

**KERAJAAN MALAYSIA**  
**JABATAN KERJA RAYA MALAYSIA**

**PROJEK JALAN MASUK KE EMPANGAN BAKUN  
NEGERI SARAWAK**

**PROGRESS REPORT NO. 6**

**FEBRUARY 1995**

**PS KONSULTANT  
1ST FLOOR,  
41-43 JALAN KERETAPI  
93150, KUCHING  
TEL: 082-244876  
FAX: 082-259678**

**KETUA PENGARAH KERJA RAYA  
JABATAN KERJA RAYA MALAYSIA  
CAWANGAN JALAN (TINGKAT 15)  
IBU PEJABAT JKR MALAYSIA  
JALAN SULTAN SALAHUDDIN  
50582 KUALA LUMPUR**

**KTA (SARAWAK) SDN BHD  
LOT 8651-3, SECTION 64  
JALAN SIMPANG TIGA  
93300, KUCHING  
TEL: 082-421133  
FAX: 082-426159**

P. KHIDMAT MAKLUMAT AKADEMIK

UNIMAS



1000267871

# KERAJAAN MALAYSIA

## JABATAN KERJA RAYA MALAYSIA

### PROJEK JALAN MASUK KE EMPANGAN BAKUN

#### NEGERI SARAWAK

#### PROGRESS REPORT NO. 6

FEBRUARY 1995

# PROJEK JALAN MASUK KE EMPANGAN BAKUN NEGERI SARAWAK

## CONTENTS

1.	INTRODUCTION	1
1.1	Project Description	1
1.2	Appointment of Consultant	2
1.3	Allocation	2
2.	WORK PROGRESS (BINTULU-MIRI ROAD TO TUBAU)	3
2.1	Route Description	3
2.2	Design Review	3
2.3	Issues in December	4
2.4	Issues in January	5
2.5	Work Progress	5
3.	WORK PROGRESS (TUBAU TO BAKUN DAM)	7
3.1	Route Location	7
3.2	Topographical Survey	7
3.3	Geotechnical Investigations	7
3.4	Requirements for Bakun Dam	8
3.5	Traffic Estimation and Pavement Design	9
3.6	Priority Works	10
3.7	Programme of Works	10
4.	DOCUMENTATION	11
4.1	Prequalification of Contractors	11
4.2	Tender Documents	11
5.	OTHER MATTERS	12
5.1	Takeover of Logging Road	12
5.2	Reports	12
5.3	Meetings	12

<b>6.</b>	<b>PROJECT COST ESTIMATE</b>	<b>13</b>
6.1	Construction Cost Estimates	13
6.2	Consultancy Fees - Design	13
6.3	Survey Fees	13
6.4	Soils Investigation	14
6.5	Construction Supervision	14
6.6	Crop and Land Compensation	14
6.7	Takeover of Logging Roads	14
6.8	Summary	15

## **APPENDICES**

- A. Project Location Plans
- B. Works Programmes Bar Charts
- C. Proposed Supervision Organization

# **1. INTRODUCTION**

## **1.1 Project Description**

The Government of Malaysia intends to construct a road from the Bintulu/Miri road at km 51 to Tubau and Bakun Dam in the state of Sarawak. The road is to be built in two sections totalling 140 km in length.

This report summarizes progress on the project during the month of February 1995 and describes the status of the project at the end of that month.

### ***Bintulu-Miri Road to Tubau (40 km)***

The road starts at Km 51 Bintulu-Miri Road and passes through an area, characterized by relatively low but often steep and strongly dissected hills and extensive flood plains especially along the Batang Kemena and the lower parts of Sungai Labang. Appendix A shows the locality plan and the general road alignment of the proposed road.

The original design was completed in 1988 for a trunk road from the Bintulu-Miri Road at km 51 to Tubau and a spur road providing access to Labang but was never constructed.

The original trunk road was designed to 05 standard and feeder road to 03 standard.

The work now being carried out by PS Konsultant on this section is a design review to reduce the road to R3 modified geometric standard.

### ***Tubau to Bakun Dam (80 km)***

This section, being design by KTA (Sarawak) Sdn Bhd, continues from Tubau to the Bakun Dam site.

For the first 60 km the terrain is 'rolling' through low hills following the alignment of existing 'main-haul' logging roads and then over the last 20 km follows a steep sided valley system through a pass at 300 m elevation on a new alignment to finish at Batang Balui just downstream of the dam site. This last section will involve some large rock cuts and is to be completed by mid-1998 to facilitate construction of the Bakun Dam. The scope of work includes:

- (a) reviewing a preliminary alignment defined by the Government
- (b) identification of an optimum alignment having regard to terrain, land use, existing (logging) traffic through the corridor which must be maintained, loads to be carried to the dam site, and environmental aspects.
- (c) carrying out detailed engineering design of the alignment approved by the Government.

