

# インドネシア火山砂防技術センター プロジェクト計画打合せ調査団報告書

昭和60年12月

国際協力事業団社会開発協力部

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## は し が き

昭和 57 年 8 月 16 日に署名された討議議事録 ( R / D ) に基づき開始された、本件火山砂防技術センターに対する協力が 3 年間経過したことから、R / D の取り決めにより協力の中間見直しを行ない、今後の協力の方向について協議するため、計画打合せ調査団を派遣することになり、この度実施されました。

本報告書は、昭和 60 年 11 月 21 日から同月 30 日までインドネシアに派遣された同調査団の現地調査およびプロジェクト・チームやインドネシア関係者との協議結果をとりまとめたものです。

ここに、同調査団の派遣にご協力いただいた外務省、建設省および、現地調査にご協力いただいた在日日本大使館や火山砂防技術協力センター等の関係者に感謝の意を表するとともに、合わせて今後のご支援、ご協力方よろしく願いする次第です。

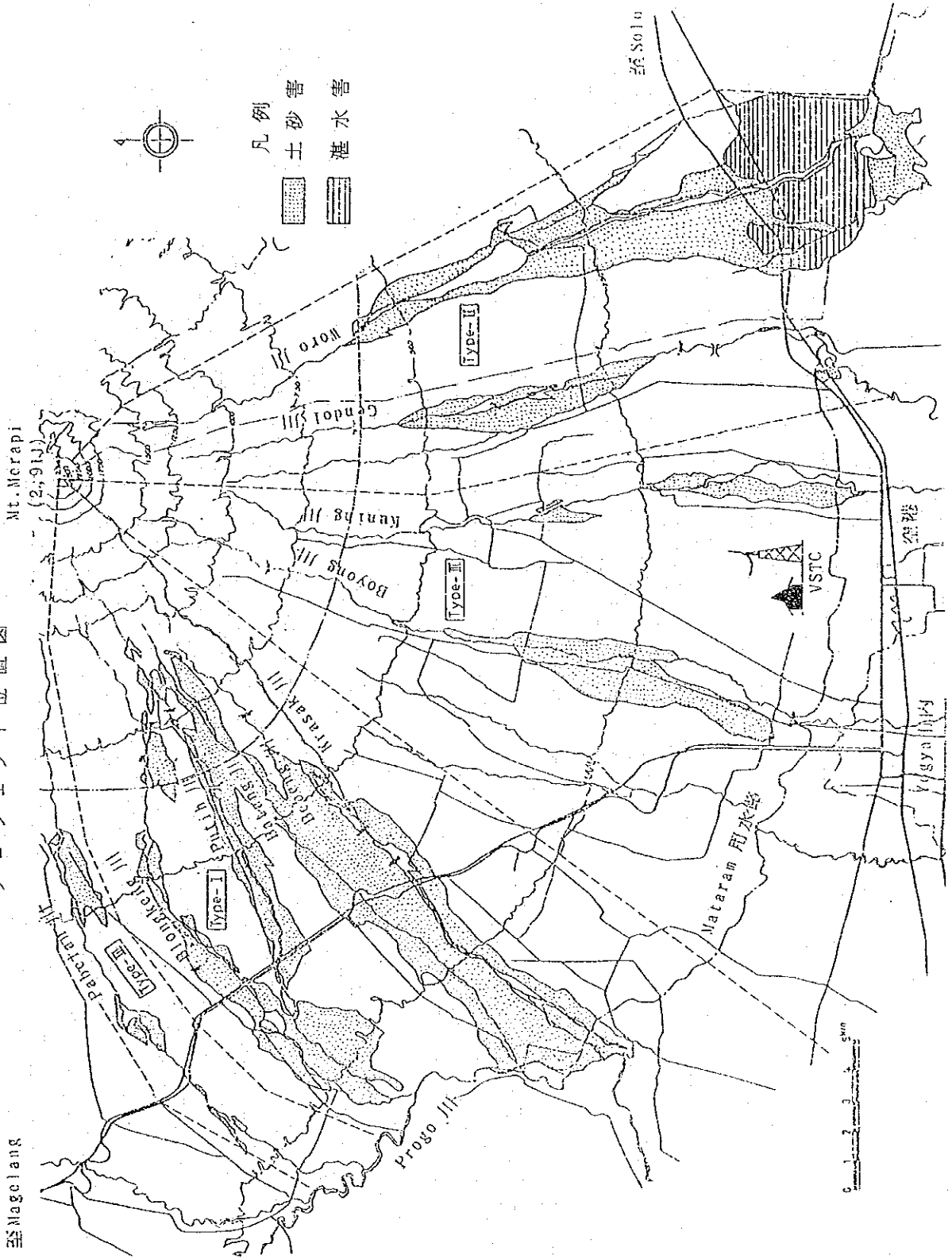
昭和 60 年 12 月

国際協力事業団  
社会開発協力部  
部長 岡田 靖夫



プロジェクト位置図

至Magelang



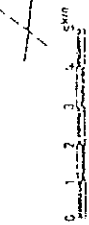
Mt. Merapi  
(2,911)

至Solo

至港

至Yogyakarta

- 凡例
- 土砂害
  - 湛水害







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## はしがき

## プロジェクト位置図

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# 1. 調査団の派遣について

## 1.1 派遣経緯

昭和57年8月26日に署名された討議議事録に基づき、同日から5年間の協力期間をもって協力が開始された本件プロジェクトは、昭和60年8月にちょうど3年間経過したことから、今後の2年間の協力の方向を協議するため、計画打合せ調査団を派遣することになったものである。

## 1.2 調査団の構成

- (1) 団長／総括・砂防設計施工 成田久夫 建設省河川局砂防部砂防課（課長）
- (2) 団員／砂防施設設計 高梨和行 建設省北陸地方建設局神通川水系砂防工事事務所（所長）
- (3) 団員／砂防調査計画 水山高久 建設省土木研究所砂防部砂防研究室（主任研究員）
- (4) 団員／協力計画・ 田辺耕治 JICA社会開発協力部海外センター課（課長代理）

## 1.3 調査日程

本調査団は、昭和60年11月21日から同月30日までの10日間派遣された。詳細日程は次のとおり。

月日	曜日	時間	内容
11. 21	木	10.15	JL721 便にて成田空港発。
		17.42	クアラ・ランブール経由、ジャカルタ・スカルノ・ハッタ国際空港着。桜木 JICA ジャカルタ事務所員、中広、板垣両専門家の出迎えを受ける。
		19.30	ホテル着。日程打合せ。 (Jakarta President Hotel 泊)
22	金	8.10～9.40	公共事業省水資源総局訪問。Sudaryoko 総局長、Putra 大臣補佐官、Pramudo 河川局長、Amir 河川局計画部長他に表敬（松田事務所員、中広・板垣両専門家同行）。
		10.20～12.00	JICA ジャカルタ事務所訪問。山村所長、松田所員と打合せ。
		19.00～21.00	Jade Garden にて JICA 山村所長主催夕食会出席。 ( Jakarta President Hotel 泊)
23	土	10.15	GA037 便にて、ジャカルタ・スカルノ・ハッタ空港発。

月日	曜日	時 間	内 容
11. 23	土	11. 3	ジョグジャカルタ着。プロジェクト専門家チームの出迎えを受ける。
		11.30~13.15	火山砂防技術センター/VSTC訪問。Darmadi 所長に表敬後、VSTC内施設視察。専門家チームと日程打合せ。
		15.00	専門家チームとの昼食会後、ホテル入り。
		19.00~21.00	広住リーダー宅にて、イ側スタッフも交え懇親会。 (Yogyakarta, Ambarukro Palace Hotel 泊)
24	日	8.00~17.00	ホテル発、プロジェクト・サイト視察(専門家チーム、Subarkah 研修課長同行)。Kali Krasak-Jurang Jero-Kali Putih-Muranggen-Kranggan-Kricakan-Kali Woro(Sand Pocket)スラカルタ着。ホテル入り。
		17.00	スラカルタ着。ホテル入り。
		19.00~21.00	同地在住、水資源専門家を交え情報交換しつつ会食(於・レストラン Centrum)。 (Surakarta, Mangkunegaran Palace Hotel 泊)。
		7.50	ホテル発。
25	月	8.15~ 8.40	ソロ河プロジェクト/PBS ラボ視察(以下、池辺専門家案内)
		9.35~11.00	Wonogiri ダム管理事務所にて、ダムをめぐる砂防について説明を受ける。
		11.30~12.00	Wonogiri ダム上流の Song Putri Check Dam(Kec. Eromoko) 視察。
		12.30~13.00	Wonogiri ダム・サイト見学
		14.30~16.00	同ダム上流の Kali Damar の砂防ダム工事現場他視察(Kec. Tertimoyo)。
		19.30	ジョグジャカルタへ戻り、ホテル入り。
		20.00~22.00	大久保専門家宅にて、夕食会。 (Yogyakarta, Ambarukro Palace Hotel 泊)
		26	火
15.00~17.30	田辺団員MMTC(ラジオ、テレビ技術訓練センター)視察。		
19.00~21.00	VSTC Darmadi 所長主催夕食会出席(於・Gita Buana)。 (Yogyakarta 泊)		

月日	曜日	時 間	内 容
11. 27	水	8.25~10.15	VSTCにて、プロジェクト・チームからJoint Meeting 用資料に基づき、プロジェクト活動の報告を受ける。
		12.06	GA036 便にて、ジョグジャカルタ発（専門家チーム同行）
		12.57	ジャカルタ着。
		14.45~16.15	田辺団員、CEVEST（人造りセンター）視察。 （ Jakarta, President Hotel 泊）
28	木	8.25	公共事業省訪問。
		9.10~12.40	同省河川局内会議室にて、開催された Joint Meeting に出席。
		14.00~16.30	同所にて、ミニッツ案協議作成。
		19.00~21.00	公共事業省派遣専門家と懇親会（於・Ratu Bahari） （ Jakarta 泊）
29	金	9.30~11.25	公共事業省にて、ミニッツについて協議。
		11.40~12.10	JICA 事務所訪問。所長に結果報告。
		12.30~12.40	大使館訪問。宇塚書記官に報告。
		19.00~21.00	調査団主催夕食会開催。席上、ミニッツ署名。 （ Jakarta, Hotel Sari Pacific 泊）。
30	土	8.15	CX710 便にて、ジャカルタ・スカルノ・ハッタ国際空港発。
		21.5	ホンコンにて、CX500 便に乗り継ぎ、成田空港着。

#### 1.4 主要関係者リスト

##### (1) 公共事業省 (DPU) 水資源総局

総局長	Ir. Y. Sudaryoko
大臣補佐官	Ir. K. Putra Duarsa
河川局長	Ir. Hartono Pramudo
河川局計画次長	Ir. Amir Muryadi

##### (2) 火山砂防技術センター

所長	Ir. Darmadi
研修課長	Ir. Subarkah
技術開発課長	Ir. Agus Sumayono
専門家チームリーダー	広住 富夫
専門家	是沢 一樹
”	万膳 英彦
”	大久保 宏明
” (短期)	安本 寿人

##### (3) 在イ大使館

一等書記官	宇塚 公一
-------	-------

##### (4) JICA ジャカルタ事務所

所長	山村 寛
所員	松田 賢

##### (5) JICA 派遣 DPU 所属専門家

河川局アドバイザー	中 広 三 男
”	板 垣 治
”	池 辺

#### 1.5 収集資料リスト

- 1) VSTC & JICA : Glossary of Terminology on Sabo Engineering / Kumpulan Istilah Teknik Sabo, 155PP., VSTC, March 1985, Yogyakarta
- 2) VSTC & JICA : インドネシア火山砂防技術センター概要説明, 14PP. + 図 1, VSTC, Yogyakarta
- 3) DPU : River Laboratory, 21pp., Bengawan & Sala River Basin Development Project

## 2. 調査結果について

### 2.1. 総括(附・ミニッツ)

協力が開始されてから3年間たち、火山砂防技術センター(VSTC)の2本柱である、技術者の訓練養成、砂防技術開発はそれぞれいくつかの問題はあるも、当初計画に沿ってまず順調に進められている。

技術者の訓練養成については、当初計画、昭和60年11月現在までの実績と60年12月以降の今後の計画は次のとおりとなっている。

#### 1) 一般コース

当初計画	18回開講(2週間コース)
実績	7回開講(初めの2回は2週間コースで、その後は1ヶ月コース)
今後の計画	5回開講(1ヶ月コース)

#### 2) 上級コース

当初計画	5回開講(6ヶ月コース)
実績	3回開講(4ヶ月コース)
今後の計画	2回開講(4ヶ月コース)

