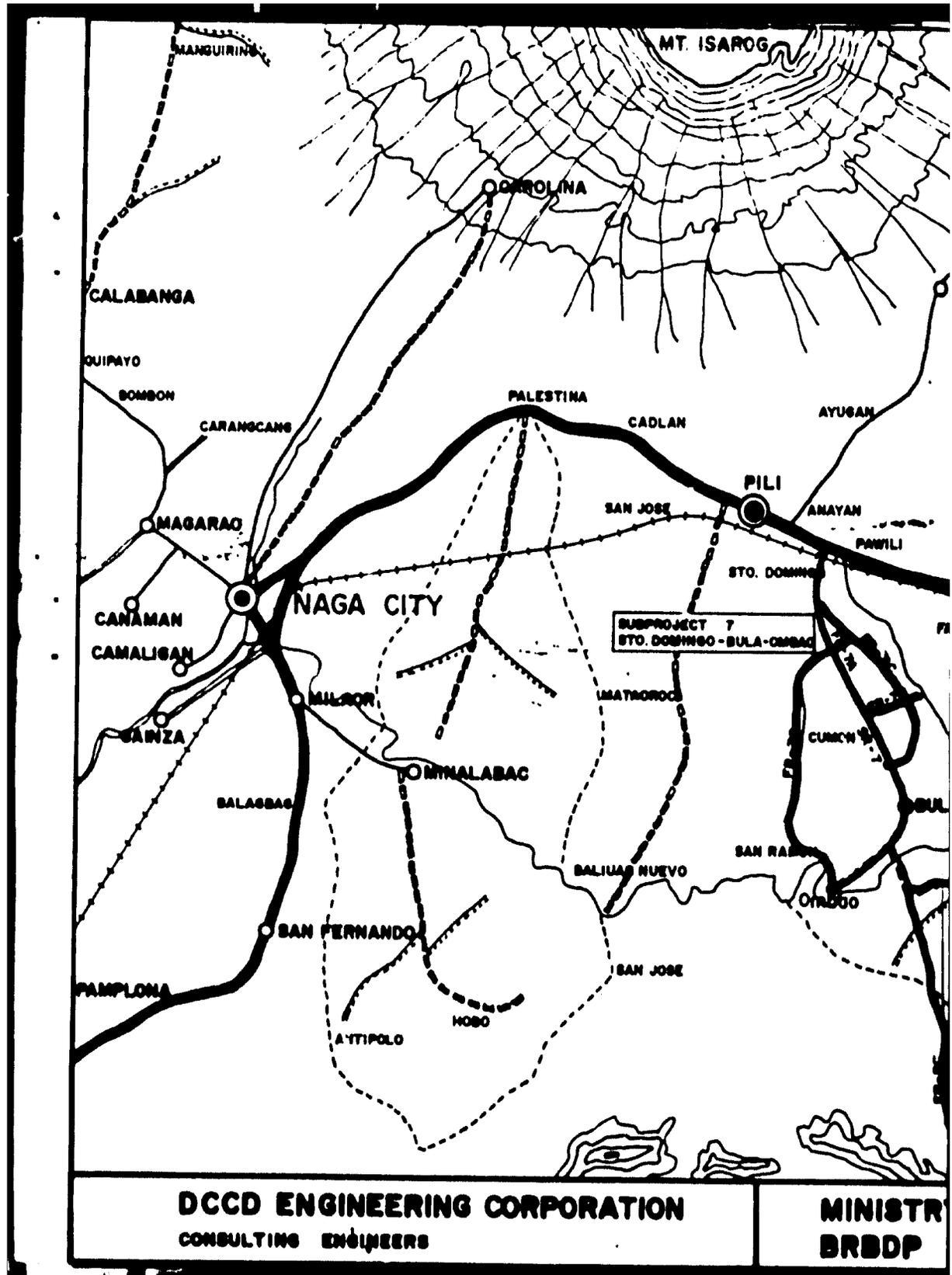


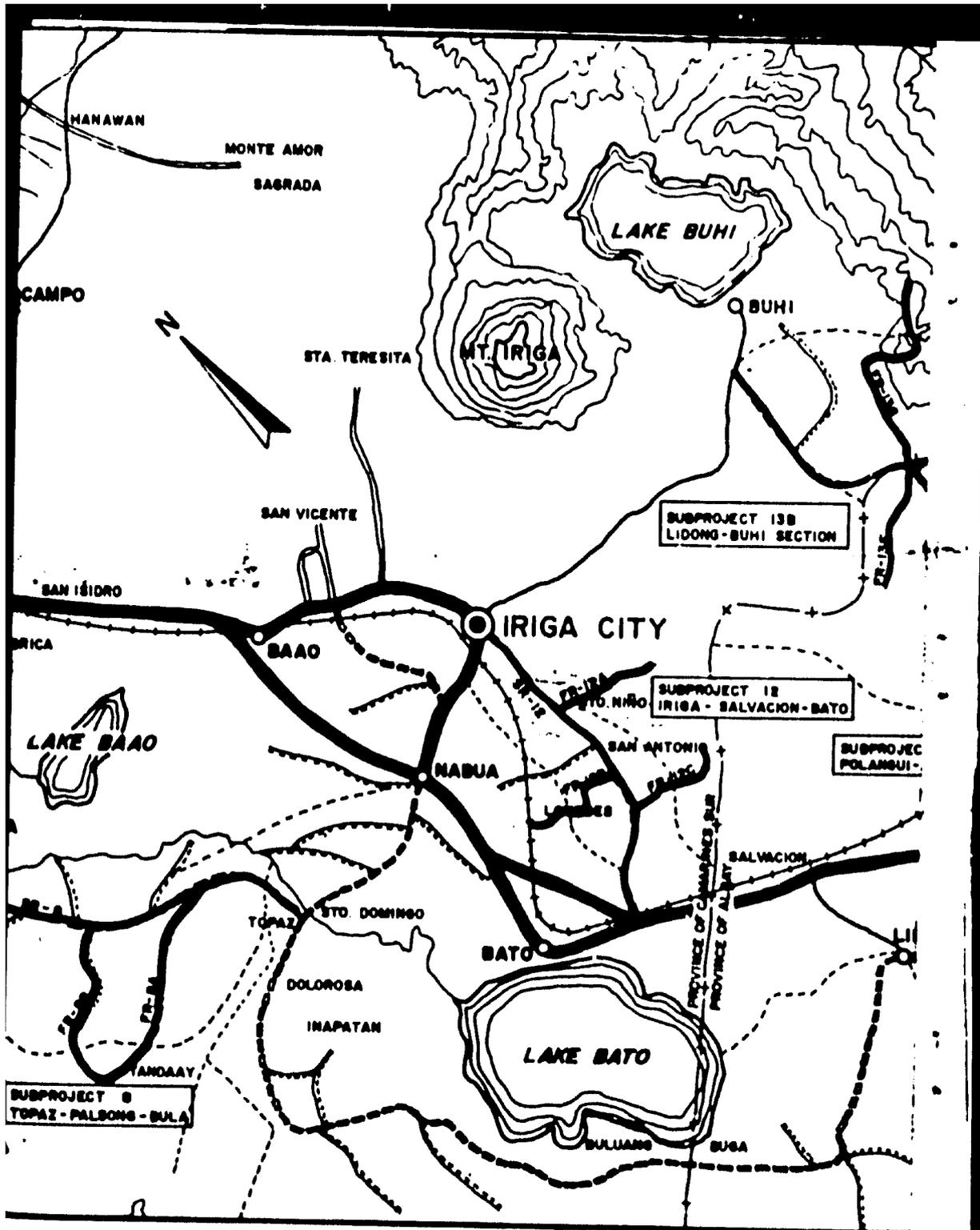
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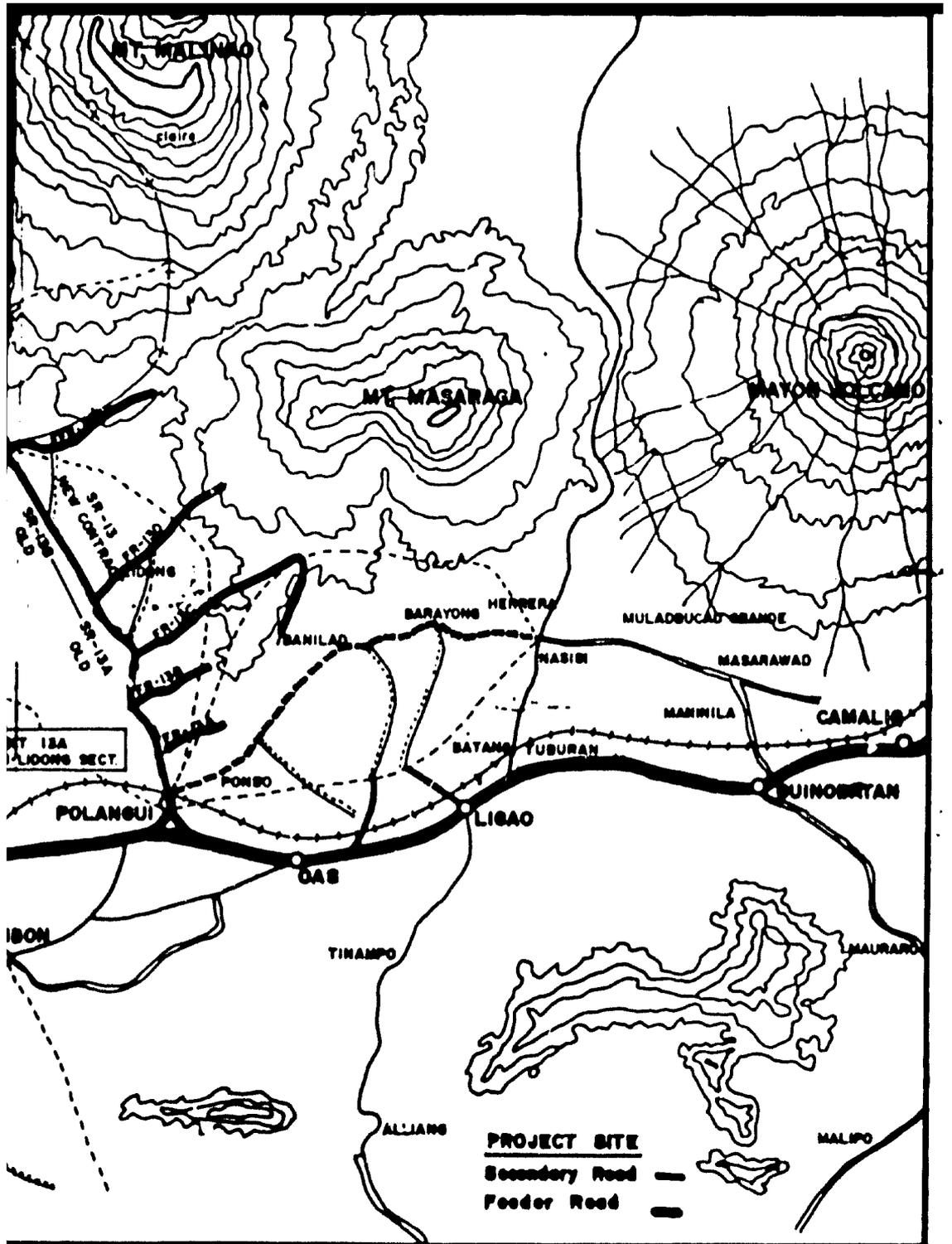
DCCD ENGINEERING CORPORATION
Consulting Engineers





OF PUBLIC WORKS & HIGHWAYS
PACKAGE III · P. M. O.

SCALE :
1 : 125,000



LOCATION MAP

FIGURE 1.1

**BICOL SECONDARY and
FEEDER ROADS, Package 111
Construction Phase**

FINAL REPORT, CONSTRUCTION

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BICOL RIVER BASIN DEVELOPMENT PROJECT (BRBDP) ROAD COMPONENT
PACKAGE III

F I N A L R E P O R T

1. INTRODUCTION

This report has been prepared in accordance with the terms of the agreement between the government of the Republic of the Philippines and DCCD Engineering Corporation, signed in Manila on April 12, 1978. The report summarizes the Construction work carried out under the supervision services, including the total effect of contract changes, claims or disputes, cost and progress of the works.

1.1 Scope of the Project

The project covers reconstruction and improvement of five subprojects of Package III, BICOL SECONDARY and FEEDER ROADS PROJECT. This project consists of the following sections within the provinces of Albay and Camarines Sur.

Subproject 7	-	Sto. Domingo-Bula-Ombao
		Secondary Road - 9.087 Km.
		Feeder Roads - 15.621 Km.
Subproject 8	-	Topaz-Palsong-Bula
		Secondary Road - 10.989 Km.
		Feeder Roads - 11.582 Km.

Subproject 12	-	Irigu-Salvacion-Bato
		Secondary Road - 9.217 Km.
		Feeder Roads - 7.382 Km.
Subproject 13A	-	Polangui-Lidong-Buhi
		Secondary Road - 12.500 Km.
		Feeder Roads - 11.163 Km.
Subproject 13B	-	Polangui-Lidong-Buhi
		Secondary Road - 8.964 Km.
		Feeder Roads - 11.633 Km.

1.2 Acknowledgement

During the course of construction varied problems were encountered regarding the contractor's performance, equipment, personnel line-up and other associated delays. These problems were overcome primarily because of the receptive and cordial attitude and the cooperation extended to the Consultants at all times by the MINISTRY OF PUBLIC WORKS AND HIGHWAYS, the BICOL RIVER BASIN COUNCIL, the UNITED STATES AGENCY for INTERNATIONAL DEVELOPMENT and other agencies.

In particular the Consultants wish to express their sincere appreciation to the HON. BALTAZAR AQUINO, former Minister of Public Highways, Hon. VICENTE T. PATERNO, former Minister of Public Highways, Hon. JESUS S. HIPOLITO, present Minister of

Public Works and Highways, Mr. JOSE F. DAVID, Asst. Minister for Planning and Operations, Mr. WENCESLAO C. DE GUZMAN, Executive Director, PADAP, BRBDP and SIRDP, Mr. VICENTE B. LOPEZ, Regional and Project Director Region V, Mr. Angel B. Salvador, Project Manager, PMO and all others who have extended their help and encouragement in supporting the Consultant's Supervision Team in the completion of all the projects under Package III of BRBDP.

2 SUMMARY

2.1 Brief Description of Each Subprojects

Subproject 7 - This project is located at the municipality of Bula, Camarines Sur, starting at the end of the existing concrete secondary road west of the National Highway at Km. 466.6, passing through the barrio of Bagumbayan and ending at Barrio Ombao. The terrain is predomir

Part of the secondary road starting from Km. 0 + 000 to Km. 0 + 5.075 will be paved with portland cement concrete and the 15.621 Km. length of the feeder roads will be gravel surfaced. One 3-span bridge (Polpog Bridge) will be constructed at Km. 8 + 000.

The project was bidded on November 11, 1977 at MPWH, Manila and was awarded to V.P. Eusebio Construction with a net bid amount of P11,488,673.90. The official starting date was

September 18, 1978 with a scheduled completion date on March 10, 1980.

Numerous difficulties were encountered during the construction period but nevertheless 100% completion was attained on June 28, 1981; the revised completion date

A total of four (4) change orders were processed for the project (see Appendix 1) involving an increase in the contract amount of P195,422.66 and an extension of time of 402 days from the original contract.

Subproject 8 - From Nabua-Balatan Road, this subproject branches out in a westerly direction through flat terrain. Following the existing provincial road, it passes through the barrios of Topaz, Palsong, Baloagan, Panoypoyan and Sorabilla where it connects with the Bula-Ombao Road (Subproject 7).

The entire 10.989 Km. length of the secondary road will be paved with Double Bituminous Surface Treatment while the 11.582 Km. length of the feeder roads will be gravel surfaced. One single lane 86 M. long bridge structure will be constructed across the Bicol River and four (4) box culverts will be built along the stretch of the secondary road.

The project was bidded on March 21, 1979 at MWI, Manila and was awarded to Capitol Industrial Construction Group,

Inc. In view of the sudden increase in cost of prime commodities, gasoline, etc., including that of the labor wages, the Ministry of Public Highways approved the revisions in unit prices for some items of works which revised the bid amount to ₱11,567,162.25. The official starting date was March 11, 1980.

Variable progress was experienced during the construction period but the contractor was able to complete the project within the revised contract period as shown in Appendix 5 of this report.

A total of four (4) change orders were processed for the project (see Appendix 1) which involved an increase in the contract amount of ₱403,876.59 and 197 days extension of time.

Subproject 12 - From the city of Iriga this road proceeds in a general southerly direction through flat terrain following the existing road, passing through the barrio of Salvacion, Masoli proper and ending at Masoli junction where it connects with the National Highway.

The entire 9.217 Km. stretch of the secondary road is to be paved with Double Bituminous Surface Treatment while the 7.382 Km. combined length of the feeder roads will be gravel surfaced.

The project was bidded on February 8, 1978 and the winning bidder was Philcon Builders and Developers Corporation with a bid amount of ₱5,306,770.00. The project starting date was on May 18, 1979 with a scheduled completion date of September 10, 1980.

Due to numerous problems and big delays in the progress schedule the scheduled completion date was never attained. The Consultant recommended termination of the project on November 24, 1980. This was approved by the Ministry of Public Highways.

The project was rebidded (thru sealed bids) in MPWH Manila on May 31, 1981. This was won by Moonrock Construction, a Bicol based contractor. The official starting date was July 25, 1981.

Progress of work under Moonrock Construction was remarkable and 100% completion was well within the revised contract period (see Appendix 9).

A total of four (4) change orders were processed for the project involving a net increase of ₱723,114.07 in the contract and an extension time of 68 days.

Subproject 13 - From Polangui town proper, this road branches out from the National Highway in a general northerly di-

rection following the existing provincial road passing through the barrio of Sagcad, San Vicente and ending at Sagrada where it joins the Iriga-Buhi Road. The terrain varies from flat to rolling to slightly mountainous.

The 21.464 Km. secondary road will be paved with Bituminous Surface Treatment and the 22.796 Km. feeder roads will be gravel surfaced. A total of 9 bridge structures will be constructed at the site.

The project was originally divided into two construction packages. Subproject 13A, starts from Polangui town proper and ends at barrio Lidong, Km. 12 + 500, while Subproject 13B, starts from barrio Lidong, Km. 12 + 500 and ends at barrio Sagrada, Km. 21 + 464.00.

Subproject 13A - This project was bidded in MPMI Manila on January 9, 1978. The winning bidder was William Uy Construction with a bid amount of P14,435,364.00. The official starting date was July 15, 1978 (see Appendix 7).

Various problems and delays were likewise experienced during the construction period but nevertheless 100 percent completion was attained on January 31, 1981. This excludes the asphalt concrete pavement which the contractor requested to delete mainly due to the breakdown of the government-owned asphalt plant at Daraga, Albay with which the contractor had negotiated for his own asphalt concrete requirements.

Subproject 13B - This project was bidded on January 9, 1978 and the winning bidder was J.P.Y. Construction with a bid amount of P10,647,071.50. The official starting date was July 15, 1978 with a scheduled completion date on January 5, 1980. Numerous problems and delays in progress schedule were experienced during the construction period. This project was terminated on March 17, 1981 at the contractors request, due to spiralling oil prices, uncertainty in payment of escalation and unprecedented critical working condition of construction equipment.

Inventories of the contractor's accomplishment was conducted on June 30, 1981 by representatives of PMO, COA, the Project Consultant and the Contractor. The remaining items of work for this project together with the deleted asphalt surfaces in Subproject 13A were repackaged into one contract for re-bidding.

The new project was awarded to L.A.L. Construction in a bidding held in Manila on May 31, 1981 at a contract value of P6,135,119.66. The official starting date was August 11, 1981 and 100 percent completion was attained on August 21, 1982, the revised contract schedule.

Under this new contract a total of five (5) change orders were processed involving an increase in the contract amount of P1,375,198.00 and an extension of contract time of 166 days.

2.2 Staffing

The Consultant Staff which were engaged during the course of the supervision services is shown in Appendix 2. The name, position and duration of employment for the key staff are shown. Staffing has been sufficient for all the subprojects.

