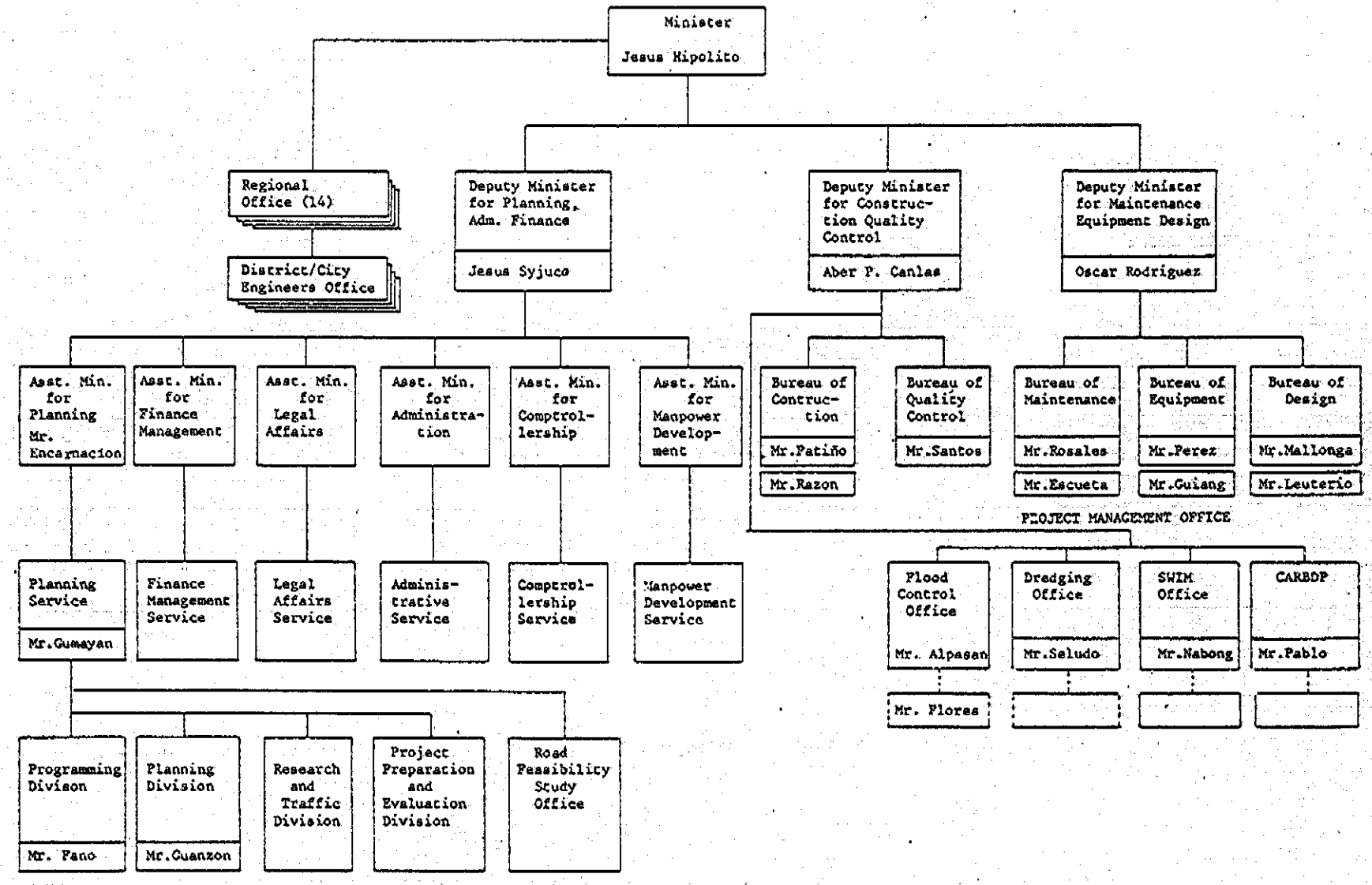
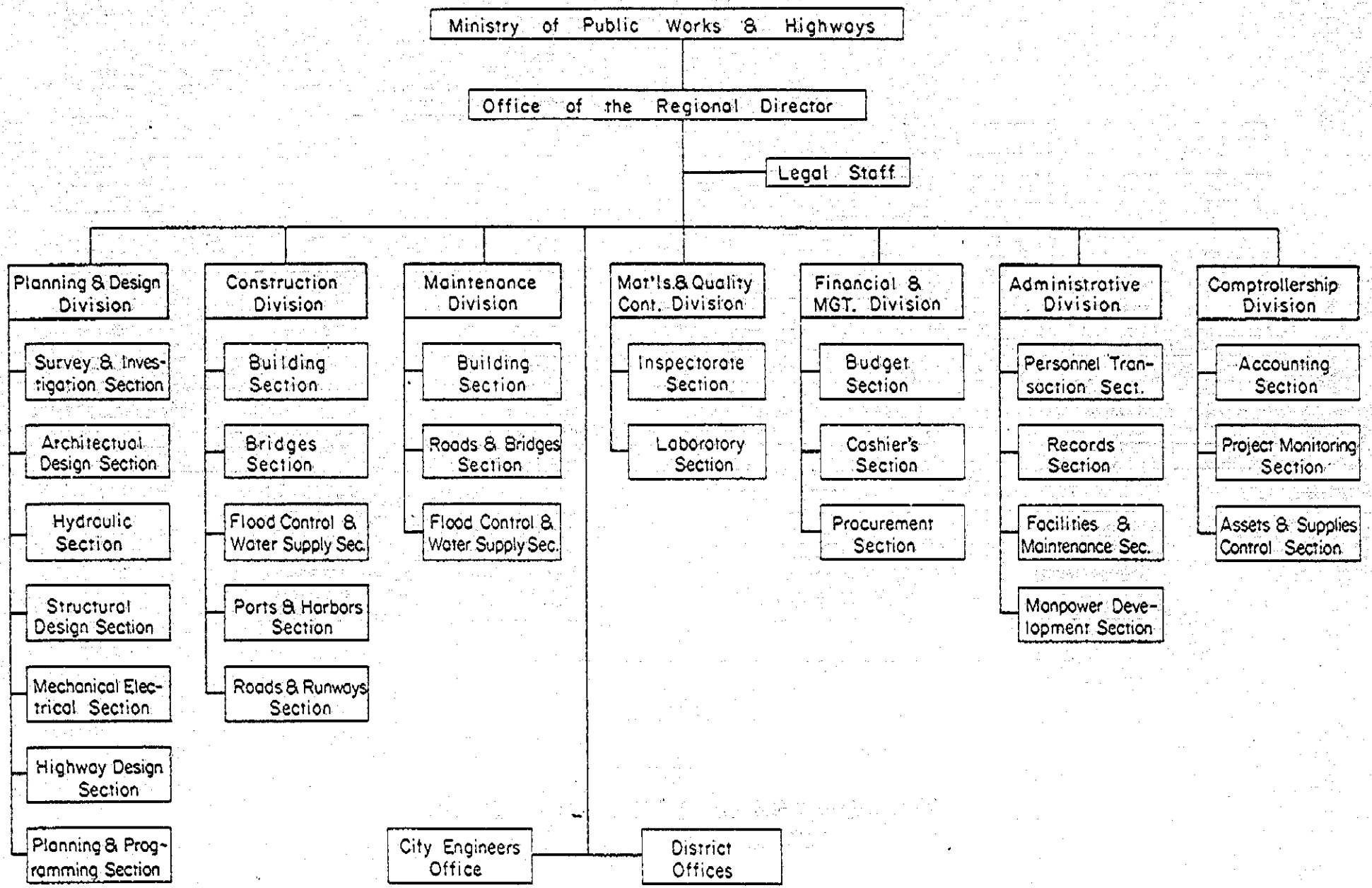
II. 組　織

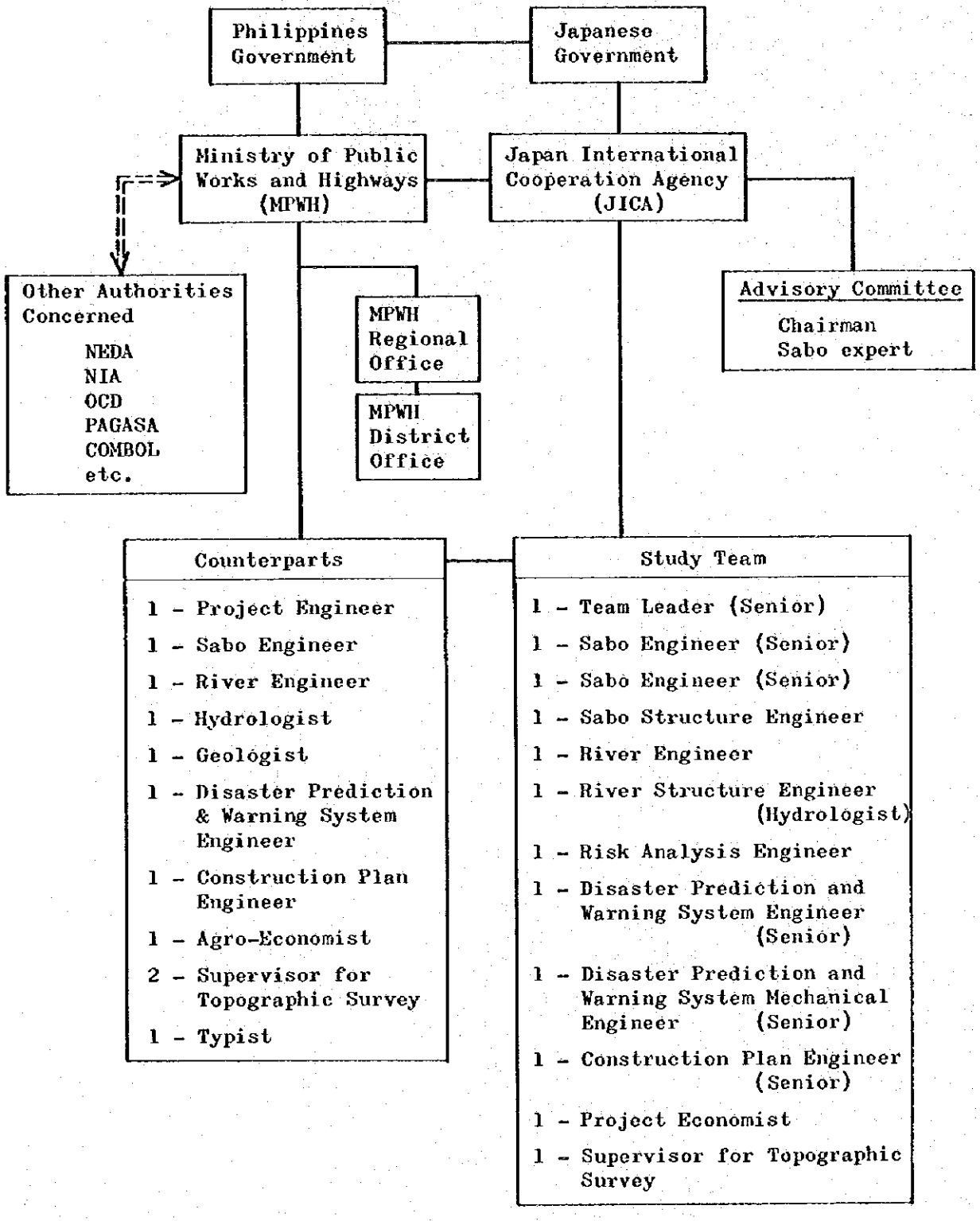
ORGANIZATION CHART
MINISTRY OF PUBLIC WORKS & HIGHWAYS



ORGANIZATION CHART OF MPWH REGIONAL OFFICE



ORGANIZATION CHART OF STUDY TEAM



Ⅲ．調査作業工程および概要

3.1 作業工程とその実績

(1) 現地作業実績

1982年6月1日，フィリピン共和国マニラ到着後，6月4日にレガスピに移動し，現地調査を開始した。

(a) 現地作業実績

<u>測　量</u>

測量契約が遅れたが，6月29日公共事業・道路省とフィリピンの測量業者との間で契約が完了した。砂防施設の詳細設計サイトをアヌリン川とパワ・プラボド川とした。航空写真図化は，日本で実施した。基本計画の再検討用の地上測量図面（ドラフト）を7月末に完成した。詳細設計サイトの平板測量を8月より開始し，9月末に完了した。

