	53	49	32	14.1	14.9	17.6
JUN	895.0	1182.2	893.1	1425.2	1440.3	1427.4	25.4	27.9	38.5	18.9	20.1	23.2	14.2	14.9	13.7	31.6	15.5	53	48	26	17.1	17.8	17.3
JUL	893.2	892.4	891.3	1409.6	1420.1	1405.9	25.8	27.3	37.8	21.4	22.0	24.1	18.9	19.0	16.0	31.7	14.1	68	64	33	22.4	22.7	20.0
AUG	894.9	895.8	893.3	1426.6	1433.9	1422.8	24.7	26.1	36.9	20.0	20.5	22.8	16.8	16.8	13.8	30.7	14.7	65	61	29	20.2	20.2	17.5
SEP	899.5	900.5	898.2	1460.5	1472.7	1465.4	20.7	22.4	34.1	15.3	16.0	20.8	10.7	10.6	11.4	27.1	16.4	56	51	28	13.8	13.9	14.9
OCT	904.8	905.8	899.9	1498.8	1509.1	1511.3	15.0	17.1	29.3	9.9	10.9	17.7	4.5	4.5	8.0	22.1	17.1	50	46	30	8.8	8.9	12.0
NOV	907.2	908.2	909.0	1512.0	1524.0	1523.5	9.8	11.2	23.4	6.0	6.7	13.9	1.1	1.0	4.5	16.6	16.3	55	51	33	6.7	6.6	9.2
DEC	907.5	908.5	906.2	1507.3	1517.4	1518.0	6.2	6.7	18.0	3.6	3.9	10.7	-0.5	-0.2	2.5	12.0	14.9	64	63	39	6.0	6.1	7.7
YEAR	901.5	926.3	900.0	1470.5	1481.6	1477.1	16.1	17.4	28.6	11.8	12.5	17.6	7.7	7.8	8.8	22.1	15.2	60	57	33	11.9	12.1	13.0
Begin	1961	1961	1961	1961	1961	1961	1961	1961	1961	1961	1961	1961	1961	1961	1961	1961	1961	1961	1961	1961	1961	1961	1961
No.of Years	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29

TABLE - XII

ASSOCIATED CONSULTING ENGINEERS (ACE) LTD.
SMALL DAMS SURVEY IN BALUCHISTAN
ANNUAL TOTAL RAINFALL DATA

STATION: BALGATTAR ELEVATION

LATITUDE 26 - 19'N LONGITUDE 63 - 55'E

YEAR	RAINFALL (Inches)	YEAR	RAINFALL (Inches)	
1973	6.84			
1974	4.95			
1975	N.A.			
1976	9.74			
1977	1.58			
1978	0.74			
1979	0.71			
MEAN	3.98			

table - XIII

ASSOCIATED CONSULTING ENGINEERS (ACE) LTD.

SMALL DAMS SURVEY IN BALUCHISTAN

CLIMATOLOGICAL MONTHLY SUMMARY

MEAN MONTHLY EVAPORATION (INCHES)

Taken from U.N.D.P. Report on Hydrometeorology of Baluchistan

STATION MAND LAT. 26° - 07' LONG. 62° - 02'

YEAR 1970 - 1975

MONTH	MEAN TEMP °F	MEAN HUMIDITY	MEAN WIND VELOCITY	MEAN EVAPORATION
JANUARY				5.81
FEBRUARY				4.10
MARCH				8.07
APRIL				9.91
MAY				20.87
JUNE				21.95
JULY				9.69
AUGUST				8.47
SEPTEMBER				11.79
OCTOBER				9.71
NOVEMBER				8.57
DECEMBER				7.13
YEAR				126.07

TABLE -XIV

ASSOCIATED CONSULTING ENGINEERS (ACE) LTD.

SMALL DAMS SURVEY IN BALUCHISTAN

CLIMATOLOGICAL MONTHLY SUMMARY

STATION MAND LAT. 26° 07' LONG. 62° 02'

YEAR 1973

MONTH	MEAN TEMP°F		MEAN HUMIDITY		MEAN WIND VELOCITY miles/hr.		TOTAL EVAPORATION	
		(Days)	%	(Days)		(Miles)	inches	Days
JANUARY	70.44	(27)	43.35	(26)	-		4.21	(30)
FEBRUARY	70.00		73.14		-		4.10	
MARCH	79.50		60.69	(25)	-		2.96	
APRIL	97.50		41.84	(29)	-		4.50	
MAY	102.50		71.61		-		23.11	
JUNE	101.00		78.28		-		23.00	
JULY	95.00		82.33		-		14.75	(23)
AUGUST	92.50		73.74		-		7.03	(20)
SEPTEMBER	93.36	(29)	63.24		-		16.19	
OCTOBER	79.00		71.95	(30)	-		14.61	
NOVEMBER	75.5		65.38	(29)	-		11.28	
DECEMBER	71.5		73.35		-		9.98	

TABLE- XV

ASSOCIATED CONSULTING ENGINEERS (ACE) LTD.

SMALL DAMS SURVEY IN BALUCHISTAN

CLIMATOLOGICAL MONTHLY SUMMARY

TATION MAND LAT. 26° 07' LONG. 62° 02'

YEAR 1974

MONTH	MEAN TEMP°F	(Days)	MEAN HUMIDITY %	(Days)	MEAN WIND VELOCITY miles/hr. (Miles	TOTAL EVAPORATION inches	(Days
ANUARY	62.5		70.57		-	7.89	
EBRUARY	59.40	(21)	72.85	(21)	-	4.73	(21)
ARCH	80.06	(25)	-		1.83	11.79	(25)
PRIL	78.77	(26)	52.36	(26)	2.16	15.32	(26)
AY	90.32	(25)	-		1.75	18.09	
UNE	98.11	(18)	51.02	(18)	-	27.13	
ULY	-		-		-	-	
UGUST	-		-		-	-	
EPTEMBER	-		-		-	-	
CTOBER	79.5		42.4		-	4.80	
OVEMBER	-		-		-	-	
ECEMBER	75.78	(28)	53.57	(28)	-	5.49	

TABLE - XVI

ASSOCIATED CONSULTING ENGINEERS (ACE) LTD.

SMALL DAMS SURVEY IN BALUCHISTAN

CLIMATOLOGICAL MONTHLY SUMMARY

STATION MAND LAT. 26° 07' LONG. 62° 02'

YEAR 1975

MONTH	MEAN TEMP°F	MEAN HUMIDITY %	(Days)	MEAN WIND VELOCITY miles/hr.	(Miles)	TOTAL EVAPORATION inches	(Days)
JANUARY	-	65.16	(30)	-		5.33	(30)
FEBRUARY	NIL	NIL		NIL		NIL	
MARCH	-	-		-		-	
APRIL	-	32.83	(28)	1.5		13.69	(28)
MAY	-	54.98		0.96		21.40	
JUNE	-	72.56		1.25		15.30	
JULY	-	82.93		1.54		9.69	
AUGUST	-	80.98		0.96		8.47	
SEPTEMBER	-	73.88		0.75		7.39	
OCTOBER	-	-		-		-	
NOVEMBER	-	85.31	(29)	0.53		5.85	
DECEMBER	-	51.3	(28)	0.45		5.92	

TABLE - XVII

ASSOCIATED CONSULTING ENGINEERS (ACE) LTD.

SMALL DAMS SURVEY IN BALUCHISTAN

CLIMATOLOGICAL MONTHLY SUMMARY

STATION MAND LAT. 26° 07' LONG. 62° 02'

YEAR 1976

MONTH	MEAN TEMP°F (Days)	MEAN HUMIDITY % (Days)	MEAN WIND VELOCITY miles/hr (Miles)	TOTAL EVAPORATION inches (Days)
JANUARY				
FEBRUARY				
MARCH				
APRIL				
MAY				
JUNE	92.644 (30)	91.281 (30)	1.09	7.67 (30)
JULY				
AUGUST				
SEPTEMBER				
OCTOBER				
NOVEMBER	72.682 (30)	70,649 (28)	1.178	3.36 (20)
DECEMBER	64.984	62.862	0.568	2.96 (19)

TABLE - XVIII

ASSOCIATED CONSULTING ENGINEERS (ACE) LTD.

SMALL DAMS SURVEY IN BALUCHISTAN

CLIMATOLOGICAL MONTHLY SUMMARY

STATION MAND LAT. 26° 07' LONG. 62° 02'

YEAR 1977

MONTH	MEAN TEMP°F		MEAN HUMIDITY		MEAN WIND VELOCITY miles/hr		TOTAL EVAPORATION	
		(Days)	%	(Days)		(Miles)	inches	(Days
JANUARY	57.68				0.94			
FEBRUARY	56.67	(28)			N.A.			
MARCH								
APRIL	81.46	(28)						
MAY								
JUNE								
JULY								
AUGUST								
SEPTEMBER								
OCTOBER								
NOVEMBER								
DECEMBER								

TABLE - XIX

ASSOCIATED CONSULTING ENGINEERS (ACE) LTD.