2.3 Construction Progress

Subproject 7 - Variable progress was experienced during the construction period. Early mobilization of earthwork equipment and timely start on critical structures placed the contractor ahead of schedule up to May, 1979. Starting June, 1979, progress fell behind due to difficult climatic conditions and shortage of diesel fuel. A revised progress chart was then prepared. However, progress fell behind schedule again starting March, 1980 up to August, 1980, due mainly to escalating costs of construction materials. The contractor officially requested to delete the remaining PCC pavement and construction time was suspended from July 16, 1980 to January 20, 1981. In early January, 1981, with the announcement from the Ministry of Public Highways that there would be price adjustments, the contractor signified his willingness to complete the remaining works provided he would be granted time extension from the expiration of his contract to the time he would resume work plus the time required to construct the remaining PCC pavement. Change Order No. 4 was then processed

and an extension of 245 days was approved. The remaining PCC pavement was satisfactorily completed on August 29, 1981 the revised schedule date.

Subproject 8 - Progress likewise varied during the construction period but completion within the revised completion date was achieved. The work had a good start and went according to schedule up to late September, 1980. The rainy months between October, 1980 and January, 1981 greatly affected the contractor's progress and a revised optimistic progress chart schedule was prepared. After May, 1981 progress fell behind again due to equipment breakdown and resignation of key staff in favor of overseas assignment. A revised progress chart was prepared in September, 1981 but progress slowed down due to repeated occurrence of adverse weather. In December, 1981 the contractor, realizing the penalties imposed for not completing the project on time, increased his output considerably and managed to complete the project on time.

Subproject 12 - Under Philcon Builders and Developers Corporation, progress had a poor start. During the first five months, work accomplishment barely reached 6% mainly due to lack of construction equipment and qualified field supervisors. Written warnings to the contractor regarding his progress were issued throughout the construction period whenever his progress lagged behind schedule. In January, 1980

to March, 1980 some improvement in the work progress was noted, but the accomplishment was not enough to catch up with the previous delays. After April, 1980, deep internal management problems arose between the managers of Philcon, Vibar and Foronda (who joined financially in the venture so) that progress of work suffered considerably. With the project accomplishment standing at 44.33% the contractor abandoned the project. The project was then terminated and rebidged in Manila.

The new contractor (Moonrock Construction) started work early. In fact, three months before the Notice to Proceed was issued earth filling works were already much advanced. About 53% of the work was already accomplished in the first five months which was considered remarkable considering the difficult weather during the months of August to December, 1981. In January to February, 1982, progress fell slightly behind schedule due to some Right-of-Way problems, accidental burning of the asphalt kettle and inclement weather. A revised progress chart was then prepared and progress was generally on schedule up to August 17, 1982, the project completion date.

Subproject 13A - Variable progress was experienced during the construction period. The first five months showed positive progress mainly due to efforts placed on Earthwork

and General items. Progress was fair until June, 1979, when the effects of difficult climatic conditions, shortage of fuel and construction materials were severely felt at the project site causing considerable delays on several items of work. A revised optimistic progress chart was then prepared to put the contractor once again parallel to the progress schedule up to the end of October, 1979, at which date about 78% of the work had been accomplished. From December, 1979 to May, 1980 progress accomplished was minimal, mainly due to the breakdown of the government asphalt plant in Daraga, Albay with which the contractor had negotiated for his asphalt concrete requirements. Due to this difficulty the contractor requested to delete the remaining items of work on Bituminous Surface Course and Pavement. The deletion changed the contractor's actual progress to 82.6%. Final inspection of the project was conducted on December 10, 1980.

Subproject 13B - Progress had a good start. In March, 1981 the actual work accomplishment was about 22.5% against a scheduled percentage completion of 18.0%. Delays began in May, 1979 and the contractor was always behind schedule since then, in spite of the two revisions in the progress chart schedule that was prepared. The causes of delays are outlined in paragraph 3.7 of this report. The project was terminated on March 18, 1981 with the progress accomplishment standing at 63.02%.

Subproject 13 (Rebidded uncompleted items of work 13A and 13B) - Progress had a poor start. After three months, only about 6% of the scheduled 29% progress had been accomplished. Delays were attributed to four main factors which are outlined in paragraph 3.2 of this report.

Written warnings were issued to the contractor and weekly meetings were held between the project Consultant and contractor in order to follow-up and discuss the problems associated with the progress delays. In March 1982, the contractor had four asphalt teams working and was able to solve the aggregates problem. General improvement was observed thereafter, and the project was completed within the approved revised construction schedule.

2.4 General Comments

Except for Mobnrock Construction, Capitol Industrial and Construction Groups, Inc. and V.P. Eusebio Construction, all the other contractors are not properly prepared for the undertaking of these subprojects although most of the time, equipment and labor were sufficient for the work as required in the progress schedule. From the beginning the Consultant's staff had to maintain a very close supervision on all phases of the work in order to insure that good quality work was produced. It is, however, acknowledged that the Contractors did cooperate with the Consultant within their capabilities

and resources and have completed their part of the project as required by the contract.

3 FINAL CONSTRUCTION COST

3.1 Effect on Change Orders

The total increase in amount due to change orders for each subprojects are tabulated below. The correspond in contract period is likewise shown.

<u>Subproject</u>	<u>Change Order Issued</u>	<u>Original Amount</u>	<u>Amount (+) Increase (-) decrease</u>	<u>Day Extended</u>	<u>Remarks</u>
7	4	P 11,488,673.90	(+) P 195,422.66	402	Completed
8	4	11,567,162.25	(+) 403,876.59	197	Completed
12	-	5,306,770.00	(-) 3,292,249.78	-	Terminated
13A	5	14,435,364.00	(-) 1,703,686.94	164	Completed up to Base Level
13B	2	10,647,071.50	(-) 57,600.00	140	Terminated

Rebidded Subproject

12	4	6,127,789.69	(+) 723,114.07	68	Completed
13	5	6,135,119.66	(+) 1,375,198.00	166	Completed

Appendix 1 shows the emergency work orders issued to the Contractors for carrying out the reconstruction work on sections destroyed by floods caused by the destructive typhoons that passed the project sites:

3.2 Causes of Significant Delays

Subproject 7

The reasons for significant delays in the subprojects affected are shown opposite the numbers.

The rebidder projects are enclosed in parenthesis.

<u>Causes of Delays</u>	<u>Subprojects Affected</u>
1. Adverse Weather	7, 8, 12, 13A, 13B (12), (13)
2. Lack and/or Breakdown of Equipment	8, 12, 13B (13)
3. Lack of Competent Field Supervisor	12, ...
4. Shortages of Fuel and other Construction Materials	7, 12, 13A, 13B
5. Cash Flow Problems	7, 12, 13B
6. Poor Coordination of Work	12, 13B (13)

Except for subprojects 12 (Phileon Builders and Developers Corporation) and 13B (J.P.Y. Construction) which were terminated, the other contractors were able to re-schedule their activities and have completed the project within the extended contract period.

3.3 Claims or Disputes Affecting Cost and Progress of the Work

No serious disputes have been encountered with any of the contractor under the Consultant's Supervision.

3.4 Unit Price Adjustment

Due to drastic price increases in cement, oil, steel, etc., including the increase in labor rates, the different subprojects were allowed to claim for unit price adjustments as contained in the implementing rules and regulations of P.D. 1594 governing infrastructure contracts. The first claim for price adjustments which covers the first half of the project since it began was prepared by the Consultants for Subproject 7, 8, 13 and 13B. The second of final claims are still under preparation for Subprojects 7 and 8. Final claims for Subproject 13A was completed last December, 1981.

For the two rebidder subprojects, claim for price escalation is allowed provided it does not exceed the limitations stipulated in the revised P.D. 1594. Due to the very slight increase in the prices of construction materials during the construction of the two rebidder subprojects, only a minimal amount of revision in unit price can be computed.

4 CONSTRUCTION

4.1 General

No particular problems were encountered in the supply of facilities and vehicles for the Resident Engineers. Some minor pieces of Laboratory Equipment which were not made

available during the early period of construction were supplied later and did not cause any delays in the prosecution of the work. The distribution in the supply of the R.E. facilities and vehicles for the different subprojects are as follows:

- Subproject 7 - R.E. office at Nabua, Camarines Sur, One Land Cruiser, one Toyota Tamaraw and set of Laboratory Equipment.
- Subproject 8 - One Toyota Land Cruiser and set of Survey Equipment and set of Laboratory Equipment.
- Subproject 12 - One Isuzu Pick-up and set of Laboratory Equipment.
- Subproject 13A - One Land Cruiser, one Toyota Tamaraw, set of Survey Instrument, and set of Laboratory Equipment.
- Subproject 13B - One Toyota Tamaraw, and set of Laboratory Equipment.

4.2 Earthwork

In Subproject 7, some minor revisions in the vertical alignment of some segments of the road in order to correct minor errors in the survey made during the construction period. This revision further improved the quality of the road and minimized the overruns in borrow materials. Abundance of suitable borrow

materials from sources near the project greatly helped in the completion of the embankments at an early period. Considerable volume of unsuitable materials were encountered in Feeder Road E, specifically on existing sections traversing rice paddies. Removal and disposal of these materials did not adversely affect the contractor's construction schedule.

In Subproject 8, the contractor experienced difficulty in earthwork handling. The cut section of Km. 4 + 000 became saturated and the road had to be closed to traffic for two weeks. The contractor had to remove the unsuitable materials along stretch of about 200 meters, replacing it with better materials in order to open the road for traffic and to be able to work further north. At Km. 7 + 200, an abandoned and silted irrigation canal was found within the roadway limits. About 400 m³ of unsuitable materials was removed and replaced in the area. Due to poor soil, grouted riprap had to be placed on both sides of the shoulders of the cut sections starting from Km. 8 + 200 to 8 + 500. The grouted riprap also prevented the intrusion of roadway slides on completed shoulders. Some stretches along feeder road C became too much saturated that earthwork operations ceased for about one month. This was primarily because of the animal drawn carts regularly commuting in the area.

In Subproject 12, under Moonrock Construction, a considerable amount of subbase materials in lieu of borrow materials were used due to the difficult weather prevailing during the time that earthwork handling was in full operation. The downstream sides of the flooded sections between Kms. 4 + 120 and 7 + 180 have been protected with asphalt seal on the shoulders and grouted riprap on the slope.

Alignment was revised along the mountainous stretch of Subproject 13A at Km. 3 + 500 in order to correct the problem posed by erosion during rainy season and at the same time to avoid formation of embankment on the fill side. Section in cut at Km. 1 + 500 feeder road C where right-of-way problems were encountered was redesigned in order to maintain the full width of the road.

In Subproject 13B, earthwork operation was intermittent mainly due to lack of equipment. The approximately 500 meters stretch between barrio San Vicente and Batang Bridge connecting Subprojects 13A and 13B was made passable to traffic in a year's time.

4.3 Subbase

All the subbase materials used in the project came from approved sources nearest to the project site. Due to the numerous construction in the region, some of the material

sources as described earlier in the material reports had been exhausted and the contractor had to probe for other sources. Sometimes the contractor had to construct his own access road to reach these areas.

Subproject 7 - The subbase materials came from an approved borrow pit (Banassi Quarry) inside the contractor's camp at Pawili about 5 km. away from the project site. A small amount of fine aggregates and binder materials from Pawili river were added during blending operation to conform with the grading requirements.

Subproject 8 - The contractor set up a 25 TPH secondary crusher upstream of Waras river, some 5 km. away from Iriga City proper. Iriga City is about 8 km. away from the project site. The crushed items were blended with item 108 in the field to meet the grading requirements. Oversized materials were removed by blading during spreading and are sometimes handpicked by laborers. Placing of base course was a problem in the beginning, but as the crew gained more experience, this operation did not hamper the asphaltting work.

Subproject 12 - The contractor had set up his own crusher at San Nicolas quarry, Iriga City which is about 2 km. away from the starting point of the project. The crusher unit pro-

duced 10-15 TPH crushed items which was not substantial enough. Only selected stones with up to 4" maximum diameter could be fed into the crusher's jaw and feeding of stones is done manually. In early December, 1981 when the requirements was at its peak level the contractor engaged around 60-70 laborer to crush the stones manually. On the whole, spreading and compaction works have been satisfactory.

Subproject 13A - For his requirements, the contractor depended upon the government owned crusher unit at Malabog, Ligao, Albay which is about 25 km. away from the project site. However, quality of the crushed items was satisfactory. Item 108 materials coming from the contractor's own quarry at Km. 4 + 000 had to be further blended in order to meet the grading requirements for item 200. The materials for the shoulders were purely item 108 obtained directly from the contractor's quarry. These were immediately placed as soon as the base course item were laid. The gravel surface of the feeder road consisted of item 108 directly obtained from the same quarry. A vibratory roller was used as compaction equipment. No major problems were encountered during the entire subbase and base course spreading and compaction works.

Subproject 13B - Base course placement had a very late start. The contractor brought his own crusher which he set up at his own yard at Sto. Domingo, Iriga City. Stones for crushing came from Waras river and Santiago some 3 Km. away. Only selected boulders with maximum diameters of 6" were fed into the crusher. Crushing, spreading and compactions were very irregular during the entire construction period due to equipment breakdown, lack of operating expenses, inclement weather, etc. About 80% of the 8.964 km. stretch had been completed with item 200 prior to the project termination. Likewise, several stretches of feeder roads F and G and the whole stretch of feeder road E were without subbase (Item 108) materials when the project was terminated.

4.4 Surface Courses and Pavement

Subproject 7 - PCC pavement started right after the town poblacion at Km. 5 + 700 and proceeded north up to Km. 5 + 023.50. From this point on the operation transferred to Km. 0 + 000 (start of the project) proceeding south to Km. 2 + 177.50. PCC pavement operation was interrupted at this point due to the prohibitive cost of construction materials which escalated during the fuel crises. At this point, the contractor decided to have the remaining unpaved portion deleted. However, in early December, 1980 the contractor was prodded by the Consultant to complete the remaining unpaved section. The project was completed on August

19, 1981 after the request of 245 days extension of contract time contained in Change Order No. 4 was granted by the Ministry of Public Highways.

The PCC pavement is 20 cm. thick and half lane paving was employed to allow traffic flow on the other half of the roadway. The dry-mix concrete batch plant at the contractor's camp at Pawili was utilized throughout the paving operations. Between two to three transit mixers delivered the mix concrete from the camp to the area of operation. Two gas driven vibrators were used in compacting and spreading the newly placed concrete. Handfloats and rectangular wooden beams were used on the concrete to produce an even and level finish. The surface was finally broomed and cured.

Some shrinkage cracks developed or appeared on the surface of the pavement, but tests revealed that they were only superficial. These cracks however, were repaired by chipping the pavement along the cracks and sealing the entire chipped length with epoxy mortar.

Subproject 8 - On March, 1980 Bituminous Surface Treatment started at the second approach of Palsong bridge at Km. 2 + 042.80 proceeding north. Only one asphalt kettle was available at that time producing an average of between

110 to 150 lineal meters of half-lane asphalt paving. The second asphalt kettle arrived in September, 1980, and a second team was immediately formed to work simultaneously forward at a paced distance of about 300 meters. When the crusher unit bogged down in March, 1981, the contractor purchased his aggregates from Tiwi, Albay which is about 95 km. away from the project site. These aggregates were further screened at the jobsite to obtain the choker and cover aggregates. Asphaltting works between August and December, 1981 have been very irregular mainly due to adverse weather conditions. The daily accomplishment during these periods was between 50 - 70 lineal meters full width asphaltting.

Asphalt bleeding was observed on some segments of the road specifically on the centerline portions where the asphalt spray overlapped due to half lane asphaltting. These sections were spread with cover aggregates to contain the bleeding. The survey team had to maintain close supervision on these elevations which accounts for the present good riding quality finish of the road.

Subproject 12 - Bituminous Surface Treatment started right after feeder road C intersection, Km. 7 + 900 and proceeded south. This section was least affected by traffic. The asphalt kettle used was rented from the City

Government and the aggregates supply, up to Km. 8 + 500 were purchased from Tiwi, Albay. Because of weather problems, a second area of operation was opened at Km. 1 + 200 going south. This scheme was considered so that if it was raining at Km. 8 + 500, the contractor could switch his operation to Km. 1 + 200 and vice-versa. The second asphalt kettle arrived six months later and asphaltting proceeded smoothly thereafter. In January, 1982 the contractor's crusher bogged down and repair works lasted for about three weeks. Aggregate supplies were purchased from Tigaon, Camarines Sur some 60 km. away from the project site and sometimes from Malabog, Ligao, Albay which is about 50 km. away. These aggregates were further screened at the job-site to obtain the required sizes for the choker and cover. The aggregated recovery from Tigaon source was about 90% with 10% waste material. The coarse aggregates is rounded and semiangular which later was discovered to be the best quality aggregates used in the entire subprojects. The aggregates from Malabog source were flaky and only 60% recovery was obtained after screening. Furthermore, the aggregates contained plenty of oversized items. The Consultants allowed the use of these aggregates on the condition that they will be blended with the aggregates coming from Tigaon. The accidental burning of the first kettle during the early phase of asphaltting work cause consider-

able delays. The two motors, tires and rubber hose were replaced and the kettle was back in operation after a lapse of 7 days. Except for unfavorable weather, there were no other delays encountered on the asphaltting work and this item was completed in accordance with the revised schedule.

During the project final inspection in August 17, 1982 the MPWI team composed of Executive Director Wenceslao C. De Guzman, Assistant Director F. de Leon, Project Manager Angel Salvador, and others were greatly impressed with the finished quality of the asphalt pavement along the entire stretch of this road.

Subproject 13A - Bituminous Surface Treatment work started at Km. 1 + 920 (start of project) and proceeded northward. The asphalt kettle used was borrowed from the government. During the first month, the accomplishment barely reached an average of 50 lineal meters, full width, which was very much behind the programmed work schedule for the item.

Numerous difficulties occurred thereafter, the most prevalent being the low supply of crushed aggregates. An additional asphalt kettle and the immediate formation of asphalt gangs helped to solve the problem. In early February 1982, an additional mini crusher with a rated capacity of 25 TPH was set up at the upstream section of Lallo River Bridge.

The first mini crusher was then transferred to the Nasisi River source to prevent double handling of stones for crushing. In the succeeding months, four additional asphalt kettles were rented from the different government offices in the region as far as Sorsogon and were brought to the project site. This brought to five (5) the number of asphalt kettles already in the project site. Three experienced asphalt teams arrived after mid-March 1982. These teams plus the two teams from Naga, completed the required number of asphalt team. These teams were deployed in four different areas along the stretch of the road. Separate heating areas for the asphalt were subsequently organized. The Contractor also gave incentives to the teams that completed the highest production per week. The Consultant, on several occasions sent warning letters to discourage this method because this practice made the team too quantity oriented, thus neglecting the quality of the work. Generally speaking, however, with the Consultants Inspectors deployed in each team, the quality of asphalt paved were acceptable. The maximum recorded average daily accomplishment by the four teams, was between 300 to 400 lineal meters full width. Delays on certain occasions were generally caused by adverse weather and the lack of coarse, choker and cover aggregates. To cover up for these delays, the contractor continued asphaltting up to mid-night, whenever it was possible. These were times when a team would be working as early as five

o'clock in the morning. These situations were very prevalent during the months of May, June and July, 1982 and created problems in the Consultant's schedule of supervision work. The aggregate situation was solved when the contractor's General Manager stayed more often in the project and continuously procured aggregates from sources in Tigaon, Camarines Sur and Bacolod source at Libon, Albay. As mentioned earlier, the aggregates from Tigaon are of the best quality and this could be attested by the good quality of the finished road surface in the sections between Pinagdapogan and Mainaga bridges. The Bacolod source were actually river run aggregates which were already screened at the source by the residents in the area. The materials were blended with the crushed items prior to the asphaltting works.

Some asphalt surface failures were experienced between Batang and Lallo bridges and most of these were located near the edge of the shoulders of cut sections and in areas where irrigation canals have been constructed parallel to the road. Investigations revealed that in some cut sections, subterranean flow had seeped to the surface, weakening the base and destroying the constructed asphalt surface. During rainy season most of the irrigation canals were flooded, soaking the base materials and reducing its required consistency. Most of these sections were repaired by the removal of the defective materials and their replacement with new base mate-

rials. Rough surfaces caused by faulty asphalt spray nozzles were resprayed with asphalt and immediately covered with seal coat aggregates.

The asphalt materials used for binding the aggregates were initially heated in the fabricated heating area where between 8 to 10 drums were used as heating kettles. About two hours were spent for heating before the asphalt was transferred to the asphalt kettle. When the asphalt reached the area of operation the two asphalt burners are lighted up to further heat the asphalt to the temperatures required for spraying. Each asphalt kettle is equipped with a temperature gauge mounted near the spray nozzle. Defective nozzles were disallowed.