<u>砂防計画調査</u>

基本計画と今回の台風ダーリンによる被害を比較するため，各渓流の詳細な現地踏査を行い，今回の基本方針を検討した。第5地域事務所が，ナシシ川中流で実施予定の床固ダムの詳細設計について技術的助言を行うとともに，カウンターパートに砂防講義を行った。

<u>河川計画調査</u>

基本計画で対象とした全河川およびその支川に関して，台風ダーリンによる被害状況を把握するため，現地踏査を行った。基本計画後および台風ダーリン後に実施された河川改修工事（復旧工事も含む）の実態を調査した。台風ダーリンによる洪水被害地域図を作成した。

<u>危険分析およびゾーニング調査</u>

マヨン火山南側山麓の現地踏査を行うとともに，1980年と1982年撮影の航空写真判読により，土石流影響範囲の検討を行った。

<u>予警報調査</u>

土石流被害，洪水被害等の災害記録，災害防御に関する制度と活動の実態，既存の予警報システム等について現地調査を行い，雨量計・水位計の設置箇所および予警報システムの全体的概略計画を検討した。また，予警報システム機器に関連して，放送局，電話局，ピコール川流域予警報システム等を調査した。資料・

情報を国防省，台風委員会，社会福祉省，ピコール川流域総合開発事務所，気象庁，火山委員会，フィリピン長距離電話会社等の機関より入手した。

水文調査

基本計画以降の水文資料を収集した。特に台風ダーリンの降雨特性に留意した。水文資料を，ピコール川流域総合開発事務所，気象庁，水資源委員会等の機関より入手した。

土石流・洪水被害調査

台風ダーリンの土石流被害を主体に調査した。土石流・洪水被害の調査にあたっては，計画対象地域の20以上の関連機関を訪問し，資料を入手するとともに，現地インタビューを実施した。

施工計画・工事費関連調査

工事費積算の基礎資料を入手するとともに，砂防工事を実施する際の契約条件，実施形態，工事事務所設立等の工事実施に関するフィリピンの実情について，公共事業・道路省より資料を入手し，フィリピン側の方針を確認した。

経済評価調査

プロジェクト評価の基礎となる経済・社会関連資料，公共事業・道路省の評価手法，ピコール川流域総合開発事務所および国家経済企画庁の評価方法等について調査した。

(b) インセプション報告書作成提出

1982年6月1日から実施した現地調査の結果を，インセプション報告書にとりまとめて，7月26日公共事業・道路省および事業団に提出した。インセプション報告書の説明を公共事業・道路省第5地域事務所で行った。参加者は総計34名で，調査団，管理委員会，事業団東京，事業団コロンボ計画派遣員，日本大使館，公共事業・道路省マニラ本部および第5地域事務所，国防省，気象庁等の機関の関係者であった。

(2) 国内作業

現地調査完了後，国内にて計画，解析報告書作成をインセプション報告書および調査業務仕様書に基づき，実施した。ドラフト報告書（主報告書，サポーティング報告書，工事費積算報告書）を1982年12月末にとりまとめ，12月28日フィリピンに送付し

た。

詳細設計サイトの地形図が9月末に完成した時点で，10月初旬に現地サイトの再調査を10日間実施後した。その後，アヌリン川およびパワ・プラボド川の砂防施設の詳細設計を開始し，1983年2月末にそのドラフト設計報告書（図面を含む）を作成した。

(3) ドラフト報告書の説明および協議

1983年2月6日から2月12日までの1週間，フィリピン共和国マニラおよびレガスピにてドラフト報告書を説明し，かつフィリピン側のコメントについて協議を行った。詳細については議事録を参照されたい。

3.4 ファイナル報告書

フィリピン側のコメントを反映して，ファイナル報告書を作成した。ファイナル報告書は，主報告書，サポーティング報告書Ⅰ，サポーティング報告書Ⅱ，工事費積算報告書，設計報告書，報告書（和文）より構成されている。

3.2 その他

(1) 現地調査と進捗状況

現地調査期間が2ヶ月と短期間ではあったが，調査業務仕様書の調査内容について，各担当者は要員計画および作業工程に基づいて完了した。現地作業を通して，主要観察事項，実施計画，詳細設計候補地の選定等をインセプション報告書としてとりまとめた。

(2) 調査業務実施における仕様書との関係

調査対象地域，調査業務の範囲，調査業務の内容，工程計画等については，特に問題はなかった。

(3) 調査業務実施における事前調査との関係

相手国の要請の背景，調査範囲，調査項目，調査方法等については，特に問題はなかった。

(4) 相手国からの便宜供与の状況

(a) 関係資料および地形図等の提供について

当該調査について必要な資料は，公共事業・道路省以外の機関からも十分入手できた。地上測量については，公共事業・道路省が実施協定書に基づいて行った。

(b) カウンターパート

公共事業・道路省のマニラ事務所および地域事務所，建設事務所および他機関所属の職員が，各調査団員の作業内容に応じて選任されたので，調査がスムーズに出来た。

(5) 車輌および資機材等の貸与状況

(a) 車輌の貸与

公共事業・道路省が2台のジープを6月4日および6月8日より準備した。そのうち1台は地上測量監督のため10月7日まで使用した。車輌貸与は無償で，かつ運転経費も公共事業・道路省負担であった。

(b) 貸与機材

航空写真判読のため，ステレオスコープ1台を，公共事業・道路省が準備した。

(c) 事務所の貸与

公共事業・道路省地域事務所が，レガスピ空港のすぐ近くの同事務所内に，調査団事務所を準備した。設備としては，机，いす，会議用テーブル，タイプライター（2台），エアーコンディショナー（3台），トレース台等であり，非常に快適な事務所であった。

(d) その他

公共事業・道路省地域事務所が，地域防衛軍ヘリコプターを調査のために要請した。

(6) 事業団からの貸与機材

3台のランドクルーザが，事業団マニラ事務所から調査団に貸与された。貸与車輌のレガスピ到着から返却までの使用期間は，以下のとおりであった。

i) 6月21日～7月28日　2台

ii) 7月7日～7月28日　1台

貸与車輌は，調査団のみが使用し，マニラからの輸送，維持管理，保管，返却等の一切の作業については，公共事業・道路省に指示し，実施させた。

(7) 技術移転

(a) 現地調査期間（1982年6月1日～7月31日）

相手国の担当機関の要望は，砂防の考え方，施設の配置計画，施設の効果，詳細設計であった。特に，現地作業期間中，次の技術移転を行った。

- 現地調査団を通して，カウンターパートに対し，各担当者が技術の伝達を図った。
- 第5地域事務所が独自で行ったナシシ川の床固ダムの詳細設計について，技術的助言を行った。
- 砂防計画の講義を，カウンターパートに行った。
- 調査団作成の設計基準書を10部公共事業・道路省に提出した。

(Outline of Design Criteria for Sabo Dam and Consolidation Works)

(b) 国内での技術研修

当該調査のカウンターパート2名が，砂防技術の修得のため1982年11月24日～12月22日までの期間来日した。その研修内容および研修実施工程は，次のとおりである。

11月24日	来　日
25日	事業団訪問，研修準備，建設省訪問
26日	砂防概論（建設省），水文（日本工営）
29日	河川（日本工営），砂防概論（建設省）
30日	日本工営技術研究所見学（日本工営）
12月1日	地形図作成，写真判読（朝日航洋）
2日～7日	砂防計画・設計（砂防・地すべり技術センター）
8日	土木研究所見学（砂防・地すべり技術センター）
9日～10日	富士山大沢崩れ扇状地対策見学（建設省）
13日	淀川水系砂防見学（建設省）
14日～16日	桜島の活火山対策砂防見学（建設省）
17日～18日	日光砂防見学（建設省）
20日	JICA，建設省訪問
22日	帰　国

フィリピン研修生

Mr. Vicente Umali Supervising Civil Engineer II	MPWH, Albay District Office
Mr. Permin E. Peteza Materials Testing Engineer	MPWH, Regional Office

(c) ドラフト報告書現地説明期間 (1983年2月6日～2月12日)