## **1.2 Appointment of Consultant**

- PS Konsultant, Consulting Engineers of Kuching, Sarawak carried out the original design for the Bintulu-Miri Road to Tubau section.

Following the meeting held on 22nd September 1994 at Bilik Mesyuarat, JKR Sarawak, Kuching, the Consultant was asked to revise the design to R3 modified standard to R3 modified standard to reduce construction cost. The design review includes reconsideration of the vertical alignment and of the soft soil treatment methods proposed.

- KTA (Sarawak) Sdn Bhd, Consulting Engineers of Kuching, Sarawak were appointed by JKR in Letter of Intent ref. (30)d/m.PKR(J)Rb.16/94/2 dated 19 August 1994 to carry out the location and design of the Tubau to Bakun Dam section.

Because of the short time available to complete the project KTA (Sarawak) Sdn Bhd commenced preliminary works in June 1994 pending the issuance of the formal Letter of Intent.

## **1.3 Allocation**

The allocation number for this project P52 4003004.

## **2. WORK PROGRESS (BINTULU-MIRI ROAD TO TUBAU)**

### **2.1 Route Description**

In selection of the route, apart from providing a short and relatively straight connection as access to the planned hydro project on the Batang Balui and the Belaga District in general, care was taken to ensure that the road also serves the local population (i.e. the towns of Labang and Tubau and 10 Longhouses) and industry (i.e. timber camps and saw mills).

To avoid large swampy sections around Labang, the road with a length of 46.5 km bypasses the town, making a 5 km feeder road connection necessary.

Two major bridges, at CH Km 11 across Sungai Labang and at CH Km 31 across Batang Kemena, as well as 10 minor bridges will be required.

The Sungai Labang crossing will be a 4 span bridge of 120 m length, rising at a gradient of 2% toward Tubau and using 30 m precast prestressed concrete beams with cast insitu roadway slab.

The Kemena bridge will have a length of 490 m. River traffic by log barges requires a navigation clearance width of 70 m and a height of 12 m above a normal high water level of RL +5.0 m. The central part of the bridge with a central span of 90 m and one 50 m span on either side will be of box girder free cantilever construction, while the approaches will consist of five 30 m spans each, using 30 m precast prestressed concrete beams. The centre of the bridge will be on a 384 m vertical curve with bridge approaches of 6% gradients.

The minor bridges range in length between 16.5 m and 60 m, being either single or double span bridges and using combinations of 16.5 m, 24 m or 30 m precast prestressed concrete beams.

### **2.2 Design Review**

As the first six (6) km of the road has been constructed by JKR, the project is to start at Km 6 to Km 46+414. The common point between PSK and KTA will be jointly reviewed to achieve a better alignment. The PSK portion is to be subdivided into two (2) packages of approximately the same construction cost.

It is proposed that the geometric design criteria be reduced from R5 standard to R3 modified standard. This would reduce the design speed, reduce the cross-sectional width and increase the allowable maximum gradient. As a result, the cross-section is to be reduced from 14.5 m formation width which consists of 3.65 m of pavement, 1.0 m hard shoulder and 2.6 m earth shoulder to 11.0 m formation width which consists of

3.0 m of pavement, 2.0 m hard shoulder and 0.5 m rounding on each side of the road. The proposed roadway cross-section is as shown in Figure 2. The 2.0 m hard shoulder was later revised to comprise 1.0m hard shoulder and 1.0m earth shoulder.

The vertical alignment is revised to reflect the new design standard. The vertical curve gradients are increased and vertical curve lengths reduced to reduce the earthwork quantities. This in turn would reduce the embankment fill height which would then reduce the extent of the piled embankment treatments.

The original design requires stream and river diversion at several locations in order to reduce the culvert lengths. However, due to environmental consideration JKR proposed to maintain the original stream and to have skew culverts rather than to realign the stream wherever possible.

It has been informed during the Technical Meeting on 22 September 1994 that UNIMAS will have completed the preliminary EIA report by Mid November, 1994. The consultant will incorporate whatever recommendations provided in the EIA report to the road design.

The tender document is also to be revised from Lump Sum contract to Bills of Quantity contract following PWD Form 203A. The construction period is to be 48 months.