4.5 Structures

Design

According to the original plans, a total of 11 bridges and 21 culverts were estimated for the project. Nine of the eleven bridges were designed as simple span RCDC type and were standardized into 12 m. and 18 m. with provisions for single lane construction, except for Polpog Bridge and Bicol River Bridge.

Polpog Bridge at SR-7 is a continuous reinforced concrete slab bridge with a total span of 27 m. This type of bridge was selected to obtain a reduction in the vertical alignment

thus minimizing embankment fills at the approaches while at the same time satisfying the 1.50 m. clearance between the lowest horizontal members of the bridge and the highest water level.

Bicol River Bridge is a continuous RC/DG Bridge with a total span of 86 m. This is supported on piles rigidly attached to the superstructure to achieve an earthquake resistant design. This type of structure produces minimal bending moments and deflections compared to multiple simple spans thus resulting in a considerable reduction in cost in the superstructure as well as in the substructure.

The standard culvert types were designed to carry loads without fill or with a maximum fill of 0.90 m. The seven standard types were designed taking into consideration the amount of water to be discharged and the sizes of openings were governed by the width of existing creeks and depth of fill required by the vertical alignment.

Due to observations during floods, minor changes in stationings as well as in elevations were made. Except for Lallo River Bridge in which one span was reduced to .15 m. all the other bridges were built exactly as per plan.

In the case of box culverts minor adjustments were made in stationings and waterway openings to concur with the actual conditions. Two box culverts, Box Culvert No. 1 in SR-7

and Box Culvert No. 7 in SR-13 were designed as normal, but were constructed with skewed angles parallel to the water flow. All the boxes were built to support the traffic load directly on the top slab.

Construction

All piles were driven to refusal without major difficulties. Some deviations from the expected lengths were experienced, as in the case of Polpog River Bridge, SR-7, where the actual depth driven was less than the anticipated depth resulting in savings in pile lengths. In another case at Amogis Bridge SR-13A, the piles recommended at the first approach failed to reach the minimum embedment requirements and the substructure had to be replaced with a spread footing. Minor problems were encountered in the inlet wingwalls which had to be extended to check the meandering flow of the creek. Wherever it was impossible to extend the walls, grouted riprap was constructed to protect the bank from erosion effects.

All the materials for concreting the structures were batched by volume and different brands of cement were used depending on the availability in the area. In the case of Bicol River Bridge, three types of cement brands were used, (Union, Island and Pacific). However, only one brand was allowed for each span. From the series of cylinder compressive tests conducted, strength results, were satisfactory and in some cases results exceeded specification requirements.

Many problems were experienced during concrete pouring, ranging from breakdown of mixers and concrete vibrators, sudden downpours and inexperienced personnel. Concreting of Lallo River Bridge footing was stopped three times due to repeated swelling of the river. However, necessary remedial works were implemented resulting in a more or less quality structures.

4.6 Drainage and Erosion Works

The original plans for the schedule of pipe culverts had to be adjusted according to actual field conditions. At the start of construction, observations were made during flood heights to check the adequacy of the pipes and the need for cross drains. Existing pipe culverts were extended or replaced as required in the schedule. Pipe culverts that were found to be unnecessary were deleted. Changes in locations were made to suit field conditions and new lines were added to meet the requests of the different government offices and barangays to divert occasional run-off and revive existing waterways.

Due to the high discharge velocity of some existing irrigation crossings, reinforced concrete headwalls were constructed. Other cross drain openings were protected with grouted riprap. The different types of grouted riprap best suited to the field conditions were constructed in accordance with the drawings issued for each subproject.

During the height of typhoon Anding in November, 1980, flood waters overflowed at the end section of SR-8 resulting in the erosion of the in-place materials at the downstream side. This was remedied by asphalt sealing of the shoulders and the construction of grouted riprap at the downstream side of the embankment. Two low points in SR-12 were also protected with asphalt seal and grouted at the downstream side of the embankment. Class A riprap were constructed at Km. 3 + 525 and 3 + 600 SR-13 to contain the continuing erosion of the embankment caused by occasional rains.

In SR-13, the poor drainage canal inside the city proper was deepened and lined with grouted riprap to facilitate the flow of run-off during rainy seasons.

4.7 Incidental Construction

Due to the existing ban on the cutting and transporting of first class timber in the area, Contractors (SR-8, 12 and 13A) substituted steel guardrails for the originally proposed timber guardrails. These were mounted on concrete posts and were placed mostly on the bridge approaches and on some sharp curves and stiff embankment sections of the roadway.

5 MATERIALS - TEST RESULTS - QUALITY

5.1 Embankment

The embankment material for SR-7 came mainly from the Banassi

source inside the V.P. Eusebio camp in Pawili which is about 5 Km. away from the project area. The embankment formed at the end section of SR-8 also came from Pawili but from a different source about 5 km. south of V.P. Eusebio's Camp. The material was predominantly silty clay with traces of limestone rock. These materials were further blended with sand material obtained from Pawili River.

The embankment materials for Km. 0 + 000 to Km. 8 + 800 SR-8 came mainly from the roadway and drainage excavations obtained from cut sections along the road.

The embankment formed in SR-12 came from the contractor's quarry in San Nicolas, Iriga City some 2 km. away from the project. The material are mostly sand and gravel with small amounts of silt.

The embankment formed in SR-13B also came from the contractor's camp at Sto. Domingo, Iriga City. The material is predominantly silty sand and gravel.

In cut sections along the stretch of SR-8 and 13A occasional spots of unsuitable materials having a CBR value of less than 3% were encountered. These portions were excavated to an average depth of 30 cm. below subgrade level and replaced with Item 108 materials.

5.2 Crushed Materials and Material Sources

The average abrasion properties of the crushed materials for DBST and the sources of the raw materials used are tabulated below:

<u>Abrasion Properties</u>		
SR - 8	38%	Waras River
SR - 12	28%	Tigaon, Camarines Sur Sn. Nicolas, Iriga City Tiwi, Albay
SR - 13	40%	Nasisi River Tigaon, Camarines Sur Tiwi, Albay

The aggregates for the asphaltting works were screened using 1", 3/4" and 1/2" size screens. The aggregates obtained were classified into coarse, choker, and cover aggregates.

The good quality aggregates for item 200 and DBST works were produced by SR-8. The crusher unit had a water system which washed away and flushed out the clay materials from the stone materials and a screen mechanism which really separates the coarse aggregates from the fines. The screen mechanisms of SR-12 and 13 were faulty and the contractor had to spend too many man-hours in sorting the aggregates to the required sizes. The best quality aggregates for the asphaltting works were those obtained from Tigaon, Camarines Sur. The crusher

plant that was used operated by the government in the processing of stones for concrete and asphalt requirements. However, due to the big load demands from contractors operating in the region and also due to some management problems the crusher operated for a short time only and finally bogged down in July, 1982.

At the start, the aggregates crushed in SR-12 was flaky. But after a series of repairs and repeated adjustments of the crusher's jaw, the required sizes were attained. In the beginning of asphaltting works the contractor obtained his aggregates in Tiwi, Albay and when his crusher bogged down in March, 1982 the contractor obtained his aggregates from Tigaon, Camarines Sur.

The aggregates for SR-13 came from four different sources. These used for the first 3 km. came from a government owned crusher in Malabog, Daraga, Albay. This crusher operated only for a short time. For the succeeding roadway section up to km. 8 the aggregates came from the mini crushers set-up at Nasasi River and at the upstream of Lallo River Bridge. When the demand of the four asphalt team became too large, the contractor obtained and purchased his aggregates from Tigaon, Camarines Sur. The crusher in Tigaon bogged down too, and the contractor had to purchase screened natural aggregates from Bacolod, Libon, Albay. These natural aggregates were further blended with the crushed items produced by the mini crushers.

This system produced satisfactory results.

For all the subprojects, crushed items for item 200 were blended with subbase materials in varying proportions which ranged from 60% to 40% or 55% to 45%. The oversized materials were removed by blading during grading operations and handpicked by laborers at the jobsite.

Cement

Five different brands of cement were utilized for the project. These were Continental, Island, Union, Pacific and National cement. This situation produced variations in the concrete quality. Trial mixes and test results showed that Continental cement was superior in quality. However, its availability from suppliers in the area were always doubtful, especially in places where there were continuous concreting works.

5.4 Steel

Reinforcing bars used in the structures were all deformed billet steel grade 40 (Intermediate Grade), supplied by the Philippine Blooming Mills and Pagasa Steel.

Representative samples were tested at the MPMI Soils and Material Quality Control Services, Sta. Lucia St., Intramuros, Manila.

Miscellaneous

Water

Water used in concreting works for the different subprojects came from the following sources.

SR	-	7	-	Motor Pump Deep Well
SR	-	8	-	Deepwell
SR	-	12	-	Salvacion Creek
SR	-	13A	-	Pintor, Itaran, Pinagdapogan, Mainaga, Anogis and Anopol Rivers
SR	-	13B	-	Batang, Lallo and Araga rivers

No representative samples were taken from each source. The quality of water used were closely observed by the Consultants inspectors. Water with impurities were immediately disapproved.

5.5 - Asphalt Materials

All asphalt products used conformed with AASHTO Specifications and were manufactured by Petrophil Corporation. Petropen 85/100 was used for the entire asphaltting works and brands MC-250 and MC-70 were used for prime coat. About 45 drums of SS-1 were allowed for priming the end sections of SR-13 which were affected by weather.

The mechanics of asphaltting works were as described in the specification. The base was primed with liquid bituminous asphalt (MC-70 or MC-250) of low viscosity and, after this had penetrated and dried, an application of heavier bitumi-

nous material (Pen. 85/100) was made. This coating was immediately covered with clean, coarse, one-size aggregate and rolled. A second application of asphalt was then made and rolled again. The last application was overlain by cover aggregates and rolled again.

The asphalt spreading equipment used for SR-8, 12 and 13, were manually operated asphalt distributors. Each had a maximum capacity of 4 drums and was powered by 10 to 12 HP motors. The inspector always checked the spread by first ascertaining the tank capacity or initial depth before spreading. Distributors with defective spraying valves were not allowed. The correct temperature was monitored by an asphalt temperature gauge mounted near the asphalt nozzle

5.6 Reinforced Concrete Pipes

All reinforced concrete pipes used for each subprojects were manufactured at the jobsite.

One set of test was made for every 25 M³ of concrete poured. This consisted of testing two cylinder samples each for 7, 14, and 28 days strengths. Sizes and spacing of reinforcing bars were regularly checked by the site inspectors to ensure that they are in accordance with the Tender Documents drawings.

SURVEYING

Three survey parties were organized for the duration of the project. Each party was headed by one Chief Surveyor with three aides and fully equipped with Engineer's Transit, Automatic Level and necessary tapes, level rods, staves, etc. The sequence of survey activity followed the order of priority as required in the field.

6.1 Vertical Control

All elevations and reference points established during the design phase were rechecked by running closed level loops and tying to existing bench marks of the Bureau of Coast and Geodetic Survey. These benchmarks are located in the vicinity of the project road. They are listed in a special publication issued by the Bureau of Coast and Geodetic Survey. These reference points were used extensively during the period of construction. Minors delays were encountered due to disturbed or lost monuments, but these did not affect the survey works nor produced any discrepancies in the checking of elevations.

6.2 Horizontal Control

The same concrete monuments used in the vertical control were used for horizontal control points in all the sub-projects. All horizontal control points such as the

beginning of curves, end of curves, points of intersection, etc. were staked out by the survey crew on all road alignments without difficulty. Some revisions in alignment were done to avoid right-of-way problems. Other revisions were due to shifting to the mountainous side to prevent formation of embankment on the fill side and to improve the appearance of the road.

7 CONTRACTOR'S PERFORMANCE

7.1 Progress

SR -7, Progress during the first seven months of the contract was steadily according to schedule. Working equipment was complete and the contractor was experienced in handling earthwork and concreting works. During the following five months, however, the contractor's performance fluctuated due to such factors as adverse weather and shortages of diesel fuel, cement and other construction materials. Starting October, 1979, work started to progress by the end of December, 1979 about 72% of the contract neared its completion. Progress of work was very slow during the period covering January to June, 1980 due to the escalating costs of fuel and other construction materials. The Ministry of Public Highways, unable to guarantee an immediate payment of price escalation, issued a memorandum giving an option to the different contractors to complete the work up to base level for the secondary road. Some portions of PCC con-

creting works were deleted. However, the Contractors did not welcome the memorandum because should the request for deletion of the remaining PCC be granted, the project, although substantially completed would be considered terminated. This terminology was not acceptable to the contractor.

After it was decided that pavement works would continue the contractor was granted time extension for the delays incurred. The remaining pavement was completed in accordance with the revised schedule.

SR - 8, Progress was ahead of schedule for several months due to the timely mobilization of equipment, good organizational set-up and experienced key staff. At the end of August, 1980 about 46% of the contract had already been completed against the scheduled completion of 37%. From September, 1980 to January, 1981 the contractor's performance slowed down due to equipment breakdown, inclement weather and resignation of staff in favor of overseas jobs. After February, 1981 an encouraging increase in performance and progress was noted but the contractor was still unable to catch up with previous delays. In August, 1981 when about 78% of the work had been completed the project suffered damages due to frequent typhoons. The schedule was then revised to cover up the repair works. The period covering December, 1981 to the end of the contract time per revised schedule was marked with the in

crease in activities. Although behind schedule at the start, the contractor was able to complete the project within the revised period.

SR-12, The project under Philcon Builders and Developers had a very poor start. During the first six months there was no adequate working equipment and the field organizational setup was very poor. The General Manager was rarely present and the management of work was left to the Project Manager who had very little experience in handling highway projects. During the first six months, there was only 7% accomplishment against the scheduled 26% completion. After several meetings between Consultant and Contractor and warning letters issued by the Consultants, progress improved slightly and by December, 1979, about 17% of the project had been accomplished although this was still way off from the scheduled completion from January up to March, 1980 a sudden increase in activities was noted when the needed equipment and became available, site management improved. Progress of work during this period increase abruptly from 18% to about 38% although this was still well below the scheduled percentage progress of 72%. Progress of work once again suffered delays when the new site management and the General Manager developed serious internal problems regarding partial collections for the work accomplished during the period. This problem was never resolved and the contractor abandoned the

project at an accomplishment of 44.83%.

This project was terminated and the remaining items of work were rebid in Manila and subsequently awarded to Moonrock Construction whose operation is described below.

Moonrock Construction

This is a locally based contractor whose main office is located in Iriga City barely a kilometer away from the project site. Without receiving the project Notice to Proceed and anticipating the bad weather ahead, the contractor started hauling and spreading earthwork along the stretch of the secondary road. By December, 1981, about 53% of the work had already been accomplished. This accomplishment was remarkable considering that between August and December, 1981, the rainy season was at its peak. In fact other contractors in the area suffered delays during this period. After December, 1981 progress continued without let-up and final completion was attained within the revised contract period.

SR-13, Progress during the first five months of the contract was ahead of schedule primarily due to the efforts exerted on earthwork and structural works. After January, 1981 progress slightly tapered off from the original schedule but the slippage was still within the acceptable limits as provided in the

guidelines issued by the Ministry of Public Highways. Actual progress at the end of July, 1979 was about 63%. From August, 1979 to February, 1980, only about 10% of the work had been accomplished primarily due to inclement weather, equipment breakdown and rising costs of construction materials. In addition, work on the surface course and pavement suffered delays due to the breakdown of the government asphalt plant in Daraga, Albay which the contractor had negotiated to use. Due to this delay, the contractor requested lowering the level of improvement of the asphalt surface from A.C. to DBST. For technical reasons, the request was not approved by the Ministry of Public Highways and the asphalt surfacing from Km. 1 + 920 to 12 + 500 was deleted instead. The project was 100% complete (excluding the pavement) on December 10, 1980 which was still within the revised schedule.

SR-13B, Progress of work was in accordance with schedule from the starting date of the work up to the middle of May, 1979. The contractor's performance after May to August 1979 was very disappointing due to equipment breakdowns, cash flow problems and inclement weather. In September, 1979 a revised progress chart was prepared but again only a slight improvement in equipment performance was gained. Progress of work suffered frequent delays and the contractor never recovered from them in spite of the numerous meetings and

warning letters issued by the Consultant. With the project accomplishment standing at 63.02% at the end of November, 1980 the contractor requested termination of the project.

The remaining items, including that of the deleted asphalt pavement of SR-13A were repackaged into one contract for re-bidding. The new project was awarded to L.A.L. Construction as discussed below.

L.A.L. Construction

The contractor had a poor start due mainly to delay in the mobilization of equipment and due partly to poor coordination of work activities. Weekly progress meetings were organized and written memos pertaining to work progress were regularly sent to the contractor. Consequently, a little progress was made. In April, 1982, the contractor increase the number of his asphalt equipment and crusher output improved, in addition to these, aggregates were obtained from outside sources and considerable progress was attained. From the month of May up to July, 1982 progress of work was very steady except for some minor deviations caused by inclement weather. The project was completed within the revised completion schedule shown in Appendix 10.

7.2 Personnel

The contractor that could be considered to have complete manpower lineup and the capability to complete their project in spite of unforeseen difficulties is the one in charge of SR-7, 8 and 12 (Moonrock Construction). The rest were either deficient in manpower line-up or did not have enough experienced personnel in handling construction works. Except for SR-12, most Project Engineers assigned to the projects came from Manila. Laborers and foremen were all hired locally, mainly from municipalities along the construction area thus creating an employment boom in the region during the construction period.

7.3 Equipment

Only three contractors, those of SR-7, 8 and 12 (Moonrock Construction) satisfied the requirement list of minimum essential equipment needed for each subproject. Although most of the equipment were second hand, the contractor had enough mechanics and motorshops to repair the standby equipment. The equipment situations for the other subprojects have been unbalanced. On several occasions hauling units were on standby because there was no loader at the quarry site or the crusher production was not enough to meet the demands of the kettle, etc. The contractors do not have reliable mechanics to repair damaged equipment causing considerable standby hours of these equipment.

7.4 Administration

Except for Subprojects 7, 8 and 12 (Moonrock Construction), site administration of the other subprojects had been exceptionally poor. Most of the time the Project Manager was in Manila and site administration was left to subordinates who could not decide on difficult field matters. However, conditions for SR-13 improved by the middle of the project after warning letters were sent by the Consultants and after the contractors themselves realized that they have to suffer payment of the penalties imposed for not completing the project on time.

7.5 Quality

Quality control was the main concern of the Consultant throughout the construction period. On several occasions the Consultants inspectors had to stay late until the last concrete pouring or DBST asphaltting, to ensure the good quality of work. Some protective measures were likewise instituted on items of work affected by rains. Results of tests conducted on embankment, base materials, cement concrete and asphaltic materials were all within the acceptable limits.

8.0 RIGHT-OF-WAY AND UTILITIES

8.1 Right-Of-Way

A 10 meter right-of-way for feeder roads and 15 meters for the secondary roads were established in accordance with the PWD-Design Guidelines.

Generally, ROW acquisition did not pose a major problems in the completion of the project.

Minor problems were experienced in SR-12 under contract by Moonrock Construction, wherein the contractor shouldered the expenses in removing and reconstructing the semi-concrete fence of residences within the construction limit, inside the Triga town proper.

In SR-8, the Consultant had to redesign some of the road alignments affecting private properties.

In SR-13A, vertical alignments of the cut sections at BR-C was raised in order to maintain the 6.00 meter travel-way limits for the feeder road.

8.2 Utilities

No above ground or underground utilities were encountered during the course of construction work.