事業団より公共事業・道路省に次の砂防関連資料が寄贈された。

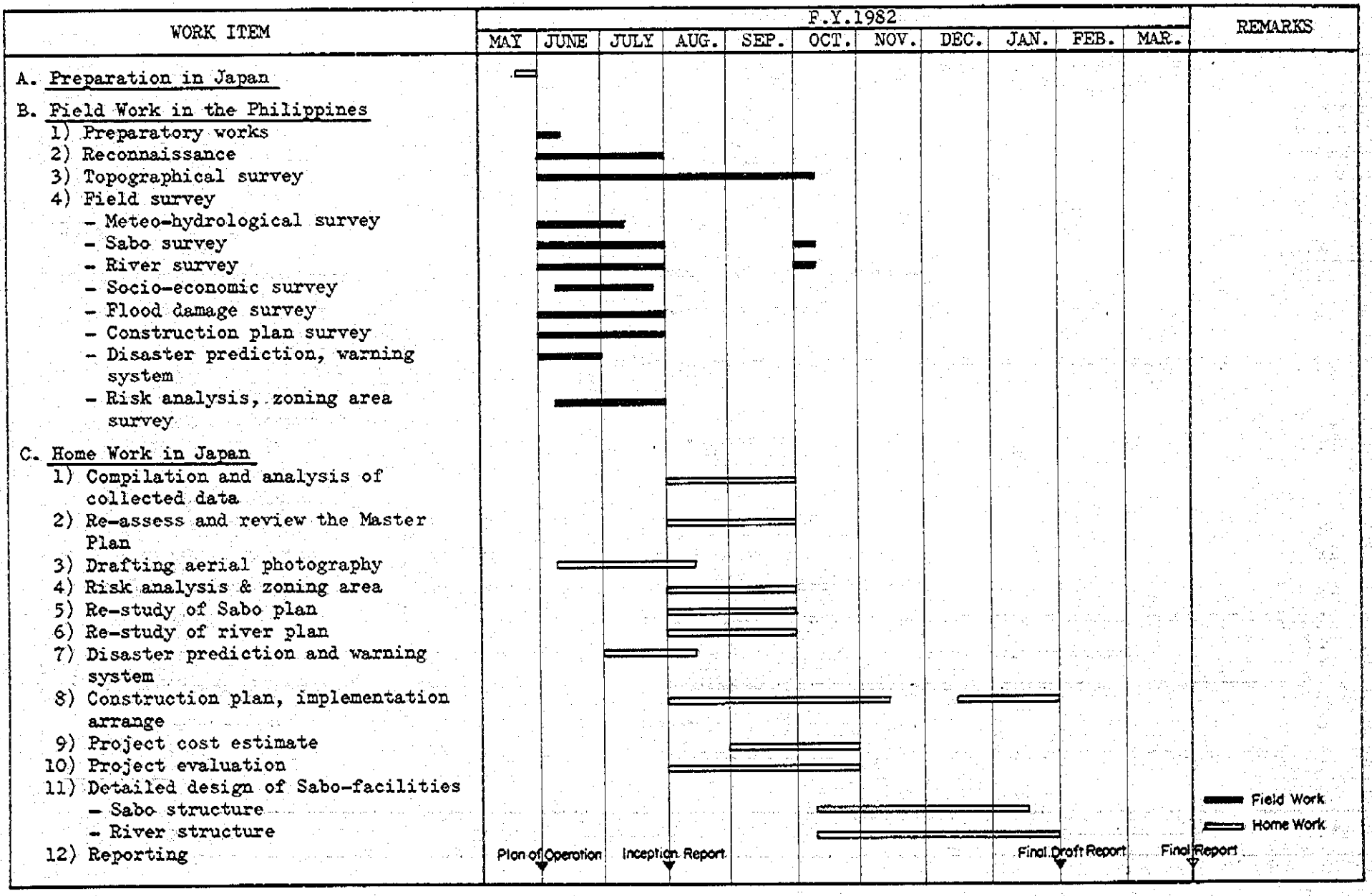
i) 映画フィルム (Sabo Works in Japan) 1巻

ii) テキスト (Introduction to Sabo Works) 10部

iii) パンフレット (写真集 Sabo Works in Japan) 30部

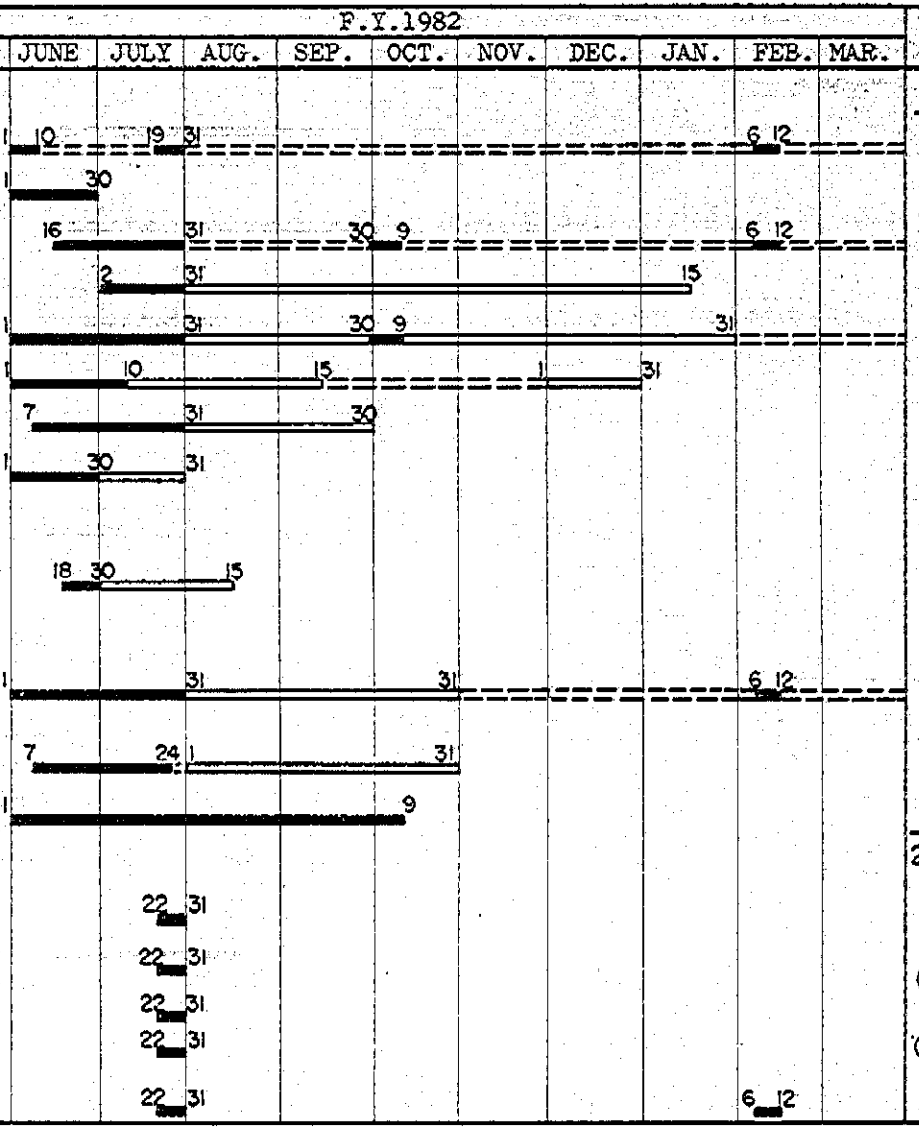
ドラフト報告書の説明，コメント協議に際し，MPWH職員およびカウンターパートに上記資料および映写会を通して，砂防知識の伝達を図った。また，映写会を別途開催したことにより，アルバイ州知事も砂防に理解を深めた。上記寄贈英語フィルムの他に，富士山大沢崩れ砂防対策も上映した。

WORK SCHEDULE IN F.Y.1982 MAYON VOLCANO SABO AND FLOOD CONTROL PROJECT

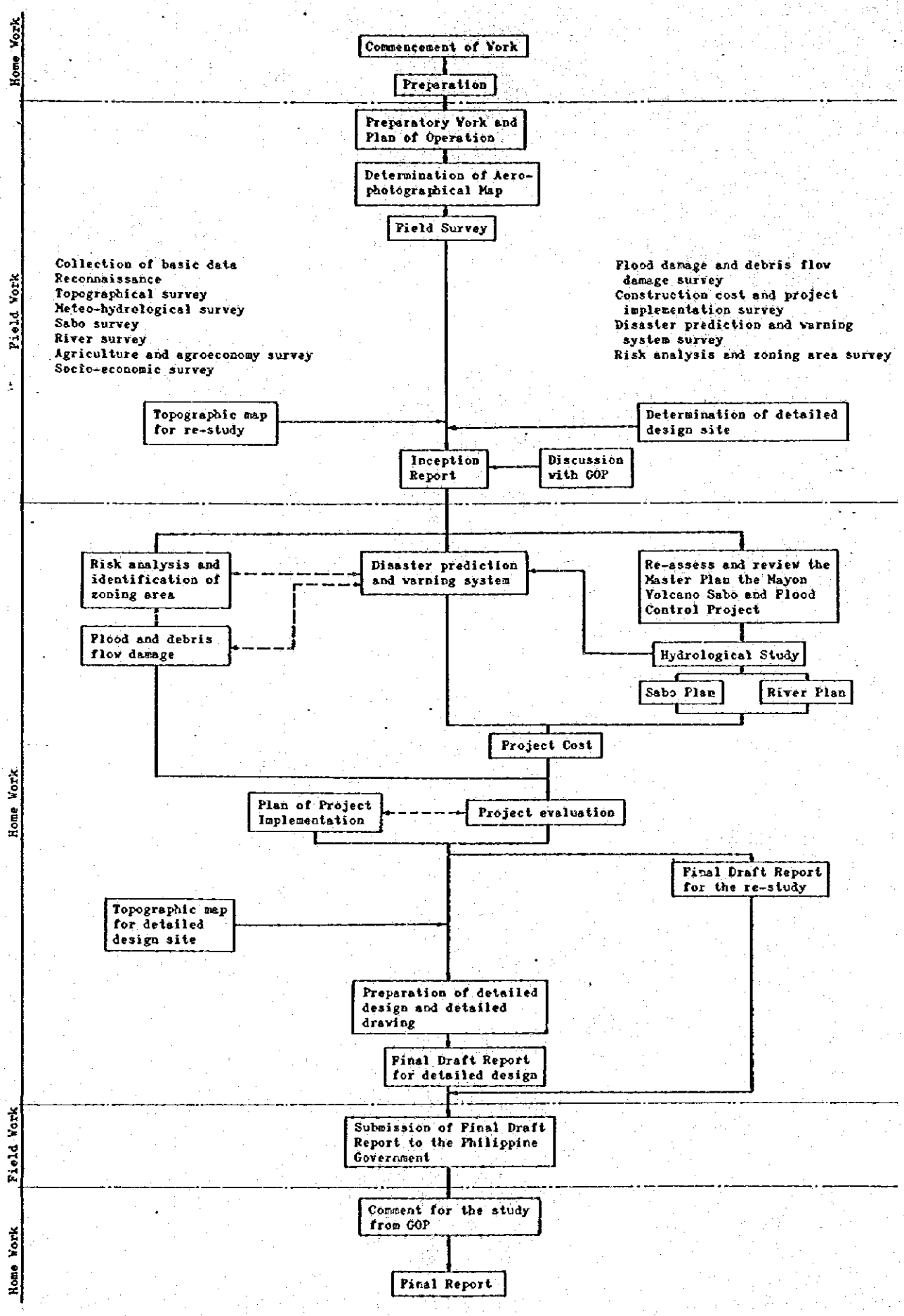


ASSIGNMENT SCHEDULE FOR F.Y.1982 MAYON VOLCANO SABO AND FLOOD CONTROL PROJECT

ASSIGNMENT	NAME	REMARKS Field	REMARKS Home
Survey Team			
1. Team Leader (Senior)	T. Yoshimatsu	1.0	2.0
2. Sabo Engineer (Senior)	T. Horizumi	1.0	–
3. Sabo Engineer (Senior)	Y. Okubo	2.1	3.9
4. Sabo Structure Engineer	K. Matsumura	1.0	5.5
5. River Engineer	A. Inaba	2.37	6.0
6. River Structure Engineer	M. Ouchi	1.33	3.3
7. Risk Analysis Engineer	S. Ukai	1.83	2.0
8. Disaster Prediction & Warning System Engineer (Senior)	N. Takayanagi	1.0	1.0
9. Disaster Prediction & Warning System Mechanical Eng. (Senior)	N. Suzuki	0.43	1.5
10. Construction Plan Eng. (Senior)	T. Kozawa	2.27	4.0
11. Economist	T. Murono	1.6	3.0
12. Supervisor of Topo. Survey	S. Tamada	4.37	–
		20.3	32.2
Advisory Committee			
Chairman	T. Sugiyama		
Sabo Engineer	Y. Ogawa		
Sabo Engineer	S. Yoshida		
River Engineer	T. Harada		
JICA's Coordinator	K. Miyoshi		



FLOW CHART OF STUDY WORK



Ⅳ．調査業務仕様書

フィリピン共和国マヨン火山砂防計画調査業務仕様書

第1　総　則

この仕様書は、国際協力事業団（以下「甲」という。）が実施する「フィリピン共和国マヨン火山砂防計画調査業務」のうち、フィリピン共和国マヨン火山砂防計画調査共同企業体 代表者 日本工営株式会社（以下「乙」という。）に実施させる調査業務の仕様を示すものである。

なお、この仕様書に定めていない事項については、乙は随時甲と協議のうえ、その作業を進めるものとする。

第2　調査の目的

本調査は、マヨン火山地域の住民の生命と財産の保全及び生活水準の向上を、目標とするものであり、次の二つを目的とする。

(1) 事業団が実施し、１９８１年３月にフィリピン共和国に提出したマヨン火山砂防治水基本計画と最近の災害を検討し見直すこと。

(2) マヨン火山地域の災害対策にかかる、砂防・治水及び予警報システムの段階計画を費用を最少として、かつ充分な効果がある方法にて策定すること。

第3　調査対象地域

マヨン火山とその周辺を調査対象地域とする。

第4　調査業務の範囲

調査関連資料の収集、航空写真図化及び地上測量監督等を行うとともに、これら資料及び情報に基づき、砂防治水及び予警報システムの段階計画を策定し、最終報告書にとりまとめるとともに緊急計画の詳細設計を実施する。又、併せて、フィリピン国技術者に対する技術知識の伝達を行う。

第5　調査業務の内容

乙は、フィリピン共和国側カウンターパートの協力を得て、事業団実施のマヨン火山砂防治水基本計画調査を踏え、下記の調査業務を実施する。

Part A　マヨン火山砂防治水計画

(1)　一般事項

本調査に直接関連する全てのデータ情報及び既存報告書のリビュー及び評価を行い、今後計画実施のため必要とされる調査の計画を策定する。

(2)　水文資料の収集及び解析

１９８１年３月の基本計画報告書提出以降、特に台風ダーリン時の雨量及び流量資料と基本計画調査時、収集できなかつた雨量及び流量資料の収集を行ない、これを既存資料に加え評価分析し雨量・流量特性を明らかにする。

(3)　地形及び地質調査

(a)　５６年度実施済の航空写真及び地上コントロールの結果により、本件調査にあたり必要とされる計画対象地域の地形図（対象区域、付図－１に示す範囲３７㎢、縮尺１：５,０００、精度B、コンター間隔５ｍ）を作成する。なお、国内図化作業に伴うフイリピン共和国セキュリテイオフイサーの監督にかかる招へい及び手配を乙の責任において実施する。

(b)　主要構造物地点の縦横断測量等の地上測量及び地質調査のフイリピン側実施にあたり仕様等についての指導及び実施の監督を行う。

(4)　災害調査

土石流、地すべり、破堤、浸水及び落橋等による災害発生について、基本計画調査時の既収集情報と台風時の情報収集を行ない、これと合わせ災害状況を雨量、及び流量特性と関連づけ評価分析する。