SMALL DAMS SURVEY IN BALUCHISTAN

CLIMATOLOGICAL MONTHLY SUMMARY

STATION MAND LAT. 26° 07' LONG. 62° 02'

YEAR 1978

MONTH	MEAN TEMP °F		MEAN HUMIDITY		MEAN WIND VELOCITY miles/hr		TOTAL EVAPORATION	
		(Days)	%	(Days)		(Miles	Inches	Days
JANUARY								
FEBRUARY								
MARCH								
APRIL								
MAY								
JUNE	94.15	(28)	-		-		5.85	(28)
JULY	90.07		-		-		6.25	
AUGUST								
SEPTEMBER								
OCTOBER								
NOVEMBER	73.675	(28)	-		-		6.01	(28)
DECEMBER	64.06	(28)	-		-		5.03	(28)

TABLE - XX

ASSOCIATED CONSULTING ENGINEERS (ACE) LTD.

SMALL DAMS SURVEY IN BALUCHISTAN
CLIMATOLOGICAL MONTHLY SUMMARY

STATION MAND LAT. 26° 07' LONG. 62° 02'

YEAR 1979

MONTH	MEAN TEMP°F		MEAN HUMIDITY		MEAN WIND VELOCITY miles/hr.	TOTAL EVAPORATION	
		(Days)	%	(Days)	(Miles	Inches	Days
JANUARY	65.3		70.74		-	6.81	
FEBRUARY	68.0		65.83		-	6.42	
MARCH	74.3		47.18		-	9.75	
APRIL	81.5		44.76		-	11.13	
MAY	90.5		44.61		-	11.17	
JUNE	100.4		49.46		-	9.66	
JULY	97.7		46.13		-	6.81	
AUGUST	92.3		57.59		-	9.68	
SEPTEMBER	90.5		58.08		-	8.78	
OCTOBER	86.0		54.71		-	6.02	
NOVEMBER	77.9	(30)	45.74	(29)	-	6.17	
DECEMBER	-		59.82	(31)	-	-	

TABLE - XXI

HIGHEST 24-HOUR RAINFALL IN A YEAR

(INCHES)

MAND

Year	Rainfall (Inches)	Year	Rainfall (Inches)
1911	0.40	1931	0.77
1912	1.50	1932	1.50
1913	0.90	1933	1.84
1914	1.76	1934	0.52
1915	1.45	1935	1.72
1916	3.56	1936	1.15
1917	-	1937	1.10
1918	1.36	1938	1.87
1919	0.90	1939	1.16
1920	1.10	1940	2.25
1921	0.55	1941	0.48
1922	1.52	1942	5.40
1923	1.50	1943	3.00
1924	6.70	1944	2.08
1925	1.20	1945	0.85
1926	2.74	1946	0.89
1927	2.50	1947	0.70
1928	1.07	1948	0.72
1929	1.25	1949	2.50
1930	2.43	1950	0.70

TABLE- XXII

ASSOCIATED CONSULTING ENGINEERS (ACE) LTD.
SMALL DAM SURVEY IN BALUCHISTAN
ANNUAL TOTAL RAINFALL DATA

STATION GOTH HAJI KARIM BUX ELEVATION

LATITUDE LONGITUDE

YEAR	RAINFALL (Inches)	YEAR	FAINFALL (Inches)	
1973	2.93			
1974	0.80			
1975	1.32			
1976	N.A.			
1977	N.A.			
1978	N.A.			
1979	3.36			
MEAN	2.10			

TABLE - XXIII

ASSOCIATED CONSULTING ENGINEERS (ACE) LTD.

SMALL DAMS SURVEY IN BALUCHISTAN

CLIMATOLOGICAL MONTHLY SUMMARY

MEAN MONTHLY EVAPORATION (INCHES)

STATION GOTH HAJI KARIM BUX. LAT. 26° - 25' LONG. 64° - 12'

YEAR 1970 - 1975

MONTH	MEAN TEMP °F	MEAN HUMIDITY	MEAN WIND VELOCITY	MEAN EVAPORATION
	(1973-1975)	(1973-1975)		(1970-1975)
JANUARY	47.98	52.91		7.81
FEBRUARY	49.50	53.27		8.49
MARCH	64.87	43.76		13.80
APRIL	73.93	49.10		11.05
MAY	82.36	60.48		20.41
JUNE	86.50	63.37		22.76
JULY	86.02	62.53		20.71
AUGUST	84.57	53.39		90.70
SEPTEMBER	87.33	43.83		17.39
OCTOBER	67.72 (Two years)	51.26 (Two years)		15.08
NOVEMBER	60.75 (")	54.09 (")		10.65
DECEMBER	55.76	55.88 (")		8.25
YEAR				176.10

TABLE - XXIV

ASSOCIATED CONSULTING ENGINEERS (ACE) LTD.

SMALL DAM SURVEY IN BALUCHISTAN

ANNUAL TOTAL RAINFALL DATA

STATION GISHKOR* (HOR) ELEVATION

LATITUDE LONGITUDE

YEAR	RAINFALL (Inches)	YEAR	RAINFALL (Inches)	
1973	24.60			
1974	3.54			
1975	N.A.			
1976	11.90			
1977	0.73			
1978	0.25			
1979	13.26			
MEAN	9.04			

ASSOCIATED CONSULTING ENGINEERS (ACE) LTD.
SMALL DAMS SURVEY IN BALUCHISTAN
ANNUAL TOTAL RAINFALL DATA

STATION BIT BULEDA ELEVATION

LATITUDE 26° - 10'N LONGITUDE 63 - 55'E

YEAR	RAINFALL (Inches)	YEAR	RAINFALL (Inches)	
1973	2.87			
1974	1.45			
1975	N.A.			
1976	9.65			
1977	7.05			
1978	3.20			
1979	6.88			
MEAN	5.18			

TABLE - XXVI

ASSOCIATED CONSULTING ENGINEERS (ACE) LTD.

SMALL DAMS SURVEY IN BALUCHISTAN
CLIMATOLOGICAL MONTHLY SUMMARY

STATION HOSHAB LAT. LONG.

YEAR 1985

MONTH	MEAN TEMP°F	MEAN HUMIDITY	MEAN WIND VELOCITY	TOTAL EVAPORATION
JANUARY				
FEBRUARY				
MARCH				
APRIL				
MAY				
JUNE	93.18	68.2	6.30	20.00
JULY	88.49	77.84	7.03	13.77
AUGUST	89.70	74.40	7.12	18.79
SEPTEMBER	85.45	79.00	6.70	16.23
OCTOBER	79.00	65.00	6.20	16.83
NOVEMBER	71.1	72.00	3.3	11.37
DECEMBER	74.9	77.00	4.3	8.76

NOTE: Met: Station established on 1.6.1985

TABLE - XXVII

ASSOCIATED CONSULTING ENGINEERS (ACE) LTD.

SMALL DAMS SURVEY IN BALUCHISTAN
CLIMATOLOGICAL MONTHLY SUMMARY

STATION GOBURD LAT. LONG.

YEAR 1985

MONTH	MEAN TEMP°F	MEAN HUMIDITY	MEAN WIND VELOCITY	TOTAL EVAPORATION
		%	(Miles/hr.)	(Inches)
JANUARY	-	-	-	-
FEBRUARY	-	-	-	-
MARCH	-	-	-	-
APRIL	-	-	-	-
MAY	-	-	-	-
JUNE	94.3	86	4.25	11.35
JULY	92.3	86	4.13	15.76
AUGUST	91.6	89	4.00	16.74
SEPTEMBER	88.5	95	3.5	13.29
OCTOBER	82.0	83	2.8	15.22
NOVEMBER	65.3	77	1.7	13.64
DECEMBER	74.9	77	2.9	8.52

Note: Met Station established on 4th June, 1985.

APPENDIX F

Social Soundness Analysis Of Balochistan Road Project

SOCIAL SOUNDNESS ANALYSIS
BALOCHISTAN ROAD PROJECT

I. INTRODUCTION

A. The Project

The Balochistan Road project aims at improving a 376 kilometer road that extends from Bela on RCD Karachi - Quetta Highway to Turbat near the Iranian border. The road follows a traditional and ancient camel track that historically formed the southern route linking the Indian sub-continent with Iran and the middle East. Although nominal vehicular traffic existed between Awaran and Turbat, a traffic over the 150 kilometers between Bela and Awaran was started for the first time in 1962 during the Ayub regime. At that time Regional Cooperation for Development (RCD) was formed between Pakistan, Iran and Turkey. Part of this effort was to link the three countries by a modern road system. The Pakistan portion was to pass through Karachi, Bela, Awaran, Turbat and Mand at the Iran border. For political reasons this project was dropped. Subsequently, the RCD highway was built between Karachi and Quetta. The proposed Bela Awaran Turbat road follows the same route as proposed for the original RCD highway. The purpose of this report is to assess the socio-cultural soundness of the Balochistan Road Project. In assessing the social feasibility of the Project, the existing socio-economic environment in the Makran and Jhal Jao/Kolwa regions and the project's potential impact on various socio-economic groups will be discussed.