#### 3) 総合コース

当初計画	2回開講(2年コース)
実績	1回開講(2年2ヶ月コース)
今後の計画	1回開講(2年コース)

このような計画と実績は、イ側の技術者不足、予算のひっ迫状況等を考慮に入れると、日本側の中堅技術者養成対策費による支援もあり、訓練期間の変更はあったが、まず順調に進捗していると云ってよいであろう。

また、もう1つの柱である砂防技術の開発については、予警報システムと適正工法の2つの課題があるが、予警報システムについては供与機材による必要設備がようやく整えられた段階であり、今後のデータ収集とその解析によるシステムの確立が待たれる。適正工法については、ローコスト工法の開発のため、砂防ダムとジャカゴ工法の強度比較等実施されているが、カウンター・パートの不足や、実験機材の整備の遅れなどもあり、今後2年間に、何をどのように取り組んで行くか、現地プロジェクトチーム(イ側と専門家チーム)で計画をしっかりと立てて進める必要がある。

プロジェクトの運営態勢については、予算の厳しい状況下でも実験棟の建設など徐々に進められているのに見られるように、イ側の努力がうかがえる。しかしながら、61年度のインドネシアの国家予算が前年比マイナスになる現状から、VSTCの予算も更に厳しくなることが予測され、供与機材による予警報システムや他機器の維持管理費、研修訓練経費、技術開発のための経費等がさらに必要となることから、イ側に強く申し入れを行なったが、わが方もでき得る限りの支援を実施する必要があるだろう。

60年度要請が出されていたVSTCに対する無償資金協力については、その実現のための支援方が強くイ側より本調査団に寄せられ、ミニッツにもその旨記載することとなったが、無償資金協力の実施が即本件プロジェクト協力の延長につながるものでなく、上述のプロジェクト経費の不足問題等もあり、イ側の技術者のみでもVSTCを充分運営してゆく力をつけるため、いかに現行協力をサマライズしていくかが、残された今後2年間の最大課題であろう。

本調査団が、イ側と交した協議結果のミニッツは次のとおり。

なお、VSTCの組織体制変更がイ側で検討されているとのことであり、決定に至っていないが、今後の協力態制とも重要な関連があるところ、慎重に見守ってゆく必要があるだろう。



MINUTES OF JOINT MEETING  
ON  
VOLCANIC SABO TECHNICAL CENTER

The Japanese Mutual Consultation Team (hereinafter referred to as " the Team "), organized by Japan International Cooperation Agency (hereinafter referred to as " JICA ") and headed by Mr. Hisao NARITA, Director of Sabo Division, Sabo Department, River Bureau, Ministry of Construction, Japan, visited the Republic of Indonesia from November 21, 1985 to November 30, 1985 for the purpose of mutual consultation for the Volcanic Sabo Technical Center Project (BTA - 91) in the Republic of Indonesia (hereinafter referred to as "the Project ") through the discussions with the Indonesian authorities concerned.

During its stay in the Republic of Indonesia, the Team exchanged views and had a series of discussions with the Indonesian authorities concerned with regard to a general review on the progress and the problems arisen in the process of the implementation and future plan of the Project and the desirable measures to be taken by the Governments of both Japan and the Republic of Indonesia for the further successful implementation on the Project in accordance with the Record of Discussions signed on August 26, 1982.

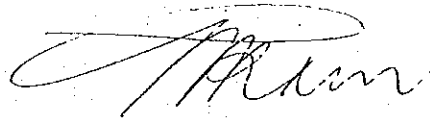
The Joint Meeting composed of such members as in the participants list attached hereto, was held on November 28, 1985 at the Directorate of Rivers, DGWRD, in Jakarta.

As a result of the discussions at the Joint Meeting, the Japanese and Indonesian sides made the following minutes of discussions which is attached hereto.

Jakarta, November 29, 1985.

成田久夫

Mr. Hisao NARITA  
Head, The Japanese Mutual Consultation Team for Volcanic Sabo Technical Center, Japan International Cooperation Agency.



Mr. Hartono Pramudo  
Director of Rivers, Directorate General of Water Resources Development, Ministry of Public Works, The Republic of Indonesia.

As the result of pre-evaluation on the progress of the implementation of the Project after three years from the commencement of the cooperation, both sides have recognized that the project activities have been progressive based on the master plan in the R/D, though there are many problems should be solved by Indonesian side. It is recognized also that the cooperation should be continued for another two years to summarize the project activities.

#### I. TRAINING ACTIVITIES

The General Course and Intensive one have been smoothly promoting until now by means of the eager endeavour of those who concerned.

The Comprehensive Course however which started in September 1983 is facing to critical conditions because of the shortage of the trainees.

The first Comprehensive Course seems to have just ended at the end of August 1985 in a rough sense of the execution, but there still remain some matters to generalize the result of study in a real sense of the completion.

We recognized that the first Comprehensive Course will be completely ended by the end of December 1985, and the second Comprehensive Course should start at the end of January 1986, at the latest.

#### II. TECHNICAL DEVELOPMENT

Debris flow monitoring and warning systems instruments were installed except some of telemetering facilities. They have started to be operated and to collect data. It is expected that good data will be collected in coming rainy season.

The development of appropriate technology suitable for the local conditions in Indonesia also has been started, it is behind the schedule though. Two reasons are considered ; (1) some cannot be operated because of the lack of three - phase electricity, (2) some Indonesian counterparts are not in VSTC because of their other training activities. More active works by the Indonesian counterparts are strongly recommended to make it successful.

### III. MANAGEMENT CONCERNED

- i. Enforcement in the field of maintenance and the regular operation of warning system of equipment and machinery.
- ii. The preparation of the budget to cope with decrease of local - cost expenditures by JICA.
- iii. Establishment of the earlier information system for mutual understanding in VSTC.

As for above mentioned items Indonesian side made a promise to do their best efforts in order to solve these troublesome situations.

### IV. OTHERS

In order to promote and develop Sabo Engineerings in Indonesia, the Indonesian side requests to the mutual consultation team to promote the realization of Grant - Aid Assistance by the Japanese Government.

ATTENDANTS OF JOINT MEETING

(November 28 , 1985)

Chairman                      Ir. Amir Muryadi                      Chief of Sub-Directorate  
of Planning, DOR.

INDONESIAN SIDE

- |                      |  |
|----------------------|--|
| 1. Ir. Sutrisno D    | Chief of Sub-Directorate of<br>Natural Disaster, DOR |
| 2. Ir. Habibudin     | Chief of Training Div., DGWRD                        |
| 3. Ir. Djoko Legowo  | Chief of Erosion Control Section,                    |
| 4. Ir. Soemarso M.   | Chief of Subdit. Div. of Volcanic<br>Disaster, DOR.  |
| 5. Ir. Endang Pipin. | Chief of Sub-Div., Training Div.,<br>DGWRD.          |
| 6. Mr. Sutrisno      | Staff of Foreign Aid Adm, DOR.                       |
| 7. Ir. Darmadi       | Head of VSTC   |
| 8. Ir. Subarkah      | Chief of Training Section, VSTC.                     |

JAPANESE SIDE

- |                     |  |
|---------------------|--|
| 1. Mr. H. Narita    | Leader of the Team                                   |
| 2. Mr. K. Takanashi | } Member of the Team                                 |
| 3. Ir. T. Mizuyama  |  |
| 4. Mr. K. Tanabe    |  |
| 5. Mr. T. Hirozumi  | } Leader, VSTC                                       |
| 6. Mr. K. Koresawa  |  |
| 7. Mr. H. Manzen    | } Expert, VSTC                                       |
| 8. Mr. H. Okubo     |  |
| 9. Mr. M. Nakahiro  | Leader experts , DOR.                                |
| 10. Mr. Itagaki     | Expert, DOR  |
| 11. Mr. Matsuda     | Assistant Representative of JICA,<br>Jakarta Office. |

## 2.2. 技術者養成計画—実績と今後の方向

### (1) 研修コース

#### 1) コースの分類と実績

砂防技術者を養成するための研修コースは下表のように分類される。

表 - 1

コース		人数	期 間		備 考
一般コース General Course		20	1～2週間×4回/年		R/D 1982.8.26
I II III IV V VI VII VIII	I	16	2週間	1983.10.17～10.29	83/84
	II	16	"	1984. 1. 9～ 1.21	"
	III	15	1ヶ月	" 5. 1～ 5.3	84/85
	IV	11	"	1985. 1. 7～ 2. 2	"
	V	21	"	" 3. 4～ 3.30	"
	VI	19	"	" ( 5 - 6)	85/86
	VII	(20)	"	" (11 - 12)	"
	VIII	(20)	"	(1986. 3. 1 - 3.30)	" (予定)
上級コース Intensive Course		15	6ヶ月		R/D
I II III	I	17	4ヶ月	1983. 5. 1～ 8.31	83/84
	II	11	"	1984. 7.16～11.16	84/85
	III	11	"	1985. 7. 1～10.31	85/86
総合コース Comprehensive Course		5	2年		R/D
I II	I	7	7	1983. 9. 1～1984. 3.31	83/84, 上級コース終了
			12	1984. 4. 1～1985. 3.31	84/85 者対象
			9	1985. 4. 1～1985.12末	85/86
	II	(5)	-	1986. 1月末より2ケ年	第II期開講予定

#### 2) コースの目的及び対象者

##### ① 一般コース

目 的：インドネシアの土木技術者の間に広く砂防事業を紹介し、砂防事業の必要性、基本的考え方、事業の手順等について理解させる。

対 象 者：各勤務先で河川事業あるいは研修事業に2～3年間従事し、専門学校もしくは工業高等学校で土木工学を専攻した職員。

## ② 上級コース

目的：インドネシアにおける砂防を，中心的に推し進めて行く技術者を養成する。

対象者：対象者は，一応学士以上の規定となっており，各機関において重要な職務に就いている場合が多い。

## ③ 総合コース

目的：砂防事業に関する F/S 及び D/D を，自ら策定しうる能力を持つ技術者を養成する。

対象者：現在の研修生は，1983 年度の上級コース受講者の中から選択された 7 名であり，同時に VSTC の職員として勤務し，主に一般コースのインストラクターとして，その研修活動に従事している。

### 3) 研修状況および提起された問題点

研修員や各種機器の不足ならびに関連施設の不備があるものの関係者の努力により一般コースと上級コースについては順調に進捗しているものと思われる。

#### ① 一般コース

砂防関連プロジェクト所長の提言により，第 5，第 6 期一般コースにおいては，技術系短大卒業者のための技術力アップが考慮された研修も実施されるなど，コース運営は順調である。

#### ② 上級コース

(i) 1985 年 1 月の第 3 回合同会議 (Joint Committee) において，上級コースの応募者の不足が指摘された。その結果，第 3 期上級コースには 25 名の志願者があったが，最終的には 11 名が登録されたに止どまった。これは募集要領の発送の遅れとともに，各工事々務所の技術者の絶対数の不足，研修生用宿泊施設の不備などが大きな原因と考えられている。

(ii) 1984 年 11 月の巡回ミッションに指摘された水理実験棟も完成し，水理模型実験の研修が実施されたが，これは大きな成果を治めた。時間数も昨年の 24 時間から 52 時間へと増加している。

また同時に指摘された基礎課目と応用課目の時間数の比率も下表のように変更された。

本コースも順調に推移しているものと考えられる。

表 - 2

	'84/'85	'85/'86	increase/decrease
for BASIC SUBJECTS	204	170	- 34
for APPLIED SUBJECTS	355	398	+ 43
Total	559	658	+ 9

③ 総合コース

R/Dにコメントされているように、本コースの目的は砂防事業のF/S, D/Dを自から策定できる能力を持つ技術者を養成することにあるが、現在第1期生が、その課程を終了していないように、解決すべきいくつかの問題をかかえている。

(i) 研修を受ける時間が物理的に不足している状況下にある。

すなわち本コースの7名の研修生は、

- 一般コースの講師であること。
- 政府で実施するKursus Perjabatan, Kursus Manajemen Ahli 等の研修に参加しなければならないこと。
- 旧宗主国であるオランダにおける水理学研修コースへの参加候補者になり得ること。
- カウンターパート研修として日本へ技術研修に行くこと。
- ガジャマダ大学の砂防修士コースに参画する権利を有していること。

等のためVSTCにおけるグループ研究活動及び日本の専門家から受けるカウンターパートトレーニングに大きな支障を起している。

その他、現場経験の少ない研修生にとって、F/S, D/Dを作る能力はそう簡単には修得できないであろうとの観点から、カリキュラムの見直しを図るべきであるとの意見も出されている。