### **2.3 Issues in December**

On 8th December a meeting was held between JKR and the road Consultants at Bilik Mesyuarat, JKR Sarawak, Kuching. In that meeting the Consultant was asked to:

- remove the 40 mm of pavement wearing course in order to reduce the initial construction cost.
- look into the possibility of using multiplate corrugated steel culvert as a substitute to RCP culvert.
- further review the vertical alignment in order to reduce the extent of soil treatment required.
- re-establish all the centreline pegs (IP to IP) one week from 15th December and the work is to be completed before Chinese New Year.
- revised the 2.0 m hard shoulder width to include 1.0 m hard shoulder and 1.0 m earth shoulder.

On 9th December the Consultant received the access road portions of the EIA interim report from UNIMAS. The Consultant is in the process of incorporating the recommendations provided in the EIA report to the road design. A copy of the bills of quantities and tender documents pertaining to the EIA will be submitted to UNIMAS for review.

## **2.4 Issues in January**

The re-establishment of centreline pegs from IP to PI have been carried out since 20th December 1994 and it has been completed on 3rd January 1995.

On 3th January a meeting was held between JKR and PS Konsultant in KL. In that meeting the Consultant has informed JKR that the vertical alignment will be further reduced to the minimum reduced level of 6.5 m for the soft soil area wherever possible to lower the estimated construction cost of RM171 million. As a result the following revisions are to be made:

- the type and extent of soil treatment at soft soil areas will be further analysed (about 100 locations) to reflect the new vertical alignment.
- the drainage layout plans and the associated quantities.
- the earthwork quantities.

In the meeting the Consultant asked JKR to provide the acceptable settlement criteria in order to carry out the analysis.

## **2.5 Work Progress**

As a consequence of the revisions as outlined in 2.4 above, most of the works up to the middle of January this year are rendered useless. A revised works programme is included in Appendix B of this report. The works programme is divided into six (6) major components, namely:-

1. Earthwork
2. Soil treatment
3. Drainage works
4. Bridge works
5. Miscellaneous drawings and
6. Tender documentation

As indicated in Figure 3, the breakdown of the design drawings and the percentage of completion are as follows:-

- Cross-sections, 70%
- Longitudinal sections, 95%
- Superelevation, 100%
- Drainage layout plans, 0%
- Miscellaneous drawings, 100%

The breakdown of the quantity estimates and the percentages of completion are as follows:-

- Earthworks, 25%
- Soil treatment, 0%
- Drainage works, 0%
- Bridge works, 100%

As of now, the soil treatment analysis is about 40% complete while the tender document is about 85% complete.

The revised design project is scheduled to be completed by the middle of May this year. It will then be followed by client review and approval, final amendment to drawings and tender documentations. It is anticipated that this project will be ready for tendering in end of May, 1995.

### 3. WORK PROGRESS (TUBAU TO BAKUN DAM)

#### 3.1 Route Location

Route location has been completed. The survey corridor has been identified and the surveyors have been given instructions on corridor location for the whole length.

#### 3.2 Topographical Survey

The surveyors have made the following progress to the end of February.

	USC		Bormap	
	Tubau - Belaga River		Belaga River - Bakun	
Control Traverse	complete	100%	complete	100%
Corridor Traverse	complete (42 km)	100%	complete (40 km)	100%
Level Control	complete (42 km)	100%	complete (40 km)	100%
Detail Survey	complete (42 km)	100%	complete (40 km)	100%
Corridor defined (instructed in field)	complete (42 km)	100%	complete (40 km)	100%
Additional 1 km to connect PSK design	instructed at end of February		n.a	
Belaga Bridge Site	n.a		completed	100%
Computation	42 km	100%	35 km	88%
Plan Drawings	20 km	45%	30 km	75%

This progress to date is satisfactory.

#### 3.3 Geotechnical Investigations

The field work for preliminary investigation to explore large cuts in the vicinity of km 75 was completed by the contractor, Geotechnique (EM) Sdn Bhd, by the end of November. Laboratory tests on the cores taken have been carried out and the results were presented in the final report on the work.

The second package of soils investigation works consisting of 8 boreholes and 42 test pits and hand bores for the section from km 0 to km 20 was awarded to Geotechnique (EM) Sdn Bhd who mobilized three drilling rigs and had completed five bores by the end of January.

Tenders for the remaining soils and materials investigation and for seismic surveys along the length of the road closed on 16 January 1995 and the Tender Evaluation Reports were prepared and submitted to JKR Sarawak in February. The award of a contracts is expected in early March.

Because of the short time available for, design and construction of this project these quotations and tenders are being called now, far in advance of the preliminary design alignment. This is necessary because of the long lead time from calling of tenders to awarding a contract following the standard departmental requirements.