(5)　不安定土砂の想定及び洪水流量の算定

マヨン火山地域における砂防計画立案に資するため、上記水文及び災害調査等の分析を踏え、マヨン地域における砂防にかかる不安定土砂の想定、土砂移動の予測と土砂影響範囲の予測とともに、河川にかかる洪水流量の算定を行う。

(6)　基本計画の再評価

マヨン火山砂防、治水基本計画にかかる砂防及び治水関連施設について再評価を行う。なお、再評価にあたつては、台風ダーリンの影響がマ

ヨン火山周辺、すなわち、キナリ(A)部分を除く地域に集中しているところから、この地域を中心として実施するものとする。

(7) 危険分析及び地域区分

災害調査及び不安定砂・洪水流量分析に基づき、調査対象地域の危険分析を行ない、調査地域における危険、避難、安全地域の分類区分を実施する。

その際、砂防施設等の設置の影響等を考慮し、工事実施の有無、それぞれの場合の検討を行う。

なお、地域区分については、航空写真と現地踏査を基本として行う。

(8) 砂防・洪水及び予警報システムの段階計画の立案

マヨン地域の住民の生命及び財産の保全と、生活水準の向上のため、費用を最少として、充分効果があるよう保全施設建設と避難・移転対策との組み合せも含め、その方法を検討し、下記の計画の立案を行う。

計画立案にあたつては、種々の代替案が検討され、最適計画が選定されるが、後になつても、充分理解、把握できるよう説明されなければならない。

(a) 砂防施設は基本計画の再評価、最近の災害状況、危険分析及び地域区分等を十分勘案して最適な砂防施設計画及び段階計画として立案する。

砂防施設計画立案にあたつては、緊急度、工事実施後の効果の影響及び優先順位を検討する。

(b) 治水施設計画は、緊急対策上必要ある場合には、基本計画部分については、下流に悪影響を与えない段階的実施の観点から、その他については緊急対策又は災害復旧の観点から検討を行ない策定する。

(c) 予警報システムを洪水解析、危険分析及び既存のシステム等を考慮してマヨン火山地域を対象として立案する。計画立案にあたつては、実施可能な計画を策定するとともに、雨量計、水位計の設置個所の選定、観測方法、警報、避難対策を検討する。

(9) 概略計画の実施

上記計画立案に基づき最適案について、概略設計を実施する。砂防施設は概略図を作成し、これには実施設計の段階における仕様の作成に役

立つよう、基本寸法及び技術内容を含んでいなければならない。予警報システムには、システム機器のリストアップ、概略仕様等の技術内容を含んでいなければならない。

00 実施計画

(a) 適正技術及び方法による実施計画を、地方事情、実施機関財的状況、建設方法等を検討し策定する。

特に、砂防関連施設の実施計画は、主体が土木事業となるため、内貨部分の財的負担能力、及び契約実施型態を、充分検討し策定されなければならない。

(b) 計画実施にあたり、民間コンサルタント（特に海外コンサルタント）が詳細設計及び監理に必要とされる場合は、このT／Rを作成する。

(c) 計画の実施に伴ない必要となる維持管理体制について検討を行う。

00 費用の算定

最適計画について詳細に費用の算定を行う。

費用算定は、外貨及び内貨に区分するとともに間接外貨についても検討を行なつてなければならない。

併せて、費用算定は経済及び財務分析、又後になつての費用構成の操作に適する充分な情報と、サポーテイングデータを含んでいなければならない。

00 計画評価（財務分析、経済・社会評価）

(a) 計画について建設費用及び維持管理費用を明らかにし、必要財的負担を検討し、財務分析を行う。

(b) 計画における砂防・治水及び予警報施設の目標の適切性を明らかにするとともに、計画の最少費用性について分析を実施する。

(c) 計画による社会便益について、できるかぎり、貨幣数量化し便益費用分析を実施する。

(d) 計画による社会便益のうち、貨幣数量化できないが、他の指標にて数量化できるものはこれを行い、計画の社会効果を明らかにする。

(e) 計画による社会便益について、社会効果のあるもので数量化できな

いものは、これを文章にて説明する。

Part B　詳細設計

03　詳細設計の実施

インセプションレポートにおいて優先度が高く最緊急と判断される砂防施設を選定し、１９８３年度フィリピン政府の砂防予算を考慮して詳細設計を実施する。

04　入札書類作成助言

フィリピン政府が実施する上記にかかる入札書類の作成について、現地作業期間中必要あれば助言を行う。

Part C　技術移転

05　フィリピン技術者に対する技術的知識の伝達

(a)　現地作業を通じ、フィリピン側カウンターパートに対し、技術の伝達を図る。

(b)　国内作業にあたり、フィリピン側研修員に技術の伝達を図る。

第６　調査業務の実施の工程計画概要

昭和５７年６月より開始し、昭和５８年３月の終了を目途とする。

第７　成果品

(1)　報告書

(a)　インセプション・レポート

４０部（英文）

インセプション・レポートを調査開始後、２ケ月以内に提出することとする。

同レポートは、既存資料についての評価、主要観察事項、調査アプローチ方法、実施計画及び詳細設計施設候補選定については、代替案を含め提起し、最適案を勧告することとする。

(b)　ドラフト・ファイナル・レポート

(i)　調査報告書（英文）

主報告書　　４０部

Supporting Report　　２０部

詳細費用数量表　　５部

(ロ) 詳細設計書　　１０部

ドラフト・ファイナル・レポートは、調査開始８ケ月以内に提出することとする。

同レポートは本業務報告書調査内容にかかる調査分析について充分なサポーテイングデータにより記載されていなければならない。

又、同レポートは分析した代替案について説明を含むこととする。

(c) ファイナル・レポート（英文）

(イ) 調査報告書

主報告書　　７０部

サポーテイングレポート　　７０部

詳細費用数量表　　５部

基礎資料集　　２部

(ロ) 詳細設計書　　２０部（内コピー可能分冊　１部）

ファイナル・レポートは、フイリピン側コメントを反映させ作成する。

なお、詳細設計書はフイリピン側の承認を受領し印刷する。

(d) 最終報告書（調査概要書）

２０部（和文）

調査概要書は、ファイナル・レポート要旨、調査実施概要を含め、調査の結論と過程が理解しやすいよう記載する。

なお、報告書のうち、フイリピン側提出分はファイナル・レポートを除き送付を実施する。又、報告書には伝達文を含める。

(2) 月次報告書

月次報告書を事業団規定に則り提出する。

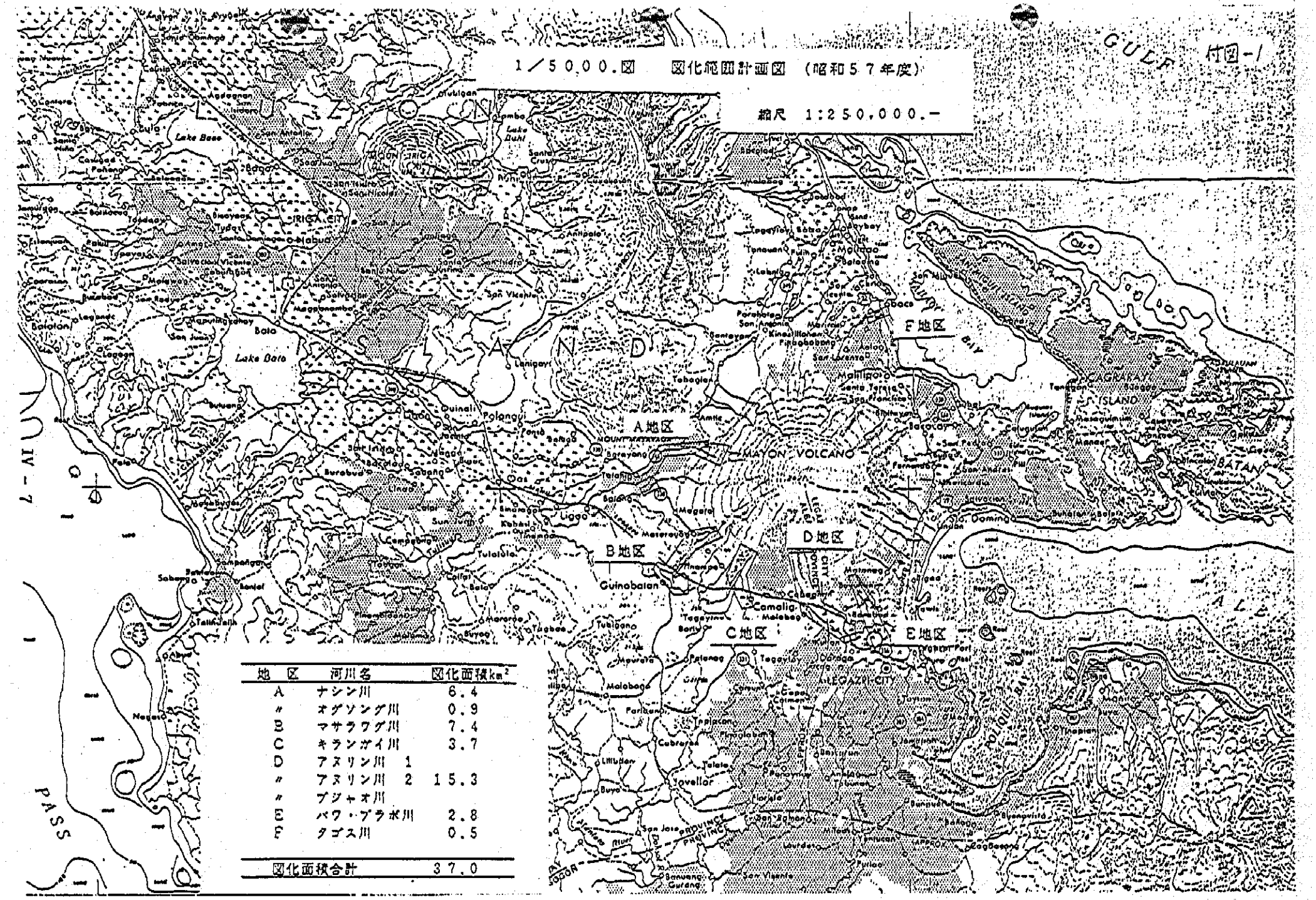
(3) 航空写真及び作成地形図成果一式

(4) 収集資料及び会議録

(a) 調査時収集した資料及びデータ等は分野別に整理し、そのリストを使用しやすいように付し事業団に提出する。

(b) 報告書説明協議及び作業監理委員会等の会議議事録を作成する。又、フイリピン側への要求事項等は基本的に書簡にて行なうものとし、写しを事業団本部及び事務所へ速やかに送付するものとする。なお、これらについては調査終了時とりまとめ、事業団に提出する。

(5) 写真集　　３部



地　区	河川名	図化面積km²
A	ナシン川	6.4
〃	オグソング川	0.9
B	マサラワグ川	7.4
C	キランガイ川	3.7
D	アヌリン川　1	
〃	アヌリン川　2	15.3
〃	ブシャオ川	
E	バワ・ブラボ川	2.8
F	タゴス川	0.5
図化面積合計		37.0

V．実施協定書

IMPLEMENTING ARRANGEMENT OF THE TECHNICAL COOPERATION BETWEEN THE JAPAN INTERNATIONAL COOPERATION AGENCY AND THE AUTHORITIES CONCERNED FOR THE RE-STUDY OF THE MAYON VOLCANO SABO AND FLOOD CONTROL PROJECT

AGREED

BETWEEN

JAPAN INTERNATIONAL COOPERATION AGENCY

AND

THE AUTHORITIES CONCERNED FOR THE STUDY

For JICA

Toshihiro Sugiyama.

Toshihiro SUGIYAMA
Team Leader
Japanese Preliminary Survey Team

For MPWH

Teodoro T. Encarnacion

TEODORO T. ENCARNACION
Asst. Minister for Planning, MPWH

February 4, 1982
Manila Philippines

IMPLEMENTING ARRANGEMENT ON THE TECHNICAL COOPERATION BETWEEN JAPAN INTERNATIONAL COOPERATION AGENCY AND THE AUTHORITIES CONCERNED FOR THE RE-STUDY OF THE MAYON VOLCANO SABO AND FLOOD CONTROL PROJECT.