(ii) ガジャマダ (Gajah Mada) 大学砂防専攻修士課程 (S-2コース) への参画。

資格を有することが日本以上に重視される国にとって、肩書の魅力は断ち難いものがある。

総合コースの魅力を高めるために、本年7月にガジャマダ大学にて開講されたS-2コースと総合コースのカリキュラム等の調整を図るべく、現在ガジャマダ大学、VSTC、公共事業省のメンバーによる三者協議が持たれている。

今後の調整に注目したいが、総合コース修了者にガジャマダ大学より修士 (SU) の称号が与えられる可能性がある。

- \* 優秀な人材のより一層のグレードアップのために、インドネシア政府が種々の研修を考えていることは、既して砂防技術者の育成の上でもマイナス要因とはならないはずであるが、VSTCの総合コース研修生の置かれている立場が現況のままである限り、VSTCサイドの砂防専門家からの直接的技術移転を図ることは難しい。

第2期総合コースの開講も1986年1月末までに予定されており、本件に関する日・イ相方の忌憚のない意見交換を期待したい。

- \* オランダ研修 (1年間) などに出る場合は必ずカウンターパートの補充をすることや、オランダ研修経験者を総合コースのメンバーにすること、あるいは大学新卒者を総合コースのメンバーにする (カリキュラムの変更を伴うが) などの案も考えられる。

以上のような諸問題をかかえながらも、第1期生は最終コーナーにさしかかっており、Merapi 火山砂防プロジェクトのPUTIH川とKRASAK川のF/S、D/Dの枠組が次のように決められている。

FEASIBILITY STUDY AND DETAIL DESIGN ON KALI PUTIH AND KALI KRASAK

By Comprehensive Course Members

Ir. Chandra Hassan  
Ir. Haryono  
Ir. Sudarminto  
Ir. Supandiyo  
Ir. Soeryono Haryadi  
Ir. Putu Gelgel  
Ir. Puspahadi

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1) 講師の育成

5年間のVSTCプロジェクトでは、インドネシア人講師自らによる研修がいつ行なわれるべきかが、下表のように示されており、一部すでにインドネシア人講師によって行なわれているものがある。

表 - 4

Shifting schedule

	'83/'84	'84/'85	'85/'86	'86/'87	'87/'88
Sabo Survey	L.E	L.E	L.E	I.I.S.E <sup>*1</sup>	I.I
Sabo Plan	L.E	L.E	L.E	L.E	I.I
Sabo Implementation	L.E	L.E	L.E	I.I	I.I
Sabo Design	L.E	L.E.I.I <sup>*2</sup>	L.E.I.I	L.E.I.I <sup>*3</sup>	I.I
Torrent Hydraulics		L.E	I.I	I.I	I.I
Hydraulic Model Test	S.E	S.E	S.E.L.E <sup>*4</sup>	S.E.I.I <sup>*5</sup>	I.I

- \*1 only aerophoto interpretation by short-term expert
- \*2 lecture by indonesian, practice by long-term expert
- \*3 only practice of channel work by long-term expert
- \*4 lecture by long-term expert, practice by short-term expert
- \*5 only practice by short-term expert

2) その他

インドネシア語の教科書の作成、日本におけるカウンターパートの研修については2.4を参照されたい。

GENERAL COURSE VII / 1985

No.		Kode	Name Pengajar	Jumlah jam
A.	<u>BASIC SUBJECT :</u>	HS	Ir. Subarkah Dipl. HE	14
	1. Hydraulics	HS	Ir. Subarkah Dipl. HE	14
	2. Sediment - Transport.	ST	Ir. Kunsatwanto Dipl. HE) Ir. Putu Gelgel. W )	18
	3. Hydrology	HY	Ir. Puspahadi	12
			sub total ... 1	44
B.	<u>APPLIED SUBJECT:</u>			
	4. Sabo Survey	SS	Ir. Putu Gelgel. W	10
	5. Sabo Plan	SP	Mr. T. Hirozumi Mr. Koresawa	4 6
			Ir. Subarkah Dipl. HE	6
	6. Sabo Design	SD	Ir. Puspahadi	14
	7. Sabo Implementation.	SI	Mr. T. Hirozumi	4
			Ir. Supandiyo	8
	8. Debris Flow	DF	Ir. Darmadi Ir. Putu Gelgel. W	10 4
	9. Quality Control	QC	Drs. Biyanto Ir. Suryono Haryadi	8 8
	10. Sediment Control Dam.	SC	Ir. Subarkah Dipl. HE	12
	11. Land Slide	LS	Ir Darmadi	6
	12. Land Slide Control.	LSC	Ir. Sudarminto	8
	13. Land Conservation.	LC	Ir. Puspahadi	6
		sub total ... 2	114	
C.	<u>OTHERS :</u>			
	14. Closing/Opening Ceremony	--	(2 x 6 jam)	12
	15. Film Performance.	F	(3 x 2 jam)	6
	16. Field trip		(2 x 8 jam)	16
		sub total ... 3	34	
		Total .....	192 jam	

表-6 SILABI KURSUS INTENSIVE "SABO WORKS" ANGKATAN III  
1 JULI 1985 SAMPAI DENGAN 31 OKTOBER 1985  
インテンシブコース (1985)

No.	Mata Kuliah 科目	Kode コード	Jumlah 時間数 Jam	Pengajar レクチャーラー	Asisten Pengajar アシスタント・レクチャーラー	Keterangan 備考
<b>A. Mata Kuliah Dasar: (基礎)</b>						
1.	Hydrology	HY	18	Drs. Sudarmadji	Drs. Sutikno HS	
2.	Engineering Geology	EG	20	Ir. Soeharto Tjojudo M.Sc	Ir. Suryono Haryadi	
3.	Hydraulics	HS	18	Ir. Nur Yuwono Dipl. HE	Ir. Subarkah Dipl. HE	
4.	Sediment Transportation	ST	22	Prof. Ir. Prognjono Mardjikoem	Ir. Chandra Hassan	
5.	Land Conservation	IC	14	Ir. Sudardjo	Ir. Puspahadi	
6.	Structural Mechanics	SH	14	Ir. H. Daroeslan	Ir. Suryono Haryadi	
7.	Soil Mechanics	SM	14	Ir. H. Daroeslan	Ir. Supandiyo	
8.	Volcanology	VO	14	Dr. Ir. Irwan Bahar	-----	
9.	Concrete Engineering	CE	12	Prof. Ir. Achmad Antono	Ir. Suryono Haryadi	
10.	Meteorology	MT	12	Ir Sukardi W	-----	
11.	Computer Programming	CP	12	Ir. E k o	Ir. Sudarainto	
			(170)			
<b>B. Mata Kuliah Terapan: (技術)</b>						
1.	Sabo Survey	SS	56	Mr. Manzen S T E	1. Ir. Haryono 2. Ir. Puspahadi	
2.	Sabo Plan	SP	52	Mr. Koresawa Ir. Subarkah Dipl. HE	1. Ir. Haryono 2. Ir. Puspahadi	
3.	Sabo Design	SD	60	Mr. Koresawa Mr. M a n z e n		
4.	Sabo Implementation	SI	38	Ir. Agus Sumaryono Dipl. HE Mr. T. Hirozumi	Ir. Puspahadi 1. Ir. Putu Gel-gel Wisanatapa 2. Ir. Supandiyo	
5.	Sabo OM	OM	18	Ir. Darmadi	Ir. Supandiyo	
6.	Debris Flow	DP	18	Ir. Darmadi S T E	Ir. Putu Gel-gel Wisanatapa	
7.	Torrent Hydraulics	TH	20	Ir. Subarkah Dipl. HE	Ir. Sudarainto	
8.	Hydraulics Model Test	HT	52	Mr. Manzen S T E	Ir. Chandra Hassan Ir. Sudarainto	
9.	Land Slide and Slope Failure	LS	22	Ir. Agus Sumaryono Dipl. HE	Ir. Sudarainto	
10.	Sabo Experiment	SE	22	Ir. Agus Sumaryono Dipl. HE	1. Ir. Suryono Haryadi 2. Dr. Biyanto	
11.	River E					
11.	River Engineering	RE	24	Ir. Siswoko Dipl. HE	Ir. Chandra Hassan	
12.	Sediment Control Dam	SC	16	Ir. Sarwono Sukardi Dipl. HE Ir. Subarkah Dipl. HE	Ir. Haryono	
			(398)			
<b>C. Ceraman Umum: (一般教育)</b>						
1.	Population	PO	4	Dr. Peter Nagul		
2.	Psychology	PY	4	Drs. Djamaludin Ancok		
3.	Erosion Control	EC	4	Ir. Djoko Legowo Dipl. HE		
4.	Organisation of Dept. PU	PU	4	Ir. Moerwanto Martodinomo		
5.	Engineering Economy	EE	4	Ir. Bambang Waluyono Dipl. HE		
6.	River Basin Development	PB	4	Ir. Graita Sutadi M. Sc		
7.	Education and Training	ET	4	Ir. Djoko Wahono		
8.	Project Management	PM	4	Ir. Darmadi		
9.	Warning System	WS	4	Ir. Agus Sumaryono Dipl. HE		
10.	Sabo Project Evaluation	SV	4	Ir. Subarkah Dipl. HE		
			(40)			
<b>D. Field Trip :</b>						
1.	Field trip ke Proyek Gunung Agung		40			
2.	Field trip ke Proyek Gunung Kelud & Gn. Semeru		40			
3.	Field trip ke Proyek Gunung Galunggung & Puslitbang Pengairan		24			
4.	Field trip ke Proyek Gunung Merapi		32			
			(136)			
<b>E. Film Performance</b>						
			8			
Total (A+B+C+D+E) .....			752			
			Jam			



### 2.3. 技術開発—実績と今後の方向

R/Dによって次の2つの項目について技術開発を行うことになっている。

#### 1) 適正工法の開発

インドネシアの実状に即した砂防計画の立案法、砂防工事の施工法を開発する。

#### 2) ラハール予警報システム及び緊急避難体制の確立

最新のテレメータシステムを、実験流域に設置し、ラハール流発生の実態を把握し、緊急時の避難体制を開発する。

適正工法の開発は具体的には、じゃかご（蛇かご）を用いた砂防ダム等の砂防構造物を考えている。まず、インドネシアにおける砂防ダムの災害実態調査を実施した。その結果、砂防ダム下流の洗掘と砂防ダム先端のまもりが主要な災害形態であることがわかった。

そこで、現地で砂防ダムのまもりに強いコンクリート等の試験を実施中である。なお、適正工法の開発のため機材供与された万能試験機は三相仕様であったため、他のポンプなどと同様使様できない状態にある。以上が適正工法開発の現状である。これに対し、次の提案を行なった。

- 1) じゃかごが必ずしもインドネシアの適正工法であるかどうか疑問である。現在、労務者の賃金は1日1,500ルピア（300円）、セメント1袋（40kg）が3,600ルピア（約700円）で、コンクリート砂防ダムよりも自然石を使用したダムやじゃかごを用いた砂防ダムがインドネシアに合っている工法であると言えるが、将来、セメントが安くなり労賃が上昇することを考えると、いつまでもじゃかごが適正工法であるとは限らない。この点についての将来予測を行う必要がある。
- 2) 砂防ダム先端のまもりは、日本国内でも流出土砂量の多い地域で問題となっており、いくつか試験も行われている。これらの成果も活用するのが良い。また現地試験と平行して、鉄球を一定の高さから落下させて相対的な対衝撃性を調べるようなことも実施するのが良い。
- 3) 3相電源は他の試験機にも必要となるので早急に導入する。
- 4) 写真-35（巻末写真集参照のこと。以下同じ）はウオノギリ貯水池上流部で行われていた、砂防ダム下流洗掘に対する根継工事である。砂防ダム下流の洗掘は局所的な問題と、砂防ダムの縦断的な配置に関する計画論上の問題が関係しており、R/Dにあるようにインドネシアの実情に即した砂防計画を立てる方法を示すことが、具体的な施工法と平行して行われる必要がある。

- 5) 適正工法の開発に加わるようになってきているインドネシア側 O/P の活動に不十分な点があり、より積極的に活動するようインドネシア側監督者が指導することを求めたい。
- 6) 現在、VSTCの所有している2本の水理実験用水路は、本来研修教育用に準備されたが、適正工法の開発についても積極的に利用されるのが望ましい。

写真-37は、ジャカゴの床固（低い砂防ダム）で、流下した土砂によって鉄線がせん断されている。ジャカゴをダムの材料として用いる場合には、表面をコンクリートで被服する必要がある。