### **3.4 Requirements for Bakun Dam**

#### ***Design Standards***

The geometric design parameters for the access road and for the dam construction traffic to meet both JKR R3 standard road and the requirements of Bakun Management Sdn Bhd were set out the October 1994 report. Further correspondence of with Bakun Management has allowed a better estimate of the amount of materials to be transported on the roads and was reported in the November 1994 report.

Bakun Management need to be formally notified of the maximum sizes and weights of vehicles that can be allowed on the road so that the information can be included in their construction tender documents. Subject to the approval of the JKR these limits have been agreed between KTA(Sarawak) Sdn Bhd and Bakun Management Sdn Bhd as follows:

***Pavements.*** Construction and general traffic: the legal limits for vehicles licensed to operate on public roads.

***Bridges.*** Transporters for heavy loads: bridges will be designed to JKR standards, which include allowance for a special heavy loading case.

#### ***Dam Construction Traffic Access***

The road geometry requirements have been well defined for access by construction traffic (originally called dam diversion tunnel construction traffic), however the pavement has not been as well specified. (Refer to November 1994 report which explains that an "all-weather" road is wanted).

Provision of an "all-weather" surface for the whole length of the road would be very costly. Field investigations to date have not found any naturally occurring suitable material. A graded crushed rock would be the only suitable material.

## ***Jetty at Tubau***

It is obvious that there will be a jetty required at Tubau specifically for trans-shipping dam (and road) construction materials. Bakun Management Sdn Bhd initially assumed this would be provided as part of the access road (ref. November 1994 report), however now indicate that any jetty and landing facilities will be required to be provided by the users. This is because of insufficient time to complete proper design and specification for the facilities to be constructed with the access road without restricting the main dam construction contract too much.

The jetty location needs to be identified as quickly as possible so that the road location can be defined, and survey and design carried out in time for construction. Whether the jetty is to become part of the access road project or not, it will nevertheless define the start point of the road construction.

### **3.5 Traffic Estimation and Pavement Design**

Although it is still believed that the traffic on the access road will be light once the dam is completed the dam construction traffic itself will be quite substantial. The volume and characteristics of this traffic can be estimated based on the total volume of concrete to be used in the dam construction, as advised by Bakun Management Sdn Bhd. (Bakun Management have indicated that all aggregates will be available on site.)

The consultant will use the average estimated cement and steel content of the concrete to derive a weight of these materials to be carried on the road, with an appropriate allowance added for other construction equipment and materials, fuels, supplies, etc. to define the total design weight to be carried on the road. The most conservative (heaviest damage factor) of various truck configurations will be used to calculate a design number of equivalent standard axes up to the completion of the dam for designing the pavement. The pavement will initially be constructed with aggregate sub-base and base courses and a 'binder' surfacing course.

It is not realistic to attempt to estimate traffic beyond the dam construction because of uncertainties in the development likely in the area. The estimated residual life of the pavement, after applying an overlay of the minimum thickness wearing course once the dam construction has been completed, will be estimated using the AASHTO method (AASHTO Guide for Design of Pavement Structures 1986). This will give an indication of the order of traffic volumes that the road could carry and its likely 'life' in the absence of any realistic estimates of future traffic.

### 3.6 Priority Works

The works for inclusion in the priority works contract are as follows:

Name	Location (reason)	Treatment
Area A	km 4 grade - length 300 m	Earthworks to achieve 8% grade on final alignment; temporary pavement.
Area B	km 57 grade - length 200 m	Construction to final design of a 1.5 km realignment bypassing the location.
Area C	km 74-76 grade - length 1500 m	Construction to final design of a 7 km realignment (km 73 to km 78) bypassing the location.
Area 1	km 63 grade - length 300 m	Earthworks to achieve 12% grade. (Road to be returned to loggers).
Area 2	km 70 grade - length 600 m	Earthworks to achieve 12% grade (Road to be returned to loggers).
Area 3	km 71 curvature - length 100 m	Earthworks to increase curve radius (Road to be returned to loggers)
Area 4 & 5	km 78+ grade - length 400 m	Earthworks to achieve 12% grade (Road to be returned to loggers).

- The section at km 4 to be constructed on final alignment and grade will be constructed without pavement courses. The earthworks will be cut and filled to the same level as the final road surface within the pavement width, and roadside drains constructed 300 mm high, to allow for attrition by traffic. The subgrade will be cut to final level and prepared anew before the final pavement is constructed.
- The sections of construction to final design will be only constructed to top of binder course level in this contract.

### 3.7 Programme of Works

The programme of works is shown in Appendix B. The programme reflects the altered construction schedule advised by Bakun Management and the resulting redefinition of Priority Works (see 3.4 and 3.6 above).