B. Methods of Investigation

In order to develop this social soundness assessment, published and unpublished documents on Balochistan, Mekran and Jhal/Jao/Kolwa regions were collected and reviewed. Such documents were obtained from USAID Islamabad and Quetta offices and from libraries and personal resources. Government of Balochistan Publications and office records were also studied. An informal questionnaire for field investigation was developed based on the scope of work provided and after discussion with the USAID office of Engineering staff at Islamabad. Field site investigations were started on June 8 and continued up to June 23, 1990. The places visited during the trip included Khuzdar, Bela, Jhal Jao, Awaran, Turbat, Jiwani, Gwadar, Pasni, Ormara and Panjgur. In these areas farmers, shepherds, fishermen, government employees, businessmen, industrialists, community leaders and members of local, provincial and national councils/assemblies were interviewed. Traveling by road, the availability, present uses and state of conservation and depletion of various natural resources were also observed.

II. SOCIO-CULTURAL AND ECONOMIC ENVIRONMENT

The history as well as socio-economic and political conditions of Jhal Jao/Kolwa region, through which about 300 kilometers of the road passes are somewhat different from that of the Kech/Makran area. Therefore a separate description of the two areas will be offered wherever necessary.

A. Social and Political History

1. Balochistan

Balochistan has an area of 347,000 square kilometers. It is Pakistan's largest but least developed province. It borders the Arabian sea to the south, the Iranian Province of the same name to the west, Afghanistan to the north and the Pakistani provinces of Sind and Punjab to the east. Balochistan has historically served as a corridor for conquerors, traders, religious, cultural, and linguistic influences, passing between the Indian sub-continent on the one hand and Iran, the Middle East and the West on the other. Balochistan is largely arid and semi-arid and the carrying capacity of the land is very low so that a population of 4.3 million represents only 4% of the Pakistan total. Balochistan's low level of development is reflected in its low income levels and inefficient infrastructural base. The province's per capita income Rs.3,000 is equal to the country's absolute paverty level and less than half of Pakistan's average. There are few industries in the province and mineral resources largely remain undeveloped. The ratio of 0.0009 kilometer of road way per square kilometer is the lowest by for of all provinces in Pakistan. A large part of Balochistan's population lives in dispersed and isolated settlements and is still predominantly nomadic and tribal.

Most of Balochistan inhabitants belong to various Baloch and Pushtun tribes, although minority ethnic groups of Iranian, Afghan, Sindhi and Punjabi origin are also found. While Pushtu is the main language spoken by Pushtun tribes, Balochi and Brahvi are the main languages spoken by the Baloch populations of the province. According to provincial government statistics 35% of province's population speak Balochi. 25% speak Pushtu, and 20% speak Brahvi. The rest speaking Farsi, Sindhi and Punjabi etc.

There is no authentic written history of the Baloch people but it is generally believed that various Baloch tribes lived in the western and central Asia before migrating to the present day Balochistan. The account of the movement of various Baloch tribes from Iranian Makran and Kirman to Balochistan in the 16th century is the first documented piece of Baloch history. Perhaps the greatest Baloch personality of this time was Chakar Khan, the Chief of Rind tribe, who ruled in the present day Sibi and surrounding areas during the middle of sixteenth century. Tribal wars ended his domination and after a period of anarchy and inter tribal feuds another Baloch tribe, Mirwari, came into prominence. One of its clans, the Ahmadzai, established a Khanate at Kalat. Naseer Khan, one of the Ahmadzai Khans, for the first time in Baloch history brought all Baloch areas from Iran to the Indus under his domination around the middle of the 18th century. When the British entered Balochistan 100 years later they found a weaker Khan of Kalat with a much contracted tribal empire. Under their so called "Forward Policy," the British divided Balochistan into two administrative regions. In the first region, the areas bordering Afghanistan were combined to form British Balochistan under a direct British administration. In the second region, comprising areas from Quetta to the Arabian sea in the South and Iran in the West, the Khan was allowed to continue his rule while recognizing British dominance and control of external affairs. At the Partition of India in 1947 both the British and Khan ruled Balochist .. became part of Pakistan. Balochistan attained provincial status in 1970.

2. Makran

Makran, a former princely state, is now one of the six administrative divisions of Balochistan and is located in the south western corner of the province. Makran has a geographical area of 55,000 square kilometers and a population of 650,000 according to the 1981 census. Makran, along with a region by the same name in adjacent Iranian Balochistan, has a distinct historical position. The name of the area is said by some to be derived from Mah Karran (Shore of sea) and by others, from Mahi Khoran (fish eaters). Because of its location on the main corridor between the Indian sub-continent and the Middle East and the West, Makran has historically been the most important part of Balochistan.

In Iranian history Makran is referred to as an important province under various empires. The armies of Alexander the Great passed through Makran in 325 B.C. Makran was part of the Sassanian empire during 5th and 6th centuries. About the middle of the 7th century Muslim Arabs conquered Makran and made it a part of their expanding empire. Various Iranian, Turkish, Afghan, and Mongol invaders brought Makran temporarily under their control. However, probably because of its harsh physical environment and relatively poor resource base they could not hold on to it for long. The Ahmadzai rulers of Kalat first invaded Makran in 1715 but it was not until the time of Naseer Khan in the Middle of 18th century that Makran was finally subjugated and brought under the dominance of Kalat. From that time until the creation of Pakistan, Makran remained under the rule of the Khans of Kalat. In 1947, along with other Kalat states, Makran became part of Pakistan. In 1976 it became a separate district under the Kalat division and in 1986 it was made into a full fledged administrative division of Balochistan.

Makran civil administration is headed by a Commissioner with one Deputy Commissioner in each of the three districts of Turbat, Panjgur and Gwader. As regards educational facilities, Makran Division has 318 primary, 60 middle and 34 high schools besides 258 mosque schools. The enrollment respectively is 13,835, 11,180, 14,799 and 9,150. Makran also has two degree colleges at Turbat and Panjgur with a total enrollment of over 600 students. Makran division has three government hospitals, 31 dispensaries and 42 basic health units. But most of the hospitals and dispensaries are without doctors and medicines due to Makran's remote location and inaccessibility.

3. Jhal Jao/Kolwa/Awaran Region

Jhal Jao/Kolwa/Awaran Region has historically been either part of Makran or the Kaikan (Khuzdar Jhalawan) region and has less political importance of its own. But 300 kilometers of the road passes through this region. It is the largest rainfed agricultural tract in the region and appears to have much potential for economic development. The entire region in different administrative zone has an estimated area of 15,000 square kilometers and a population of 200,000. The

Awaran administrative sub-division has an area of about 3,000 square kilometers and a population of 110,000. Between Bela and Awaran the only significant area of interest is the valley of Jhal Jao. Jhal Jao (meaning lower Jao) is a sub-tehsil of Awaran sub-division. Unlike the rest of Awaran sub-division which has been part of Makran in the past, Jhal Jao has always been part of Jhalawan (Khuzdar) country. The main population and economic center of the valley is Sar Jao (upper Jao) or the village of Pelar 68 kilometers to the north. Although part of Jhalawan socioculturally and linguistically, it is more akin to Awaran/Kolwa and Makran. Jhal Jao sub-tehsil has a population of 29,000. The main tribe living here is Bezanjo, although Channal Mirwari and Mohammad Hasani are also found. Jao has one high and one middle school, a hospital and a rural health center.

Kolwa/Awaran valley starts from the town of Awaran and continues up to Hoshab 150 kilometers to the west. Administratively the first 88 kilometers of the road to Maadag-i-Kalat lie in Khuzdar district of Kalat Division, the remaining portion of 62 kilometers lies in the Turbat District of Makran division. Awaran Tehsil has a population of 43,000. Before the British arrived in this region Kolwa was part of Jhalawan country. In 1891 it was made part of Makran and in 1976 a part of Kolwa was again annexed to Jhalawan (Khuzdar district).

Kolwa's historical importance lies in that Mir Chakar, the hero of Baloch Ballads was born at Ashale Kalat near Rodkan in Kolwa during the eastward migration of Baloch around 1500. As a result of a 15th century war between the Brahuis and Jadgals of Bela, the victorious Mirwari tribe received Awaran as their share. During the 18th and 19th centuries the Mirwari, Nausherwani and Bezanjo tribes fought for the control of agricultural lands. The Nausherwani tribe, with the help of the Gichkis won most of the wars and lands but Mirwari and Bezanjo tribes later acquired some of these lands through purchase and marriage. The various tribes living in the entire vicinity of the road are Balochi speaking and include Bezanjo, Mirwani, Nausherwani, Rakhshani Mohammad Hasani Samalani Jarozai and Darzadag tribes. The main villages/settlements in Kolwa are Awaran, Chambur, Pirandar, Mashi, Bedi, Malar, Hor, Gishkaur, Maadagai Kalat and Tank. Awaran has two high schools, two middle and fifteen primary schools. Awaran has a hospital, and Gishkaur and Malar have health centers.

B. Social Organization

Social organization has been and still is somewhat different between the Jhal Jao/Awaran/Kolwa region and in the Kech/Makran valley. A separate description for each of the above regions is therefore offered.