ラハール予警報システム及び緊急避難体制の確立は昭和59年のレーダー雨量計、雨量テレメーターにつづき、昭和60年度、水位計、土石流発生検知センサー、VTRカメラが設置され観測が始まった。11月21日夜土石流が発生しセンサーに検知されたが、夜間であったためVTRには記録されなかった。その後11月28日にはVTRに土石流を記録することに成功したということである。この予警報システムについては、インドネシア側の2名のC/Pが熱心でシステムの維持に関する技術移転が確実に行われつつある。この雨季の間にかかなりの資料が蓄積されると期待される。

なお、写真-21～25のように1984年6月に発生しブティ川沿いに堆積した熱雲堆積物は、この1年半の間に新旧堆積物の境で下刻が進み、今後、新しい堆積物を横方向に洗掘して下流にラハール（泥流）災害を発生させる可能性が高い。したがって、最新の技術に基づく予警報システムを、従来の人による予警報システムとどのように組み合わせるかなど、より实际的な研究が行われるよう期待される。

3. 日本側投与実績（総表）

項目 \ 年度	56	57	58	59	60	計
調査団派遣						
① 種類	事前	実施協議	計画打合せ	巡回指導	計画打合せ	5件
② 構成人数(人)	5	5	4	4	4	22
③ 所要経費(千円)	3,488	3,457	3,708	2,619	2,596	15,868
専門家派遣						
① 長期専門家(人)	0	3	4	5	5	17(実員 7)
② " (M/M)	0	18.7	46.0	47.3	35.0	147.0
③ 短期専門家(人)	0	7	7	11	11	36(実員 36)
④ " (M/M)	0	3.7	4.4	7.2	7.6	22.9
⑤ 長・短計(人)	0	10	11	16	16	53(実員 43)
⑥ " (M/M)	0	22.4	50.4	54.5	42.6	169.9
⑦ 所要経費(千円)	0	30,058	62,011	96,634	103,302	292,005
機材供与						
① 所要経費計(千円)	0	81,001	97,495	122,413	79,656	380,565
中堅技術者養成対策						
① 所要経費計(千円)	0	0	0	19,472	15,512	34,984
応急対策						
① 所要経費計(千円)	0	0	0	1,500	3,196	4,696
現地研究費						
① 所要経費計(千円)	0	0	0	2,620	2,577	5,197
普及広報費						
① 所要経費計(千円)	0	0	0	938	0	938
現地語教科書作成						
① 所要経費計(千円)	0	0	1,391	230	300	1,921
所要経費総合計(千円)	3,488	114,516	164,605	246,426	207,139	736,174

### 3.1. 調査団派遣実績

調査団種類	団員氏名	担当分野	調査期間	調査内容
(1) 事前調査	水越 三郎	総括	56.10.7～56.10.22	インドネシア政府はジョクジャカルタのメラビ火山噴火物を原因とする河川の氾濫による被害を防ぐため、砂防技術者の育成、砂防技術の開発を目的とした技術センター設置の要請をした。そのため、同調査団は当該分野の現状および技術協力に際しての妥当性と可能性を調査した。
	中村 雅	予警報システム	〃	
	竹村 公太郎	水理、水文	〃	
	大久保 駿	砂防	〃	
	宮本 秀夫	業務調整	〃	
(2) 実施協議調査	川本 正知	総括	57.8.22～57.8.29	協力開始に当たっての協力内容等の協議およびR/Dの署名。
	齋藤 尚久	砂防調査計画	57.8.15～57.8.29	
	松下 忠洋	砂防施設施工	〃	
	田畑 茂清	砂防施設設計	〃	
	宮本 秀夫	業務調整	〃	
(3) 計画打合せ	友松 靖夫	総括	58.7.26～58.8.5	下記事項について、必要な調査を実施した。 (1) 建物・施設整備の進捗状況及び今後の計画 (2) 研修コース(①一般コース、②上級コース、③総合コース)の実施状況及び実施計画 (3) 技術開発の実施状況及び計画 (4) 機材供与計画 (5) 火山砂防技術センターのメラビ工事事務所との関連における組織上の位置づけ
	吉川 敏行	施設整備	〃	
	宮本 登	砂防計画	〃	
	服部 一平	技術協力	〃	
(4) 巡回指導	矢野 勝太郎	団長兼 砂防施設施工	59.11.23～59.12.2	協力期間半ばにさしかかる時期に於て、プロジェクトサイトにおけるプロジェクトの実施・運営につき現状調査し、技術面並びに運営面での助言・指導を行った。
	友松 靖夫	砂防施設設計	〃	
	是沢 一樹	砂防施設計画	〃	
	服部 一平	協力企画	〃	

### 3.2 専門家派遣実績

#### (1) 長期専門家

専門家氏名	担当業務	派遣期間	赴任時現職
広住 富夫	リーダー	57. 9.16 ~ 62. 8.25	(前) 砂防地すべり技術センター
近藤 浩一	砂防調査計画	58. 3. 1 ~ 60. 2.28	建設省
瀬戸 利彦	砂防施設設計	58. 3. 1 ~ 60. 4. 9	建設省
中川 和夫	業務調整	58. 6. 4 ~ 60. 6. 3	JICA
是沢 一樹	砂防調査設計	60. 3.20 ~ 62. 3.19	建設省
万膳 英彦	砂防施設設計	60. 4. 1 ~ 62. 3.31	建設省
大久保 宏明	業務調整	60. 5.24 ~ 62. 8.25	JICA

#### (2) 短期専門家

専門家氏名	担当業務	派遣期間	赴任時現職
中沢 武仁	協力企画	57.11.15 ~ 57.11.24	JICA (理事)
山口 三郎	技術協力	57.11.15 ~ 57.11.24	JICA 社会開発協力部
友松 靖夫	警報システム	57. 1.31 ~ 58. 2.13	建設省
大久保 巖	土木流観測	58. 1.31 ~ 58. 2.13	"
永末 博幸	水門観測	58. 1.31 ~ 58. 2.13	"
大森 悟	電気通信	58. 1.31 ~ 58. 2.20	
青島 剛	電気通信	58. 1.31 ~ 58. 2.20	
近森 藤夫	砂防計画論	58. 8. 1 ~ 58. 8.10	建設省
矢野 義夫	森林効果論	"	砂防協会
水山 高久	土石流予警報	58. 8. 8 ~ 58. 8.21	建設省 (土研)
中筋 章人	空中写真判読	"	国際航業
板垣 治	地すべり	58.10.31 ~ 58.11.27	建設省
黒川 興及	砂防工事の効果	"	砂防センター
岩崎 千代次	砂防施設設計	"	関東工管
寺本 和子	土保全	59. 9.10 ~ 59. 9.30	建設省中部地方建設局
牧田 一男	砂防計画	"	福島県土木部
中筋 章人	空中写真判読	"	国際航業
塚田 信一	レター据付	59. 9.10 ~ 59.10. 9	東亜電通

専門家氏名	担当業務	派遣期間	赴任時現職
鮎田 健 司	レーダー据付	59. 9.10 ~ 59.10. 9	日本無線
都丸 徳 治	河川砂防新工法	59.10. 8 ~ 59.10.21	建設省土木研究所
水山 高 久	土石流予警報	"	建設省架線局
長田 正 嗣	レーダー操作	59.10.16 ~ 59.11.24	日本無線
大谷 敏 治	テレメーター操作	"	"
後藤 洋	運営指導	59.10.28 ~ 59.11. 1	JICA
田中 良 子	"	"	"
下村 郁 夫	経済評価	60. 4.14 ~ 60. 4.27	建設省
井上 孝	経済評価	60. 4.14 ~ 60. 5.11	システム科学コンサルタンツ
藤江 良 雄	砂防新工法	60. 8.12 ~ 60. 8.26	青森県
杉浦 信 男	土砂災害	60. 8.12 ~ 60. 8.31	建設省
中筋 章 人	空中写真判読	60. 8.12 ~ 60. 8.31	国際航業
大谷 敏 治	テレメーター据付	60.10.10 ~ 60.11. 9	日本無線
高橋 雅 久	レーダー 雨量計操作	60.10.10 ~ 60.11. 9	"
網木 亮 介	水理模型実験	60.10.10 ~ 60.10.24	建設省
蒲 正 之	泥流感知装置 据付	60.10.21 ~ 60.11. 9	"
阿部 宗 年	水理模型実験	60.10.21 ~ 60.11.16	"
安本 寿 人	テレメーター装置	60.10.21 ~ 60.11.30	拓和

3.3. 研修員受入れ実績（57～60年度）

氏 名	研修期間	研修科目
MOH. DJAAD SHIDDIE Q. DH.	58. 3.17～58. 6. 8	砂防
SUTIKNO HARDJOSO E. WARNO	58. 3.17～58. 6. 8	"
AMIR MURYADI	58. 3.10～58. 3.20	"
SUPANDIYO	59. 2.11～59. 5.11	砂防工学
CHANDRA HASSAN	"	"
SOERYONO HARYADI	"	"
HARYONO	"	"
Y. SUDARYOKO	58. 5.28～58. 6. 7	火山砂防事情視察
PUSPAHADI	59. 5. 1～59. 8.15	砂防技術
SUDARMINTO	59. 5. 1～59. 8.15	"
PUTU GELGEL WISANA TAPA	59. 5. 1～59. 8.15	"
BAHBANG SUKATJA	85. 6.27～85. 9. 6	レーダーおよびテレメーターシステム
AGUS SUHARYONO	85. 8.22～85.11.30	地すべりおよび砂防水理実験
SUBARKAH	86. 2.27～86. 5. 9	砂防工学
DARMADI	86. 2.27～86. 3.12	火山砂防

4. 添 附 資 料

4.1. 合同會議用資料

R E P O R T O N

J O I N T M E E T I N G

November 28 , 1985



AGENDA FOR JOINT MEETING

1. Opening Address ... (Chairman)
2. Report from VSTC
  - 2-1. General Report
    - 2-1-1. Input due to Indonesian Government (DPU) ... (Ir. Darmadi)
    - 2-1-2. Input due to Japanese Government (JICA) ... (Mr. Okubo)
  - 2-2. Report on Implementation of Training Courses ... (Ir. Subarkah)
  - 2-3. Report on Implementation of Technical Development ... (Ir. Subarkah)  
... (Mr. Hirozumi)
3. Pending Matters for Further Development of VSTC
  - 3-1. Measures to cope with current situations ... (Ir. Darmadi)
  - 3-2. Envisaged matters in Connection with Further Development ... (Ir. Subarkah)
4. Commentary from Japanese Experts
  - 4-1. General Comment ... (Mr. Hirozumi)
  - 4-2. Comment on the Implementation of Training Courses ... (Mr. Koresawa)
  - 4-3. Comment on the Situation of Technical Development ... (Mr. Manzen)
  - 4-4. Comment on the Management Matters ... (Mr. Okubo)
5. Questions and Discussion ... (Attendants)
6. Closing Address ... (Chairman)

## ELEMENTS TO BE REFERRED

Based on the recommended proposal attached to the Merapi Master Plan, Volcanic Sabo Technical Centre was considered to be established at Yogyakarta with a view develop proper Sabo Technology in this country and to train Indonesian Engineers.

After anthusiastic discussion both of the governments agreed to each other and the Record of Discussion (R/D) for VSTC Project (BTA-91) was signed on August 26, 1982.

The content of R/D can be clarified as follows :

### 1. Training programme

VSTC will conduct the following three (3) courses as described in the Record of Discussion.

- a. General Course (20 persons) ... 1 - 2 weeks x 4 times/year.
- b. Intensive Course (15 persons) ... 6 months.
- c. Comprehensive Course (5 persons) ... 2 years.

### 2. Technical development

- a. Development of appropriate method of construction.  
The proper planning method for Sabo Project and the proper construction method for Sabo works will be brought about by taking the actual conditions of Indonesia into account.
- b. Installation of experimental lahar forecasting system and development of evacuation system.  
After grasping the actual condition of lahar flow as to an experimental basin by using the up-to-date radar raingauge and telemetering system, a certain practical lahar forecasting and evacuation system can be applied to the area concerned.

3. Japanese assistance

- a. Dispatch of experts
- b. Provision of machinery and equipment
- c. Training of counterparts in Japan
- d. Supplement to local cost expenditures

The subjects of articles described in R/D merely are listed up herewith for your convenience of discussion.

REFERENCE :

According to the Attached document of R/D, it is mentioned regarding TERM OF COOPERATION as follows :

The duration of the technical cooperation for the Project under this Attached Document will be basically five (5) years from August 26, 1982.

However, there will be a general review by the Committee on the progress of the implementation of the Project after three (3) years from the commencement of the cooperation taking account of measures to be taken by two Governments in order to decide if the cooperation should be continued for another two (2) years.