## **4. DOCUMENTATION**

### **4.1 Prequalification of Contractors**

Applications for Prequalification of Contractors which were called on 19 December 1994 closed on 16 January 1995.

Evaluation was carried out by a combined team from the two Consultants. The Draft Final Evaluation was submitted on 24 February 1995 for approval by JKR.

### **4.2 Tender Documents**

The contracts will all be Bill of Quantities based and the General Conditions of Contract, "P.W.D. Form 203A (Rev 10/83)" in English will be used with Special Provisions as necessary.

#### ***Bintulu-Miri Road to Tubau***

The tender documents are being revised to accord with the review design and to change from original Lump Sum contracts to Bill of Quantities contracts.

#### ***Tubau to Bakun Dam***

The Tender documents for the Priority Works section of the project were submitted to JKR on 24 February 1995. JKR is investigating the possibility of letting the works through a Negotiated Contract for part or all of the project and will use these documents as a basis for any negotiations.

## **5. OTHER MATTERS**

### **5.1 Takeover of Logging Road**

The two logging companies, Syarikat Samling Timber Sdn Bhd and Liangti Sdn Bhd, whose roads are affected by the new road have stated their positions regarding taking over of sections of their roads, as was reported in November.

JKR Sarawak has indicated that once a Contract has been let for the construction a meeting will be called, under the auspices of the Ministry of Infrastructure Development and JKR, with the logging companies, and attended by the Contractor, to resolve these matters.

### **5.2 Reports**

The Draft Final Prequalification of Tenderers Report was submitted to JKR for approval on 24 February.

### **5.3 Meetings**

A meeting was held on 24 February 1995 in Kuala Lumpur to present the Tender Documents for the Priority Works construction section of the project. The meeting was chaired by the Deputy Director General of Public Works, Dato' Omar, and attended by The Director of Roads and staff from JKR, the Assistant Director for Roads and Airports JKR (Sarawak), Ir Hubert Thian, and the KTA (Sarawak) Sdn Bhd Project Director, Ir Wong Mee Seng, and Project Manager.

The Consultant was asked to provide a detailed estimate of the cost of the works based on the premise that the whole of the works from Tubau to Bakun will be constructed under a contract to be negotiated in two parts: the Priority Works and then the remainder of the works. A prospective Contractor also attended part of the meeting to be briefed on the extent and nature of the works and JKR's requirements.

## **6. PROJECT COST ESTIMATE**

### **6.1 Construction Cost Estimates**

#### ***Bintulu-Miri Road to Tubau***

The estimated construction cost of RM171 million as reported previously has not yet been revised. However it is anticipated that the revised design will further reduce the construction cost.

#### ***Tubau to Bakun Dam***

The estimates construction cost of RM216,150,000 as reported in November has not yet been revised. A detailed estimate of the cost of the works based on breakdowns of all the major cost items is being carried out (refer to 5.3 above) and will be completed by mid-March.

### **6.2 Consultancy Fees - Design**

#### ***Bintulu-Miri to Tubau***

PS Konsultant estimates the balance consultancy fees in accordance with the Board of Engineers (Malaysia) Scale of Fees, using a construction cost of RM161,157,444 which does not include any contingencies, to be RM4,534,474.

#### ***Tubau to Bakun Dam***

KTA (Sarawak) Sdn Bhd estimates the consultation fees in accordance with the Board of Engineers (Malaysia) Scale of fees, using a construction cost of RM196,000,000 which does not include any contingencies, to be RM7,600,000.

The method of payment is the subject of an appeal to Treasury, to change from man-months to scale of fees, which is yet to be decided.

### **6.3 Survey Fees**

#### ***Bintulu-Miri to Tubau***

The estimated cost of re-establishing the centreline pegs is RM100,000.

#### ***Tubau to Bakun Dam***

The estimated cost of survey fees is RM1,100,000 which is the total estimated cost of the contracts let to United Survey Consultants and Bormap Surveys Sdn Bhd by JKR.

## **6.4 Soils Investigation**

Further detailed soils investigation is not required on the Bintulu-Miri Road to Tubau section.

The estimated cost for all soils investigation work (boring, sampling, testing, seismic) for the Tubau to Bakun section is now RM1,100,000. This estimate has been revised to better account for the access and drilling costs for material sources proving.

## **6.5 Construction Supervision**

The proposed supervision organisation is shown in Appendix E together with the time frame of the various construction packages and the breakdown of time input of the supervision staff.

The total supervision cost is estimated as:

Staff Costs	11,317,950
Reimbursable Costs	1,301,100
Total	RM 12,619,050

## **6.6 Crop and Land Compensation**

The total cost of land and crop compensation is estimated as approximately RM5,000,000.