9 CLIMATIC CONDITIONS

9.1 Rains

The monthly rainfall distribution observed for each sub-project during the construction period are tabulated below:

ACTUAL NUMBER OF RAINY DAYS

Subproject 7, Sto. Domingo-Bula-Ombao

MONTH	J	F	M	A	M	J	J	A	S	O	N	D
1978	1	1	2	7	9	9	13	20	13	15	9	13
1979	4	2	1	5	10	22	17	14	15	11	9	10
1980	2	4	4	2	4	15	13	20	13	16	13	9
1981	4	5	0	6	13	21	22	9	14	10	13	4

Subproject 8, Topaz-Palsong-Bula

1980	2	4	4	2	4	15	13	20	13	16	13	9
1981	4	5	0	6	13	21	22	9	14	10	13	4
1982	4	5	3	7	7	4	12	12				

Subproject 12, Triga-Salvacion-Bato

1979	4	2	1	5	10	22	17	14	15	11	9	10
1980	2	4	4	2	4	15	13	20	13	16	13	9
1981	4	5	0	6	13	21	22	9	14	10	13	4
1982	4	5	3	7	7	4	12	12				

Subproject 13, Polangui-Lidong-Buhi

1978	9	12	12	7	16	15	18	17	20	22	20	20
1979	10	7	6	12	12	19	22	14	18	24	20	16
1980	17	19	15	11	6	25	12	16	20	20	15	21

1981	:13	:12	: 9	:19	:13	:19	:18	:14	:16	:21	:24	:20	:
1982	:15	:13	:13	: 9	:12	:17	:17	:	:	:	:	:	:

Compared to the rainfall distribution picked up during the design stage of the project, the rainfall distributed during the construction period was heavier. These are shown on 9.1.

9.2 Typhoons

During the entire course of construction the subproject areas were subjected to the effects of 10 typhoons which caused considerable damages. These destructive typhoons are listed below in the order of their occurrence.

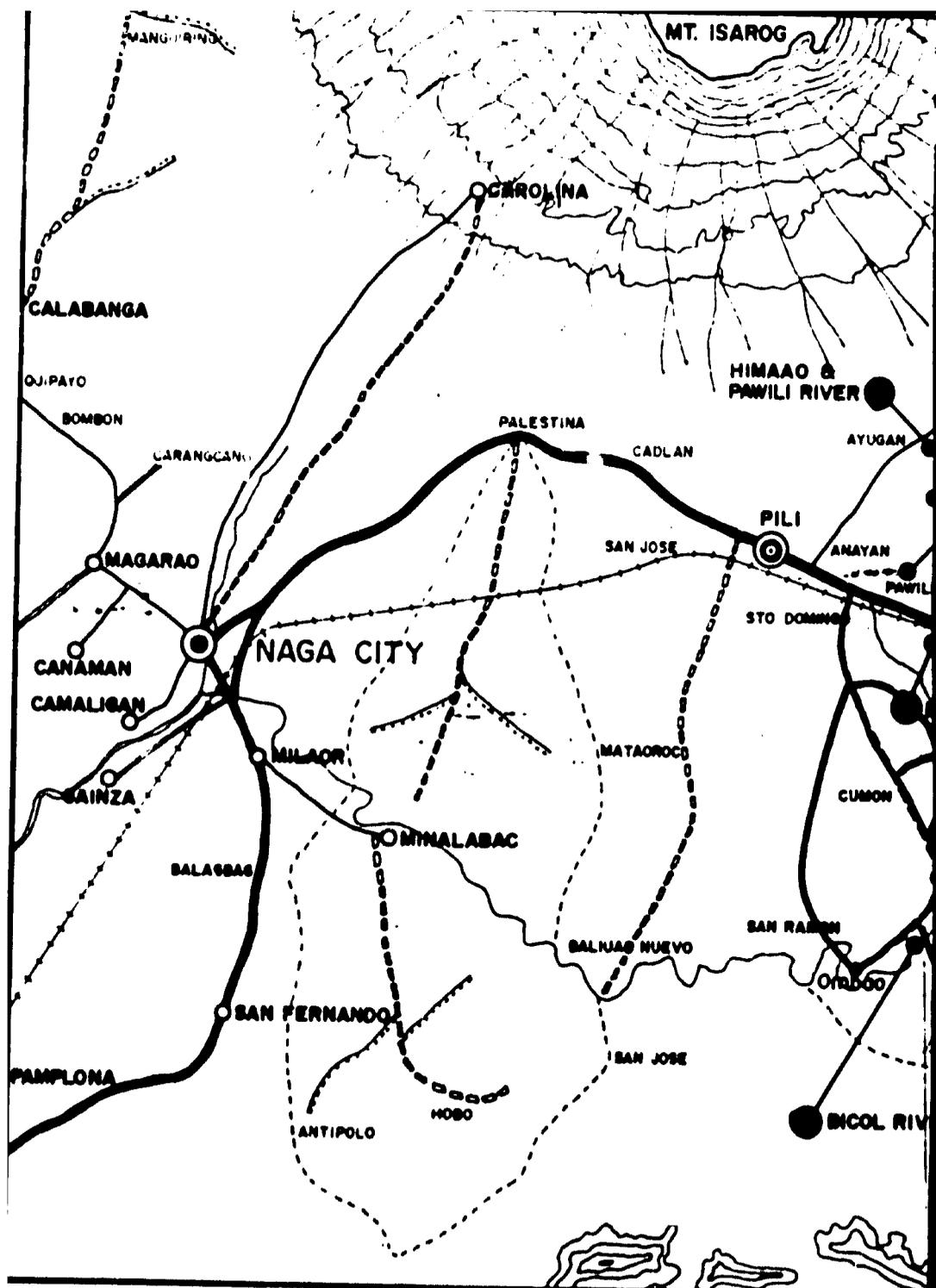
Pepang	-	September, 1979
Bebeng	-	April, 1980
Yoning	-	October, 1980
Uring	-	June, 1981
Daling	-	June, 1981
Elang	-	July, 1981
Yoyeng	-	November, 1981
Anding	-	November, 1981
Erang	-	July 13, 1982
Ruping	-	September, 1982

Typhoon Pepang in September 16, 1979 flooded the Resident Engineer's office in Nabua, Camarines Sur for two days.

Typhoons Daling, Elang, Yeyeng and Anding caused landslides, erosion of embankment, undermining of items 108 and 200 and destruction of existing riprap on completed bridge structures in SR-13.

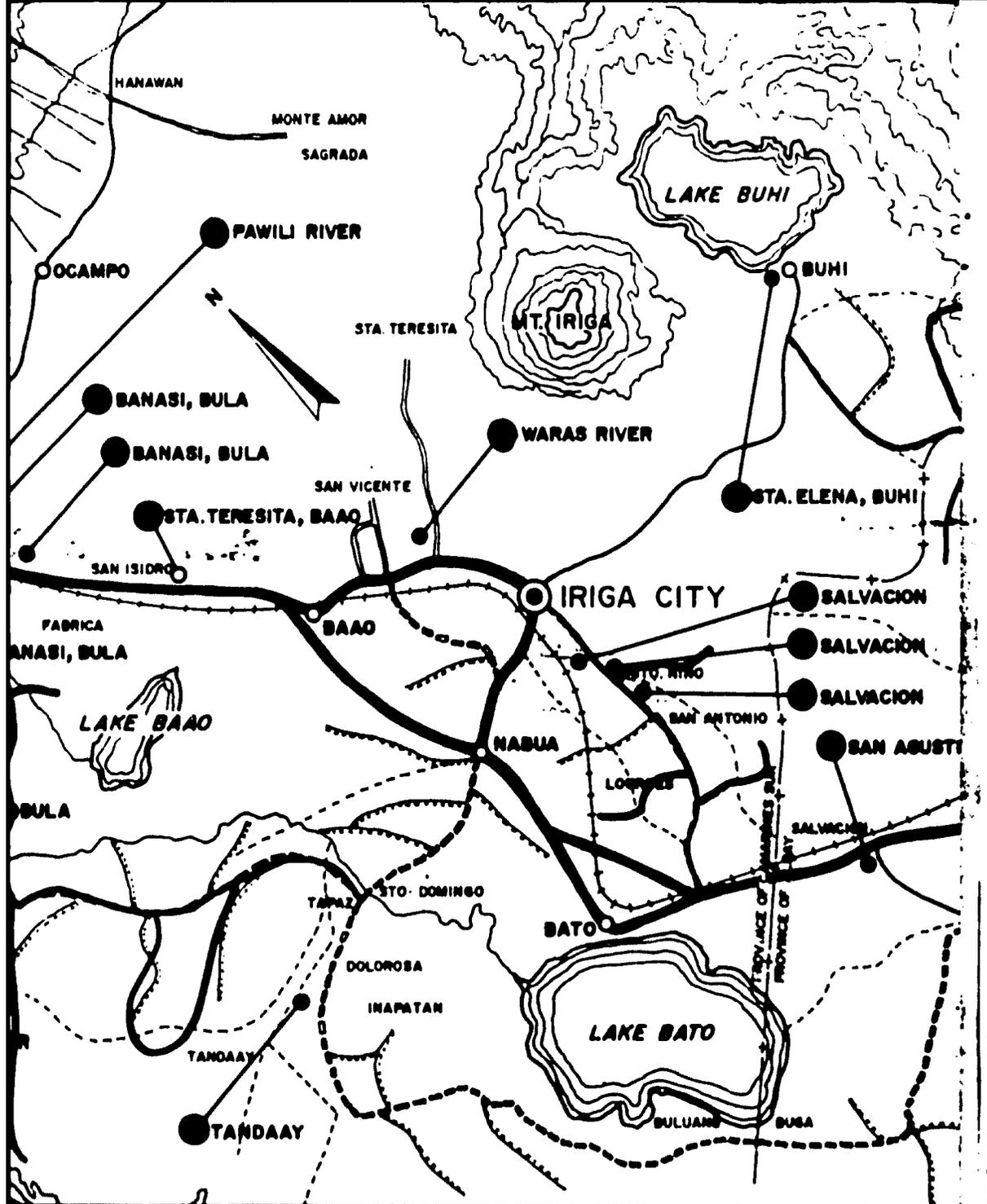
Typhoons Daling and Anding caused landslides, destruction of riprap and overtopping of items 107, 108 and 200 at the low sections after Bicol River Bridge.

Flood waters in two sections along the stretch of SR-12 secondary road rose above the roadway level and eroded the embankment and subbase material at the downstream side of subsiding waters during typhoon Elang.



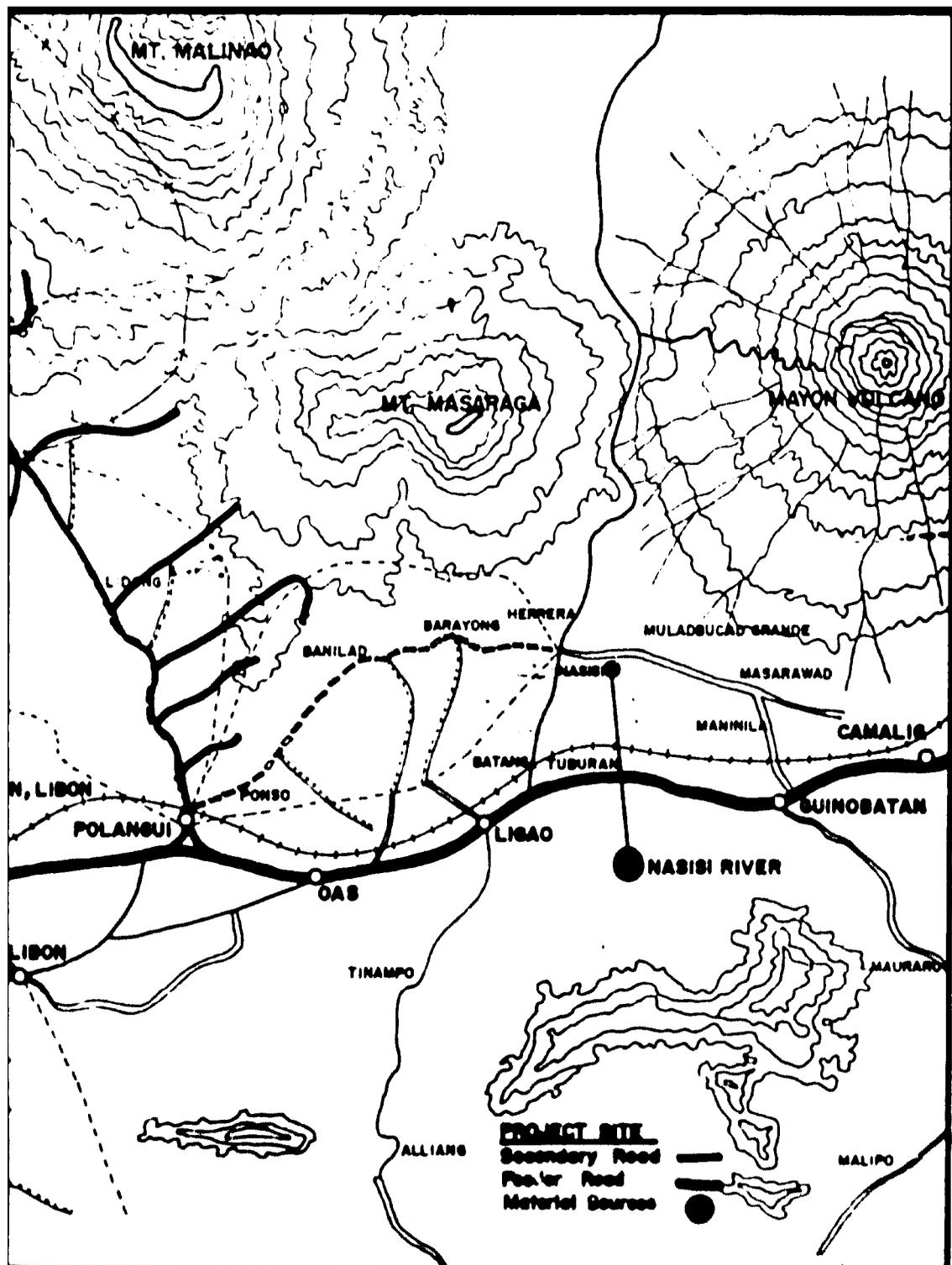
DCCD ENGINEERING CORPORATION
CONSULTING ENGINEERS

MINIS
BRBO



DEPARTMENT OF PUBLIC WORKS & HIGHWAYS
P. P. M. O. · PACKAGE III

SCALE :
1 : 125,000



LOCATION MAP, MATERIAL SOURCES

FIGURE 5.1

MONTHLY RAINFALL COMPARISON

SUBPROJECT NO. 7, STO. DOMINGO-BULA-OMBAO ROAD

LEGEND:

■ NORMAL

PRECIPITATION (mm)

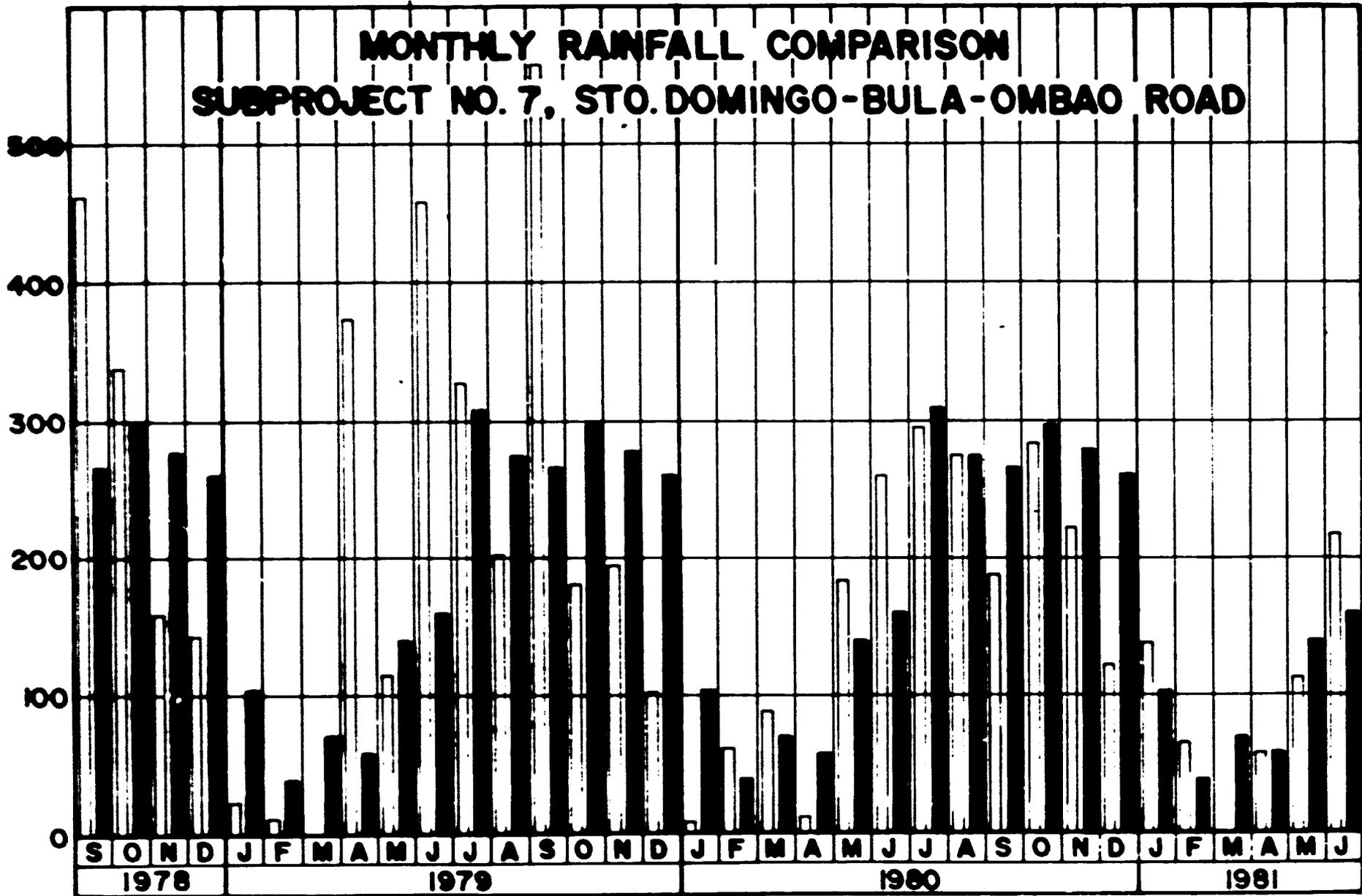


FIGURE 9.1-1

LEGEND:

■ NORMAL

PRECIPITATION (mm)