1. Jhal Jao/Kolwa/Awaran Regions

In recent times, these areas have been under different administrative units but have historically been part of Jhalawan ruled by representatives of the Khans of Kalat. Although Bezanjo, Mirwani, Mohammad Hasani and Rakshani group make up the bulk of the population, sections of Kalandarani, Kahodai, Sangur, Kolwai, Sajidi, Channal, Somalani and Jihandani are also found. Each tribe (Qaum) is divided into clans (Takar/Shakh) which are in turn divided into sections (Tall/Tabar/Log). Here for centuries a relatively egalitarian based tribal system existed. Tribesmen owned allegiance to their clan and section heads who themselves owed alliance to the Sardars. The Sardar was sometimes independent and at other times under the overlordship of the Khan of Kalat. The system was relatively egalitarian because only the chiefs and sometimes section head's families were highly placed in the society, all other tribesmen being equal in status. The Sardar received voluntary contributions called Bijar from tribesmen and generally no coercion was involved. It is only recently that a tribesman was required to pay a fixed portion (usually 1/6th) of his produce to the chief. Most land in Jhal Jao and Kolwa was owned by Mirwari, Bezenjo, and Nosherwani Sardars. As a result of 1972-1976 land reforms introduced by the then Bhutto regime, most land is in the possession of owner cultivators. There is still tribal solidarity and co-operation at the local level. Marriages still take place principally within the tribe and elders settle inter-tribal disputes. However, with the reduced power of the main player, the Sardars traditional social organization is also in decline.

2. Makran

In Makran there is an almost complete absence of organized tribes and tribal social organization. The society in Makran has historically been stratified and class ridden. There are three main social strata in Makran; the Hakims, the Baloch, and the Hizmatgar. The Hakims are the traditional ruling elites of the area and include Gichki, Naushenwani, and Bezanjo. These three tribes have smaller numbers resident in Makran. The Gichki were the most recent rulers of Makran. Their members are widely dispersed in Makran, hold property and are also part of the modern leadership in Makran. The former Nawab of Makran now spends more time in Karachi and Quetta than in Makran but is still probably the wealthiest person in Makran. He is not without political power. The Bezanjos are genealogically Brahvi and live in a vast area between Bela Hoshab and Khuzdar. The Bezanjo chief lives in Naal 40 kilometers from Khuzdar. The Naushærwani are the former rulers of Kharan state, Makran, and Kolwa. Residents of the main branch of Nausherwanis still live in Kharan.

The groups referred to as Baloch in Makran are either animal raisers or small land holders. Although they belong to various Baloch tribes who may be organized tribally elsewhere, no such organization exists in Makran. A Kahudai/Komash/Mastar could be a village or area elder who is the traditional leader of all area residents but has himself recognized the authority of the ruler whether he was a Gichki or Nausherwani or Bezanjo. The main Baloch tribes found in Makran are Hot, Kalmati, Rind, Kahudai, Rais, Sangar, Puzh, Wadela, Kashani, Mullazai, and Kinagizan.

The Hizmatgar were formerly considered an inferior race and consist of Nakib/Darzadag, Med, Lori, and Golam tribes. The Nakib/Darzadag have been landless agricultural laborers and were considered skilled and hard working farmers. The Med are fishermen and live along the length of the Makran coast. The Loris have traditionally been carpenters, black smiths, and musicians. the Golam, which means slave, are people of mainly African origin who were slaves until the first part of this century. They have since either migrated to Karachi and other places or continue working as domestic help and maids mostly with their former masters.

With modern education and exposure to the outside world all in Makran consider themselves Baloch and equal in status. Upward mobility among farmer lower classes is not only possible but has actually been achieved in numerous cases.

C. Leadership

1. Kolwa/Awaran/Jhal Jao

In the region neither tribal organization nor traditional leadership patterns are as strong as in other areas of Balochistan in the North. Yet tribal social organization and a hierarchical leadership system exist. The tribe is headed by a Sardar while each clan, section and family under him is headed respectively by a Motabar/Mir, Takri/Kahudai, and Spetrish. Since the incorporation of the State of Kalat in Pakistan and the demise of the Khan of Kalat as Chief of Chiefs, the traditional Sardari system in this region has weakened considerably. The Bhutto land reforms of 1972-76 which abolished Shashak (1/6th of produce owed to the chief) and the ensuing Sardar vs. tribesmen conflicts further weakened the system. The conflicts also resulted in the tribesman uniting under their local, sub-tribal, and sectional leaders against the Sardars, most of whom also lived outside the area. The Bezanjo chief lives in Naal near Khuzdar while the Nowsherwani chiefs live in Kharan hundreds of kilometers away. Tribal solidarity was evident when Mr. Majeed Bezanjo won election to the provincial assembly. Mr. Bezanjo is the nephew of an assassinated pro-Bhutto land reform and anti-sardar leader, and now a Minister in the Balochistan Government. The Mirwari tribe chief, Sardar Qadir Buksh, lives in Mangoli Kalat about 40 kilometers from Awaran. In general, the chiefs and their families still command some respect and following, but traditional authority has been seriously challenged and undermined during the last few years.

2. Makran Area

Most recently, Gichkis and to a lesser extent Nausherwani and Bezanjo provided traditional leadership in Makran. These families still own most of the productive land in Makran and being richer also have better access to educational facilities and to positions of authority in Government and business. Significant changes in local class structure and leadership patterns have taken place during the last two - three decades. Job opportunities in the Arab Gulf countries attracted more young Makranis from the poor and formerly inferior classes. As a result, mainly of higher wages and incomes from the Gulf, traditional economic leadership is fast slipping away from the former ruling classes to the middle and lower classes. So there is a newly emerging economic, political, and social leadership in Makran.

There is a continuous struggle between those offering a traditional leadership and those offering a new alternative. In spite of recent attempts, religious leadership could not get a foothold in the region. Young leadership demanding provincial rights have won provincial and national assembly seats throughout Makran during past elections. This is in stark contrast to the rest of Balochistan where either traditional tribal or religious leaders won most of the assembly seats. Grass roots leadership in Kolwa as well as Makran is provided by elected members and chairmen of local councils. Throughout the region local government officials (Naib Tehsildar, Tehsildar, and Assistant Commissioners etc) are normally local people with knowledge of the socio-cultural environment and have, in most situations, a harmonious relationship with the people.

D. Economic Organization

Makran has a total of 5.5 million hectares of land with a 400 kilometer coast along the Arabian sea. Most of the Makran population extracts a subsistence living from these resources. In the northern most district of Punjgur 90% of the population is dependent upon irrigation from the Rakhshan semiperennial river. A similar percentage of the central Turbat District population is dependent upon the Kech, Nihing and Dasht River systems. Water from these river systems is used for both irrigation and drinking. The main agricultural produce of Makran is dates. In 1989 an area of 7,000 hectares produced about 64,000 tones of dates. 17% of the Makran population lives in Gwadar district and is mainly dependent upon fishing and related activities. During 1988, some 95,000 metric tons of fish valued at 417 million rupees were produced in Makran. A relatively smaller portion of the Makran population engages in dry land farming, animal husbandry, trade and services. The number of Makranis working in the Persian Gulf countries is not large, but their wages, sometimes up to 60 times as high as in Makran, make them an important economic class in Makran.

The Jhal Jao/Kolwa/Awaran region has a different resource base and topographical conditions than Makran. Under the circumstances people have to exercise all survival strategies possible. In the mountains of Jhal Jao and Kolwa people mainly raise sheep and goats. Low rainfall and grazing capacity mitigates against large flocks. Normally people must supplement incomes by cutting and selling local dwarf palm (Peesh) or by engaging in seasonal work. In the valleys of Jhal Jao and Kolwa/Awaran, people mainly engage in dry land farming. In the Eastern areas of the valley Mashkai and Doraski are the two river systems which flood the dry arable land. The areas in the center and the West of the valley are basins of closed drainage and only the locally collected flash flood waters are used for cultivation. In areas around Awaran Town where both surface and underground water resources are relatively abundant, there is irrigated agriculture. The main crop in the region is barley. Earlier the main staple, barley is now produced primarily for market not for home consumption. It is estimated that one of Khuzdar districts 8735 hectares of land producing 5520 tons of barley grain comes from Jao/Kolwa and adjacent areas. Barley has a lower production cost than wheat, serves as a better green fodder, and sells for at least as much per unit. This combined with soil and conditions more suitable for barley production make it the most profitable crop. The main market for barley is Karachi.

III. SOCIAL FEASIBILITY

The project aims at improving an existing road system and at fulfilling one of the most important needs of the people of south western Balochistan. Therefore, in general the project is feasible and in the interest of the people of the area. But the construction of a major road system which links a vast region of Balochistan with the main Pakistani markets on the one hand and with markets in Iran and, the Middle East on the other will have important socio-cultural, economic and political consequences for the local population. Some of the issues related to social feasibility are discussed below:

A. Socio-economic Considerations

1. Over 70% of the Balochistan territory and 30% of its population lives in the region which lies west of the RCD highway and lacks any quality road system. The road and railways linking Quetta to Iran were constructed by the British for strategic and political reasons and even today have far less socio-economic importance than the Bela Turbat road for various reasons. In Pakistan the 600 kilometer long rail and road system passes through the Chagai district, a desert waste with a population no larger than the Awaran sub-division's 110,000. Ascross the border in Iran in the area bordering Makran, there is a larger population and production centers as well as good quality roads. As a consequence the potential socio-economic and trade benefits of the road for Pakistan are very high compared to any other road system linking Pakistan with Iran.