## **6.7 Takeover of Logging Roads**

No information is available at present on the likely costs involved in taking over the logging roads built by Syarikat Samling Timber Sdn Bhd and Liangti Sdn Bhd.

## 6.8 Summary

Item	Bintulu-Miri Road to Tubau	Tubau to Bakun Dam	Total (RM)
1. Construction	171,157,444	216,150,000	387,307,444
2. Consultancy Fee-Design	* 4,534,474	7,600,000	12,134,474
3. Survey	100,000	1,100,000	1,200,000
4. Soils Investigation	0	1,100,000	1,100,000
5. Construction Supervision	-	-	12,619,050
6. Crop and Land Compensation	-	-	5,000,000
7. Takeover of Logging Roads	0	N.A.	N.A.
<b>PROJECT TOTAL</b>	<b>175,791,918</b>	<b>225,950,000</b>	<b>419,360,968</b>

N.A - Not available.

\* - Balance of Consultancy Fee.

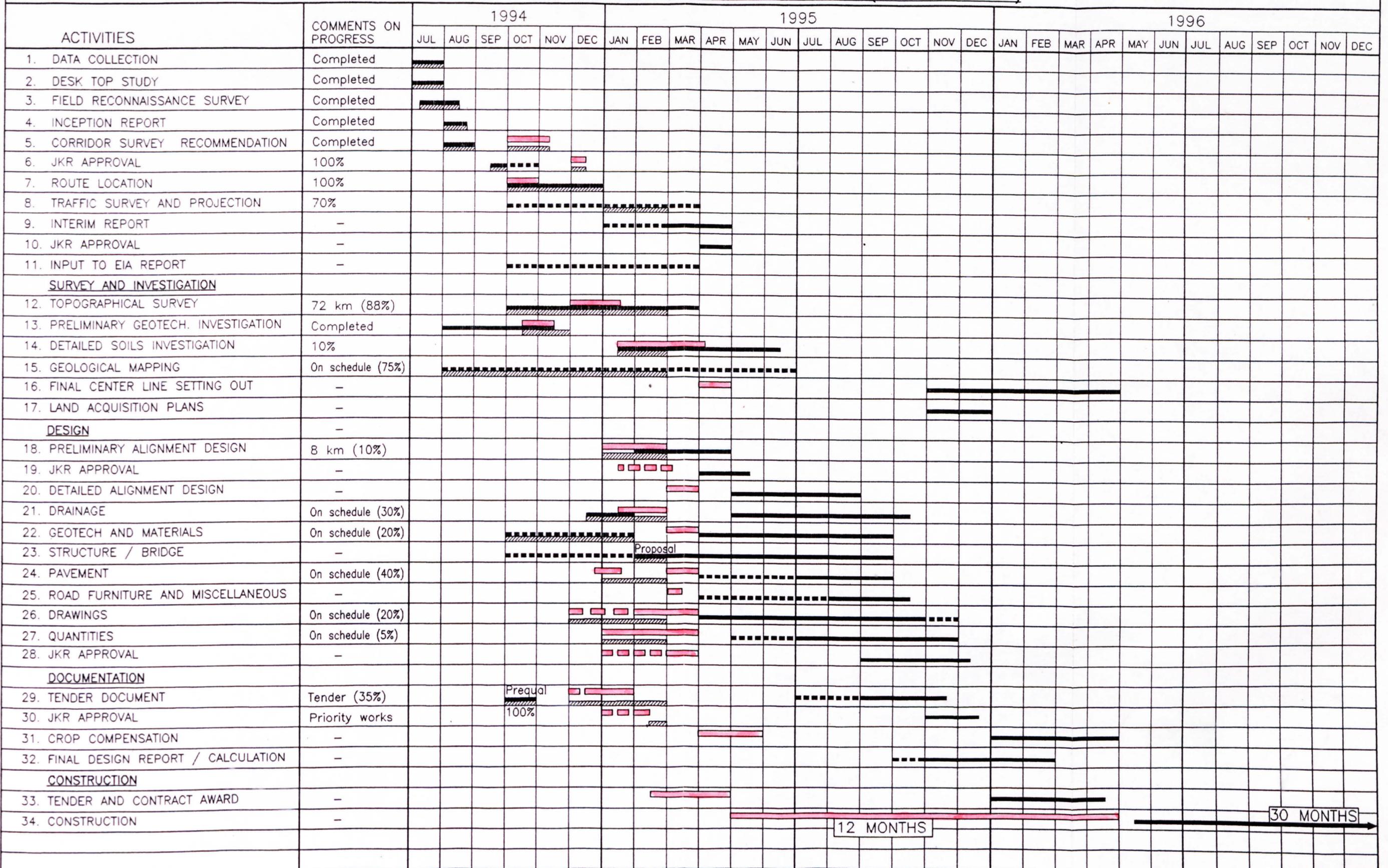
**APPENDIX A PROJECT LOCATION PLAN**



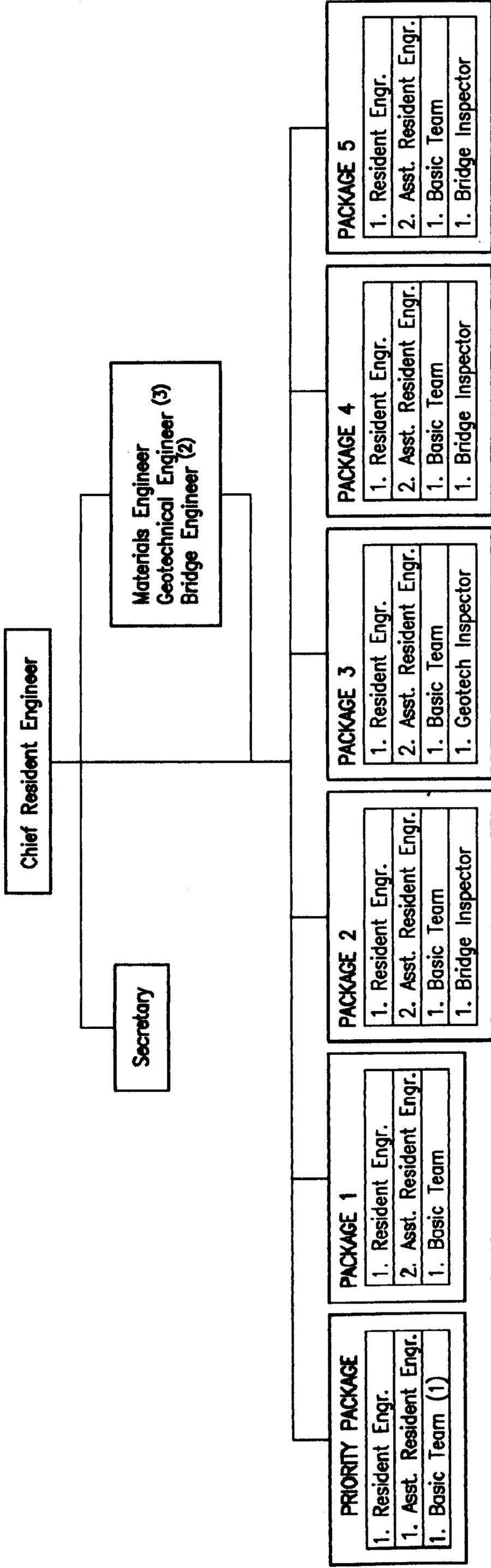
**APPENDIX B WORKS PROGRAMME BAR CHART**