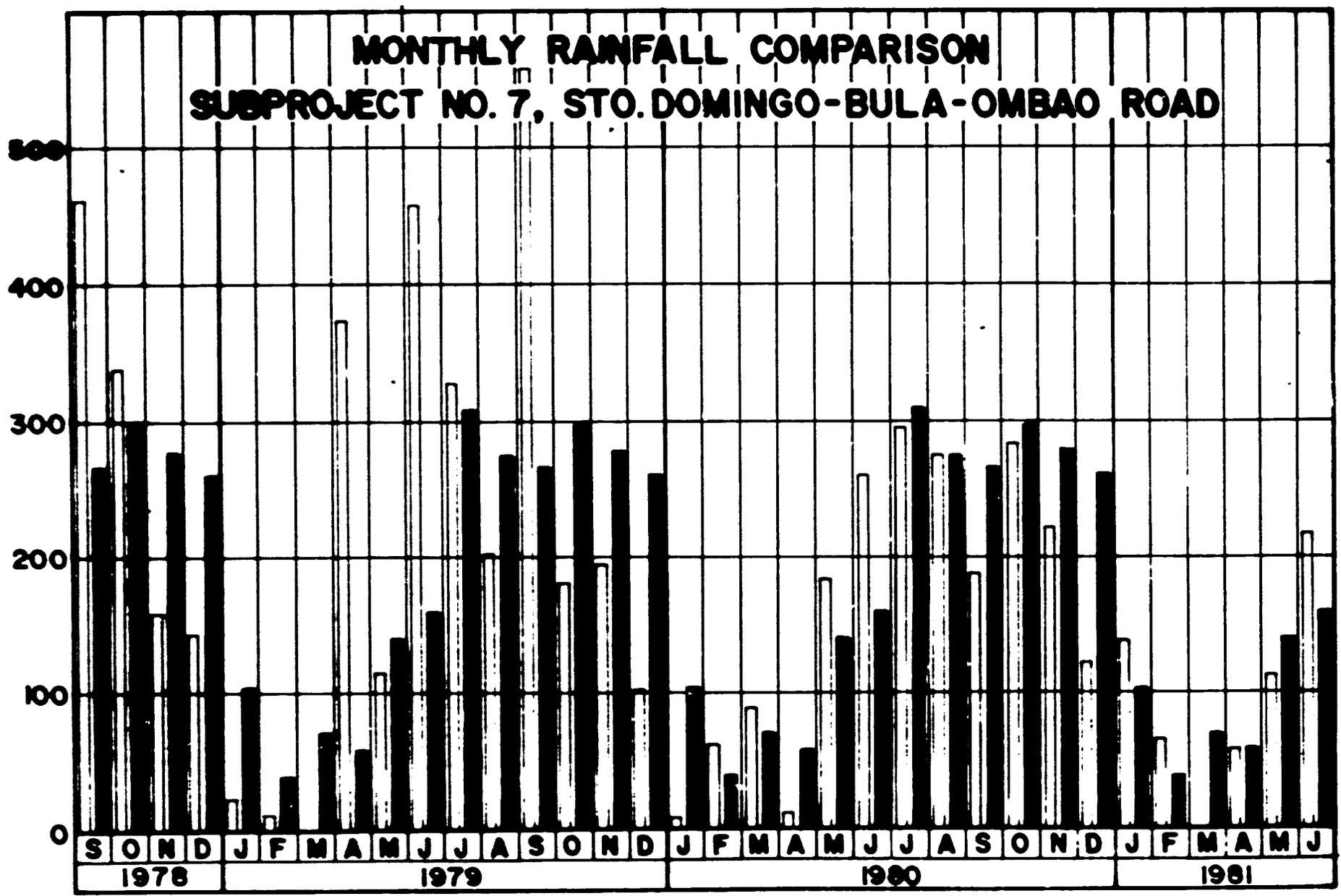
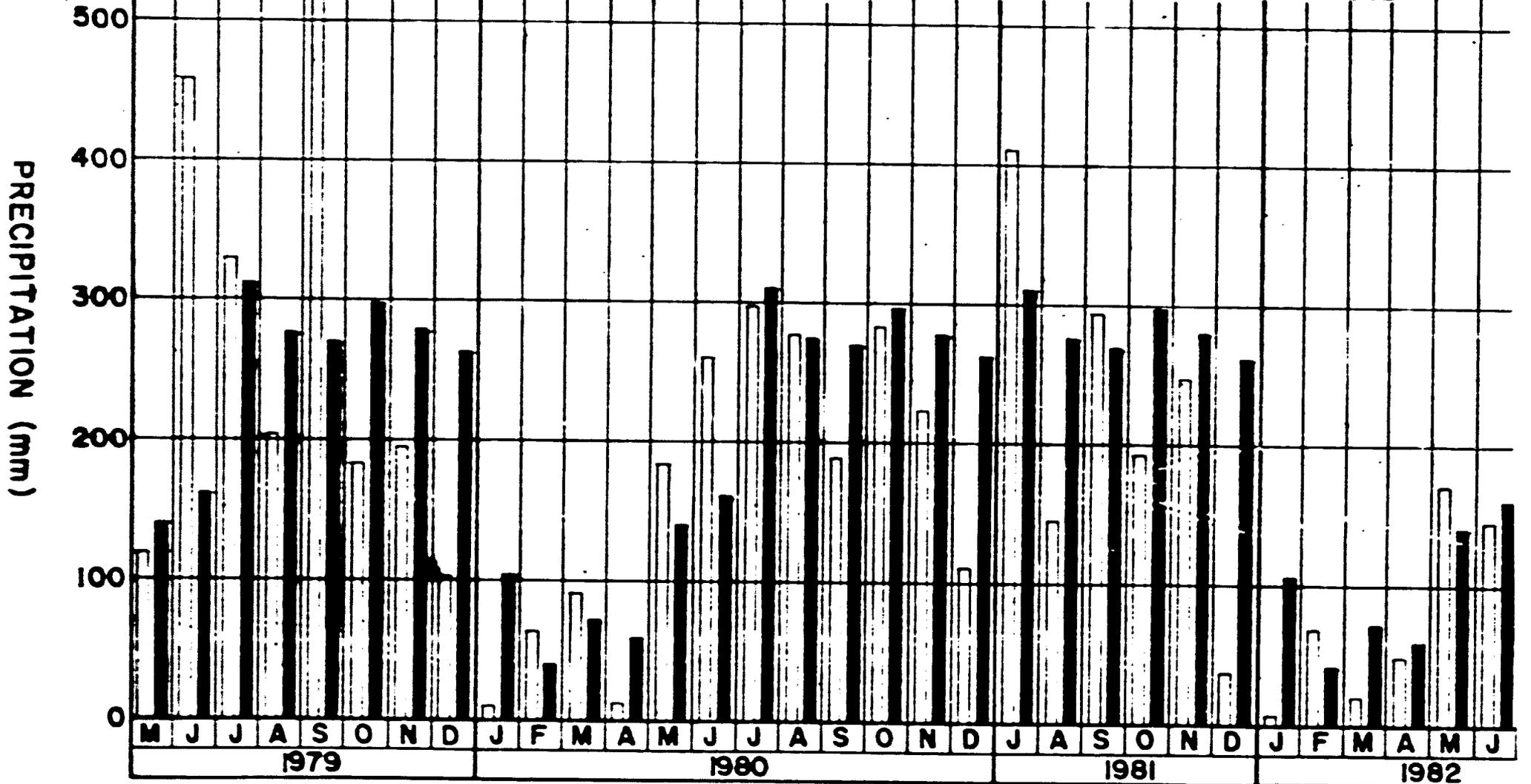


FIGURE 9.1-1

MONTHLY RAINFALL COMPARISON

SUBPROJECT NO.12, IRIGA - SALVACION - BATO ROAD



LEGEND

■ NORMAL

LIST OF CHANGE ORDERSA. Subproject No. 7, Sto. Domingo-Bula Ombao RoadContractor: V.P. Eusebio Construction

1. Change Order No. 1, dated August 27, 1979, covering extension of 97 days due to inclement weather and scarcity of fuel supply.
 2. Change Order No. 2, dated June 2, 1980, covering extension of 60 days due to adverse weather and increase in prices of fuel, materials and labor rates.
 3. Change Order No. 3, dated June 9, 1980, covering adjustments of overruns and underruns in quantities with a net increase of P195,422.66 in the contract amount and no change in contract time.
 4. Change Order No. 4, dated December 19, 1980, covering extension of 245 days in the contract due to time suspension (from date of expiration of contract to date of resumption of work) and time for construction of the remaining PCC pavement.
- Total Amount Added in the Contract P + 195,422.66
 - Total Extension of Time Granted + 402 days

B. Subproject No. 8, Topaz-Palsong-Bula RoadContractor: Capital Industrial Construction Group, Inc.

1. Change Order No. 1, dated January 26, 1981, covering extension of 36 days due to bad weather.
 2. Change Order No. 2, dated September 10, 1981, covering payment for typhoon damages and remedial works involving an increase of ₱121,022.59 in the contract amount and extension time of 61 days.
 3. Change Order No. 3, dated December 11, 1981, covering payment for typhoon damages involving an increase of ₱143,526.75 in the contract amount and extension time of 100 days.
 4. Change Order No. 4, dated April 19, 1982, involving adjustment of final quantities with a net increase of ₱139,327.25 and no change in contract time.
- Total Amount Added in the Contract + ₱403,876.59
 - Total Extension of Time Granted + 197 days

C. Subproject No. 12, Iriga-Salvacion-Bato RoadContractor: Moonrock Construction

1. Change Order No. 1, dated March 18, 1982, involving extension of 34 days due to bad weather, ROW problems and unavoidable delays.
 2. Change Order No. 2, dated June 10, 1982, covering additional works involving an increase of P301,811.81 and an extension of contract time of 25 days.
 3. Change Order No. 3, dated July 27, 1982, covering payment for typhoon damages involving an increase of P150,499.43 in the contract amount and extension time of 9 days.
 4. Underruns and Overruns in quantities involving a net increase of P270,802.83 in the contract.
- Total Amount Added in the Contract + P723,114.07
 - Total Extension of Time Granted + 68 days

D. Subproject No. 13A, Polangui-Lidong-Buhi Road

Contractor: William Uy Construction

1. Change Order No. 1, dated January 12, 1979 covering additional work involving an increase of P607,456.00 and an extension time of 45 days in the contract.
2. Change Order No. 2, dated August 27, 1979, extension time of 100 days due to bad weather and the shortage of fuel and construction materials.
3. Change Order No. 3, dated November, 1980, recommending deletion of the remaining items of works on Bituminous Surface Courses and Pavement involving a reduction of P2,587,020.00 in the contract amount with no change in contract time.
4. Change Order No. 4, dated May 26, 1980, covering payment for typhoon damages involving an increase of P203,299.23 in the contract amount and extension time of 19 days.

5. Change Order No. 5, dated January 19, 1981, involving adjustment of final quantities with a net increase in the contract amount of P72,647.83 and no change in contract time.

- Total Amount Reduced in the Contract - P1,703,686.04
- Total Extension of time Granted - 164 days

*E. Subproject No. 13B, Polangui-Lidong Buhi Road

Contractor: J.P.Y. Construction

1. Change Order No. 1, dated August 28, 1979, involving extension of 92 days due to bad weather.
 2. Change Order No. 2, dated October 24, 1979, covering deletion of maintenance and repair of R.E. vehicles with no time extension.
 3. Change Order No. 3, dated May 26, 1980, This Change Order covers recommending 139 days extension of time but the MPMI in an Endorsement Letter dated August 6, 1980 approved only 48 days which fixed the contract completion date on May 2, 1980.
- Total Amount Added in the Contract - P0.00
 - Total Extension of Time Granted - 140 days
- For Subproject No. 13B, there are still pending Change Orders submitted to the Ministry of Public Works and Highw. wherein approval has not been received up to the time this report was prepared.

F. Subproject No. 13, Polangui-Lidong-Buhi Road

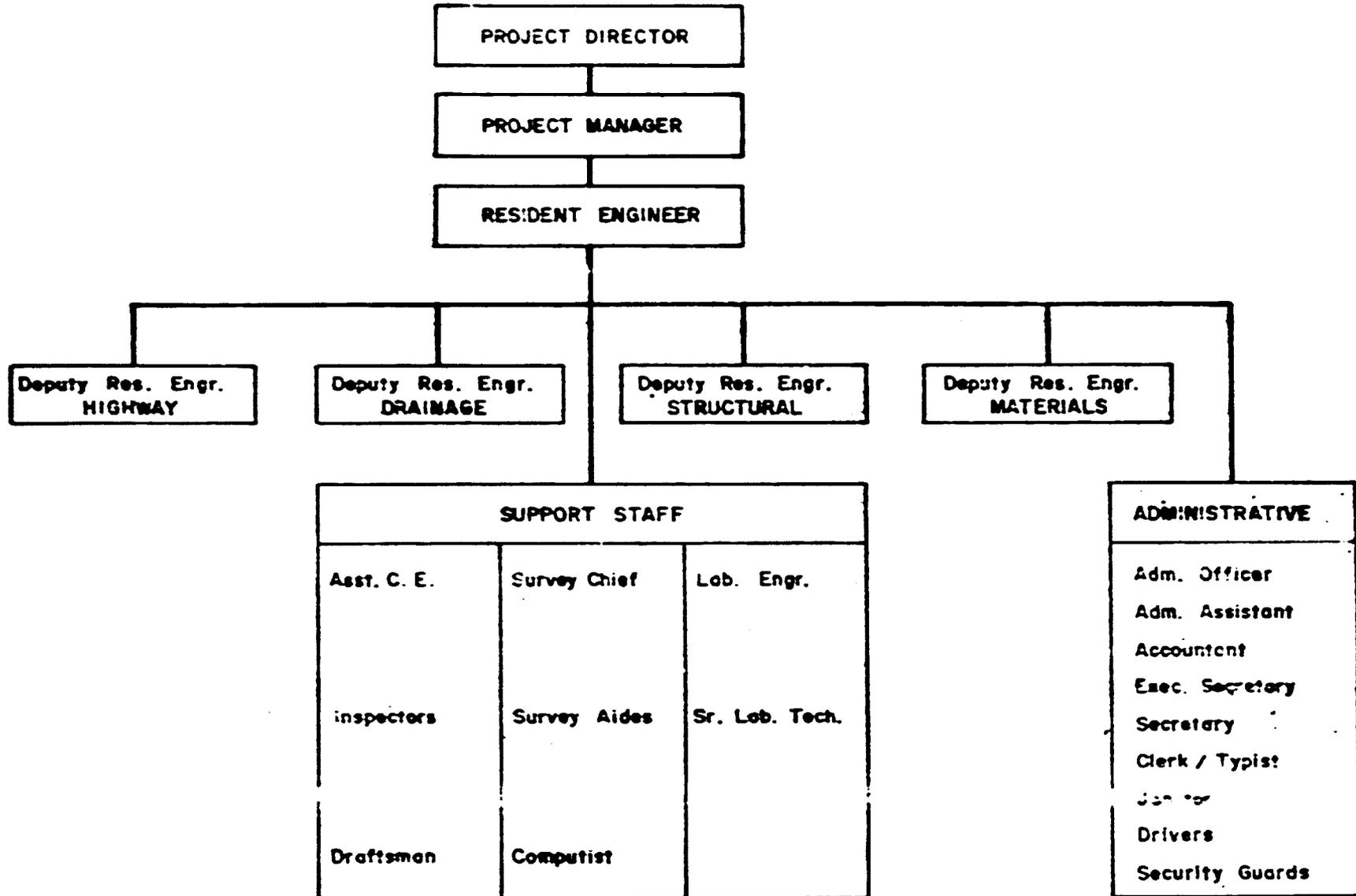
Contractor : L.A.L. Construction

1. Change Order No. 1, dated November 11, 1981, covering payment for typhoon damages involving an increase of P386,032.10 in the contract amount and an extension time of 30 days.
2. Change Order No. 2, dated January 25, 1982, covering payment for typhoon damages involving an increase of P399,244.50 in the contract amount and extension time of 30 days.
3. Change Order No. 3, dated April 12, 1982, covering extension of time of 80 days due to bad weather.
4. Change Order No. 4, dated July 5, 1982, covering additional works involving an increase of P256,890.70 in the contract amount and an extension of 26 days.
5. Underruns and Overruns in Quantities involving a net increase of P333,030.70 in the contract.

Total Amount Added in the Contract = P1,375,198.00

Total Extension of Time Granted = 166 days

CONSULTANT'S ORGANIZATIONAL CHART DCCD ENGINEERING CORPORATION BRBDP PACKAGE III



CONSTRUCTION SUPERVISION STAFF

R. BASA	Project Manager	December 1977	to	September 1977
R. VILLAMIL	Resident Engineer	December 1977	to	June 1982
G. BENITO	Resident Engineer	July 1981	to	September 1982
A. MENDEZ	Deputy Res. Engr.	July 1981	to	September 1981
A. ZARALA	Deputy Res. Engr.	March 1980	to	April 1982
B. GALANG	Deputy Res. Engr.	May 1979	to	November 1981
G. GENUINO	Deputy Res. Engr.	January 1978	to	November 1979
L. STA. MARIA	Deputy Res. Engr.	July 1978	to	November 1979
C. ARENAS	Deputy Res. Engr.	November 1979	to	November 1980
G. BENITO	Deputy Res. Engr.	November 1979	to	June 1981
R. CAGERO	Deputy Res. Engr.	January 1982	to	September 1982
A. ZARALA	Laboratory Engr.	July 1978	to	February 1980
P. CABOTAJE	Laboratory Engr.	May 1980	to	February 1981
R. PARAS	Sr. Lab. Technician	December 1978	to	February 1979
Z. AMOROSO	Sr. Lab. Technician	May 1979	to	September 1980
N. FERNANDEZ	Sr. Lab. Technician	July 1978	to	October 1980
D. SISON	Sr. Lab. Technician	September 1979	to	January 1981
D. OONER	Sr. Lab. Technician	July 1979	to	December 1979
P. CABOTAJE	Sr. Lab. Technician	December 1979	to	April 1980
A. ALVINA	Sr. Lab. Technician	April 1980	to	September 1982
O. FERNANDEZ	Asst. Civil Engr.	November 1978	to	April 1982
R. CAGERO	Asst. Civil Engr.	July 1979	to	December 1981
P. RAMIREZ	Asst. Civil Engr.	June 1978	to	February 1981
R. LASCANO	Asst. Civil Engr.	June 1978	to	January 1980
R. MANANGIT	Asst. Civil Engr.	April 1982	to	September 1982
A. LLEPES	Inspector	July 1978	to	July 1980
R. MORANARTE	Inspector	March 1980	to	July 1980
A. SANTOS	Inspector	July 1978	to	February 1980

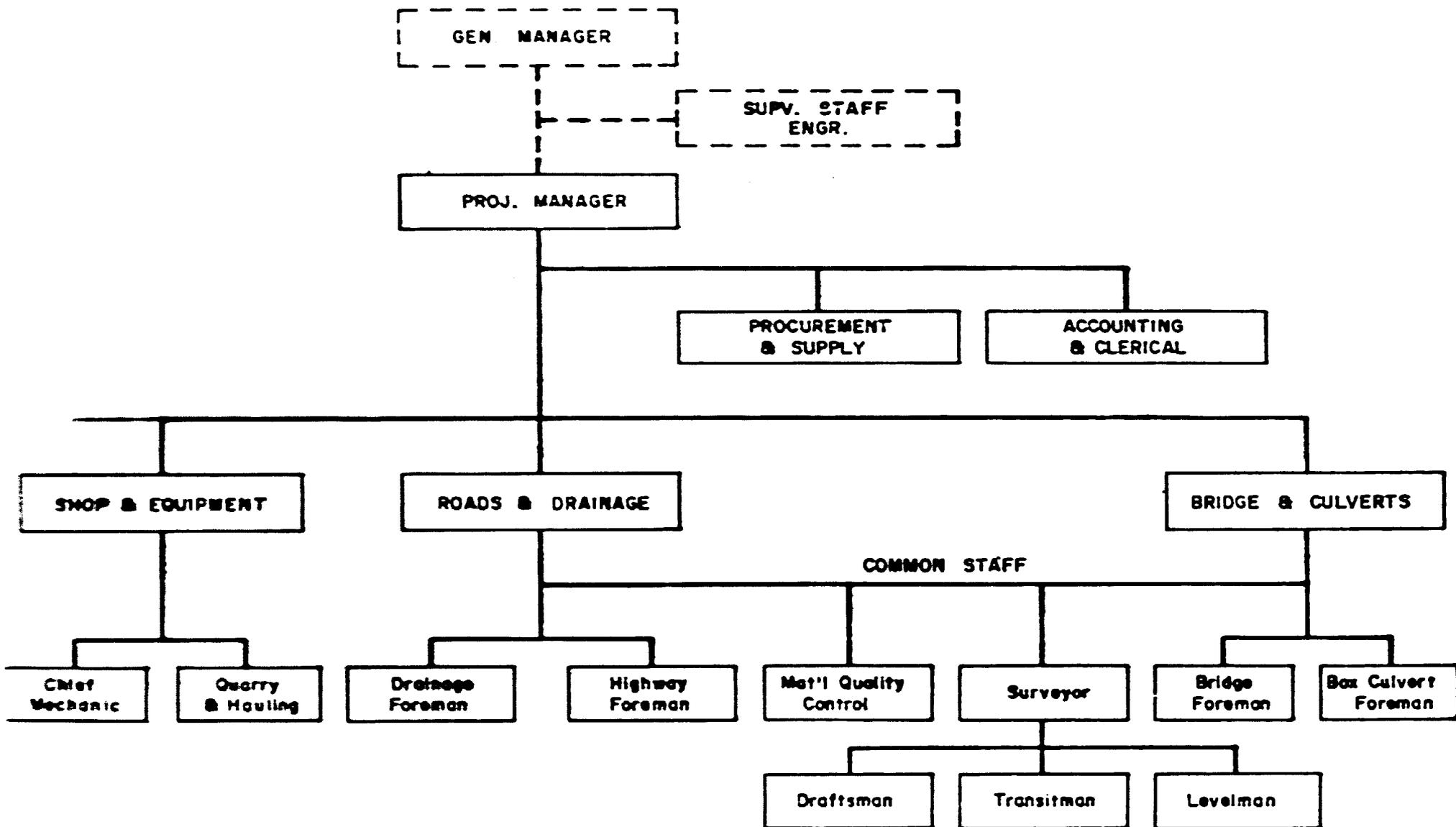
APPENDIX 2.1

H. ATAMAZA	Inspector	August 1979	to August 1980
G. LEE	Inspector	July 1979	to February 1982
R. DIZON	Inspector	February 1979	to February 1980
F. MANANGIAC	Inspector	February 1979	to January 1982
R. PINEDA	Inspector	March 1979	to November 1979
H. VASQUEZ	Inspector	July 1976	to September 1980
H. BUENA	Inspector	January 1982	to September 1982
A. BORROMEO	Inspector	January 1982	to September 1982
A. CURADA	Inspector	October 1978	to April 1979
E. ZAMORA	Inspector	October 1979	to February 1981
R. GARCIA	Survey Chief	August 1978	to February 1979
N. SACRO	Survey Chief	October 1979	to February 1981
R. DOLORICAL	Survey Chief	April 1982	to September 1982
C. SISON	Survey Chief	April 1979	to December 1981
L. FULE	Survey Chief	March 1981	to September 1981