I. INTRODUCTION

In response to the request of the Government of the Republic of the Philippines, the Government of Japan decided to conduct a technical cooperation (the Cooperation) for a Re-Study on the Mayon Volcano Sabo and Flood Control Project (the Study) and entrusted the cooperation to the Japan International Cooperation Agency (JICA). The JICA dispatched a preliminary survey team (the Team) to the Philippines in January, 1982 to finalize the Cooperation.

The Team carried out a field survey and held a series of discussions with the authorities concerned on the Mayon Volcano Sabo and Flood Control Project (the Authorities Concerned), with the Ministry of Public Works and Highways as the lead Agency, during their stay in the Philippines.

II. IMPLEMENTATION OF THE STUDY

The Cooperation shall be undertaken by the Japanese Study Team (the Study Team) in close collaboration with the Authorities Concerned.

1) The Study shall be implemented in accordance with the work plan given in detail in the Scope of Work (APPENDIX I).

2) The Study shall be conducted in accordance with the Schedule (APPENDIX II) formulated on the basis of the Scope of Work.

III. RESPONSIBILITIES OF THE JICA

The JICA shall, in accordance with the relevant laws and regulations in force in Japan, take the following necessary measures to conduct the Cooperation:

1) The JICA shall, at its own expense, dispatch Japanese Consultants as the Study Team in accordance with the schedule mutually agreed upon by both JICA and the Authorities Concerned;

2) The JICA shall, at its own expense, receive Philippine Government personnel connected with the Study, for technical training in Japan in accordance with the normal procedures under the Colombo Plan Technical Cooperation Scheme;

3) JICA shall, at its own expense, conduct aerophoto mapping including ground controls.

IV. RESPONSIBILITIES OF THE GOVERNMENT OF THE PHILIPPINES

1. The Authorities Concerned shall provide the necessary counterpart available to the Study Team;

2. The Government of the Philippines shall be responsible for the preparation of tender documents;

3. In accordance with the Note Verbale to be exchange between the Government of the Philippines and the Government of Japan, the Authorities Concerned, shall be responsible for dealing with claims which may be brought by third parties against the members of the Study Team and shall hold them harmless in respect of claims or liabilities arising in the course of/or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims or liabilities arise from their gross negligence or willful misconduct. Should any question arise in connection with the foregoing, both Governments shall immediately consult with each other.

4. The Authorities Concerned shall, at their own expense, provide the following:

   a. Available data and information related to the Study;

   b. Ground survey (topomapping, profiles and cross-sections) for proposed major structure sites including geological survey, material and soil test;

c. Credentials or Identification (ID) cards to the members of the Study Team who shall be working in the Philippines for the execution of the Study;

d. Suitable office space in Manila and field office in Legazpi City;

e. Two vehicles with drivers in the field office and appropriate vehicles with drivers in Manila Office.

5. The Authorities Concerned shall make the necessary arrangement for the following:

a. Permission for the entry into private properties and other areas necessary for the conduct of the Study;

b. Availability of medical facilities, when needed, but medical expenses shall be chargeable to JICA funds alloted for the Study.

6. The Authorities Concerned shall make the necessary arrangement with proper agencies concerned:

a. To ensure the safety of the Study Team;

b. To provide the necessary facilities to the Study Team for the remittance, as well as utilization of funds introduced into the Philippines from Japan, in connection with the implementation of the Study;

c. To exempt the Study Team members from taxes, duties, fees, and other charges on machinery, equipment and other materials brought into the Philippines for the conduct of the Study;

d. To secure clearance for the release of the aerial photographs needed in the Study;

e. To allow the Study Team to take all necessary data and documents related to the Study, including aerial photographs out of the Republic of the Philippines to Japan in accordance with security regulation;

f. To secure permission for the use of radio communication facilities, whenever necessary;

g. To recommend local firms for the charter of helicopters and airplanes whenever necessary.

Appendix I

SCOPE OF WORK

FOR

THE RE-STUDY

OF THE MAYON VOLCANO SABO AND FLOOD CONTROL PROJECT

I. Objectives of the Study:

The Study will be conducted to protect human life and property and promote the living standard of the population in the Mayon Volcano Area. The Study would aim to:

a - carry out a review of the Master Plan for the Mayon Volcano Sabo and Flood Control Project submitted by JICA in March, 1981, taking into account among others the recent disaster that occurred in the Area.

b - prepare a disaster prevention program which will maximize benefits in the Mayon Volcano area at minimum cost.

II. Scope of the Study:

The Study Team, in close coordination with the counterpart personnel, will conduct the Study. The Study will include the following:

a - collection and evaluation of all data and information relevant to the Study;

b - conduct the aero-photo mapping and supervise the topographical survey;

c - re-assess and review the proposed Sabo/erosion control works and flood control facilities of the Master Plan;

d - conduct a risk analysis and identify the zoning area for disaster preparedness;

e - conduct a study for disaster prediction and warning system in the area;

f - study the establishment of measures for disaster preparedness and prevention. This study will include also the plan of resettlement and emergency evacuation procedures;

g - identify urgent Sabo/river improvement works and facilities, and disaster prediction and warning system;

h - prepare an immediate phased implementation program of urgent Sabo/river improvement works and facilities and disaster prediction and warning system which will maximize benefit at a minimum cost;

i - conduct preliminary engineering design of the selected development giving all basic dimensions and technical description of all components to facilitate preparation of specifications at a later stage;

j - examine and formulate the implementation arrangement by appropriate and suitable technology and methodology, taking into account local conditions, implementing organization, budget, methods of construction (contract/force account basis);

k - estimate project cost, the foreign and local currency components, including adequate information and supporting data for economic and financial analysis;

l - justify the project based on benefit-cost/cost effectiveness analysis considering changes in such key factors as costs and benefits, implementation schedule, and other relevant factors;

m - prepare the detailed engineering drawings for urgent projects in the 1st year program.

III. Study Schedule:

The Study will be executed in accordance with the attached tentative schedule (Appendix II).

IV. Reports and Drawings:

The following reports in English will be prepared by the Study Team. and provided the Authorities Concerned:

a - Inception Report (30 copies)

The Inception Report will be prepared within two (2) months after the commencement of the Study, covering the evaluation of existing data, major findings, the method of approach for the study, the proposed plan of operation and identification of sites for the preparation of tender drawings.

b - Draft Final Report (30 copies)

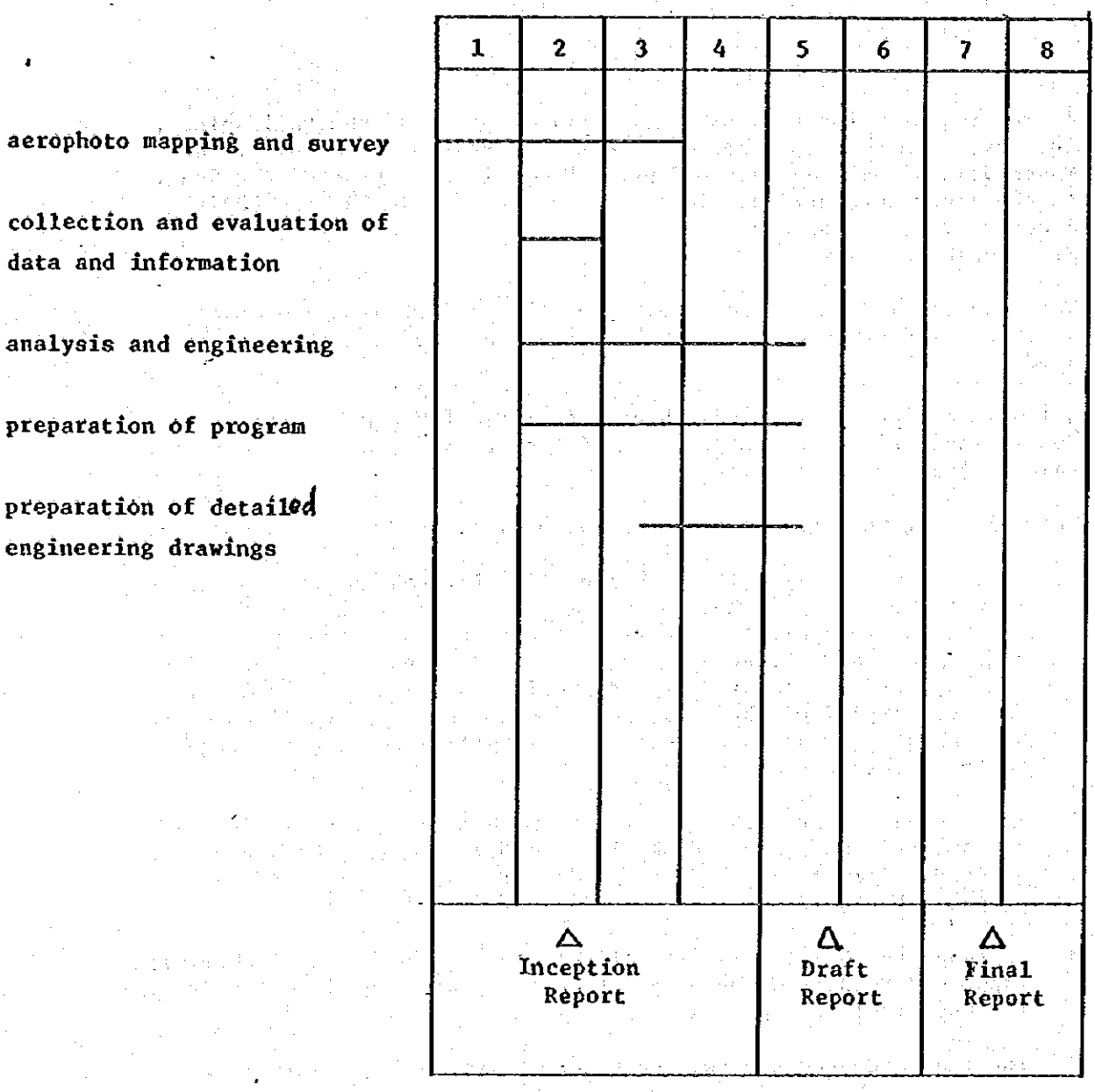
The Draft Final Report will be prepared within four (4) months and twenty (20) days after commencement of the Study. The Draft Report will cover all study and analysis defined in Section II of this Appendix, with enough supporting data including the alternatives analyzed in detail and detailed drawings.

c - Final Report (50 copies)

The Final Report will be finalized one (1) month after receipt of comments by the Authorities Concerned on the Draft report.

APPENDIX II

TENTATIVE SCHEDULE



The Study will commence in May or June, 1982

Minutes of Discussion

on the

Re-Study of the Mayon Volcano Sabo and Flood Control Project

At the request of the Government of the Republic of the Philippines, The Government of Japan has decided to conduct the Re-Study of the Mayon Volcano Sabo and Flood Control Project and entrusted the Study to the Japan International Cooperation Agency. JICA dispatched in January 1982, a four member Preliminary Survey Team, headed by Mr. Toshihiro Sugiyama.

The Team carried out a field survey of the project area and held a series of discussions with Authorities Concerned regarding the Study.

A final meeting was held on February 4, 1982 at the MPWH office, Manila (Authorities Concerned). A list of those who attended to the said meeting is shown in Annex A.

The following aspects, relative to the project study were discussed:

1. In reference to item IV - 4 b and e (geological survey and provision of vehicle) of the Implementing Arrangement the Authorities Concerned explained their current situation and strongly requested that an appropriate number of drilling equipment and accessories, and support vehicles (jeeps) be provided by JICA for the Study. The Team explained the situation of the budgetary condition of the Government of Japan and stated that it will recommend the request to the Government of Japan.

2. In response to item IV - 2, of the Implementing Arrangement , the Authorities Concerned shall be responsible for the preparation of tender documents based on the detailed engineering drawings prepared by the Study Team.

3. In response to item II, m , of the Scope of Work, the Authorities Concerned requested the preparation of detailed engineering drawings for the first year program.

   The Team accepted the request under the following conditions:

   a. The detailed engineering drawings for selected urgent structures/ works, under the First Year Program, will be prepared as its advanced program.