## ACCESS ROAD TO BAKUN DAM PROPOSED WORKS PROGRAMME (ACCELERATED)

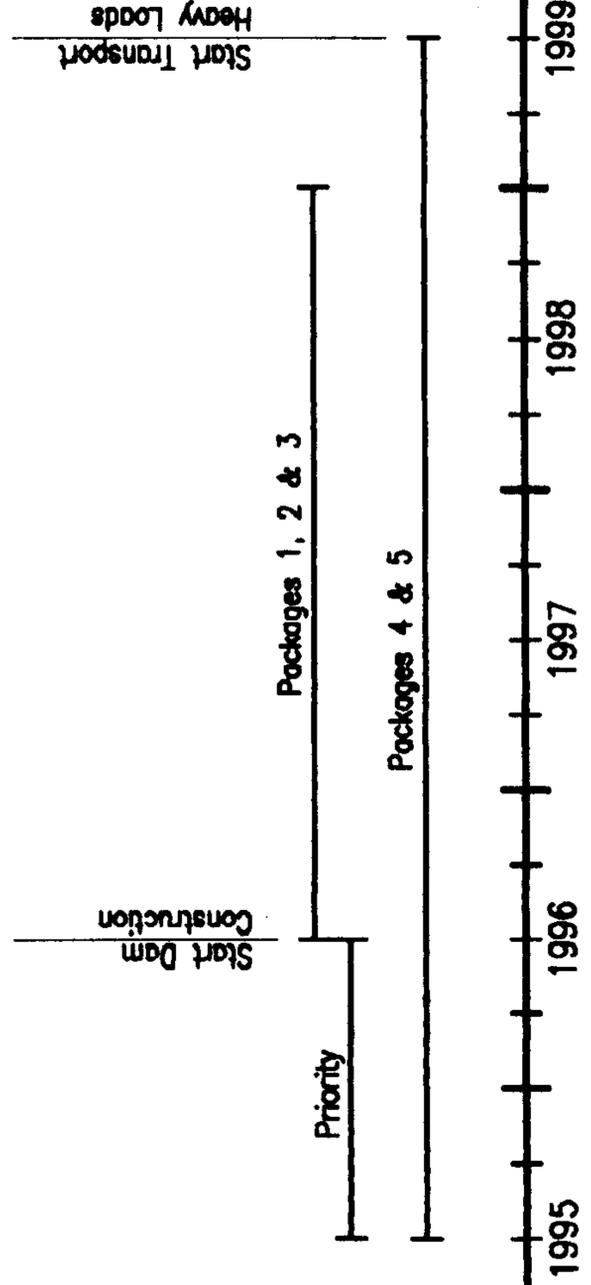


## **APPENDIX C PROPOSED SUPERVISION ORGANISATION**



**NOTES :**

1. One Inspector of Works for Rock Cuts.
2. Mainly for Kemena No. 2 Bridge ( Package 5 )
3. For Soft Ground Treatment ( Packages 4 & 5 ) and Rock Cuts and High Fills ( Packages 3 & Priority )



Time Frame  
( Construction Periods )

**BAKUN DAM ACCESS ROAD**

**ESTIMATED COST OF PROPOSED CONSTRUCTION SUPERVISION ORGANISATION – STAFF COSTS**

Position	Months						Total Months	Charge Rate/ Month	Amount (RM)
	General	Priority Package	Package 1	Package 2	Package 3	Package 4			
Chief Resident Engineer	48	–	–	–	–	–	48	20,000.00	960,000.00
Material Engineer	42	–	–	–	–	–	42	12,000.00	504,000.00
Geotechnical Engineer	30	–	–	–	–	–	30	14,000.00	420,000.00
Bridge Engineer	36	–	–	–	–	–	36	14,000.00	504,000.00
Resident Engineer	–	12	30	30	30	48	48	10,000.00	1,980,000.00
Assistant Resident Engineer 1	–	12	30	30	30	48	48	7,000.00	1,386,000.00
Assistant Resident Engineer 2	–	–	30	30	30	48	48	7,000.00	1,302,000.00
<b>Sub–Total</b>	<b>156</b>	<b>24</b>	<b>90</b>	<b>90</b>	<b>90</b>	<b>144</b>	<b>144</b>	<b>738</b>	<b>7,056,000.00</b>
Survey Technical Assistant	–	12	30	30	30	48	48	3,000.00	594,000.00
Laboratory Technical Assistant	–	12	30	30	30	48	48	3,000.00	594,000.00
Quantity Surveying Technical Assistant	–	12	30	30	30	48	48	3,000.00	594,000.00
Inspector of Works 1	–	12	30	30	30	48	48	3,000.00	594,000.00
Inspector of Works 2	–	–	30	30	30	48	48	3,000.00	558,000.00
Bridge Inspector	–	–	–	24	–	36	36	3,000.00	288,000.00
Geotechnical Inspector	–	12	–	–	24	–	–	3,000.00	108,000.00
<b>Sub–Total</b>	<b>0</b>	<b>60</b>	<b>150</b>	<b>174</b>	<b>174</b>	<b>276</b>	<b>276</b>	<b>1,110</b>	<b>3,330,000.00</b>
Secretary	48	–	–	–	–	–	–	2,000.00	96,000.00
Clerk/Typist	–	12	30	30	30	48	48	1,500.00	297,000.00
<b>Sub–Total</b>	<b>48</b>	<b>12</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>48</b>	<b>48</b>	<b>246</b>	<b>393,000.00</b>
<b>Total</b>								<b>2,094</b>	<b>10,779,000.00</b>
Government Tax 5% on Staff Cost									538,950.00
<b>GRAND TOTAL</b>									<b>11,317,950.00</b>

**BAKUN DAM ACCESS ROAD****ESTIMATED COST OF PROPOSED CONSTRUCTION SUPERVISION ORGANISATION  
- REIMBURSABLE COSTS**

Description	Quantity	Rate	Amount (RM)
<b>1. Site Allowances</b>			
a. Professional	738 manmonths	675	498,150
b. Sub-professional	1110 manmonths	535	593,850
c. Clerical	246 manmonths	350	86,100
Sub-Total			1,178,100
<b>2. Office Operation</b>			
Telephone, Stationery, Reports, etc.	246 months	500	123,000
<b>TOTAL</b>			<b>1,301,100</b>