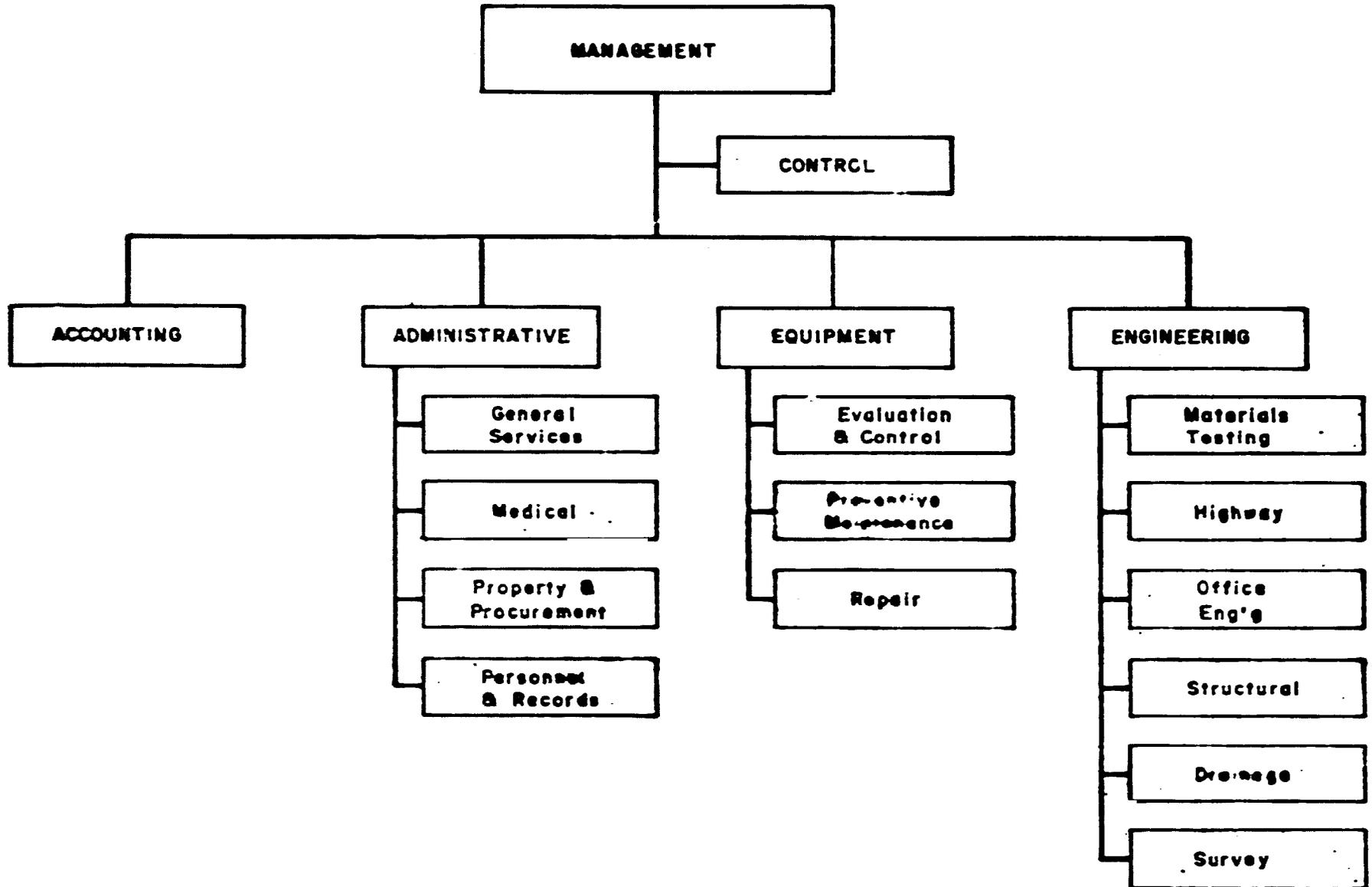
CONTRACTOR'S ORGANIZATIONAL CHART

V.P. EUSEBIO CONSTRUCTION INCORPORATED

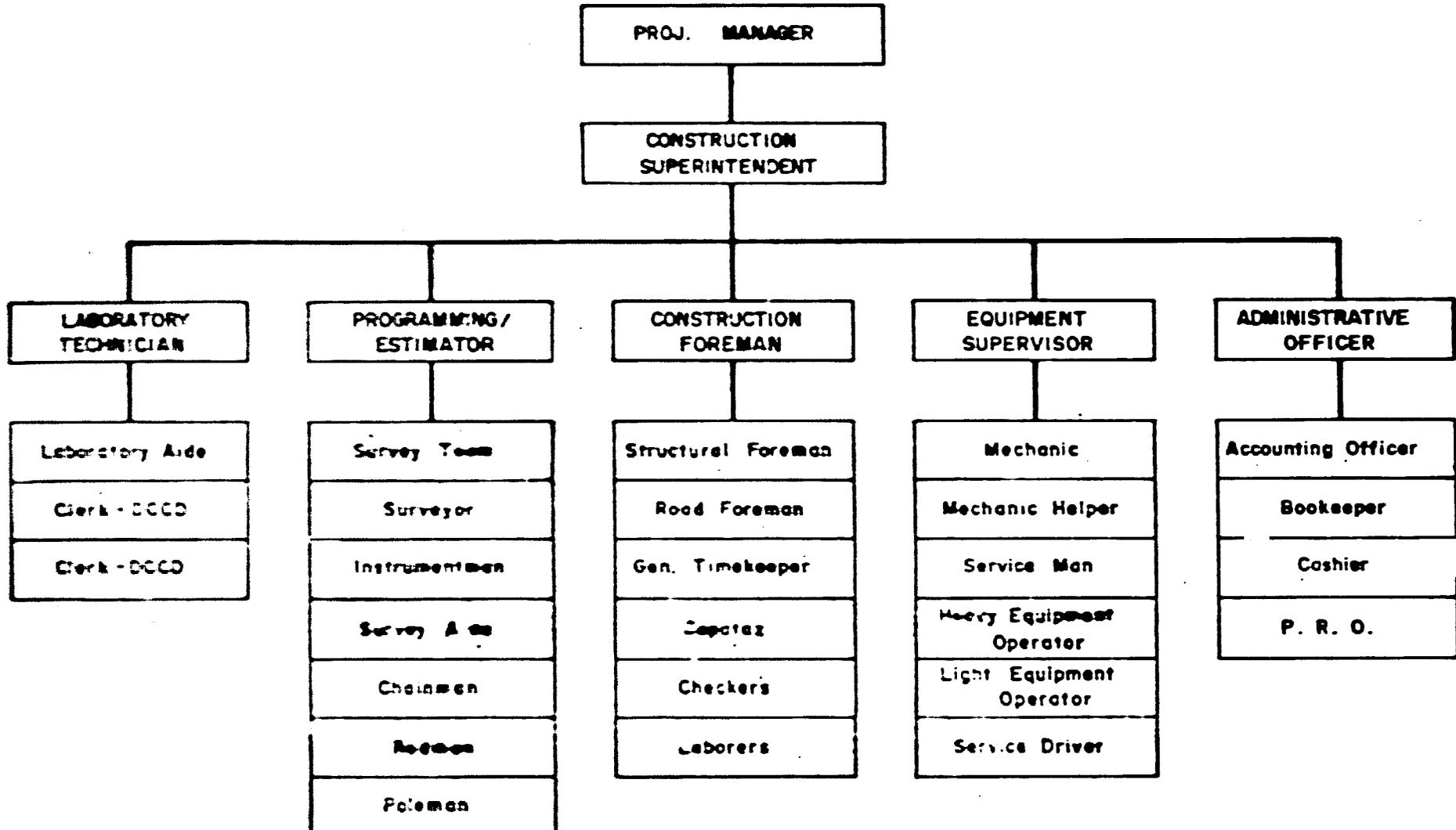
STO. DOMINGO - BULA - OMBAO ROAD



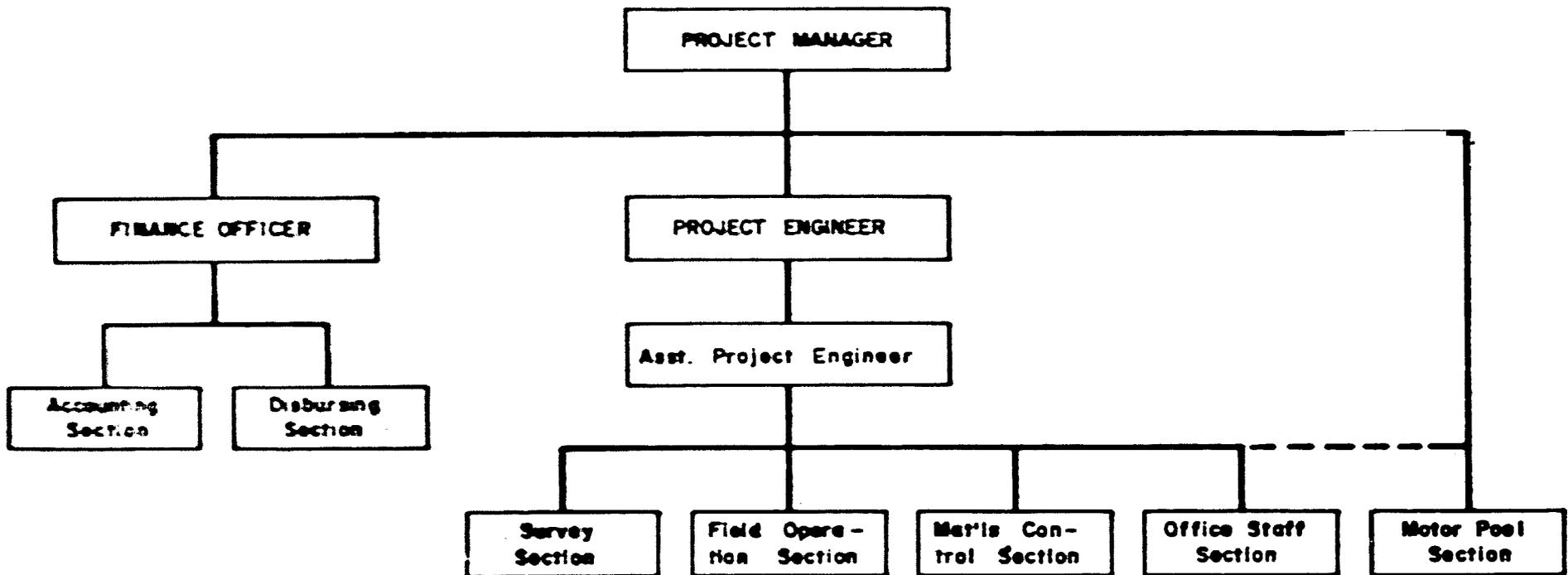
**CONTRACTOR'S ORGANIZATIONAL CHART
CAPITOL INDUSTRIAL CONSTRUCTION GROUPS, INC.
TOPAZ - PALSONG - BULA ROAD**



CONTRACTOR'S ORGANIZATIONAL CHART PHILCON BUILDERS & DEVELOPERS INC. IRIGA - SALVACION - BATO ROAD



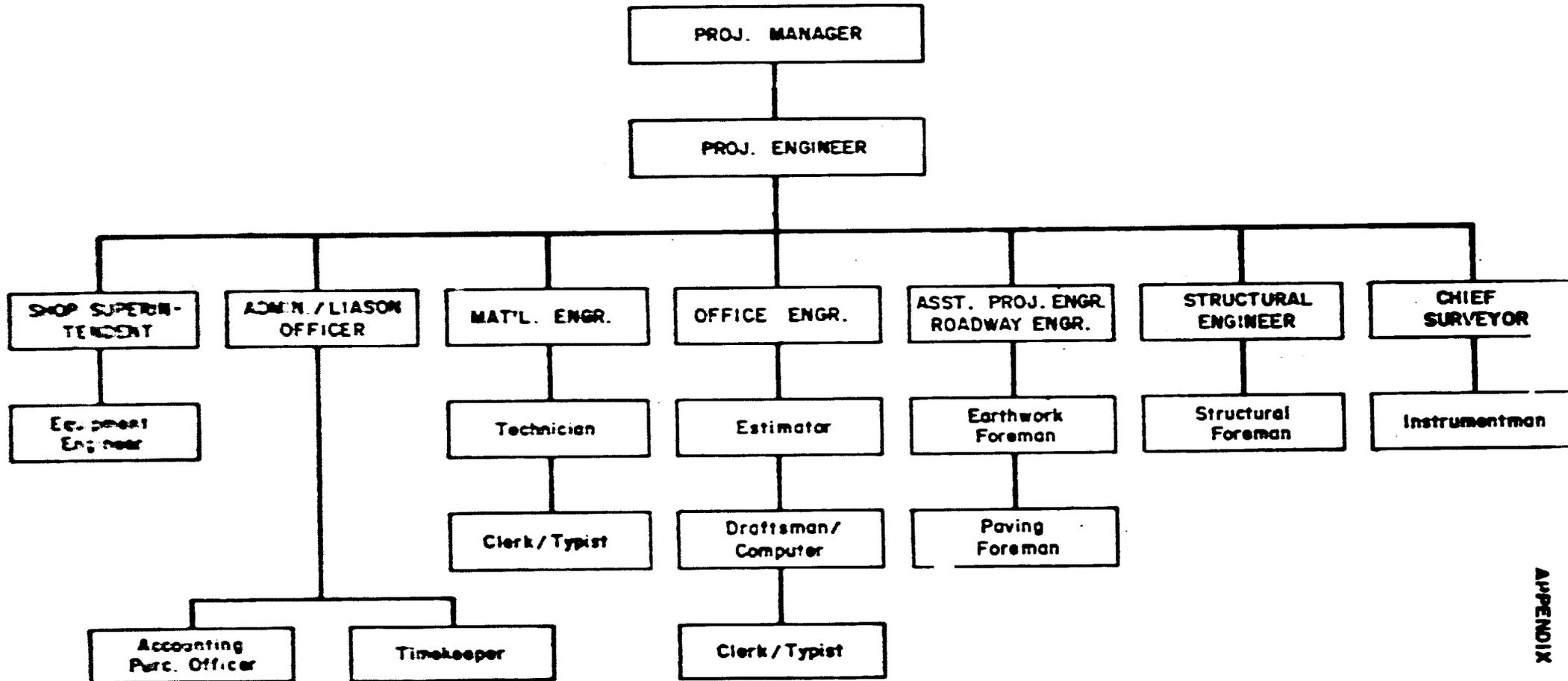
**CONTRACTOR'S ORGANIZATIONAL CHART
MOONROCK CONSTRUCTION
IRIGA-SALVACION-BATO ROAD**



CONTRACTOR'S ORGANIZATIONAL CHART

WILLIAM UY - CONTRACTOR

POLANGUI - LIDONG SECTION

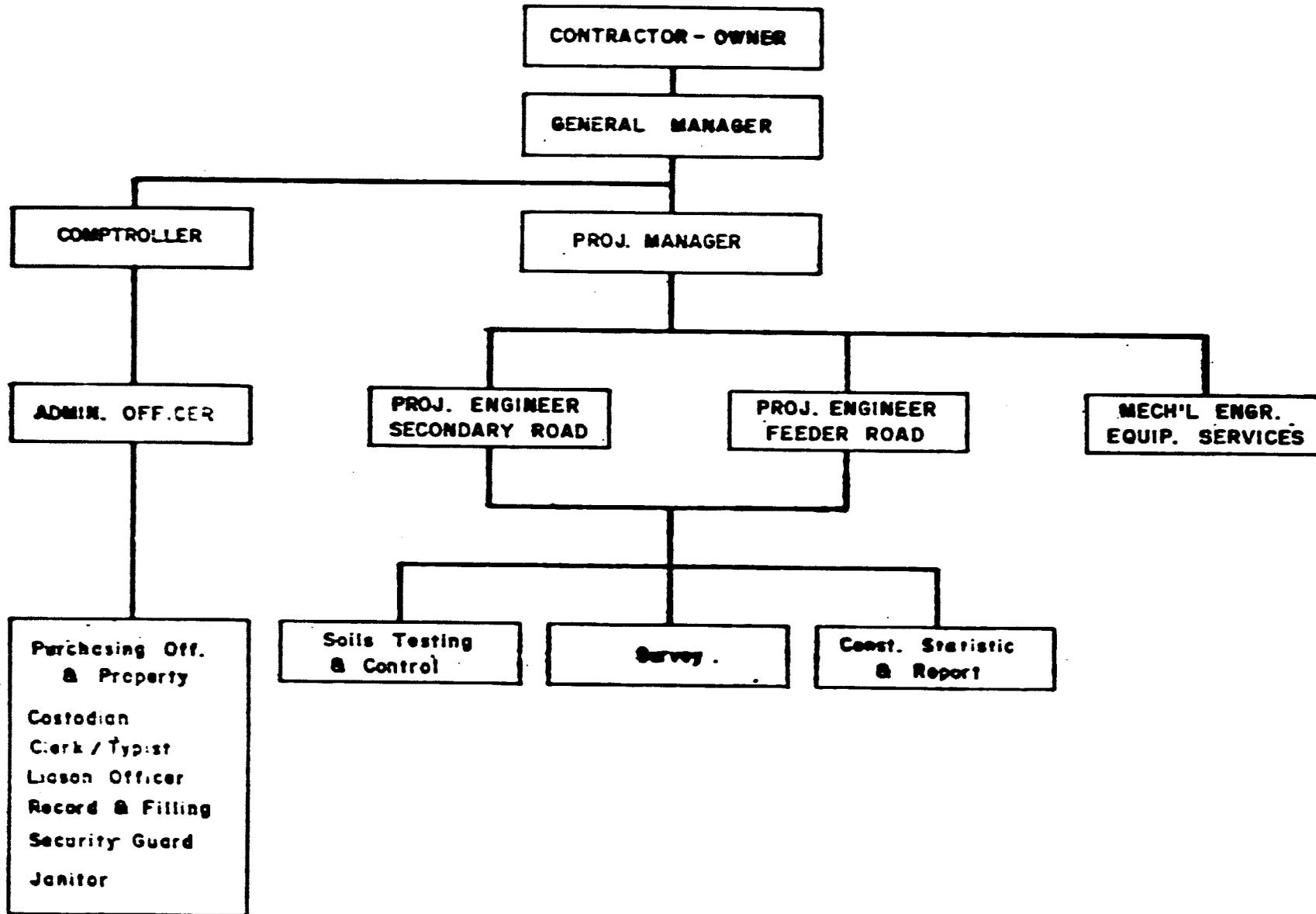


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CONTRACTOR'S ORGANIZATIONAL CHART