Annex "A"

LIST OF ATTENDANCE:

1. Authorities Concerned:

   a) Ministry of Public Works & Highways

      i. Mr. Teodoro T. Encarnacion - Asst. Minister for Planning

      ii. Mr. Antonio A. Alpasan - Asst. Director, Bureau of Flood Control & Drainage

      iii. Mr. Rogelio A. Flores - Chief Civil Engineer Planning Service

      iv. Mr. Resito V. David - Supv'g. Civil Engineer I Planning Service

      v. Mr. Takashi Inoue - JICA Consultant

   b) Office of Civil Defense:

      i. Mr. Romeo E. Valera - Chief Operations Division

   c) PAGASA

      i. Mr. Florante V. Camacho - Sr. Meteorologist

      ii. Mr. Osamu Machida - Hydrologist (ESCAP/Typhoon Committee Secretariat)

2. JICA Survey Team

      i. Mr. Toshihiro Sugiyama - Team Leader

      ii. Mr. Yuji Ogawa - Member

      iii. Mr. Takeki Harada - Member

      iv. Mr. Koichi Miyoshi - Coordinator

3. Embassy of Japan

      i. Mr. Tamio Shimogami - First Secretary

4. JICA - Manila - Philippines

      i. Mr. Hiroyoki Arai - Deputy Resident Representative

b. The Authorities Concerned will provide 1983 budget information by the Inception Report Stage for the selection of urgent structures/works to be covered by detailed engineering drawings as stated in 3a above.

For JICA

Toshihiro SUGIYAMA
Team Leader
Japanese Preliminary Survey Team

For MPWH

TEODORO T. ENCARNACION
Asst. Minister for Planning
MPWH

February 4, 1982
Manila Philippines

VI. 議 事 録

MINUTES OF MEETING

(MAYON VOLCANO SABO AND FLOOD CONTROL PROJECT)

DATE & TIME : June 2, 1982 14:00 - 15:30

PLACE : Ministry of Public Works & Highways (MPWH Office)

PARTICIPANTS : Ministry of Public Works & Highways (MPWH)

Mr. Antonio A. Alpasan
Assistant Director
Acting Project Manager for Flood Control and Drainage

Mr. Rogelio A. Flores
Chief Civil Engineer, Planning Service

Mr. Takashi Inoue
JICA Colombo Plan Expert for MPWH

JICA Survey Team

Mr. T. Yoshimatsu	(Team Leader)
Mr. T. Hirozumi	(Sabo Engineer)
Mr. A. Inaba	(River Engineer)
Mr. M. Ouchi	(River Structural Engineer)
Mr. N. Takayanagi	(Disaster Prediction & Warning System Engineer)
Mr. T. Kozawa	(Construction Plan Engr.)
Mr. S. Tamada	(Supervisor of Topo Survey)

****

1. JICA Survey Team (hereinafter referred to as the Team) was warmly welcomed by the Assistant Minister for Planning, Mr. Teodoro T. Encarnacion. Before starting the meeting for the Mayon Volcano Sabo and Flood Control Project (hereinafter referred to as the Project), the Team Leader, Mr. T. Yoshimatsu explained the

objectives of the study for the project. Under this project, two (2) engineers of MPWH will be accepted in Japan as trainees in the field of sabo technology.

2. The Team submitted to MPWH the plan of operation for the field survey to be made in the fiscal year 1982. Discussions were made between MPWH and the Team mostly on this plan of operation.

3. MPWH generally agreed to the content of the Plan of Operation with the following clarifications and minor amendments.

(1) In making a study on the plan of resettlement and emergency evacuation procedures, the Team should coordinate with the Departments concerned of the Government. The Team should study on the basis of the existing evacuation system in the Philippines.

(2) MPWH agreed to provide 1983 budget information in an early stage of the field survey for the selection of urgent sabo/erosion works to be covered by the detailed design.

(3) MPWH agreed to be responsible for the preparation of tender documents and the cost estimates for the detailed design.

(4) MPWH informed that the schedule of dispatching of the security officer to Japan will be delayed by about one week. However, the Team strongly requested that they should come to Japan by June 10, 1982.

(5) The Team informed that the meeting to finalize the Inception Report is to be held at Legazpi starting July 26, 1982 through discussions with MPWH and the Team with the Advisory Committee.

(6) The Team informed that the Advisory Committee will arrive at Legazpi on July 23, 1982.

(7) MPWH agreed to make necessary arrangement for the assignment of the following counterparts as soon as possible:

(i) 1 - Project Engineer

(ii) 1 - Sabo Engineer

(iii) 1 - River Engineer

(iv) 1 - Hydrologist

(v) 1 - Geologist

(vi) 1 - Disaster Prediction and Warning System Engr.

(vii) 1 - Construction Engineer

(viii) 1 - Economist

(ix) 1 - Typist

(8) MPWH informed the Team that they have already sent 1 jeep to the Regional Office, and another one will be dispatch next week. MPWH will make the necessary arrangement and transport of three jeeps owned by JICA (Manila) to Legazpi City for used in the study. Drivers, including fuel, lubricant, maintenance shall be provided by MPWH.

(9) The Team informed that the area of ground survey (topo-mapping, profiles and cross-sections) is to be submitted in the early stage of the field survey. MPWH agreed that the ground survey will be done by administration and/or by contract with private firms in the Philippines, under the supervision of the Team.

(10) MPWH agreed to provide ID cards to the members of the Team.

(11) The Team informed that the office space at Manila is not necessary in the field work. MPWH stated that the office space at Legazpi had already been arranged.

(12) MPWH agreed to conduct geological exploration by boring when the Team confirms the necessity of it for the study.

(13) MPWH agreed to arrange and to secure permission for the use of walky talkies in executing the ground survey if necessary.

T. YOSHIMATSU
Team Leader

TEODORO T. ENCARNACION
Asst. Minister for Planning

MINUTES OF MEETING

(MAYON VOLCANO SABO AND FLOOD CONTROL PROJECT)

DATE & TIME : June 4, 1982 14:00 - 16:00

PLACE : Ministry of Public Works and Highways (MPWH), Regional Office No. V, Rawis, Legazpi City

PARTICIPANTS : MPWH, Regional Office

Mr. Vicente B. Lopez
Regional Director

Mr. Pedro F. Jao
Chief Civil Engineer
Planning & Design Division

Mr. Eleuterio Y. Rosal, Jr.
Chief Civil Engineer
Construction & Maint. Division

Mr. Domingo Villaseñor
District Engineer of Albay

Mr. Vicente Umali
Asst. District Engineer

Mr. Benjamin S. Paras
Supervising Civil Engineer III

Mr. Henry Paul R. Pawa
Supervising Civil Engineer I

Mr. Fermin E. Peteza
Material Testing Engineer

MPWH, Manila Office

Mr. Rogelio A. Flores
Chief Civil Engineer,
Planning Service

JICA Study Team

Mr. T. Yoshimatsu (Team Leader)

Mr. T. Kozawa (Construction Plan Engineer)

JICA Study Team (con't.)

Mr. T. Hirozumi	(Sabo Engineer)
Mr. A. Inaba	(River Engineer)
Mr. M. Ohuchi	(River Structural Engineer
Mr. N. Takayanagi	(Disaster Prediction & Warning System Engineer)

1. JICA Survey Team (hereinafter referred to as the Team) was warmly welcomed by the Regional Director, Mr. Vicente B. Lopez. He stated that his office is ready to extend full cooperation to the Team for the Study. He also stated that in case of his absence, Mr. Pedro Jao will assist the Team on his behalf.

2. The Team submitted to MPWH Regional Office the Plan of Operation and a copy of the minutes of the meeting held on June 2, 1982 at the MPWH Manila Office. The discussions were made between MPWH Regional Office and the Team, mostly on this Plan of Operation.

   The Team explained the objectives of the study and the outline of the study for the Mayon Volcano Sabo and Flood Control Project completed in FY 1980.

The Review was made by paragraph on the above documents and the following cooperation was confirmed by the Regional Director.

(1) MPWH Regional Office agreed to make necessary arrangement for the assigning the counterparts timely based on the

assignment schedule described in the Plan of Operation; and MPWH Regional Office will send a secretary and a typist to the Team at the office provided by MPWH. MPWH Manila Office has already made necessary arrangement to dispatch three counterparts to Legazpi City by June 7 or 8, 1982.

(2) MPWH Regional Office informed that 1 jeep of MPWH Manila Office has already arrived at Legazpi for the study. Also MPWH Manila Office informed that another 1 jeep will be sent next week from Manila, and three more jeeps owned by JICA (Manila) is scheduled to be sent to Legazpi on June 14, 1982.

(3) MPWH Regional Office has already made available an office space at MPWH building near Legazpi Airport. Necessary office furnitures for the study will be provided as soon as possible.

(4) The Team agreed that the area and quantity of ground survey (topo mapping, profiles and cross-sections) will be submitted to MPWH on June 7, 1982.

(5) MPWH Regional Office agreed that necessary tests for soil and materials for the study will be conducted by the soil engineer of the Regional Office, from the sample submitted by the Team.

T. YOSHIMATSU
Team Leader

for VICENTE B. LOPEZ, CESO II
Regional Director

MINUTES OF MEETING

(MAYON SABO AND FLOOD CONTROL PROJECT)

DATE & TIME : July 26, 1982 14:00 - 16:00

PLACE : Ministry of Public Works and Highways (MPWH), Regional Office No. V, Rawis, Albay

PARTICIPANTS :

MPWH, Manila Office

Mr. Antonio A. Alpasan	Assistant Director, Project Manager for Flood Control and Drainage
Mr. Rogelio A. Flores	Chief Civil Engineer, Planning Service
Mr. Takashi Inoue	JICA Colombo Plan Flood Control Expert for MPWH
Mr. Roberto Jamilla	Senior Civil Engineer
Mr. Resito V. David	Supervising Civil Engineer I

MPWH, Regional Office

Mr. Vicente B. Lopez	Regional Director
Mr. Benjamin T. Marcial	Asst. Regional Director
Mr. Pedro F. Jao	Chief Civil Engineer, Planning and Design Division
Mr. Eleuterio Y. Rosal, Jr.	Chief Civil Engineer, Construction and Maintenance Division
Mr. Domingo Villaseñor	District Engineer , Albay

MPWH, Regional Office (continuation)

Mr. Benjamin S. Paras	Supervising Civil Engineer III
Mr. Vicente Umali	Supervising Civil Engineer II , Albay District Office
Mr. Henry Paul R. Paua	Supervising Civil Engineer I , Albay District Office
Mr. Fermin E. Peteza	Material Testing Engineer
Mr. Honesto Masbate	Geodetic Engineer
Mr. Jovito Declaro	Supervising Material Testing Engineer
Miss Mila P. Mateum	Senior Economist

Office of Civil Defense

Mr. Renato Arevalo	Regional Director
Mr. Ricardo Dy	Operation Officer

PAGASA

Mr. Tolentino Bachiller	Chief Meteorological Officer

Philippine Institute on Volcanology

Miss Esterlita Saliva	Geologist/Volcanologist

ACRE Surveying & Development

Mr. Edilberto Tato	President

JICA Study Team

Mr. Teruo Yoshimatsu	Team Leader
Mr. Takuo Kozawa	Acting Team Leader, Construction Planning Engineer, Senior
Mr. Yuji Okubo	Sabo Engineer, Senior
Mr. Kazuki Matsumura	Sabo Structural Engineer
Mr. Akimitsu Inaba	River Engineer
Mr. Akikazu Ukai	Risk Analysis Engineer
Mr. Susumu Tamada	Supervisor of Topographic Survey

JICA Advisory Committee

Mr. Toshihiro Sugiyama	Chairman
Mr. Takeki Harada	River Engineer
Mr. Saburo Yoshida	Sabo Engineer

JICA Tokyo

Mr. Koichi Miyoshi	Coordinator

Embassy of Japan

Mr. Tamio Shimogami	Secretary

JICA Study Team (hereinafter referred to as the Team) submitted to the MPWH thirty (30) copies of the Inception Report, according to the Implementing Arrangement of the Technical Cooperation between the JICA and the Authorities Concerned for the Re-Study of the Sabo and Flood Control Project, dated February 4, 1982.

The Team explained the contents of the Inception Report, covering the work progress of field work, evaluation of existing data, major findings, the method of approach for the study, selection of the stream for detailed design of Sabo facilities and Plan of Operation of home work in Japan.

The discussions were made between the above mentioned Authorities concerned and the Team on the Inception Report.