#### 2-1-1. Input due to Indonesian Government

Even if Indonesian Government suffers from shortage of budget strong effort to take necessary measures to *consolidate the whole facilities for VSTC Project at its own expense has been executed successfully.*

- In this year a necessary budget already spent in amount : 30 million rupiahs to install laboratory facilities and telemetering equipments for Intensive Course practice and collects the data during rainy season.
- The building for Geotechnical laboratory with 300 m<sup>2</sup> are now under construction.
- To prepare the development of VSTC in near future, the land with total area 3000 m<sup>2</sup> has been acquitted in this year.

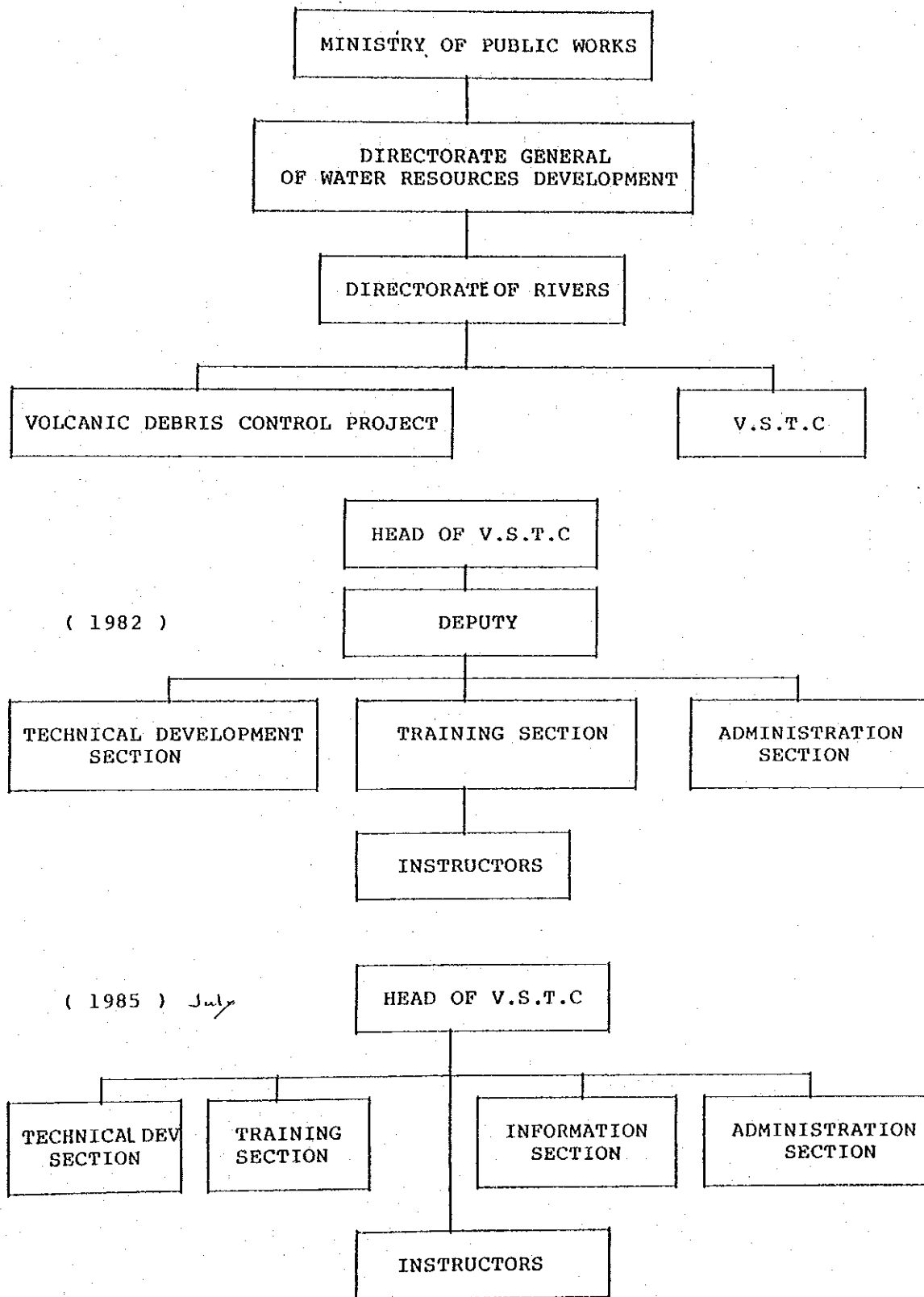
#### Present and Future Organization of VSTC

At present VSTC Project still belong to Directorate General of Water Resources Development and under guidance Directorate of Rivers. To follow new organization system at Ministry of Public Works, small modification *has been done in this year.*

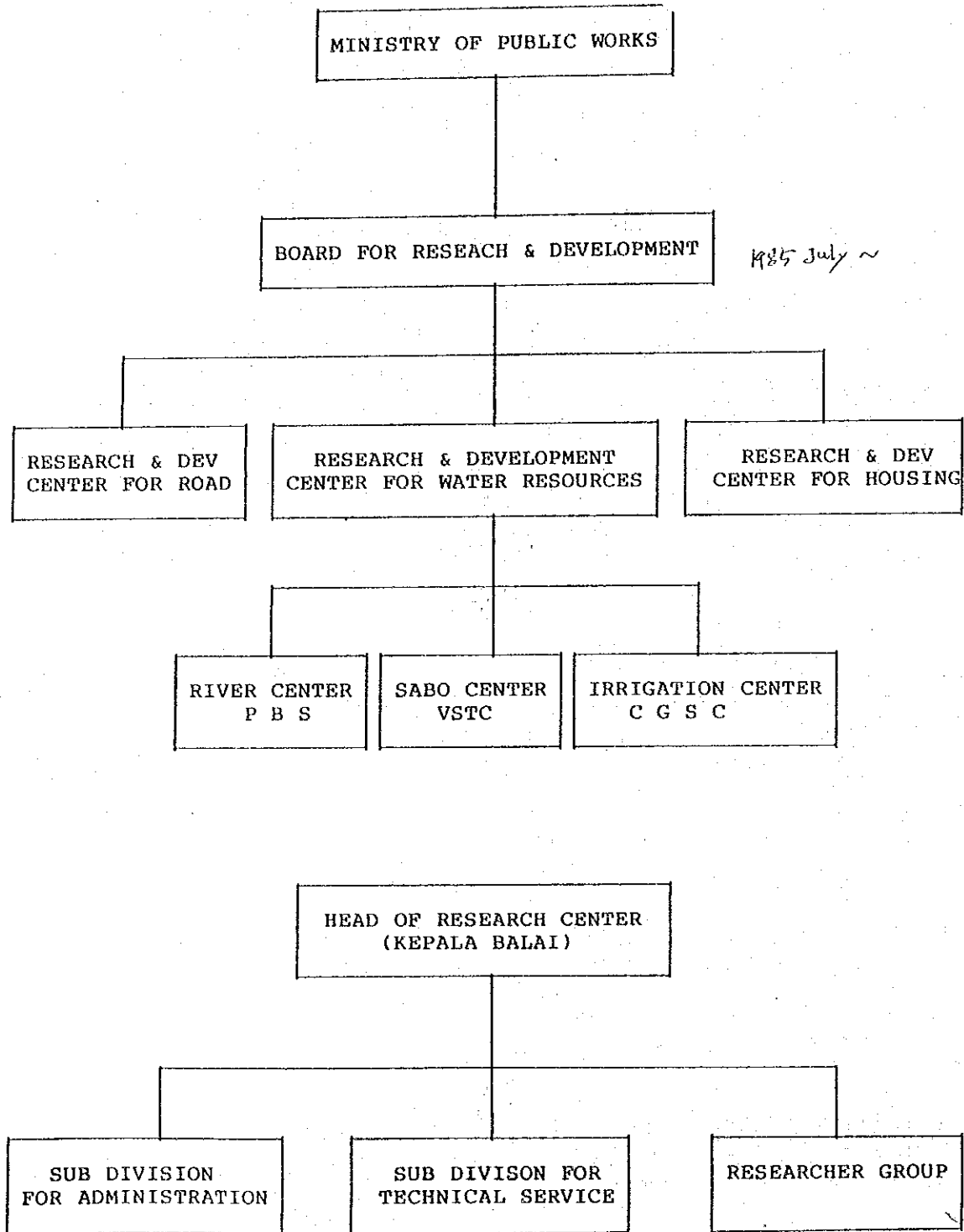
Ministry of Public Works has decided to develop the future organization of VSTC to be : "Research Centre for SABO. Organization of this Centre will be managed by Head of Research Centre (Kepala Balai) under guidance "Research and Development Centre for Water Resources" (Bandung).

In order to obtain close cooperation with Directorate of Rivers, DGWRD, and to maintain training activity, the existing project to implement training course must be needed continuously.

PRESENT ORGANIZATION OF VSTC



FUTURE ORGANISATION OF VSTC

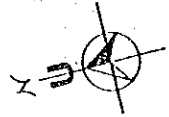


REMARK :

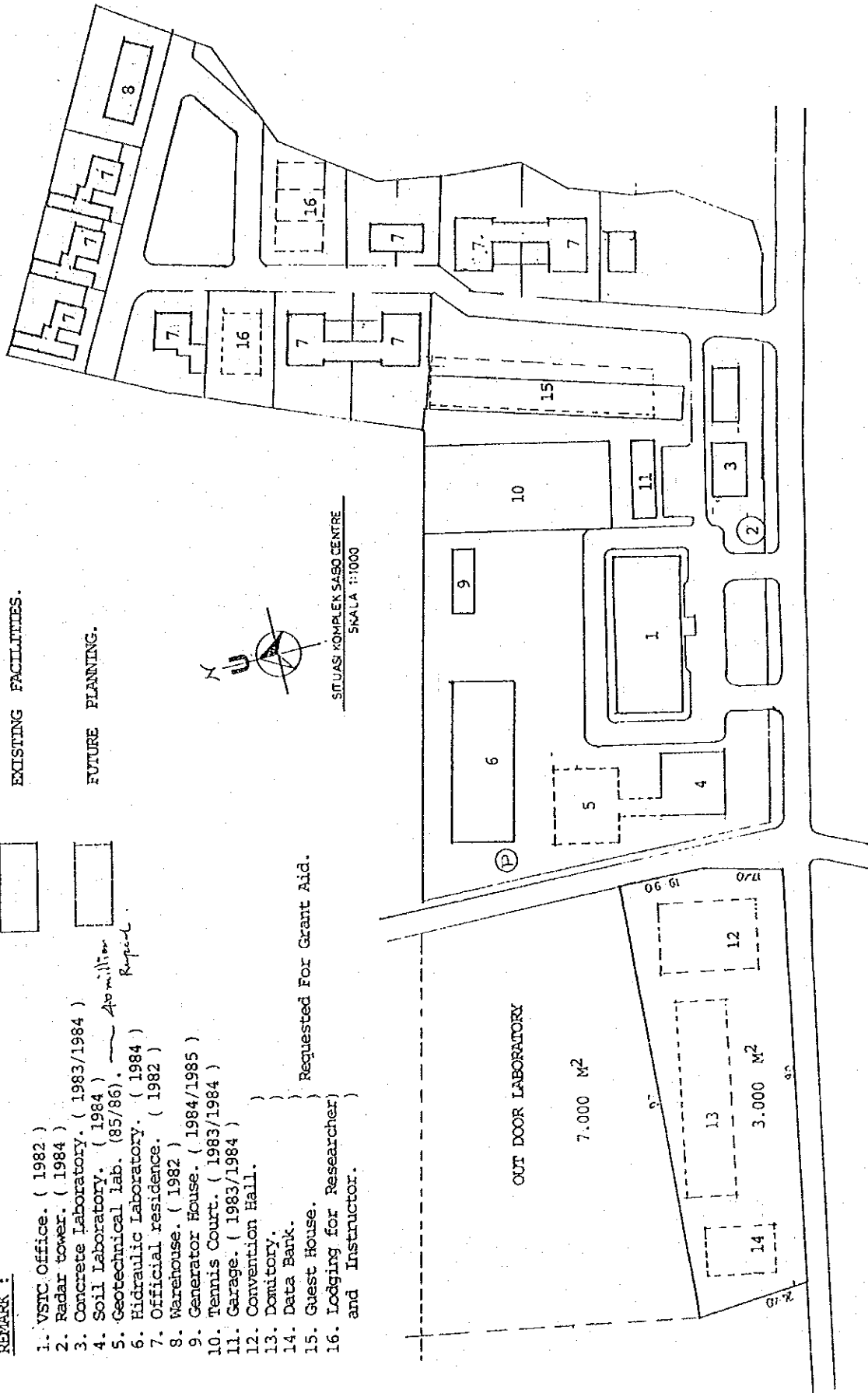
- |  |                          |
|--|--------------------------|
| 1. VSTC Office. ( 1982 )                   |                          |
| 2. Radar tower. ( 1984 )                   |                          |
| 3. Concrete Laboratory. ( 1983/1984 )      |                          |
| 4. Soil Laboratory. ( 1984 )               | Admin                    |
| 5. Geotechnical lab. (85/86).              | Request                  |
| 6. Hydraulic Laboratory. ( 1984 )          |                          |
| 7. Official residence. ( 1982 )            |                          |
| 8. Warehouse. ( 1982 )                     |                          |
| 9. Generator House. ( 1984/1985 )          |                          |
| 10. Tennis Court. ( 1983/1984 )            |                          |
| 11. Garage. ( 1983/1984 )                  |                          |
| 12. Convention Hall.                       |                          |
| 13. Dormitory.                             |                          |
| 14. Data Bank.                             |                          |
| 15. Guest House.                           | Requested For Grant Aid. |
| 16. Lodging for Researcher and Instructor. |                          |

EXISTING FACILITIES.