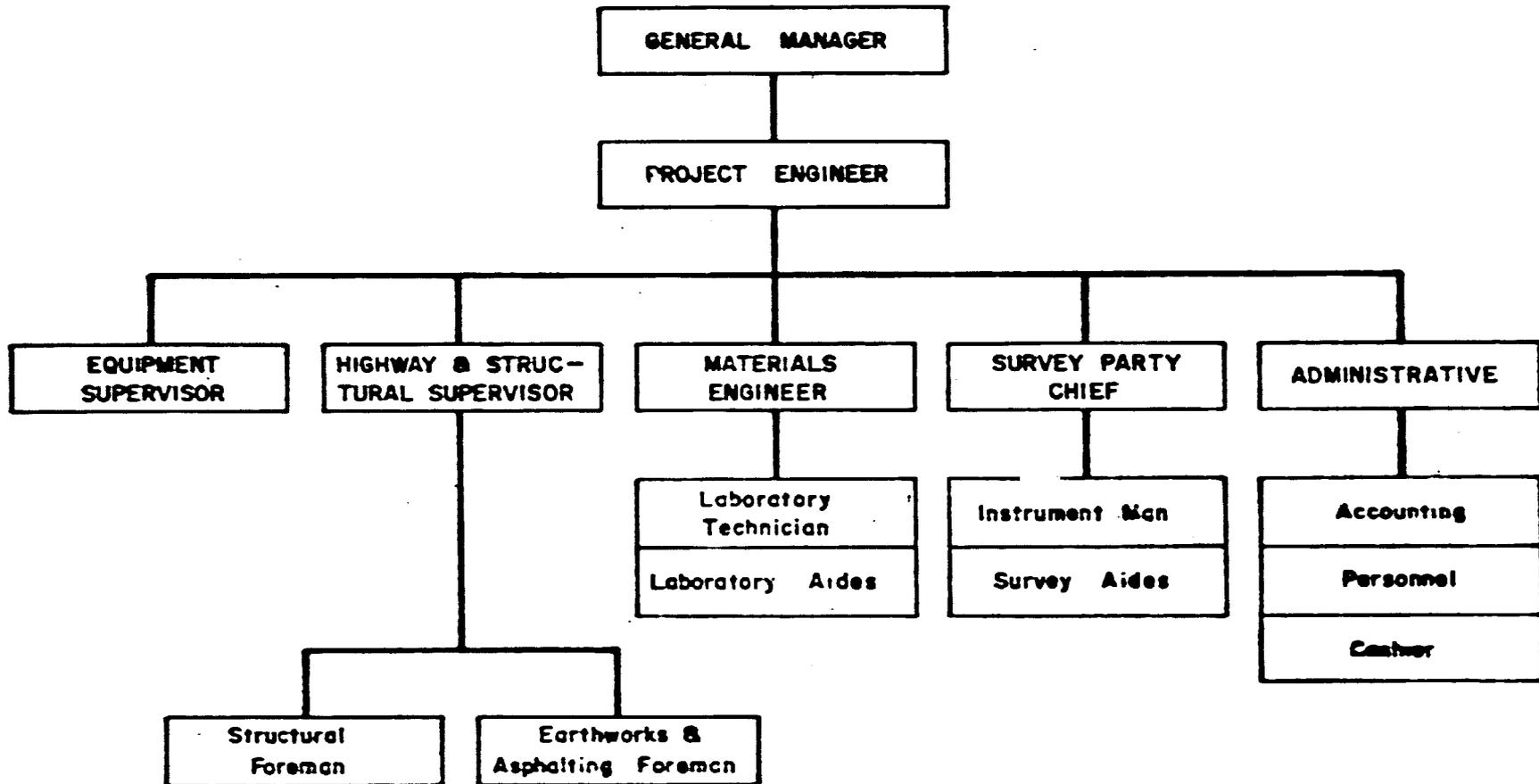
J. P. Y. CONSTRUCTION

LIDONG - BUHI SECTION



56

CONTRACTOR'S ORGANIZATIONAL CHART L. A. L. CONSTRUCTION POLANGUI - LIDONG - BUHI ROAD



CONTRACTOR V P EUSEBIO CONSTRUCTION, INC

BIDDING DATE NOVEMBER 11, 1977

OFFICIAL STARTING DATE SEPTEMBER 18, 1978

ORIGINAL COMPLETION DATE MARCH 10, 1980

100% COMPLETION DATE JUNE 28, 1981

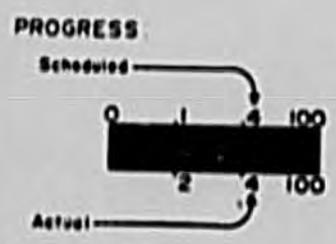
**BICOL SECONDARY
PACKAG**

CONTRACT
STO. DOMINGO-BULA-OM

PROGRESS

ITEM	% CONTRACT VALUE	% ITEM COMPLETE	% PROJECT COMPLETE	1978												1979											
				S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A
I GENERAL	4.23	100	4.23	[Progress bars and data points for 1978 and 1979]																							
II EARTHWORK	55.00	100	55.00	[Progress bars and data points for 1978 and 1979]																							
III SURFACE COURSES AND PAVEMENT	25.32	100	25.32	[Progress bars and data points for 1978 and 1979]																							
IV STRUCTURES	15.45	100	15.45	[Progress bars and data points for 1978 and 1979]																							

TOTAL 100



ACTUAL	100
SCHEDULED	100

COMPLETION

LEGEND

----- ACTUAL PROGRESS

AND FEEDER ROADS

E III

T NO. 1

BAO (SUB-PROJECT 7)

CHART

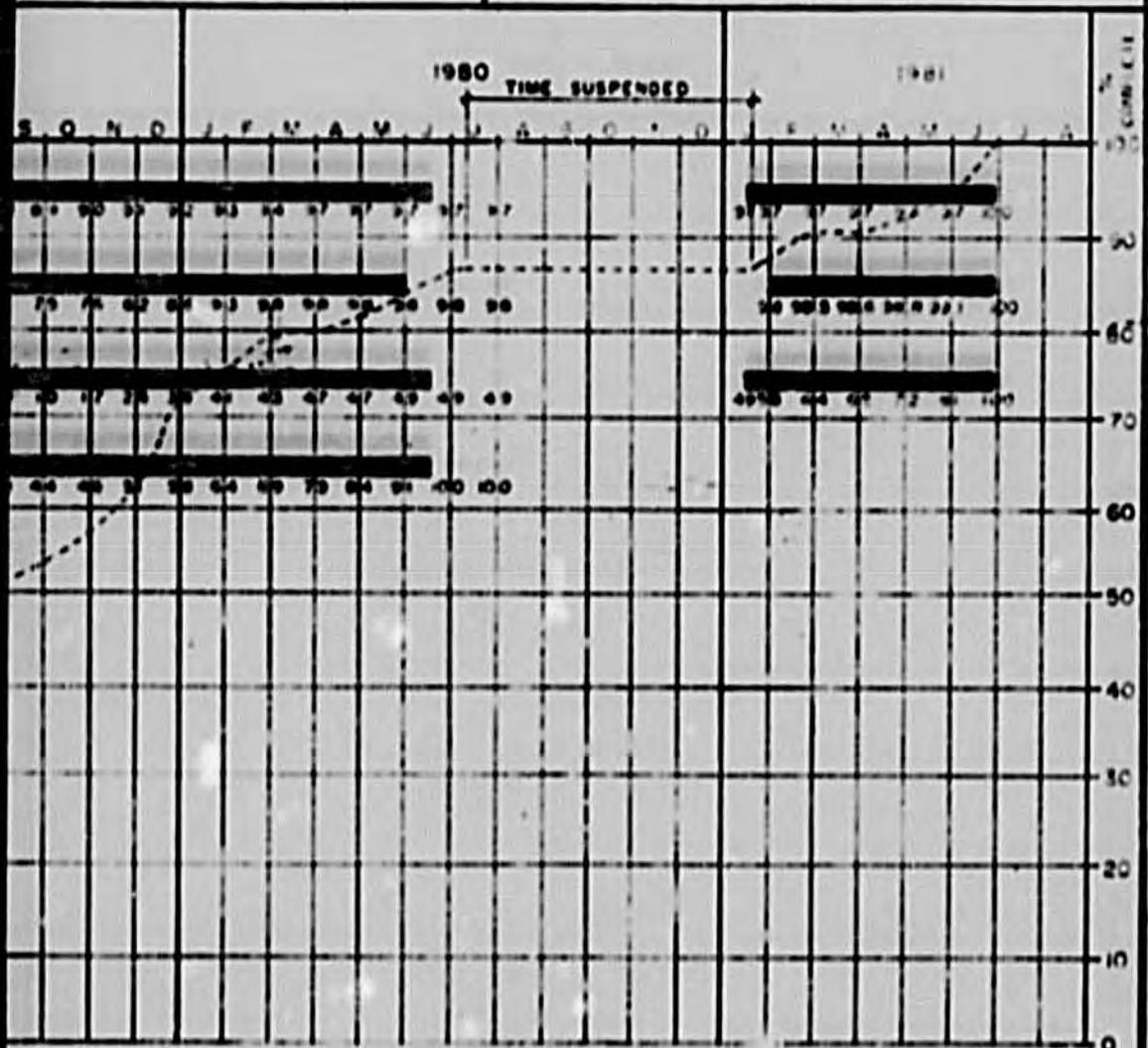
PROGRESS OF WORK

PREPARED BY GAUDENCIO L. RENTO, R. E.

NET CONTRACT BID AMOUNT ₱ 11,488,673.00

APPROVED REVISED CONT AMOUNT ₱ 11,684,000.00

FINAL COST TO BE DETERMINED LATER



CONTRACTOR CAPITOL INDUSTRIAL CONST GROUPS, INC

BIDDING DATE MARCH 21, 1979

OFFICIAL STARTING DATE MARCH 11, 1980

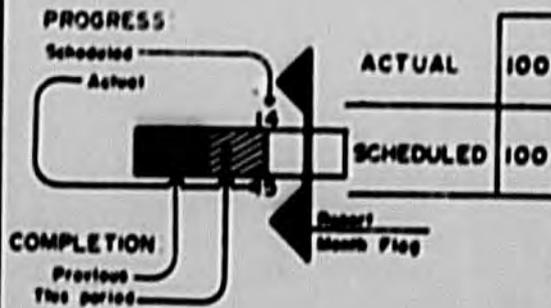
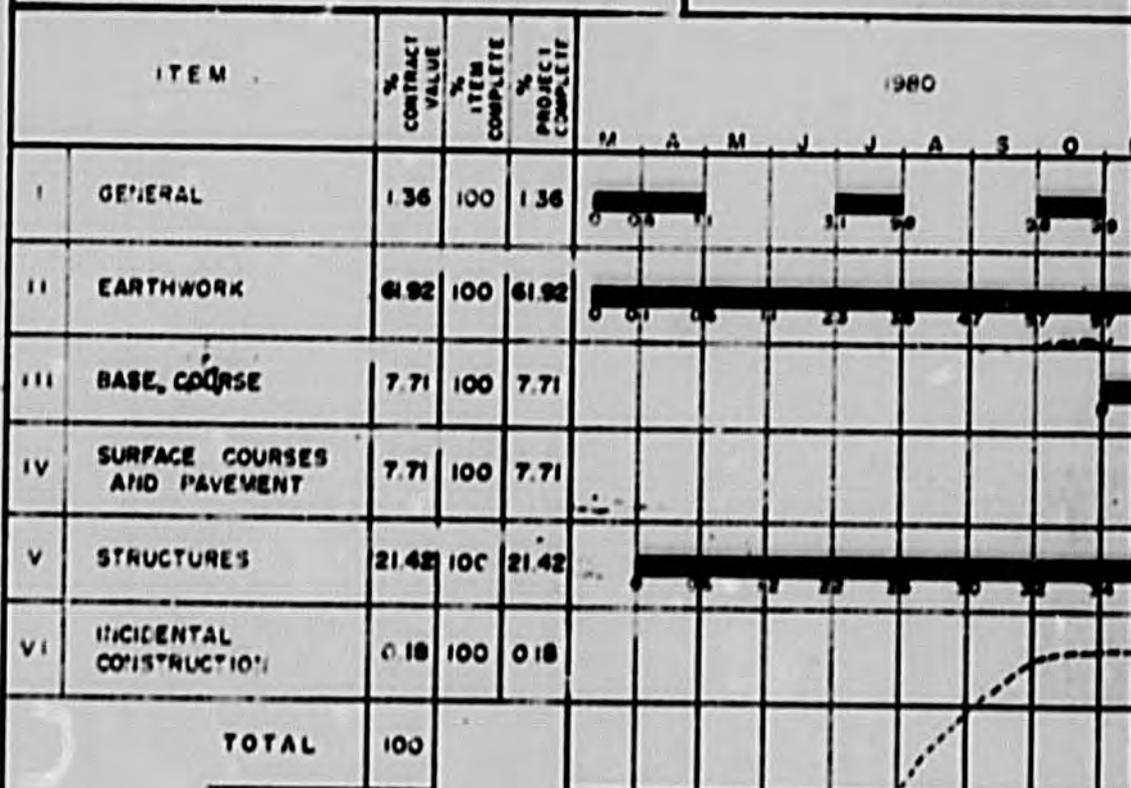
ORIGINAL COMPLETION DATE SEPTEMBER 01, 1981

100% COMPLETION DATE MARCH 17, 1982

**BICOL SECONDARY
PACKAG**

**CONTRACT
TOPAZ - PALSONG - BULA**

PROGRESS



LEGEND :

----- ACTUAL PROGRESS

AND FEEDER ROADS
SE III
ST NO. 1
(SUB-PROJECT 8)

PROGRESS OF WORK

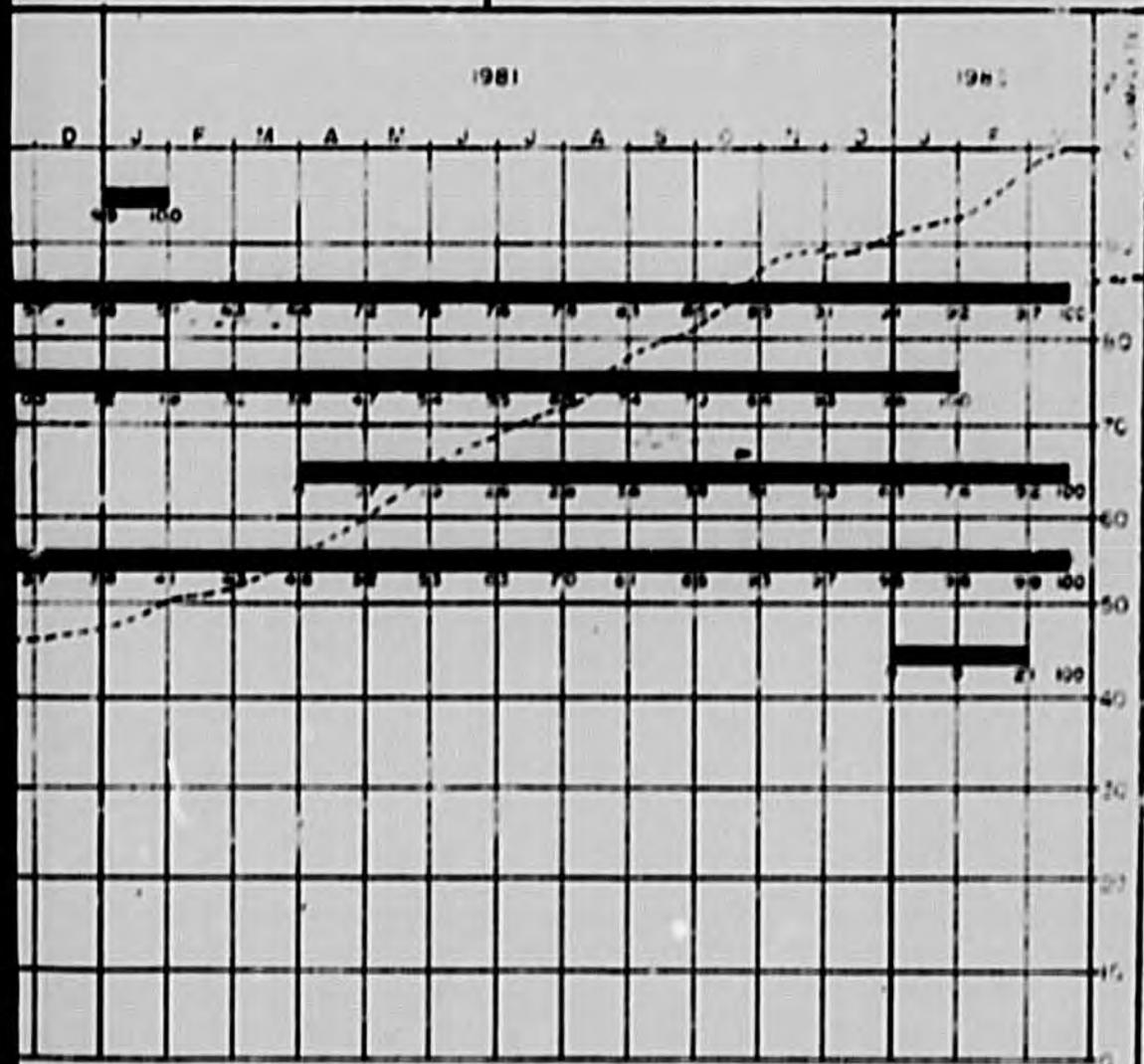
PREPARED BY GALDENICIO L. BENITO, R.E.

NET CONTRACT BID AMOUNT ₱ 11,587,482.25

REVISED CONTRACT AMOUNT ₱ 11,971,036.84

FINAL COST TO BE DETERMINED LATER

CHART



CONTRACTOR PHILCON BUILDERS AND DEVELOPERS CORPORATION

BIDDING DATE FEBRUARY 8, 1978

OFFICIAL STARTING DATE MAY 18, 1979

ORIGINAL COMPLETION DATE SEPT 10, 1980

CONTRACT TERMINATED DECEMBER 10, 1980

**BICOL SECONDARY
PACKA**

CONTRACT NO. 1
IRIGA-SALVACION-BAT

PROGRES

ITEM	ESTIMATED	ACTUAL	REMAINING	1979											
				M	J	J	A	S	O	N	D				
I GENERAL	1.66	90.84	1.51	[Bar chart showing progress from May to July]											
II EARTHWORK	54.77	59.81	32.76	[Bar chart showing progress from July to December]											
III BASE COURSE	12.33	0.00	0.00	[No progress shown]											
IV SURFACE COURSES AND PAVEMENT	14.88	0.00	0.00	[No progress shown]											
V STRUCTURES	19.17	30.00	4.66	[Bar chart showing progress from November to December]											
VI INCIDENTAL CONSTRUCTION	0.81	0.00	0.00	[No progress shown]											
TOTAL	100														

PROGRESS

SCHEDULE



COMPLETION

Actual

ACTUAL 38.82

SCHEDULED 100

LEGEND :

LEGEND :

..... ACTUAL PROGRES

**AND FEEDER ROADS
GE III**

(OLD CONTRACT)
O (SUB-PROJECT 12)

S CHART

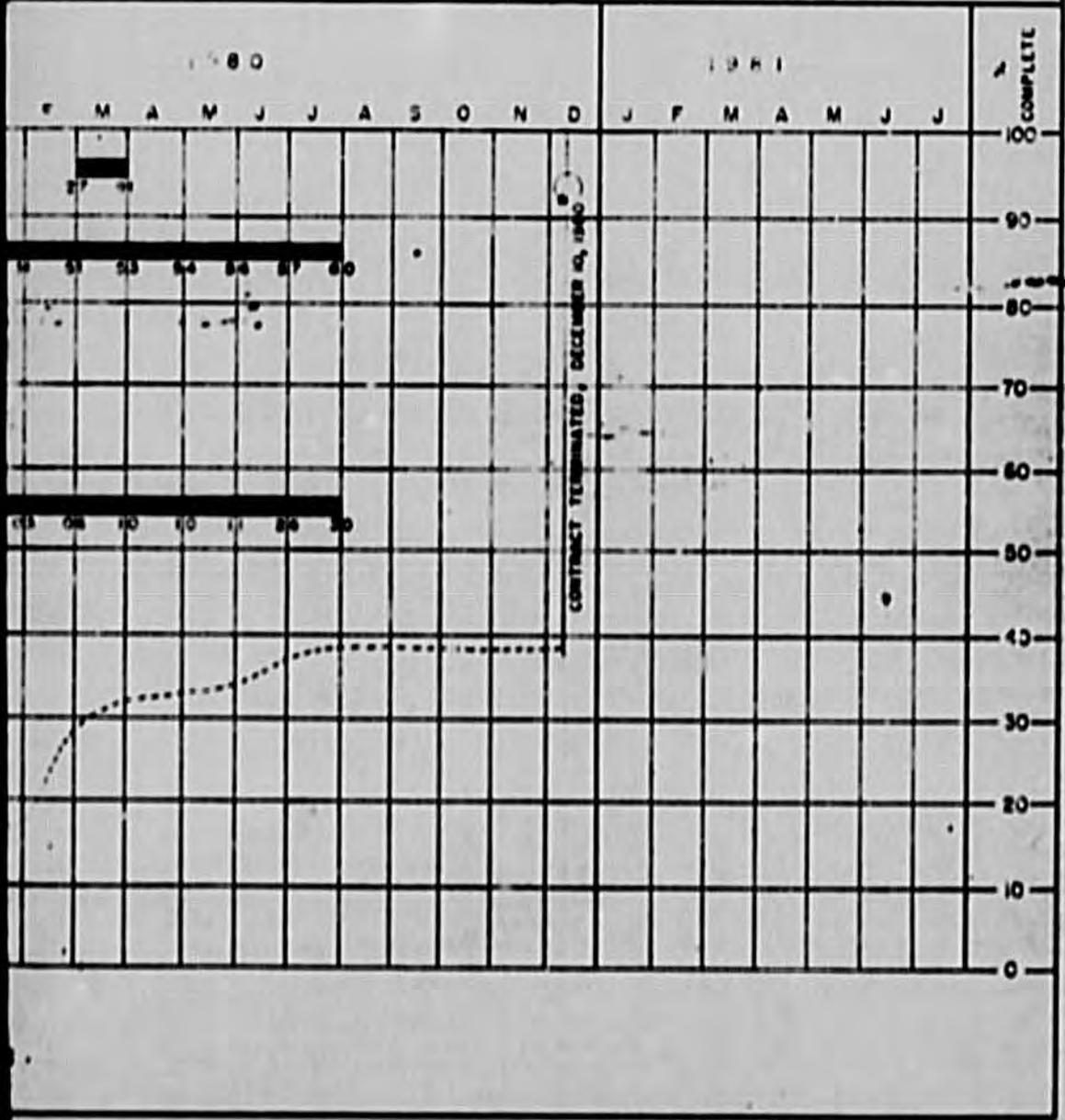
PROGRESS OF WORK

PREPARED BY GAUDENCIO L. BENITO, R. E.