The major items of the discussion are as follows:

(1) The Team explained that the stream for detailed design of urgent Sabo facilities was selected at Anuling River, taking into account the urgency in Sabo facilities and also the strong desire of the Philippine Government that places special importance on the social impact and public stabilization.

(2) The Team expressed its concern about the possible delay in completing the detailed topographic survey for the Anuling River, as it will directly affect the schedule of detailed design work. MPWH promised to complete it as scheduled, i.e. by the end of September, 1982.

The area to be surveyed is shown in the attached drawing, Appendix "A".

(3) MPWH requested additionally the detailed design for the most urgent part of the Sabo facilities on Pawa Burabod River.

The Team agreed to include the above design, on the condition that the MPWH will provide the Team with the necessary complete detailed topographic map by the end of September 1982. Area coverage of the said survey is shown in Appendix "B".

(4) Pursuant to Item III, No. 2, "Technical Training", of the Implementing Arrangement, the Team suggested that the training period of the two (2) counterparts will be for two (2) months each. It was suggested further, that the trainees be dispatched preferably either on November and December 1982 or January and February 1983; during the preparation of the detailed design.

(5) MPWH agreed to be responsible for the necessary arrangement, transportation and maintenance for the three jeeps owned by JICA Manila Office to return to JICA Manila Office, after the completion of the field work schedule at the end of July, 1982.

(6) MPWH agreed that the office space and one (1) jeep for Mr. S. Tamada assigned supervisor of Topographic survey will be arranged and provided at MPWH Regional Office until the completion of the detailed topographic survey scheduled on October 9, 1982.

For the Study Team:

T. YOSHIMATSU
Team Leader

For JICA:

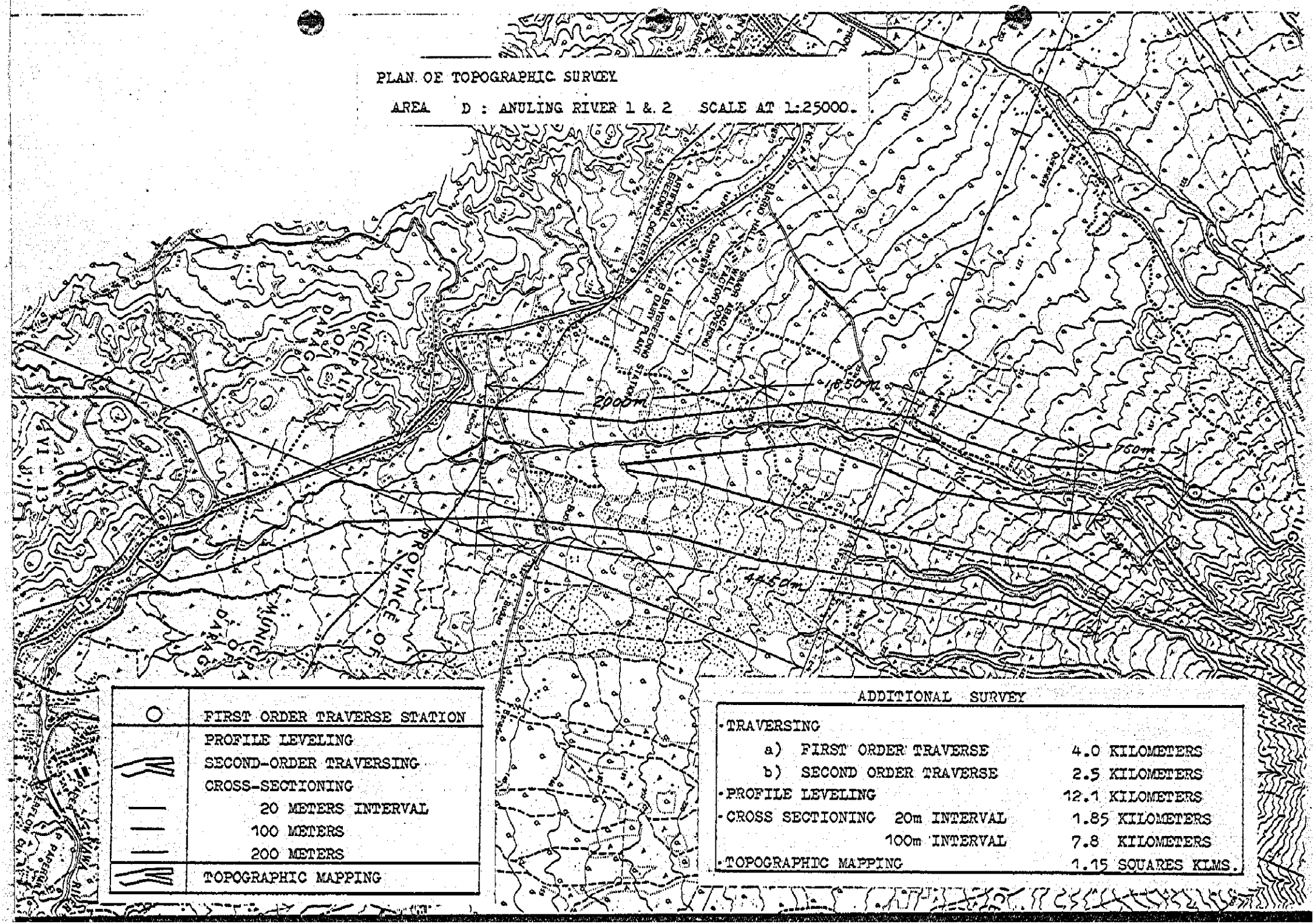
T. SUGIYAMA
Advisory Committee

For MPWH:

TEODORO T. ENCARNACION
Asst. Minister for Planning

PLAN OF TOPOGRAPHIC SURVEY

AREA D : ANULING RIVER 1 & 2 SCALE AT 1:25000.

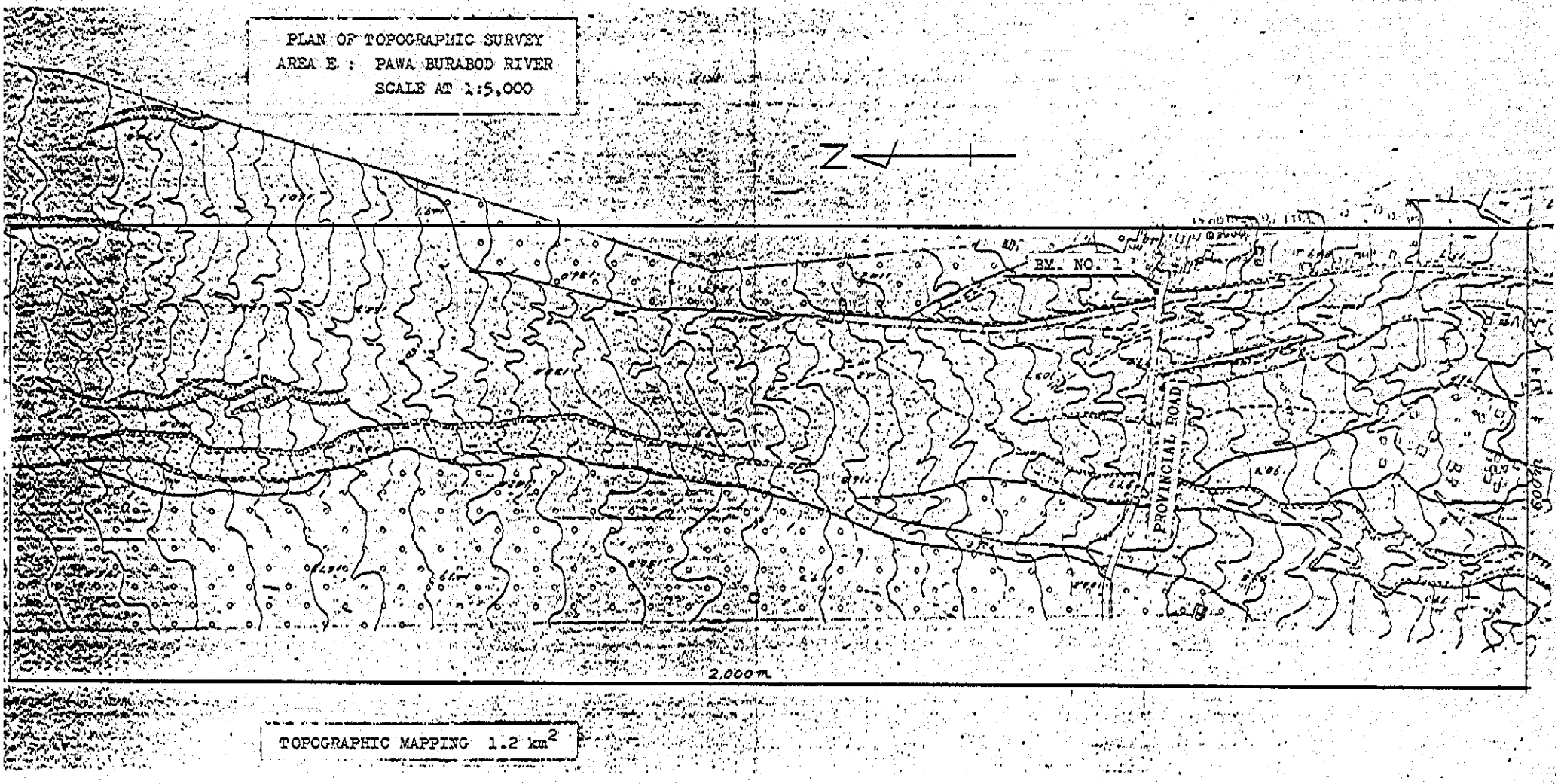


○	FIRST ORDER TRAVERSE STATION
	PROFILE LEVELING
	SECOND-ORDER TRAVERSING
	CROSS-SECTIONING
	20 METERS INTERVAL
	100 METERS
	200 METERS
	TOPOGRAPHIC MAPPING

ADDITIONAL SURVEY

· TRAVERSING		
a)	FIRST ORDER TRAVERSE	4.0 KILOMETERS
b)	SECOND ORDER TRAVERSE	2.5 KILOMETERS
· PROFILE LEVELING		12.1 KILOMETERS
· CROSS SECTIONING	20m INTERVAL	1.85 KILOMETERS
	100m INTERVAL	7.8 KILOMETERS
· TOPOGRAPHIC MAPPING		1.15 SQUARES KLMS.

PLAN OF TOPOGRAPHIC SURVEY
AREA E : PAWA BURABOD RIVER
SCALE AT 1:5,000



TOPOGRAPHIC MAPPING 1.2 km^2

MINUTES OF MEETING
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D A T E : 10 February 1983

T I M E : 3:00 P.M.

P L A C E : Office of the Assistant Minister for Planning MPWH Building, Port Area, Manila

ATTENDANCE : Please refer to Annex I

AGENDA : Discussion on the Comments and Suggestions of the Authorities Concerned on the Draft Final Report - Re-study Mayon Volcano Sabo (Erosion) and Flood Control Project

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GENERAL:

The meeting started at 3:00 P.M. with both sides going over the contents of the prepared comments as enumerated in Annex II. It was noted that the comments of the MPWH Regional Office are in jest, similar to those of the consolidated comments from the Central Office, Manila.

DISCUSSION/AGREEMENTS:

The Comments were discussed as follows:

1. Comment No. 1. Design Flood: The adoption of the Rational Formula (Q = CiA) was explained by the Study Team. The Study Team will compare the estimated probable flood design discharge with the ones estimated by using other methods aside from the Rational Formula and will assess the difference.

2. Comment No. 2. Implementation schedule for Urgent River Improvement Works not shown in report. The Study Team explained that the cost estimates and implementation schedules were not included due to insufficient data and that their recommendations were based on their actual field investigation at the time.

3. Comment No. 3. It was requested that the IRR and benefit computations should be indicated in the report. The Study Team agreed to incorporate in the final report this comment, including the IRR and benefit-cost analysis for each of the different stages of implementation.

4. Comment No. 5. On the use of other flexible type structures such as gabions and mattresses, the Study Team explained that the use of such flexible structures in place of the recommended massive types was considered and the reason for their recommendation is, that flexible type structures may not be able to withstand or resist the forces induced by heavy mud/sediment flow and the cost of maintenance of these types is high thereby making the total cost even higher in the long run. The flexible type though maybe used only on selected sites, where it is adaptable.