2. Due to certain socio-economic and climatic factors Makran as well as Kolwa/Awaran have become areas where dates, fish and barley are produced in large enough quaiities to produce a surplus for export whereas almost all necessities must be imported. Trade is being carried out now at great disadvantage to the Makran population because of the high costs of transportation due to lack of a quality road system.

3. Given the absence of employment opportunities in Makran, many people engage in narcotics smuggling. New job opportunities resulting from establishment of a modern road system will enable many of these people to choose more respectable undertakings to make a living.

4. Thousands of Makranis working in Karachi and in the Middle East have accumulated capital resources, but to date have had no profitable investment opportunities in Makran. The local market being very small, any investment in agriculture, fisheries, animal raising and in other areas could only be profitable if reasonable cost access to outside markets is possible. This road will provide that opportunity.

5. Forced by economic necessity, many Makranis and Kolwas have been working in the Middle-East. These countries virtually require single-status employment. The result is social disruption and split families. There are alarming reports of widespread drug addiction among children and teenagers in Makran. This is a new phenomenon and may be a direct consequence of the long absence of the father. A number of persons working in the Gulf were interviewed in Turbat these indicated that road construction and subsequent investment and employment opportunities will lure many workers back to Makran.

6. Based upon the experience of the past 4-5 years, most of the initial investors would be expatriate Markanis themselves. Makranis have been emigrating since the early part of this century but most have maintained contacts with families and relatives in Makran. Among them are industrialists and businessmen both in Karachi and the Middle East. These people likely would be the first to invest. But Makranis, in general, have been an open-minded and non-xenophobic people. As an example, one of Makran's most important elected leaders during the 1960s and 70s was a Sindhi. In the 1989 election a politician of Punjabi origin defeated a Baloch candidate to become an MPA. There are non-Baloch landlords, farmers, businessmen and traders all over Makran. In Makran social, linguistic and religious prejudices are almost non-existent.

B. Political Considerations

1. Makran and the adjacent areas of Kharan and Jhalawan have remained the most neglected and least developed areas of Balochistan. It is due to this sense of deprivation that Baloch nationalism and a secessionist movement attracted most of its adherents from this part of Balochistan. It is in the best interest of the region's stability that the people of this area are made partners in Pakistan's socio-economic development. The construction of an efficient road system will be an important step in this direction.

2. If the road were proposed in the sixties and seventies there would likely have been tough resistance by the Baloch nationalist movement as happened in case of the RCD highway. Although mild political opposition to various Federal Government policies remain today, USAID activities are not considered inimical and against Baloch interests. In this respect, a dozen or so Makranis educated in the U.S. have returned recently are doing a very important job of removing misunderstandings and spreading goodwill for the U.S.

3. A road toll tax for maintenance is feasible, but rates and modes of implementation should be thoroughly discussed with local people and government officials. A few years back a toll tax was imposed on the RCD highway and the contract was auctioned off to a Mengal tribesman from Wadh area. The contractor kept a gun in his office and on occasion used it against violating drivers of vehicles who attempted to avoid the toll. To avoid law and order problems the administration finally abolished the toll tax.

C. Environmental Considerations

1. Makran's arid and semi-arid environments are precarious. Without access to and the use of modern technology, the rates of exploitation of natural resources such as water, soil and vegetation as well as fish are generally consistent with naturally sustainable growth rates. However, the Baloch over the years developed socio-economic and political institutions which, among other things, regulate the use of local resources of rangeland, fuel and timber trees. The animal raisers in Jhal Jao have institutionalized rotational grazing of common rangelands. In Makran new karez developers must keep a specified distance from existing Karezes. Similarly, in coastal areas, use of certain

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fishing gear is prohibited. Fishermen in Pasni and Ormara are prohibited catching small fish as this depletes sustained yield since they serve as food for the larger fish that the fisherman prefer to catch. In Kalmat, 90 kilometers from Pasni, catching of shrimp is banned during May and June. All of the above conservation methods are institutionalized social arrangements aimed at utilization of resources at levels consistent with sustainable yield. With more exposure to outside influences and market forces these institutions will come under increasing pressure.

2. The Gazetteer of Balochistan published in 1906 says "as a grazing ground Makran compares favorably with other parts of Balochistan owing to the large uncultivated tracts which it contains, in most of which fodder is plentiful." However, In June 1990 the price of meat is 40% higher in Turbat than in Quetta an indication of a worsening of the rangeland resource. One government official who grew up in Turbat says that in 1960 there was a dense forest in the Kech bed just outside of Turbat where wild animals could be seen. The Kech river in the same vicinity had numerious deep lakes. Neither exists today.

As has happened in the developed countries of the world, productivity of the rangeland and the forests can be revived with the use of modern technology. But if that is not done, easy access to outside markets provided by the road may result in further depletion of Makran's natural resources. After using and discarding plastic bags and wraps for over a decade in Makran, people have only now realized that this was a costly business. The plastic bags in thousands accumulated in Karez wells and clogged their discharge and channel flow. The cost of cleaning the Karezes are higher than ever before. The lesson is that consequences of introduction of even basic and simple technologies should be well understood before they are adopted.

IV. BENEFICIARIES AND DISTRIBUTION OF BENEFITS

The primary beneficiaries would be the people of Jhal Jao Awaran/Kolwa and Makran areas. The primary benefits would accrue to the local farmers, animal raisers, businessman and fisherman in the form of direct employment opportunities and improved access to outside markets for inputs and products. Improved living conditions would result from higher incomes, lower costs of living, and better access to and availability of educational and health facilities and other amenities of life. The Secondary beneficiaries would be the communities living in the entire south-western regions of Balochistan extending to Kharan and Chagai Districts in the north west and Kalat and Khuzdar Districts in central Balochistan. Secondary benefits would accrue in the form of increased employment opportunities, availability of productivity enhancing inputs and improved access to markets. Improved income levels and better access to social services will benefit the entire region directly and through trickle down effects. The multiplier effects would include higher land values, production of high value crops, animals, and fish; high profits to the businessman resulting from higher employment; higher incomes, higher consumption levels, and higher demand for goods and services.

As far as the distribution of benefits is concerned, the following shows how residents of the area will benefit.

1. As mentioned earlier all necessities of life including staple grain in Makran are imported from outside, mainly from Karachi. While there is little question small land owners will benefit from a reduced price for inputs and better areas to markets, the poor spend a disproportionately higher percentage of their income on imported necessities and high costs of transportation hurt them the most. Accordingly, the construction of an efficient road system and consequent lower costs of transport would benefit both landowner and the poor.

2. Until recently a form of absentee landlordism existed in Kolwa region under which a few Sardars owned all agricultural and grazing land. The cultivators then were tenants who could be evicted at will. This situation has now changed and the former tenants have themselves become owners who cultivate their lands themselves in Makran, the holdings have always been small. According to best estimates, in the entire region the average land holding is two hectares of irrigated land or 20 hectares of rainfed land. The rangelands are under common ownership and the size of flocks are at or below subsistence level. Fishermen belong mostly to the poor coastal Med tribe coast and barely make a subsistence living. The above are specific groups who will have better access to both inputs and markets for their products.

3. The construction of the road would provide greater mobility to agricultural and other labor. Scarcity of agricultural labor and higher wages in recent years in Makran have mainly been du- to competition for labor from the Middle East. But studies in Khuzdar and Nal area indicate that agriculture labor have benefited significantly from the construction of the RCD Highway. Until the mid-seventies a share-cropper was paid 1/5th of fruit crop and 1/4th of all other crops. Now-a-days the share is 1/4th and 1/3rd respectively. The change is due to increased mobility of labor made possible by the construction of the road.

4. Land and water rights and in some cases even fishing boats in Makran are also owned by women. Therefore improved access to inputs and markets will equally benefit women. Women will naturally benefit from better availability of social services and from general improvement in the living standards of the people of the area. The women will especially benefit when their products including leather and cloth embriodery work and peesh (dwarf palm) products have improved access to markets.

V. CONCLUSIONS

It may be concluded on the basis of the preceding discussion that the Bela-Awaran-Turbat road project is socially feasible. There will be no social or cultural impediments to the successful implementation of the project. Similarly there is no likelihood of rapid and unmanageable social change nor of any radical disruption of the existing social organization. The road is a basic felt need of the areas population and its importance is well understood by the local population. In fact, the construction of the road is considered by the majority of the population a sine qua non for the development of the area and for improvement in their living standards.