FUTURE PLANNING.



SITUASI KOMPLEK SASO CENTRE  
SKALA 1:1000



2-1-2. Input due to Japanese Government

2-1-2-1. Dispatch of Experts

(i). Dispatch of the Long-Term Experts

According to R/D signed on August 20, 1982, the following long-term experts have been dispatched.

NAME	ASSIGNMENT	DURATION
Mr. Tomio Hirozumi	Chief Advisor	23th Sep. '82-22th Sep. '86
Mr. Kouich Kondo	Sabo Invest. and Planning	1st Mar. '83-28th Feb. '85
Mr. Kazuki Koresawa	- ditto -	20th Mar. '85-19th Mar. '87
Mr. Toshihiko Seto	Designing of Sabo Facilities	10th Apr. '82-31st Mar. '87
Mr. Hidehiko Manzen	- ditto -	1st Apr. '82-31th Mar. '87
Mr. Kazuo Nakagawa	Coordinator	4th Jun. '83- 3rd Jun. '85
Mr. Hiroaki Okubo	- ditto -	24th May '85-26th Aug. '87

Note :

The chief advisor is concurrently an expert in the field of construction and maintenance of Sabo facilities.

(ii). Dispatch of the Short-Term Experts

In 1983, 7 short-term experts were dispatched and 9 short-term experts were also dispatched in 1984. In this fiscal year, 13 short-term experts were already dispatched in the attached list.



## LIST OF SHORT-TERM EXPERTS

28th November 1985 in VSIC.

NAME	DURATION	ASSIGNMENT	REMARKS
1. Ikuo SHIMOMURA	17th April - 27th April	Socio-Economic Evaluation	A
2. Takashi INOUE	17th April - 11th May	Socio-Economic Evaluation	A
3. Yoshio FUJIE	13th August - 25th August	Sabo Implementation (New Construction Method)	B
4. Nobuo SUGIURA	13th August - 30th August	Sabo Survey (Sediment Disaster)	B
5. Akito NAKASUJI	13th August - 30th August	Sabo Survey (Aerophoto Interpretation)	B
6. Ryosuke TSUNAKI	10th October - 24th October	Guidance to the Installation of Hydraulic Model Test Equipment	B
7. Masahisa TAKAHASHI	10th October - 9th November	Operation and Maintenance Practice of Radar Rain gauge	C
8. Toshiharu OTANI	10th October - 9th November	Guidance to the Installation of Telemetry System	C
9. Masayuki KABA	21st October - 9th November	Instruction to Placing and the Location of Mud-flow Sensor, Video Camera	C
10. Souhei ABE	21st October - 16th November	Operation and Practice of Hydraulic Model Test	A, B
11. Hisato YASUMOTO	21st October - 30th November	Guidance to the Installation of Mud-flow Sensor Equipment	C
12. Akio YAZAWA	21st October - 9th November	Guidance to the Operation and Management of Forecasting and Warning System	C
13. Masahiro WATANABE	21st October - 9th November	Guidance to the Operation and Management of Forecasting and Warning System	C

A. For Comprehensive Course

B. For Intensive Course

C. For Technical Development

## 2-1-2-2. Provision of Machinery and Equipment

Based on the request from VSTC, the machinery and equipments provided in F.Y. 1985/1986 are now under the purchasing process in Tokyo. They are supposed to be landed in Indonesia by the end of May 1985 at the latest. Some of them also will be purchased in Indonesia within this fiscal year. The details are shown in the following list.

Now, the installation of these equipment provided in fiscal 1984/1985 was finished.

The machine using the motor such as pumps and concrete compression testing machine and so on, are necessary to be worked by the 3-phases electricity in order to make their each power strong, therefore, it is necessary to install the 3-phases electricity piping in VSTC.

LIST OF DONATION ARTICLES IN F.Y. 1985/1986

CATEGORY		Q'TY	REMARKS
Mud flow forecasting system	Telemetering system (Rainfall gauge)	2	Girikerto Babadan
	Telemetering system (Water level gauge)	2	Tegalsari Check-dam Kopen
	FM radio telephone system (for mobile)	5	in Indonesia
	FM radio telephone system (pocketable)	2	in Indonesia
	CRT display unit (Remote Control Type)	1	
	Measuring instrument	1	
	Warning system equip.	1	
Landslide instruments	Landslide measurement equipment	5	
	Groundwater prospecting equipment	1	
	Pipe strain gauge	1	
	Strain meter in soil	1	
	Groundwater level meter	3	
	Groundwater level gauge	2	
	Tiltmeter	10	
Concrete test apparatus	Core drilling machine	1	
	Concrete cutting machine	1	

2-1-2-3. Training of Counterparts personnels in Japan

(i). At the end of F.Y. 1983/1984, following four persons were sent to Japan to participate the technical training in the field of Sabo engineering for three (3) months from February 10, 1984 to May 11, 1984, consequently total five (5) persons were accepted from VSTC Project in F.Y. '83/'84.

- Mr. Chandra Hassan : Chief of Technical Development Section, VSTC (Trainee of Comprehensive Course)
- Mr. Soerjono Harjadi : Trainee of Comprehensive Course, VSTC
- Mr. Supandijo : - ditto -
- Mr. Haryono : - ditto -

(ii). In F.Y. 1984/1985, following three (3) persons were sent to Japan for technical training for three and half months from September 5, 1984 to December 23, 1984.

- Mr. Puspahadi : Trainee of Comprehensive Course, VSTC
- Mr. Sudarminto : - ditto -
- Mr. Putu Gelgel : - ditto -

(iii). In F.Y. 1985/1986, following 5 persons were have been and will be sent for technical training.

No.	NAME	DURATION	SUBJECTS
1.	Bambang Sukatja BE	Jun.'85-Aug.'85	Maintenance of Radar System
2.	Ir. Agus Sumaryono	Sep.'85-Nov.'85	Sabo Hydraulics Model Test
3.	Djoko Wiyono Sm.HK	Nov.'85-Apr.'86	Intensive Course for Japanese language
4.	Ir. Darmadi	will be accepted the beginning of next year	Sabo Plan
5.	Ir. Subarkah Dip.HE	- ditto -	- ditto -

#### 2-1-2-4. Supplement of local cost expenditures

According to R/D and JICA Regulation, basically, the Indonesian Government should provide the budget for the local cost like the Participation cost of trainees, Special lecture fee, cost of teaching material, cost for the study tour, cost for emergency measures and so on. However, because of severe budgetary circumstances in Indonesia, VSTC (including the Japanese Experts) has been trying to get several kinds of financial assistance from JICA, in consequence of it. In this year also the budget as described below has been provided to our Project from JICA in F.Y 1985/1986.

KIND OF BUDGET	PURPOSE	IN F.Y '84/85	IN F.Y '85/86
Cost for Middle Level Technical Training	- Participation cost of Trainees - Special lecture fee - Cost for teaching material - Cost for travel and trip - Cost for training material	¥ 19,472,000.-	¥ 15,577,000.-
Cost for Emergency Measures	- Strengthening the foundation of water level gauging stations	¥ 1,500,000.-	¥ 1,500,000.-
Campaigning Cost of Sabo Technology	- Cost for Panels and model of Sabo works	Rp. 3,750,000.-	¥ 0.-
Cost for Technical Development	- Cost for the inventory of Sabo facilities in 5 Sabo Projects	Rp. 10,464,000.-	¥ 2,700,000.-

The cost for middle Level Technician Training will be decreased year by year as follows :

1st year	19,472,000	(100%)
2nd year	15,577,000	(80% of the first year)
3rd year	11,683,000	(60% of the first year)

2-1-2-5. Other matters to be mentioned

(i). Text-books

Until the end of November 1985, text-books for the Intensive Course and General Course were almost prepared by both Japanese side and Indonesian side. Some of the text-books in English prepared by the Japanese side were translated into Indonesian by using the budget for Middle Level Technical Training.

The present condition of text-books in VSTC are shown in the attached list of text-books and the text-books not yet translated will be translated into Indonesian until the end of the cooperation period.

The following text-books is planned to translated into Indonesian by the Indonesian Counterparts within this fiscal year.

1. Handbook for Hydraulic Model Experiment on Channel Works.

The following text-books are planned to rearrange the composition by the Japanese long-term experts within this fiscal year and will be forced to be translated in F.Y. 1986/1987 by the Indonesian Counterparts.

1. Sabo Survey
2. Sabo Plan
3. Sabo Implementation

LIST OF TEXT-BOOKS FOR INTENSIVE COURSE

No.	TITLE OF TEXT-BOOKS	WRITTEN BY :	ORIGINAL	TRANSLATION	PAGES	REMARKS
1.	Applied Hydrology	JICA (KONDO)	English	F.Y. 1984/1985	230	
2.	Engineering Geology	Subarto Tjojudo	Indonesian	not necessary	180	
3.	Hydraulics	Nur Yuwono	- ditto -	- ditto -	270	
4.	Sediment Transportation	Prajono Mardjikoen	- ditto -	- ditto -	170	
5.	Structural Mechanics	H. Daroeslan	- ditto -	- ditto -	55	
6.	Soil Mechanics	H. Daroeslan	- ditto -	- ditto -	55	
7.	Concrete Engineering	Antono	- ditto -	- ditto -	260	
8.	Geodetic Survey I	Suprpto	- ditto -	- ditto -	?	
9.	Geodetic Survey II	Priyono	- ditto -	- ditto -	150	
10.	Torrent Hydraulics	JICA (IKEVA)	English	F.Y. 1984/1985	62	
11.	Execution Control Works Inspection	JICA	English	F.Y. 1984/1985	238	
12.	Concrete	JICA	English	F.Y. 1984/1985	186	
13.	Surveying for Sabo Works	JICA	English	F.Y. 1984/1985	89	
14.	Sabo Survey	JICA (KONDO)	English	not yet	75	
15.	Sabo Plan (General Remarks)	JICA (KORESAWA)	English	not yet	122	
16.	Sabo Plan	JICA (HIROZUMI)	English	F.Y. 1984/1985	66	
17.	Maintenance of Sabo Facilities	JICA	English	F.Y. 1984/1985	30	
18.	Sabo Design	JICA (KONDO, SETO)	English	F.Y. 1984/1985	60	
19.	Manual for Reforestation and Erosion Control for the Philippines	JICA	English	F.Y. 1984/1985	100	
20.	River Engineering	Siswoko	Eng. and Ind.	not necessary	250	
21.	Sabo Implementation	JICA (HIROZUMI)	English	not yet	200	written within their fiscal year
22.	Sabo O/M	Sumeri	Indonesian	not necessary	35	
23.	Sabo Hydraulic Model Test	JICA (Y. TASHIRO)	English	not yet	370	
24.	Debris Flow I	Darmadi	Indonesian	not necessary	75	
25.	Debris Flow II	JICA				written within 1986
26.	Computer Programming		Indonesian			by U.G.M
27.	Vegetation		Indonesian		55	
28.	Handbook for Hydraulic Model Experiment on Channel Works	JICA (ABE)	English	not yet	69	
29.	Landslide Control	JICA	English	not necessary	206	for reference
30.	Glossary of Terminology on Sabo Engineering	JICA (HIROZUMI)	Eng. and Ind.	not necessary	155	for reference

LIST OF TEXT-BOOKS FOR GENERAL COURSE

No.	TITLE OF TEXT-BOOKS	WRITTEN BY :	ORIGINAL	TRANSLATION	PAGES	REMARKS
1.	Hydrology				80	
2.	Hydrolika				30	
3.	Beton				46	
4.	Quality Control and Aggregate	JICA	English	F.Y. 1984/1985	45	
5.	Sabo Survey and Plan	JICA	English	F.Y. 1984/1985	45	
6.	Sabo Design	JICA	English	F.Y. 1984/1985	45	
7.	Sabo Implementation and O/M				70	
8.	Sabo O.M Peralatan				45	
9.	Sabo O.M Pengaliran				40	
10.	Debris Control				98	
11.	Landslide	JICA	English		21	



(ii). Reference books for the course

In F.Y. 1984/1985, Rp. 968,250 was spent as purchasing the both English and Indonesian reference books.