5. Comment No. 7. Disaster Prediction and Warning System: It was noted from the report that the First Stage component indicates insufficient number of rainfall stations to be established. Since rainfall data is vital to the system, it was suggested that the number of rainfall stations be increased to the desired level to attain a more efficient prediction and warning network required of the system.

6. Comment No. 8. Limits of inundation areas relative to the different flood frequencies of 100 Yrs.; 50 yrs.; 20 yrs.; 2 yrs. and 1 yr.. After a lengthy discussion, the Study Team agreed to incorporate an explanatory paragraph/section on their assumptions.

7. Comment No. 9. Selection and Location of Danger and Safety Zones. The Study Team explained that the selected safety zones shown in the report were based only on aerial photographs and actual field investigations. The delineation of the actual areas needs further studies and shall be done in the implementation stage of the disaster prediction and warning system.

8. Comment No. 10. Same as Comment No. 1.

9. Comment No. 11. On alternative solutions, it was pointed out that other alternatives, such as reforestation should have been considered. The Study Team explained that the reforestation aspect was considered, but alone, it would not be effective. On the other hand, if reforestation is considered as supplement to the project, it will entail additional cost, thereby, resulting in a lower IRR.

10. Comment No. 12. The comment is well taken. The Study Team explained that the implementation will include detailed engineering designs of the succeeding works and follow the "Design as you build" method.

11. Comment No. 13. On suggested coloring of maps and figures. The Study Team agreed to make this in the final report only for selected maps and figures.

12. Comment No. 14. Rewriting of paragraph 1, page XVI. The Study Team agreed on this suggestion.

Others:

1. The MPWH strongly expressed its earnest desire to establish a Sabo Research and Disaster Prevention Center in Legaspi City for the purpose of the smooth planning, implementation and management of disaster prevention works.

   The mission was requested to convey to the Japanese Goverment the possible establishment of such center, to be supported by JICA under the Grant Assistance Programme. Site for the Center is available in Legaspi City.

2. The Authorities Concerned requested the Study Team to prepare a Concise Main Report on the project, in a form presentable to financing institutions. The original main report will then serve as the supporting document to such Concise Main Report . The Study Team agreed to the request.

3. The Study Team submitted the following documents:

   a. Five (5) copies - Detailed Design Draft Report Sabo Facilities in Anuling and Pawa-Burabod Rivers;

   b. Three (3) sets, Blueprint - Design Drawings on the Sabo Facilities;

   c. Three (3) sets, Blueprint - Topographic Maps, Scale 1:1,000, Selected sites, Anuling and Pawa-Burabod Rivers.

For the Mission:

TERUO YOSHIHATSU
Leader Study Team

For the Authorities Concerned:

TEODORO T. ENCARNACION
Asst. Minister for Planning
Ministry of Public Works & Highways

W I T N E S S E S :

YUJI OGAWA
Advisory Committee
JICA, Tokyo

ANTONIO A. ADRASAN
Project Manager IV
PMO - Major Flood Control Projects - MPWH

Manila, Philippines
10 February 1983

ANNEX I

ATTENDANCE

I. AUTHORITIES CONCERNED:

1.	TEODORO T. ENCARNACION	- Assistant Minister for Planning Ministry of Public Works and Highways
2.	ANTONIO A. ALPASAN	- Project Manager IV Project Management Office - Major Flood Control Projects, MPWH
3.	ROGELIO A. FLORES	- Project Manager III Project Management Office - Major Flood Control Projects, MPWH
4.	TAKASHI INOUE	- JICA, Flood Control Consultant MPWH

II. JAPANESE MISSION:

1.	YUJI OGAWA	- Director Fuji Sabo Works Office Chubu Regional Construction Bureau Ministry of Construction, Tokyo,Japan
2.	SHUNICHI TATEISHI	- Staff Member First Training Division Training Affairs Department JICA - Tokyo, Japan
3.	TERUO YOSHIMATSU	- Leader - Study Team Nippon Koei Co. Ltd. Tokyo, Japan
4.	TAKUO KOZAWA	- Senior Planning Engineer, Construction Member, Study Team Nippon Koei Co. Ltd. Tokyo, Japan
5.	YUJI OKUBO	- Senior Sabo Engineer Member, Study Team Nippon Koei Co. Ltd. Tokyo, Japan

III. OTHERS:

1. OZAMU MACHIDA - JICA, Hydrology Consultant
Typhoon Committee Secretariat
PAGASA, Manila

2. NORIO TAKAYANAGI - Disaster Prediction and Warning System Engineer
Member, Study Team
Nippon Koei Co. Ltd.
Tokyo, Japan

Manila, Philippines
10 February 1983

"ANNEX II"

COMMENT ON: DRAFT FINAL REPORT RE-STUDY MAYON VOLCANO EROSION AND FLOOD CONTROL PROJECT

1. Design Flood Discharge

The design flood discharge is very important for river improvement plan. The analysis for run-off calculation should considered carefully since it is also an important factor in the transfer of technology. The report however uses the rational formula for the run-off calculation. Generally, the discharge computed by using the rational formula has bigger value than by using other methods. Also, above 100 km^2 drainage area is not so recommendable in the rational formula. As reference we compare the results of design discharge at Quinali (A) iver as shown below.

	Catchment Area	Frequency	Design Discharge	Specific Design Discharge
JICA	524.2 km^2	50-yr.	4,170 m/sec	7.95 $m^3/sec/km^2$
River Dredging	546.5	50	2,320	4.3
Others	500	50	2,000	4.0

If the design discharge is changed, there is no need to change the Master Plan for the flood control scheme since MPWH has no schedule to improve the rivers in the area in the near future. The Master Plan will be changed to Feasibility Study Level in the future.

2. Urgent River Improvement Work was recommended in the Report. I could not find the Report the implementation schedule, construction cost and benefit, please give an outline on these.

3. Construction period of the Sabo Works Stage - I project is five (5) years. However, the project is not so clear in terms of benefit or IRR. To request for loan for such type of project would be difficult. If possible, please show clearer benefit and IRR computations and also implementing program should be prepared by JICA. The cost is shown below.

	Foreign Cost	Local Cost	Total
Sabo Works	₱43.964 M.	₱ 117.532 M	₱ 161.496 M
Disaster Pre...	44.516	2.186	46.702
Engineering Service	4.800	-	4.800
T O T A L	₱93.280 M.	₱ 199.718 M	₱ 212.998 M
			₱ 213.000 M

4. Sabo, Disaster Institute Center Idea.

Protection from mudflow, erosion control, disaster prediction and warning system around the Mayon Volcano area are needed urgently by the people. For the smooth implementation and mangement of the said measures, the Sabo, Disaster Institute Center should be created with the following active functions.

a) Study of Sabo Technology

b) Training for Sabo design and construction methods

c) Study of Volcanology and Mudflow

d) Collection and Observation for Hydrologic, Volcanic etc. data.

The facilities needed for the center are as follows:

a) Sabo Technology Office and Disaster Predition Office

b) Training Room

c) Data Exhibition Room

d) Material Testing Laboratory

e) Model Testing Facilities

f) Storeroom and others

More concrete idea on this matter if possible can be requested from the JICA Team. This center should be included in the project if possible.

5. The Sabo Works and urgent river rehabilitation works locations have soft geological condition generally. The works could make use of flexible type structures such as gabions and mattresses. Presently the materials for these structures are quite costly because they are mostly imported and there is only two (2) fabrication machines should be purchased for the project in the amount of about P1,000,000.00 per machine.

6. Risk analysis and zoning

Risk analysis carried out by using two aerophotographs which were taken before and after the disaster is a rare and excellent accomplishment. It is hoped to make full use of the results of the risk analysis (devastation maps and micro - topography maps Fig. 7.2.1 - 7.2.10) for future land use.

Zoning maps which show danger zone, shelter zone and safety zone of mud/debris flow (Fig. 7.2.11-12) are also of great help to authorities concerned and local people. Dissemination of the zoning

maps as well as administrative counter-measures against mud/debris flow disaster is of the first necessity to minimize human damaged caused by similar disasters.

7. Disaster prediction and warning system

(i) Importance of a raingauge network

The observation on the relationship between rainfall intensity and occurrence of mud flows suggests good possibilities of disaster prediction. We also know through long experience of flood forecasting operation that rainfall stations are more reliable in providing data and easier to maintain than water level stations. All hydrological staff know that maintaining water level stations in good condition during rainy season is quite hard especially sandy/muddy river basins. It needs constant all-the-year-round care by a well-equipped, well-trained technicians team.

Therefore, taking these facts into consideration, the proposal in the report is very agreeable that the first stage of constru ction of the system is limited to a network of rainfall stations and warning facilities. However, it seems that the number of proposed rainfall stations proposed in the first stage is not enough to grasp the local rainfall. Therefore, I would like to suggest to study establishing some more rainfall stations, for instance, at south, southeast, southwest areas where most of debris/mud flows are foreseen to take place in the future.

(ii) Stage construction

The proposed stage construction is very appropriate because of both fund limitation and familization of people concerned with the operation of the system. The second stage shall be taken up at least four or five-year operation of the first-stage system so that more improved whole system could be formulated based on the experience of the first system.

(iii) Water level observation stations

Proposed selection of float type gauges is agreeable though intake-pipes are often choked-up with silt as mentioned in the report. Water level stations for existing flood forecasting and warning system in the Philippines are composed of both float type gauges and sensing type gauges. Float type gauges have been showing better performance than sensing types so far.

A number of proposed water level observation stations are suggested to be equipped with raingauges because of importance of rainfall observation for disaster prediction as before-mentioned.

Additional cost for installing a raingauge is relatively small compared with the whole cost of an observation station. Consequently, establishment of combined observation stations is recommended instead of mere water level stations.

8. Table VI and Table V.2 of the Supporting Report, showed that the inundated areas for Quinali (A) and Quinali (B) River Basins are 89 Km^2 and 11.9 Km^2, respectively, for rainfalls with return periods of 100 yrs., 50 yrs., 20 yrs., 2 yrs., and 1.00 yr. The limit or extent of the inundated areas for the two river basins appeared to have been fixed when the above rainfalls of different return periods should correspondingly have different depths of inundation.

9. In the risk analysis and identification of zoning areas as discussed in Section 7.2.3 of the draft Main Report, the methods and criteria for selecting and identifying the different zones are well taken. However, it might also be relevant to consider the Lag Time of flood waters in the main rivers discussed in Section 7.4.1 (2) as another criterion in selecting and locating the shelter zones, especially those within the danger zones, so as to give the people to be evacuated enough time to reach these shelter areas before their place is inundated by flood or mud/debris flow.

10. In the calculation of Probable Flood Peak Runoff, it was noticed that the Rational Formula was used even if the drainage area exceeds 20 sq. km. Per our design guideline and as a generally accepted design procedure, the Rational Formula should not be used for drainage areas exceeding 20 sq. km. It is therefore suggested that the Probable Flood Peak Runoff for drainage areas larger than 20 sq. km be determined by other acceptable methods appropriate to the size of the watershed.

11. It would seem that the identified projects, especially the Sabo works are not viable considering their very low IRR. The re-study should have considered other alternative solutions to the perrennial erosion problem in the area instead of focusing on only one aspect. It is noted that the economic evaluation was based on the "with or without project principle", but it did not examine further other solutions, especially so when the Sabo solution came out to be not economically viable.

12. Construction period of the Sabo works is estimated for an 8-year period. It is possible that during or before the construction period another rain/typhoon of same or greater intensity as "Daling" might pass, hence, there is a possibility that the Sabo works will be affected and another re-design works might be needed. Moreover, the study team should have considered the possible effects and measures to be undertaken to the Sabo works when an eruption occurs.

13. General comment on Figures/Maps - Coloring of areas be made for easier identification.

14. Page XVI, item 1, - Main Report, should be reworded to read as: Executing Agencies: The Ministry of Public Works and Highways (MPWH) will have the overall responsibility for the implementation of the Sabo Project. Prior to the commencement of the implementation activities, it is suggested that MPWH will create and/or establish an adequately staffed and well equipped Project Management Office under the Office of the Minister, with the MPWH Regional Office in assisting capacity.