As would be in case of any project opening an area to modern influences, markets and technologies, there are genuine concerns over possible alterations in the environment. The BAT road design provides for adequate measures to alleviate problems associated with stagnant water, litter, soil erosion and slides etc. as a result of the construction work. Issues related to the possible enhancement of the natural resource depletion can be addressed through a combination of socio-economic and technological measures. The discussions during the Environmental Scoping session held in Quetta on June 25, 1990 revealed that the people and the Government of Balochistan are aware of and concerned about environmental degradation and are keen to adopt mitigating measures in this regard. On the positive side, the road will make it easier to introduce techniques and technologies for the improvement of the environment. Depleted rangeland, forest and water resources can be revived and replenished. According to UNICEF and GOB health department figures, diarrhoea and other cases related to unsafe water cause thousands of deaths, mainly among children in Balochistan. An efficient road system will make it easier for the government and domestic and international social organizations to provide cleaner drinking water as well as relevant education to the people of the area.

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APPENDIX G

Considerations On Environmental Heath Implications

CONSIDERATIONS ON ENVIRONMENTAL HEALTH IMPLICATIONS AT BELA-AWARAN-TURBAT ROAD PROJECT

INTRODUCTION: The Bela-Awaran-Turbat Road aims at improving a 376 kilometer road that extends from Bela to Turbat enroute Awaran. According to UNICEF and GOB health department figures, diarrhoea and other cases related to unsafe water cause thousands of deaths, mainly among children in Balochistan. An efficient road system will make it easier for the government and domestic and international social organisations to provide potable drinking water as well as relevant education to the people of the area.

Like any construction project this will also involve a number of health implications both to the working population at site and the people dwelling in the vicinity or even for the passersby.

IDENTIFICATION OF HEALTH HAZARDS:

1. ACCIDENTS: It should be noted that accidents and injuries are an integral part of any process where man-machine integration is involved. The causes are usually complex and involve both, the operator-error in misjudgement and the hazards arising from the machines (vehicles, mixers, cranes etc) and equipments, tools etc.

   Accidents have hierarchy of causes which may be simply presented as:

ACCIDENT

- Preventable
  - Cause (Direct or Contributory)
    - Human failure
      - Error
      - Ignorance
    - Unsafe condition
      - Mechanical
      - Physical
      - Chemical
      - Environmental
        - Underlying cause: Human failure
- Not preventable

Accident prevention is essentially an engineering problem and mainly rests on strict compliance with safety rules and regulations.

For this to take effect 'Safety consciousness is essential' both on the part of the contractor as well as his labour. The project incharge has to make sure that the contractor has fulfilled this requirement before starting the work and continues to do so.

2. ENVIRONMENTAL HAZARDS: By 'Environment' is meant man's surroundings which include all the circumstances, influences and events that he encounters in his life-time.

Environment may be physical e.g. water, air, food, housing, climate, occupation etc; it may be biological e.g. contact of man with animals, insects, parasites and the organisms; it may be social environment, that is, contact of man with persons other than himself; and it may be economic environment which is the way of life as influenced by the economic circumstances. An abuse of some or all of these elements leads to unhealthy state in the community. To prevent and control such a state application of the principles of Environmental Sanitation is needed because it deals essentially with measures which are found desirable for promoting optimum conditions for man's health and well-being.

Environmental hazards associated with the project under study can be classed as under:

2.1 Spread of Communicable Diseases:

A communicable disease in man is a state of disorder that results from the entrance of micro-organisms that are pathogenic and can be communicated to other individuals in the community. Only the relevant and important of these diseases have been mentioned here with a brief description of these causative agents, clinical course and preventive methods thereby. Only a guideline for the preventive methods has been given here which should be applicable collectively to all the communicable diseases anticipated in the project area.

2.1.1 MALARIA: This is a protozoan disease transmitted to humans by the bite of Anaphiles mosquitoes. It is characterised by rigors, fever, splenic enlargement, anaemia and a chronic relapsing course. First attacks are often severe but repeated episodes become milder, although debilitations may be progressive.

Malaria is carried from person to person by certain species of Anapheles mosquitoes, the parasite requiring two hosts to complete the life cycle, the mosquito being the 'definitive' host and man the intermediate host.

The area where road construction is to be carried out is known to be notorious for Anapheles mosquito breeding and July to November are the months mostly infested.

Preventive and Control: The guideline will be:

2.1.2 Protection against the bites of the mosquitoes: This may achieved through the use of mosquito nets and local application of mosquito repellent lotions.

2.1.3 Weekly prophylactic administration of anti-malarial drugs.

2.1.4 Destruction of mosquitoes in the larval stages: Anapheles larvae breed in the depressions caused by a number of factors including animal hoofs in which water stagnates during rains or constructions.

Use of proper larvicide may be carried out as a regular drill, but this will involve a very close collabration between the government and the contractor. Spray killing of mosquitos is perhaps the most effective method. Pyrethrene is the main insecticide used for this purpose, Dendrine has also proved very effective.

2.2 LEISHMANIASIS: This is a human disorder produced by flagellated tissue protozoa of genus Leishmania. It is transmitted from animal to human being by the bite of phlebitomine sandflies. Three specific names are given to the organisms which cause three different forms of the disease, the visceral form known as Kala Azar, Cutaneous form known as Oriental Sore or Quetta Sore, and the mucocutaneous type known as Mucocutaneous Leishmaniasis. Kala Azar is not known to occur in Quetta region and Mucocutaneous type is also rare.

2.2.1 Cutaneous Leishmaniasis: The characteristic lesion is initiated in a granular nodule which ruptures into an open ulcer, usually on exposed part of the body. The lesion may remain localised and after a year or more may heal permanently leaving disfiguring scar. The causative organism is Leishmania Tropica and diagnosis is made by taking smear from the base of the ulcer from the living person. The infection is transmitted by the bite of sandfly. Dogs and rodents serve as reservoir of infection. Since sandflies live in the burrows of rodents, their infection rate is the highest. One attack confers permanent immunity. The lesions may be multiple or chronic skin ulcers, destructive mucocutaneous lesions or disseminated infection resembling leprosy.

2.2.2 SANDFLY FEVER: The sandfly exists in many parts of Balochistan including the area through which BAT road is running. The sandfly is smaller in size but resembles a bee. It operates at a height of 1.5 to 2 ft and is active in dull light or darkness such that every affected person has been bitten above the ankle and below the knee if standing but in a sitting or relaxing position it may bite at any part of the body. The fly is posionous and is attracted by human flesh.

The condition is characterised by a 3-4 day fever with headache, retrobulbar pain on moving the eyes, injected sclera pain in the limbs and back and malaise. Clinically it resembles influenza. It is rarely fatal. The causative organism is the virus of sandfly.

Prevention includes : Wearing of full shoes with long stockings upto knee, covering of entire body except the face, avoiding relaxing postures on the ground, having the beds at least two feet above floor level and rooms and bathrooms perperly lighted.

2.3 TYPHOID FEVER: It is an acute infectious communcable disease characterized by continuous fever, malaise, nuroxia, haedache, enlarged spleen, intestinal symptoms and slow pulse. Man is the only species which serves as a reservoir of infection. Infected persons may be cases of carriers. The causative organism resides in gall bladder, intestines, kidneys, bones and cartilages. The organisms escape in stools and urine of cases and carriers. Transmission to new hosts occurs directly or indirectly through contaminated food, fingers, formites, faeces, and flies. Transmission is influenced by season, the incidence of disease being higher in summer. Cultivated soils impregnated with organic matter, insanitation, defective system of disposal of refuse and human excreta and contaminated water supply are several factors of physical environment which raise the disease incidence. Since house flies play an important part in the mechanical transmission of infection the increase of disease in summer may be partly due to increase in the number of flies in the season.

Typhoid bacilli enter the body of new hosts through the mouth by ingestion of infection with the contaminated food.

Pure water supply, imporved drainage and personal hygiene diminish the incidence of the disease.

Artificial active immunisation protects the individual for 12 months.

Treatment is done by antibiotice therapy chloremphencol being the antibiotic of choice.

2.3.1 Paratyphoid fevers: The natural history and cause of disease is clinically in distinguishable from Typhoid fever. However, paratyphoid fever is a milder illness. Treatment is with Cotrimaxazole two tablets daily.

2.4 BACILLARY DYSENTERY: It is an acute self-limiting intestinal infection caused by either of the four organisms viz Shigella Shiga, Shigella Dysenteriae, Shigella Flexneri, Shigella Soneri. It is characterised clinically by fever, abdominal pain, tenesmus, and frequent stools which contain mucous, blood and pus. Treatment by antibiotics preferably of Tetracycline group.

Prevention: Waste food from the patient's meals should burnt.

Before throwing stools or urine discharges into a toilet or privy, they should be thoroughly mixed with chloride of lime and allowed to stand for one hour.

Protection of food and antifly measures.

Personal hygiene.

2.5 AMOEBIC DYSENTERY: Amoebic Dysentery is an acute or chronic infectious disease caused by a protozoan residing in the colon, and characterized by involvement of the large intestine and discharge of blood and mucus. Usually there is no fever or toxaemia. Nausea and anorexia are often present but there is generally no dehydration. Treatment is given by Metrinidazole 800mg three times daily for 5 days.