NET CONTRACT BID AMOUNT ₱ 5,306,770.00

REVISED CONTRACT AMOUNT

FINAL COST ₱ 2,014,520.22



CONTRACTOR WILLIAM UY CONSTRUCTION

BIDDING DATE JANUARY 9, 1978

OFFICIAL STARTING DATE JULY 15, 1978

ORIGINAL COMPLETION DATE JANUARY 5, 1980

ACTUAL COMPLETION DATE JANUARY 31, 1981

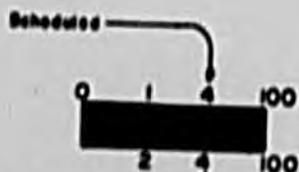
**BICOL SECONDARY
PACKA**

CONTRACT NO. 1
POLANGUI-LIDONG -

PROGRES

I T E M	% CONTRACT VALUE	% ITEM COMPLETE	% PROJECT COMPLETE	1978											
				J	A	S	O	N	D	J	F	M	A	M	J
I GENERAL	13	100	13	[Progress bars and grid for GENERAL]											
II EARTHWORK	61.6	100	61.6	[Progress bars and grid for EARTHWORK]											
III BASE COURSE	9.1	100	9.1	[Progress bars and grid for BASE COURSE]											
IV SURFACE COURSES AND PAVEMENT	4.7	100	4.7	[Progress bars and grid for SURFACE COURSES AND PAVEMENT]											
V STRUCTURES	22.6	100	22.6	[Progress bars and grid for STRUCTURES]											
VI INCIDENTAL CONSTRUCTION	0.7	100	0.7	[Progress bars and grid for INCIDENTAL CONSTRUCTION]											
TOTAL	100			[Summary grid]											

PROGRESS:



COMPLETION:

Actual

ACTUAL	100
SCHEDULED	100

LEGEND :

----- ACTUAL PROGRESS

**AND FEEDER ROADS
SE III**

(OLD CONTRACT)
UHI (SUB-PROJECT 13A)

S CHART

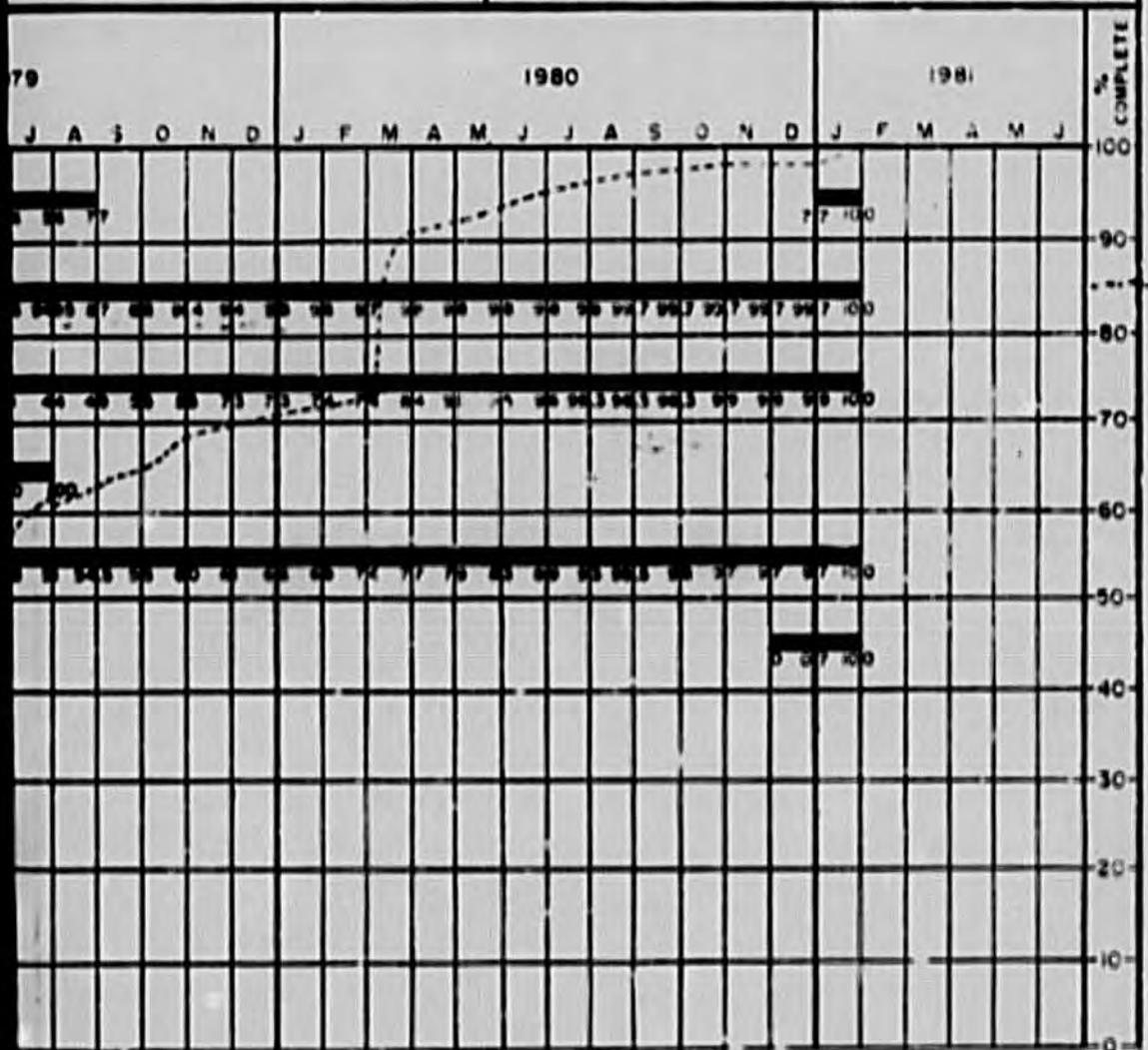
PROGRESS OF WORK

PREPARED BY GAUDENCIO L BENITO, R E

NET CONTRACT BID AMOUNT P 14,435,364.00

REVISED CONTRACT AMOUNT P 12,731,677.06

FINAL COST TO BE DETERMINED LATER



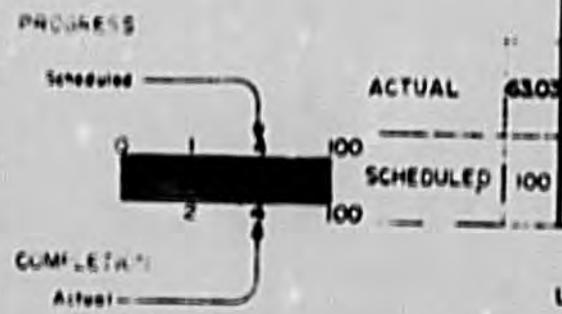
CONTRACT BY DISTRIBUTION
 BIDDING DATE JANUARY 9, 1978
 OFFICIAL STARTING DATE JULY 15, 1978
 ORIGINAL COMPLETION DATE JANUARY 5, 1980
 CONTRACT TERMINATED MARCH 17, 1981

**BICOL SECONDARY
 PACKAG**

CONTRACT NO. 2
 POLANGUI - LIDONG - B

PROGRES

I T E M	N CONTRACT VALUE	N ITEM COMPLETE	N PROJECT COMPLETE	1978											
				J	A	S	O	N	D	J	F	M	A	M	J
I GENERAL	59 63.71	0.38		[Progress bars for 1978]											
II EARTHWORK	36 55.87	90.32	13	[Progress bars for 1978]											
III BASE COURSE	8 97.84	62.76	1	[Progress bars for 1978]											
IV SURFACE COURSES AND PAVEMENT	21.49	0	0	[Progress bars for 1978]											
V STRUCTURES	32.35	70.81	22.91	[Progress bars for 1978]											
VI INCIDENTAL CONSTRUCTION	0.05	0	0	[Progress bars for 1978]											
TOTAL	100			[Progress bars for 1978]											



LEGEND: ----- ACTUAL PROGRESS

**AND FEEDER ROADS
E III**

(OLD CONTRACT)
UHI (SUB-PROJECT 13B)

CHART

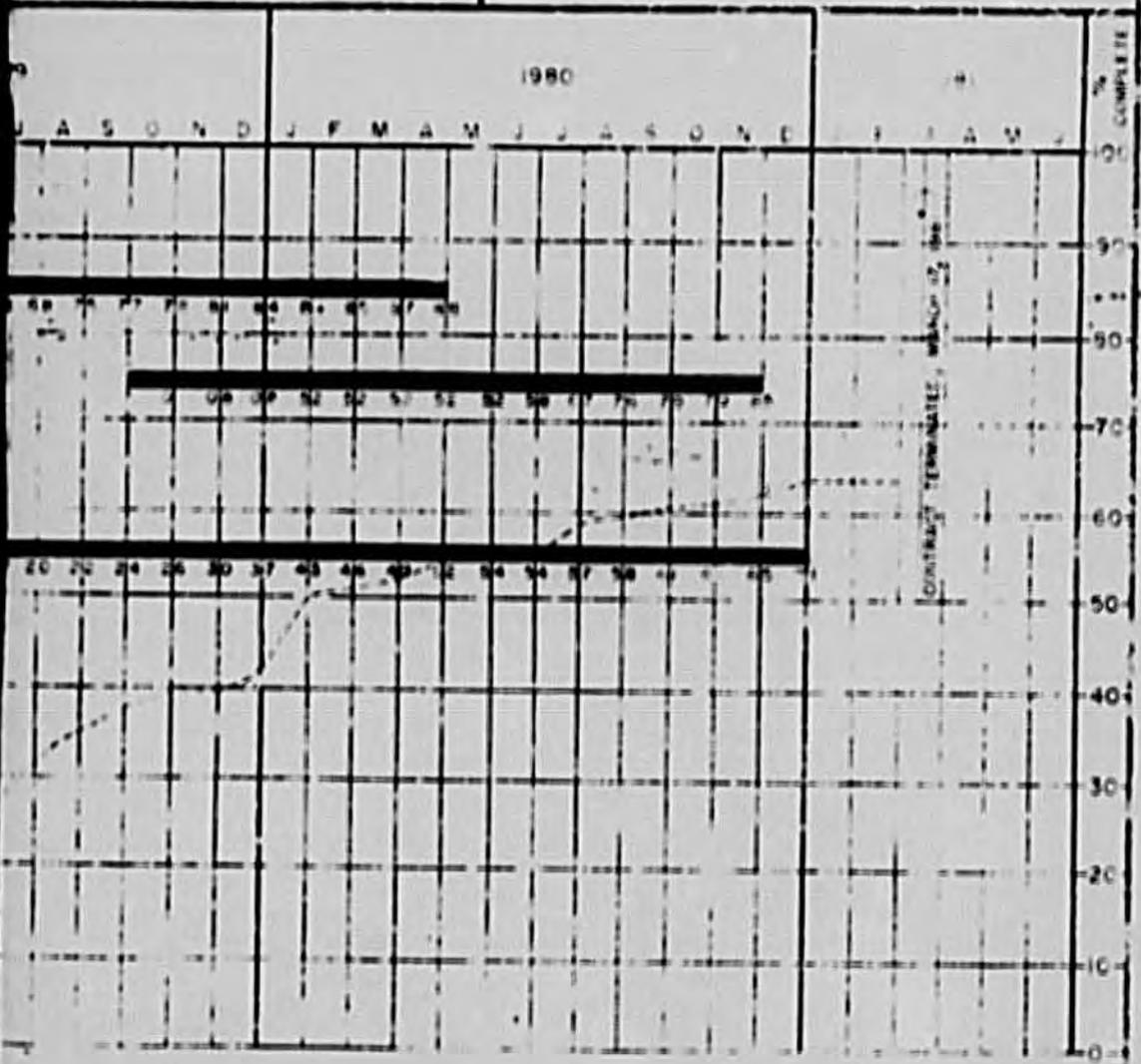
PROGRESS OF WORK

PREPARED BY GAUCENCIO L. BENITO, P.E.

NET CONTRACT BID AMOUNT P 0,647,071.50

REVISED CONTRACT AMOUNT P 0,680,000.00

FINAL COST P 6,473,044.48



CONTRACTOR: MOONROCK CONSTRUCTION
BIDDING DATE: MAY 31, 1981 (THRU SEALED BID)
OFFICIAL STARTING DATE: JULY 25, 1981
ORIGINAL COMPLETION DATE: JUNE 19, 1982
100% COMPLETION DATE: AUGUST 17, 1982

BICOL SECONDARY
PACKAG

CONTRACT NO. 1
IRIGA - SALVACION - BAT

PROGRESS

I T E M	% CONTRACT VALUE	% ITEM COMPLETE	% PROJECT COMPLETE	1981											
				J	A	S	O	N	D	J	A	S	O	N	D
I EARTHWORK	38.52	100	38.52												
II BASE COURSE	15.72	100	15.72												
III SURFACE COURSES AND PAVEMENT	21.69	100	21.69												
IV STRUCTURES	22.82	100	22.82												
V INCIDENTAL CONSTRUCTION	1.24	100	1.24												
TOTAL			100												



ACTUAL	100
SCHEDULED	100

LEGEND:
 -----ACTUAL PROGRESS

AND FEEDER ROADS

E III

(NEW CONTRACT)

(SUB-PROJECT NO.12)

CHART

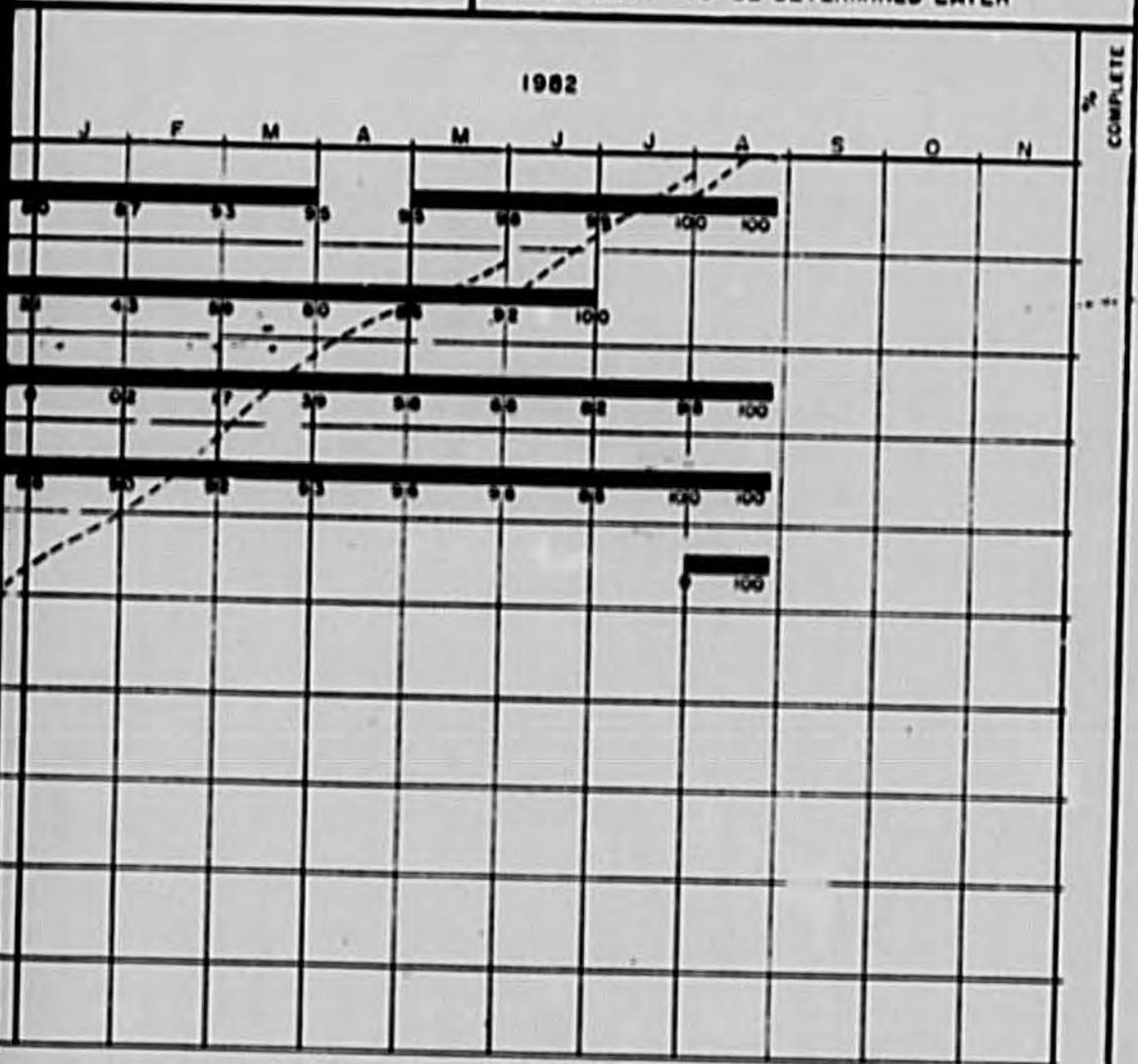
PROGRESS OF WORK

PREPARED BY: GAUDENCIO L. BENITO, R.E.

NET CONTRACT BID AMOUNT ₱ 6,127,789.69

REVISED CONT. AMOUNT: ₱ 6,850,903.76

FINAL COST: TO BE DETERMINED LATER



CONTRACTOR: LAL CONSTRUCTION

BIDDING DATE: MAY 31, 1981 (THRU SEALED BID)

OFFICIAL STARTING DATE: AUGUST 11, 1981

ORIGINAL COMPLETION DATE: MARCH 9, 1982

100% COMPLETION DATE: AUGUST 21, 1982

**BICOL SECONDARY
PACKA**

CONTRACT NO. 1
POLANGUI-LIDONG-BU

PROGRES

I T E M	% CONTRACT VALUE	% ITEM COMPLETE	% PROJECT COMPLETE	1981			
				A	S	O	N
I EARTHWORK	16.93	100	16.93	0	19	03	04
II BASE COURSE	9.81	100	9.81	0	05	05	
III SURFACE COURSES AND PAVEMENT	48.62	100	48.62	0		05	01
IV STRUCTURES	24.48	100	24.48	0	03	22	27
V INCIDENTAL CONSTRUCTION	0.16	100	0.16				
TOTAL			100				

PROGRESS:

Scheduled

ACTUAL

100



SCHEDULED

100

Actual

COMPLETION

LEGEND :

----- ACTUAL PROGR

**AND FEEDER ROADS
GE III**

(NEW CONTRACT)

HI (SUB-PROJECT 13)

S CHART

PROGRESS OF WORK

PREPARED BY SAUCENCIO L. BENITO, R. E.

NET CONTRACT BID AMOUNT ₱ 6,135,119.06

REVISED CONT. AMOUNT ₱ 7,510,317.66

FINAL COST TO BE DETERMINED LATER