In this F.Y. 1985/1986, the budget more than Rp. 4,000,000.- is planned to purchase the English reference books by Japanese side.

STATION FOR HYDROLOGICAL OBSERVATION

STATION	LOCATION	PROVISION	INSTALLATION	REMARKS
Automatic Raingauge	Ngandong	F.Y. 1982/1983	F.Y. 1983/1984	
	Girikerto	- ditto -	- ditto -	Telemetering in F.Y. 1986/1987
	Plawangan	- ditto -	- ditto -	
	Ngemplak	- ditto -	F.Y. 1985/1986	
	Simping	- ditto -	- ditto -	
	VSTC	- ditto -	- ditto -	
Water level gauge	Kopen	F.Y. 1982/1983	F.Y. 1985/1986	Telemetering in F.Y. 1986/1987
	Tegalsari	- ditto -	- ditto -	- ditto -
	K. Krasak	- ditto -	not yet ('86/'87)	
Telemetering Master Station	VSTC	F.Y. 1982/1983	F.Y. 1984/1985	
	Mranggen	F.Y. 1984/1985	F.Y. 1985/1986	
	Plawangan	F.Y. 1983/1984	F.Y. 1984/1985	
	G. Maron	- ditto -	- ditto -	
	Girikerto	F.Y. 1985/1986	not yet ('86/'87)	
	Babadan	- ditto -	- ditto -	
Water level	Kopen	F.Y. 1985/1986	not yet ('86/'87)	
	Tegalsari	- ditto -	- ditto -	
Radar Raingauge	VSTC	F.Y. 1983/1984	F.Y. 1984/1985	
Mudflow Sensor	Jurang Jero	F.Y. 1984/1985	F.Y. 1985/1986	

## 2-2. Report of Training Activities

Since April 1983 VSTC has been implementing three kinds of courses as mentioned in Record of Discussion.

In order to get convenient period for General and Intensive Course, an applicable modification for the duration of courses have been conducted carefully without changing the content of syllabus as well as number of hours.

General Course : 3 times for one month  
Intensive Course : one a year for four months

The implementation for each Course has been carried out successfully, although there happened to be some matters such as shortage of participants, lacks of experimental apparatus and laboratory facilities for practice.

Training activities of VSTC as for each course has been executed so far, as follows :

Course	Total Times	Total Persons
General Course	6	98
Intensive Course	3	39
Comprehensive Course	1	7

As a whole it can be said almost in accord with initial intention. Refer to Appendix-

### General Course

Based upon the suggestion of Sabo Project Managers that VSTC should give a chance to those technicians (those who completed Technical High School, STM) to attend General Course in order to improve their knowledge about Sabo, especially those technicians being in charge of Sabo Project Office, the Directorate of Rivers invited parti-

cipants who had educational background of STM, at the time of General Course V and VI.

The subjects of lecture were almost the same with those of usual General Course to provide for BE participants (those who graduated from Technical Academy or College). But the content of syllabus was adjusted in compliance with their level of ability or knowledge.

The result seems to be successful for them.

### Intensive Course

As we suffered from shortage of applicants when we recruited the second Intensive Course participants, an improved way of recruit was proposed and agreed at the time of the third Joint Committee which was held last January at Jakarta.

The agreed conclusion was that the candidates of participants should be designated by Director General of Water Resources Development through Project Manager.

Although 25 candidates were requested to attend the third Intensive Course, but unfortunately only 11 persons could follow the third Intensive Course.

According to some participants this time the delivery of invitation letter was too late that was just few days before scheduled date of beginning.

The fact exactly suggests that the participation to the Course from a project concerned naturally claims the necessary arrangement on the side of project itself because of extremely limited number of engineers.

## Comprehensive Course

As mentioned in R/D, the aim of Comprehensive Course is to train Sabo-engineers who have the ability enough capable to work out a feasibility study and detailed design.

The objective area for the first Comprehensive Course has been chosen out of the type I area of Mt. Merapi Project, that is : the catchment area of K. Putih and K. Bebeng/K. Krasak.

According to the schedule shown in the third Joint Committee Report, the study of the Course should be finished until the end of August 1985.

But unfortunately the progress of Comprehensive Course still remains behind the schedule to rather big extent, because of manifold or unforeseen circumstances that happened to be brought about during the period of study.

Above-mentioned unfortunate circumstances can be said to consist of three components as follows :

- i. Physical limitation of substantial study time.
  - Participants used to be so frequently dragged into routine job of VSTC Office.
  - They could not be released from their obligation to attend such kinds of official short courses as "Kursus Prajabatan", "Kursus Manajemen Ahli", etc.
  - They had to become lecturer or assistant lecturer for General Course concurrently in accordance with technology transfer schedule.

ii. Broken-up state of group study activity.

- All the members of Comprehensive Course have been dispatched to Japan for the purpose of Counterpart Training for a few months. Even an intermittent dispatchment in the course of study was apt to interrupt so-called team-work in the end.
- In the final stage of their study three of executive members of Comprehensive Course have been adopted as candidates to study in Nederland. Consequently they could not settle themselves to their given task. Attached paper-1

iii. Actual difficulties of study

- The principle or theory itself has been thought understandable for the participant at the earlier stage of study. However, the application of theory to practical matters seems to be found very hard for them at the latter half of the scheduled period. Sophisticated manners of practical application perhaps can't be left to their own devices.
- Especially, so-called socio-economic evaluation which should be derived from the evaluation as to the effectiveness of planned facilities seems to be extremely difficult for the participant because of actual lack of their experience.

Despite of such undesirable conditions of circumstances around "Comprehensive Course", it can be said that the Course now has got reached to its final stage of study owing to eager endeavour of those who concerned.

TRAINING ACTIVITY OF COMPREHENSIVE COURSE MEMBERS

(1985 - 1987)

Attached paper-1

No.	N a m e	Name of Training	1985			1986			1987			P l a c e											
			1	2	3	4	5	6	7	8	9		10	11	12								
1.	Ir. Chandra - Hassan.	1. Management Pro-ject Course II	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	
			4 6 3 days																				
			20 25 35 days																				
			15 27 43 days																				
2.	Ir. Haryono	1. Managemen Pro-ject Course. 2. English Course 3. Candidat official Course. 4. Training in Netherland.	15 ( 11 Month ) 15																				
			8 20 12 days																				
			20 25 35 days																				
			15 27 43 days																				
3.	Ir. Sudarminto	1. Management Pro-ject Course. 2. Candidat official Course. 3. Strata II Pro-grams.	15 ( 11 Month ) 15																				
			8 20 12 days																				
			15 27 43 days																				
			2 Years																				
4.	Ir. Supandiyo	1. Management Pro-ject Course II 2. Strata II Pro-grams.	2 Years																				
			4 6 3 days																				
			2 Years																				
			2 Years																				
5.	Ir. Suryono - Faryadi.	1. Management Pro-ject Course II 2. Strata II Pro-grams.	2 Years																				
			4 6 3 days																				
			2 Years																				
			2 Years																				
6.	Ir. Pitu Gal-gel	1. Management Pro-ject Course.	8 20 12 days																				
			2 Years																				
7.	Ir. Pusgabadi																						

## 2-3. Report on Implementation of Technical Development

### 2-3-1. Development of appropriate method of construction

In accordance with the schedule, each subject has been worked out as follows :

- (i). According to the result of "Survey on Antecedents of the damaged Sabo-structures" which was carried out last F.Y., has proved that the most of damages on Sabo-dam was concentrated at the spillway crown and the scoring at its immediate downstream, as anticipated since before. (The result was complied as for each Project following a formerly determined form).

Referring to above-mentioned survey result, it has been confirmed that two of the investigation subjects will be worthy to study. One is to design "strengthened concrete to protect the spillway crown of Sabo-dam, another is to provide a appropriate way for the protection of apron portion of Sabo-dam

- (ii). Three to four sorts of trial mix-proportion design of strengthened concrete have been worked out already. Laboratory tests concerned to this subject is now under execution. Field test at the site of Kopen Sabo-dam will be implemented before long for the purpose of examining the durability against debris/sediment flow.
- (iii). With a view to apply the stronger gabion or crib structure not only to the foot protection of levee revetment but also to so-called lateral works of Sabo facilities, an elementary and comparative investigation between JIS and SII (Standar Industri Indonesia) has been conducted at first since July, 1985. Such kind of study can be said to lead up to the final aim.



(iv). As to a provisional survey for a vegetative way of construction, it is scheduled that some locally dominant species of grass or bush tree shall be studied by making the best use of convenient opportunities.

2-3-2. Development of forecasting and evacuation system

- (i). The installation of telemeterized raingauge and water-level gauging instruments at the site of Mranggen Sabo-dam as well as the telemeterization for two of the water-level gauging stations located at Tegalsari and Kopen have finished by the effort of Short-term Experts from JICA towards the end of October, 1985 or the beginning of November, 1985.
- (ii). The installation of mud-flow sensor and its telemetering system also is now about to finish, it will be complete before the end of November, 1985. The works of installation os also guided by Short-term Expert from JICA.
- (iii). The installation of experimental flume for hydraulic model test, compression test machine for concrete, power generator for emergency etc. also finished towards the beginning of November, 1985. Thus most of the scheduled installation of observation instruments can be said to be making a final approach to the plan initially intended.

Unfortunately data survey or collection through radar telemetering system is not always kept in good condition because of mechanical trouble, especially in radar system, from time to time. It is feared that those instruments involved in this system could be maintained or managed good enough to gather the data essential to mud-flow forecasting. Meanwhile, the survey as to existing emergency and evacuation system has begun with some questionnaire to local governmental offices.

### 3-1. Measures to Cope with Current Situations

The technical cooperation between Indonesia and Japan in the field of Sabo Engineering has been executed since 1970. The VSTC was established on August 26, 1982 to realize the domestic training and to seek proper Sabo technology in Indonesia.

However, thinking of the present situation, the function of VSTC is considered to be "Research Centre of Sabo and Land slide Technology in near future. This centre will play the role to research the technology of Sabo Engineering and to develop the activity extending the more wider range.

In order to realize above-mentioned intention the Government of Indonesia requested Grant-Aid Assistance to Government of Japan to strengthen the foundation of technical development program of the Centre because of financially hard state of the Government. Detailed additional facilities and equipments requested to Japanese Government are shown in attached paper.

Meanwhile, the Directorate General of Water Resources Development is now discussing and collaborating with Gajah Mada University how to make the recruit of Comprehensive Course more attractive for the candidate. Although the factors involved in and the process related to are too many to solve, it is sincerely hoped that the cooperation would become true.