Prevention: Improved personal hygiene and water quality are important. Cysts are destroyed by boiling water for at least ten minutes but the effects of chlorination are variable. It is transmitted through food and water. Carriers should be excluded from food carriers.

2.6 TUBERCULOSIS: It is a specific communicable disease caused by Mycobacterium tuberculosis. The sources of infection are sputum or excreta of tuberculosis patient containing tubercle bacilli. It is transmitted by droplet infection by direct droplet spray generated by the infectious patient by coughing, sneezing etc. However, the most important method is through dust laden with tubercle bacilli which gets contamination from sputum of patients deposited indiscriminately on floor, road etc, dries and gets mixed with the dust. Unboiled milk from cows suffering from udder tuberculosis is another source of infection.

Our concern is mainly the Prima: · Pulmonary Tuberculosis. Environmental factors responsible for Tuberculosis are unhygienic living conditions, especially overcrowding and slum formation, malnutrition, poor economic state, mental stress, intercurrent infections and concomitant disease, certain endocrene disorders and occupation.

In road construction operations slum creation and dust laden with silica are very important factors.

It is an insidious disease. It does not produce violent symptoms like other infectious disease. By the time the classical symptoms of cough and expectoration, fever and loss of weight are evident, the person has infected many people. It is therefore necessary to find cases early so that they can be prevented from becoming infectious. The following are the case finding techniques for early detection or diagnosis of cases:

(i) Tuberculosis testing.
(ii) Xray examination of chest.
(iii) Bacteriological examination of sputum.

It is common observation that many people who have tuberculosis may be free of symptoms and even physical signs. Xray examination in these persons is the only criterion whereby a presumptive diagnosis of tuberculosis can be made. Ideally every worker involved in road construction must be xrayed for evidence of disease. Help may be sought from Mass Minature Radiography (MMR) if available nearby.

Treatment cannot be instituted on the site and the patient must be isolated and shifted to a hospital for treatment.

Application of environmental sanitation standards, personal hygiene, avoiding slum creation and isolating the suspects are the most important preventive methods along with chest xray of every worker before his employment.

2.7 WORM INFESTATION: There are three important forms of worms that deserve mention. They are Hook Worms, Round Worms and Thread Worms.

Hook Worms cause a debilitating disease producing chronic anaemia due to blood-sucking activity of these worms. Malnutrition is invariably a predisposing factor. Microscopic examination of stools for ova of hook worms is confirmatory for diagnosis. The source is soil infected with hook worm larvae

Reservoir is faeces of infested persons. Contaminated faeces are deposited on the soil, larvae develop, the filari form larvae penetrate the skin producing dermatities (ground itch). As long as the person remains infective and pollutes the soil, he transmits the infection.

Prevention: Health education regarding dangers of soil pollution.
Installation of sanitary laterines and privies and disposing of excreta effectively.
Personal hygiene and wearing of shoes, isolation of infected persons and investigation of contacts.

Treatment is done by Thiabendozole in dosage of 25mg/kg in three consecutive days.

Ascariasis or Round Worms: When present in small numbers in intestines, they often produce no apparent disturbances but heavy infection causes abdominal pain, restlessness, disturbed sleep and digestive disturbances.

Diagnosis is made by identification of the ova in stools.

Source is the soil and vegetable contaminated with infected human faeces. Infected individuals act as reservoirs. Man acquires the infection by ingestion of ova containing the larvae conveyed to the mouth in food, drink or dirty hands.

Prevention: Same as for Hook Worms.
Treatment: Many propriety preparations are available.

Thread Worms: It is very common, nonfatal intestinal infection causing itching and disturbed sleep, irritability, nervousness and local irritation and inflamation from scratching. Sources are clothes and bedding soiled with faeces containing eggs or contaminated hands and food. Reservoir is an infected person.

Infection is produced by anus to mouth directly via contaminated hands to the same host or through contaminated articles to a new host.

Prevention is the same as for other worms.

Treatment: Prperazine compounds.

2.8 RABIES: It has been observed that in camp life the labourers generally keep dogs. These dogs are almost invariably unprotected against Rabies and if bitten by rabid stray dogs in the vicinity or in an encounter with some wild animal e.g. fox, jackals etc they may develop Rabies and thus transmit it to human beings.

Rabies is an acute, repidly fatal, neurotropic viral infection communicated from a rabid animal to a susceptible person through a wound. It begins with a sense of apprehension or headache, fever, malaise or marked excitability and hydrophobia. Later on paralysis, delirium and convulsions follow, ending in death from respiratory failure from 2-6 days after the onset of disease.

Prophylactic antirabic treatment, if started soon after injury will prevent the disease in man. In dogs artificial active immunity can be produced by antirabic vaccination.

A guideline for post-exposure treatment as approved by W.H.O. has been given herewith.

All stray dogs in the vicinity should be destroyed through the collaboration of local health authorities. Pet dogs must be vacinnated and labour educated for seeking immediate medical attention of dog bite, in confining the biting animal for observation and watching for strange behaviour of dogs.

GUIDE FOR POST EXPOSURE TREATMENT
(By Expert Committee on Rabies WHO-1960)

Nature of exposure	Biting animal: At the time of exposure	Biting animal: During observation period of 10 days.	Recommended treatment (In addition to local treatment).
I. No lesion: Indirect contact	Rabid		None.
II. Licks: (I) Unabraded skin	Rabid	-	None.
(2) Abraded skin scratches and unabraded or abraded mucosa	(a) Healthy	Clinical signs of rabies or proven rabies (laboratory)	Start vaccine at first sign of rabies in the biting animal.
	(b) signs suggestive of rabies.	Healthy	Start vaccine immediately; stop treatment if animal is normal on 5th day after exposive.
	(c) Rabid, escaped, killed, or unknown.		Start vaccine immediately.
III Bites: (1) Mild exposure	(a) Healthy	Clinical signs of rabies or proven rabid (laboratory)	Start vaccine at first signs of rabies in the biting animal.
	(b) Signs suggestive of rabies.	Healthy	Start vaccine immediately, stop treatment if animal is normal till 5th day.
	(c) Rabid, escaped, killed or unknown.		Start vaccine immediately.
	(d) Wild wolf, jackal, fox, bat, etc.)		Serum immediately, followed by a course of vaccine.
(2) Serve exposure (multiple bites or if bites on face, head, fingers or neck).	(a) Healthy	Clinical signs of rabies or proven rabid: (laboratory).	Serum immediately, followed by vaccine at first sign of rabies in the biting animal.
	(b) Signs suggestive of rabies.	Healthy	Serum immediatoly, followed by vaccine. Vaccine may be stopped if animal is normal on 5th day after exposure.
	(c) Rabid, escaped, killed or unknown		Serum immediately, followed by s vaccine.
	(d) Wild wolf jackal, fox, bat, etc.		

2.9 LEPROSY: It is a chronic infectious disease of men, caused by Mycobacterium Leprae, characterized by lesions of the peripheral nerves, skin, and mucous membrane of upper respiratory tract. The disease is prevalent in many parts of Baluchistan and among Afghan Refugees.

All suspects must be screened according to following rules.

Any skin lesion which does not itch, remains unaltered for 6 or more weeks, does not fit into any of the common skin disease is most probably Leprosy.

Any patient showing at the same time, dermatological and neurological symptoms is most probably suffering from Leprosy.

Early diagnosis and adequate treatment accompanied by health education are the control measures applicable. Hence any suspects should be transfered to Leprosy Centres as soon as possible.

2.10 CHOLERA & GASTROENTERITIS: Strictly speaking cholera is not so common as infective gastroenteritis caused by E.Coli. The characteristic features are diarrhoea, vomiting and dehydration with or without fever.

Treatment consists in correcting the basic abnormalities without delay, restoring the circulating blood volume and blood electrolytes to normal levels and maintaining them there. The first line of treatment is the oral use of Rehydration Salts (GRS) with or without I.V. infusion with dextrose saline or D.T.S. Antibiotic therapy may be required where indicated but not as a rule.

2.11 DUST HAZARDS: Normally during road constuction a heavy amount of dust is created and nearby villages in the close vicinity of the road site will mostly be under dust clouds. Also there may be the fumes from bitumen burning.

These dusts and fumes may cause respiratory diseases among the workers depending on the type and concentration as well as the size of the particles present in the breathing zone of the worker. Stone-cutting and sandblasting is a common cause of silicosis which is a dangerous condition itself and also predisposes to pulmonary tuberculisis. Bitumen and other fumes from burning materials may cause acute respiratory irritation and bronchitis.

The dust hazard can be minimized by the use of dust masks as personal respiratory protection for the worker and educating the workers to keep their backs to the source of dust and against the direction of wind. However it must be remembered that a sufficiently long exposure is required for the dust to show changes in the lungs of human beings and preventive methods must not be ignored simply because of the absence of clinical manifestations of dust inhalation.

2.12 NOISE AND VIBRATION: Any disagreeable or undesired sound is called a noise. The unit of measurement of the intensity of sound is a decibel (dB). The lowest intensity at which sound can normally be perceived is a 0dB, in extreme quiet. The maximim is 150 dB beyond which sound waves may rupture the tympanic membrane. The capacity of human ear to distinguish between one sound and another is related to various tones of which they are composed. Audible tones vary in frequency from about 16 to 16000 cycles per second (c.p.s) with a critical frequency band of about 500-2000 c.p.s. for basic communication.

Most sounds comprise of multiple frequencies. Apart from this intensity and frequency of noise, the time scale of exposure and its total extent are important in determining the degree of impairment which also depends upon individual susceptibility.

Loss of perception for higher frequencies indicates damage by noise. As a rule regular exposures to noises greater than 80 dB may expected to impair hearing, either temporarily or permanently.

Certain occupations are known to be hazardous but environmental noise can affect hearing independently of an individual occupation.

The sources of noise pollution in road construction may be blasting, whinning and rotary accelerations of mixers, heavy vehicles e.g. trucks, shovels and tractors.

Protection: Noise impact level of blasting operations must be measured before actually conducting the job. If the level is 150 dB or above workers must be removed well away from the blasting site before actual blasting takes place. It is not certain what grade and intensity of blasting will be encountered during this particular project. All workers involved in blasting must be in possession of ear muffs and should be forced to wear them. Similarly noise levels of steady continuous sounds should be tested and, if found about 75 dB, protective appliances must be used.

Apart from deafness noise can also produce certain undesirable non-auditory effects e.g. annoyance, distraction and irritability etc.

Vibration may be of two kinds: (i) Hand transmitted. Intensive vibration can be transmitted from vibrating tools, vibrating machinery or vibrating work pieces to the hands and arms of operators. Such situations occur in construction operations when handling pneumatic tools. These vibrations are transmitted through the hand and arms to the shoulder. Depending on the work situation they can be transmitted to one arm only or both arms simultaneously. In principle, these hand transmitted vibrations are in the frequency range of 8-1000 Hz. (ii) Whole body: Vibration transmitted to the body as a whole through the supporting surface, namely the feet of a standing man or supporting area of a reclining man. This kind of vibration is usual in vehicles, in vibrating buildings and in the vicinity of working machinery. In principle, it applies to vibration transmitted from solid surfaces to human body in the frequency range 1-80 Hz.

Vibration in low frequencies between 1 and 20 Hz may cause lumbago, sciatica in the lumber region, naekache and hernia, if exposure is prolonged for sufficient length of time.

Low frequency vibration (between 10 and 20 Hz) transmitted to the hand and arms leads to high muscular strain due to resonance.

Higher frequency vibration (above 20 Hz) may cause osseous or arthritic lesions in the hands, wrists, forearms and upper arms, vascular manifestations and sensory and trophic manifestations giving a burning or numb sensation.

The dangers inherent in vibration is quite serious but their prevention is essentially an engineering problem.

2.13 FIRES: In camp dwellings accidental fires may cause great damage and adequate fire fighting equipment should be available. There may be a scarcity of water for this purpose, hence sand buckets or foam cylinders should be made handy.

3. GUIDELINE FOR PROTECTION AGAINST COMMUNICABLE DISEASES:

3.1 Personal Hygiene, apart from general cleanliness of the body particular emphasis should paid to thorough washing of hands before eating meals, because hands are a ready means of transmitting the germs of a disease into the body through oral route. There should be separate clothes for work and off-work hours.

3.2 Environmental Sanitation: It is a branch of Public Health which seeks to control all factors in the physical environment which exerts, or may exercise a deletrious effect on man's physical, mental or social well-being optimum conditions for man's health and well-being and it is a specialised field in which engineering principles and techniques are employed. The basic sanitary need relate to

3.2.1 Provision of safe water supply.

3.2.2 Safe disposal of excreta.

3.2.3 Safe disposal of garbage and refuse.

3.2.4 Vector control

3.2.5 Food sanitation.

3.2.6 Sanitary housing.

3.2.7 Control of diseases of animals communicable to man.

3.2.8 Control of air pollution.

3.2.9 Control of occupational hazards.

The contractor should be urged to set up his camping in consultation with a Public Health Inspector. Particular attention should however be paid to the following:

3.2.10 Resting camps must be set on high grounds at least 2½ ft above the normal ground level.

3.2.11 Each worker must possess mosquito net and preferrably sleep on a cot.

3.2.11 Workers should take only freshly prepared food and dispose off the left overs by dumping underground.

3.2.12 The workers must be taught to wash their hands and rinse their mouth before and after taking food.

3.2.13 All suspects for Tuberculosis must be Xrayed.

4. GUIDELINE FOR PROTECTION AGAINST DUST, NOISE AND VIBRATION.

4.1 Noise level of constant steady sounds generated must be predetermined at distances ranging from nearest vicinity to 10 ft, 20 ft, 50 ft and 100 ft away and safe working area determined.

4.2 Similarly noise level of sudden impact noise from blasts should also be determined and if found 85 dB or above ear muffs must be sorn. Ears should be completely plugged during every blast.

4.3 Suitable dust masks should be worn by the workers. This would need persistent education because generally the labourers are reluctant to wear them for an imaginary phobia of suffocation.

4.4 All workers must be checked for hearing acuity at the time of employment and every three months thereafter.

4.5 Proper handling of vibrating tools should be taught to the workers.

4.6 There may be aproblem of continuous atmospheric pollution during and after construction of road mainly from motor vehicle exhaust fumes and possibly from industries which may be constructed along the road depending on other favourable factors. Motor vehicle exhausts emit lead, carbon monoxide and oxides of nitrogen, and industrial plants contribute such toxic substances as silica, lead, mercury, cadmium, berylium, arsenic, zine, selenium, fluoride, asbestos, cotton, iron and coal dust.

It rests with the government to take into consideration these hazards while granting permission for such industries and ensure safety of health parameters in this regard.

5. GUIDELINE FOR A CAMP DISPENSARY

From the preceding discussion it is obvious that a small dispensary must be maintained at site for emergency treatment and First Aid. The various components for such a dispensar y would be as under.

5.1 Building: The camp dispensary should be set at a distance from the dwelling area but near the work site. It may be set in a tent or temporary hut.

5.2 Equipment: The dispensary should be equipped with basic furniture, dressing materials, first aid materials and drugs essential for use in communicable diseases viz Antimarials, Antibiotics, Anthelmintics, Antipyretic and Analgensic etc. There should be sufficient supplies of dressing materials and other first aid equipments. There should also be one emergency bed available.

5.3 Transport: It may not be possible to have an ambulance always available but a van generally used for other transportations may be improvised for emergency use as an ambulance to shift serious cases to nearest hospitals.

5.4 Staff: One qualified dispenser at least a medellion certificate in First Aid should be employed on whole time basis. He should be able to treat all cases of communicable diseases mentioned in this report and also deal with common injuries and render first aid to them.

APPENDIX H

Miscellaneous Information

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BIBLIOGRAPHY

List of Bibliography other than referred in respective Chapters.

1. Planning and Investigation Division, WAPDA, Balochistan Valley Development Project, P&I Publication No. 254.

2. Japan International Cooperative Agency, Study Report on the Construction Project of A Mini - Port in Gwadar, 1990.

3. BALAD Technical Assistance Team, Dasht Area Plan, 1990.

4. BALAD Technical Assistance Team, Gwadar Area Plan, 1990.

5. BALAD Technical Assistance Team, Dasht Dam Project, Preliminary Report.

6. Nek Buzdar, USAID, Socio-Economic Survey of the Makran Division of Balochistan, 1987.

7. Louis Berger International Inc., BALAD, Water Sector Third Interim Report, 1989.

8. Fizac (A Joint Venture of Consultants), Khuzdar Valley Area, A Feasibility Report.

9. Nasir Geotechnics, Report of the Groundwater Resources of Balochistan, Main Report and Appendices, 1973.

10. Planning and Investigation Directorate, Project Planning Report of Bela Plain (Groundwater Development Project), 1974.

12. Population Census Organization, Government of Pakistan, 1981 Census Report of Balochistan Province.

13. Pakistan Hydro Consultant, Ghazi Gariala Hydropower Project, Feasibility Report, Vol. 7, Environmental Assessment, 1991.

14. Dams & More, et al, Bolan Dam & Irrigation System, Environmental Assessment Report, 1988.

15. Farah, A., etal, Geological Survey of Pakistan, Geodynamics of Pakistan, 1979.

16. Fraser, I.S., A Reconnaissance Survey of the Landforms, Soils and Present Land Use of Indus Plan, Pakistan, A Colombo Plan Cooperative Project, 1958.

17. Directorate General, Agriculture Development, Agricultural Statistics of Balochistan, 1989.

18. Bureau of Statistics, P&D Department, Government of Balochistan, Development Statistics of Balochistan, 1989.

19. WAPDA and GOB, Seminar on Water Resources Development in Balochistan, Technical Papers, 1986.

20. Groombridge, B.; IUCN Conservation Monitoring Centre, A Preliminary Environmental Profile of Balochistan, 1988.