## LIST OF ADDITIONAL EQUIPMENT

### 1. Equipment for Technical Development Programme

Artificial Rainfall apparatus	30
Mudflow-model generator	10
Experimental flume apparatus with changeable gradient	25
Travelling automatic filming apparatus for experimental flume	20
Abraision testing machine ( Doken type )	10
Impact testing machine ( Doken type )	10
Outdoor Sabo Hydraulic Model Test Laboratory - Water supply & drainage system , Observa- tion tower , etc.	
Total 2.000 m2	20
Experimental Equipment - Equipments for Concrete , Soil and Hydrau- lic Test , etc.	50

### 2. Equipment for Warning and Evacuation System

Automatic VTR apparatus for lahar observation	30
Electric current meter 3 sets	20
Super sonicwater level gauging 4 sets	28
Jeep 4 unit	10

### 3. Equipment for the Data Bank

Computer for data processing	50
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### 4. Equipment for the Training Programme

Bus for 40 persons 1 unit	5
Mini bus for 11 persons 2 unit	5

### 5. Others Equipment

Printing machine for drawing ( Blue Print ) 1 set	4
Offset machine 1 set	1
CRF for NEC Computer 100/45 3 set	10
Sound system facilities for Conventional Hall	2

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Total : 340 million yen

Facilities and Equipments has already been requested  
 ( See letter from Set Kab No.:4874/Set Kab/LN /P / 8 / 1985  
 Date : August 10 , 1985 ) (unit : Million Yen)

Facility			275
	Lodging Accommodation.	20 beds, Dining hall Recreation room, Two storied, Total 1.000 m2	150
	Data Bank	Data room, Reading, Com puter, Laboratory ( 6 rooms ) Two-storied , Total 400 M2	60
	Conference Hall	Total 300 m2	45
	Outdoor Sabo Hydraulic Model Test La- boratory.	Water supply & draina ge system , Observation tower, etc. Total 2.000 m2	20
Equipment & Machinery			120
	Experimental - Equipment.	Equipments for Concre te , Soil and Hydrau- lic Test , etc.	50
	Data Processing Equipment.	Computer , Word proces sor , etc.	50
	Vehicle	Bus (1), mini bus (2), Jeep (4)	20
Grand Total			395

Additional Facilities and Equipments are requested  
 rough estimation (unit: Million Yen)

Facility			75
	Guest House	5 bed rooms , Hall , Dinning room Kitchen Ware house , garage Total 456 m2	40
	Lodging House For Instruc- tor and Rese- archer (4 unit)	Guest room , Bed room Kitchen , Bath room , Total 4 x 80 m2 = 240 m2	35
Equipment			200
	Equipment For Technical Deve lopment.	-Artificial Rainfall - apparatus. -Mudflow-model genera tor. -Experimental flume - apparatus with change able gradient. -Travelling automatic filming apparatus for experimental flume -Abrasion testing mac hine (Doken type) -Impact testing machi ne ( Doken type )	105
	Equipment For Warning and Evacuation - system.	-Automatic VTR appara tus for lahar observa tion. -Electric current meter 3 sets. -Super sonic water le vel gauging 4 sets	78
	Others Equip ment.	-Blue Print 1 set. -Offset machine 1 set -CRT for NEC Computer 100 / 45 3 sets. -Sound system facili ties for Conventional Hall.	17
Total Additional Facilities and Equipments			275

Total : Grant Aid are requested = 395 + 275 = 670  
 ( in unit : Million Yen )

### 3-2. Envisaged Matters in Connection with further Development

The government of Indonesia already established the principle to develop the activities of VSTC towards the positive direction, apart from the duration of technical cooperation for five years.

This can be said a drastic matter in view of the significance of land conservation and disaster prevention. Once we would succeed in being financially sustained, there are lot of desirable things to be materialized so that existing Centre could meet the Government's expectation. Some of them can be enumerated as follows :

(i). Establishment of Research Centre (Institute) of Sabo and Landslide Technology

Proper countermeasures against erosion and sediment run-off not only in volcanic areas but also as to general critical areas should be taken into account, as a matter of course; because the disaster due to former one is usually intermittent as well as locally confined, but various damages due to latter one occur consecutively and extend all over the land.

(ii). Further development activities of the Centre

Manifold functions to meet the demand of all the projects concerned naturally should be taken into consideration as a due activities. Such functions as technical information/guidance service accompanied so-called monitoring system, torrential-hydraulic/landslide model test with sufficient instrument and space and so on will be indispensable, more less, sooner or later. Otherwise actual demand perhaps will not be satisfied. This comes from the fact that the characteristics of

critical land or devastated stream in the mountainous areas are quite diverse, much more than ordinary cases on flat area having good access.

- (iii). Higher-grade research on the same level of international grade

It will be naturally desirable to work out the influential research activities in the Centre on one hand and to make a chance to invite executive lecturers from overseas or exchange the opinion with them on the other hand. International meeting or symposium in the field of Sabo-engineering, if could, would like to be held at the Centre, because the radar and telemetering system must be attractive even for foreigners. Supposing those kinds of our hope, existing building and facilities without convention hall, guest house, library or data storage room are feared to fall short of their expectation.

#### 4-1. General Comment

Now that we have got through the middle-turning point of designated cooperation period for five years, it exactly is a high time that we should reflect the result of activities in order to make haste in improving the latter half activities.

It can be pointed out as a whole by recollecting the facts and analyzing the results, as follows :

- (i). Troubles in recruiting the participants to the Courses
- (ii). Unsettled situations of the participants to Comprehensive Course
- (iii). Scanty conditions of the budget necessary for positive activities
- (iv). Gradual recession of executive members of counterparts in the midst
- (v). Concurrent services of officials being in charge

All the matters mentioned above should be recognized with frankness on this occasion, at any rate. Detailed argument as to the elongation of project duration would hardly possible until some reliable countermeasures might be materialized. Towards the end of duration period, the problems involved in the matter should be focussed at.

In this connection, the collaboration plan of the implementation for Comprehensive Course with Gajah Mada University is to be scrutinized much more in detail with regard to above-mentioned item (i) on one hand, and the occasional request for Grant Aid is also to be ascertained by all means with regard to above-mentioned item (ii) on the other hand.

#### 4-2. Comment of the Implementation of Training Courses

It can be said that the training courses have been implemented for the best in spite of rather hard conditions that happened to trouble us occasionally. Through the implementation of "Comprehensive Course" the things have not always come right to us because of broken-down state of team activities. On top of that, there still remains some problems; that is how to recruit the participants of the "Comprehensive Course" towards the near future. As for this matter, another opportunity seems to be given to discuss in detail.

Owing to eager endeavour of those who have been in charge, the actual the activities can be said to have been showing rather good consequence after all. Main matters to be worthy of appreciation are :

- (1). Advanced translation of textbooks into Indonesian language.

In order to form a link in the chain of technology transfer, the translation of textbooks written in English into Indonesian language has been successfully conducted by those officials in VSTC and others.

The progress of translation is shown in attached table "LIST OF TEXTBOOKS FOR INTENSIVE COURSE". Thus the rest of translation is little. Sabo Survey and Planning, Sabo Implementation, Sabo Model Test, etc. shall be arranged to be compiled as textbooks written in Indonesian language in F.Y. 1985/1986.

- (2). Forward shifting of lectures by Indonesian staffs

Keeping pace with above-mentioned advanced translation of textbook, the shifting schedule of lecturers from Japanese Experts to Indonesian staffs has been showing a considerably good progress. All the basic or related subjects of syllabus except Sabo technology itself have been lectured by lectures from Gajah Mada University and



Indonesian officials in VSTC or Directorate of Rivers since before. The current state of shifting schedule as to Sabo technology itself can be shown in another table :

Shifting schedule

	'83/'84	'84/'85	'85/'86	'86/'87	'87/'88
Sabo Survey	L.E	L.E	L.E	I.I.S.E <sup>*1</sup>	I.I
Sabo Plan	L.E	L.E	L.E	L.E	I.I
Sabo Implementation	L.E	L.E	L.E	I.I	I.I
Sabo Design	L.E	L.E.I.I <sup>*2</sup>	LE.I.I	L.E.I.I <sup>*3</sup>	I.I
Torrent Hydraulics		L.E	I.I	I.I	I.I
Hydraulic Model Test	S.E	S.E	S.E.L.E <sup>*4</sup>	S.E.I.I <sup>*5</sup>	I.I

- \*1 only aerophoto interpretation by short-term expert
- \*2 lecture by indonesian, practice by long-term expert
- \*3 only practice of channel work by long-term expert
- \*4 lecture by long-term expert, practice by short-term expert
- \*5 only practice by short-term expert

(3). Positive effect on the participants of training courses

With the advance of provision of instruments such as hydraulic experimental channel, not only the participant to the Intensive Course but also assistant lecturers seems to be much more interested in Sabo or Sabo engineering than before. Actually the hours of Hydraulic Model Test in Intensive Course this year amount to 52 hours in total, as against 24 hours of those hours last year. Also, the lectures on the subject of socio-economy is thought to have given an affectual consequences to the participants of Comprehensive Course who were in their final stage of the study.

Thus, it is almost sure that such additional lectures which was given by short-term Experts as quoted above, on the top of usual lectures by Long-term Experts will be enough to stimulate further development. Eager attitude of participants and staff in VSTC is hoped to be kept up with.

(4). Consequitively compact content of Intensive Course

The term of Intensive Course in 1985/1986 has been confined to four months just as last year because of limited number of executive engineers in project offices, unvaried situations since before. In light of the purpose as mentioned in R/D, however, the curriculum has been devised or arranged so that equal effect should be brought about. Consequently, the content of lectures and practices can be said very compact apart from usual case.

As compared with those of last year, lecture hours this year were as shown below :

	'84/'85	'85/'86	increase/decrease
for BASIC SUBJECTS	204	170	- 34
for APPLIED SUBJECTS	355	398	+ 43
Total	559	568	+ 9

Namely, the lecture hours for applied subjects increased, but hours for basic subjects decreased a little. This comes from a substantial necessity for applied subjects such as hydraulic model test especially for torrential sediment flow, special lecture on the design of Sabo channel work and so on. As a whole, the effectiveness of this Course for four months is considered almost the same with that for six months.

Contrary to above-mentioned fact it is hardly possible to appreciate the consequence of Comprehensive Course even though an original difficulties involved in this Course had been taken into account. The theme has been divided into seven themes or chapter as seen in the attached paper-2. Among them, theme 1, 2, 3 and 6 can be said to have been fulfilled as a matter of fact and

theme 4, 5 and 7 have been left in unsatisfied condition until quite recently. The circumstances surrounding this Course, however, are likely being improved to a considerable extent because a settled atmosphere and prospective finalization of the study can be seen among those concerned. The rest will be finished within December.

FEASIBILITY STUDY AND DETAIL DESIGN ON KALI PUTIH AND KALI KRASAK  
=====

By Comprehensive Course Members

Ir. Chandra Hassan  
Ir. Haryono  
Ir. Sudarminto  
Ir. Supandiyo  
Ir. Soeryono Haryadi  
Ir. Putu Gelgel  
Ir. Puspahadi

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- 7.2.3. Decision on damage ratio
- 7.2.4. Direct damage disicion on direct damage
- 7.2.5. Indirect damage dication on indirect damage
- 7.2.6. Other benefits

## 7.3. Cost Estimation

- 7.3.1. Method of cost estimation
- 7.3.2. Designs and quantity
- 7.3.3. Land acquisition
- 7.3.4. Total cost of new Sabo facilities

## 7.4. Implementation of the Planned Facilities

- 7.4.1. Construction method
- 7.4.2. Construction schedule
- 7.4.3. Financial schedule

## 7.5. Evaluation

- 7.5.1. Economic evaluation
- 7.5.2. Social evaluation
- 7.5.3. Total evaluation
- 7.5.4. Summary and recommendation

#### 4-3. Comment on the Situation of Technical Development

##### (i). Appropriate method of construction

Three of intended subjects have been studied so as to get reach to the target until the end of project period. The progress of investigation of research study is not always rapid, comparing with elapse of the time. Those who are concerned are hoped to catch up with the original schedule. We can suggest the key points for each subject so that they can work out the better result.

- (1). As for "strengthened concrete", a certain sophisticated, indoor experiment should be considered to examine the resistability against abrasion due to sediment flow as well as field test at jobsite. Shock or impulse-proof concrete will be taken up as a subsequent subject from actual view-point of resistable concrete against debris/mud-flow.
- (2). As for "flexible way of construction", the detailed matters of gabion have been taken up to investigate with a view to improve the currently prevailing way of construction. That can be said to be appreciated. But on the other hand there must happen some practical difficulties because of construction cost, regulations as to factory product of gabion, etc. In order to increase the possibility of successful result, we will propose a most-likely way of application before long, within this F.Y., based upon comparative study with the regulation or industrial standard of gabion in our country.
- (3). As for "vegetative way of construction", we are still under the preliminary state of investigation. Some of locally dominant species of grasses and bush trees are now envisaged to be examined for practical use at jobsite.



(ii). Forecasting and warning system

- (1). It is absolutely essential for these who are engaged in actual job to understand aim method and process of the program with their full recognition.

It is also necessary to present the interim report and the final report. And it is desirable that the result of research should be presented on a scientific journal such as "SHIN SABO", from time to time.

- (2). Technical development should be made progress in cooperation with all Sabo Projects in Indonesia. In order to make a good relationship between VSTC and each project especially Mt. Merapi Project, it is expected to hold regular meeting between them.
- (3). It is a very important problem how to maintain those observation equipments such as the Radar Raingauge and Telemetering Rain and Water-level Gauges. We have to pay attention not only to the analysis of data but also the maintenance of equipments.
- (4). The Radar Raingauge should be working whole day at least during rainy season.

#### 4-4. Comments on the Management Matters

##### 4-4-1. Machinery and Equipments

- (i). The Custom clearance period of provided Machinery and Equipments

In case of donated equipments arrived at Jakarta on May 1985, in F.Y. 1984/1985, about one month was increased compared with the case of last fiscal year. These cases should be avoided in next fiscal year by the efforts by the Indonesian officials concerned.

- (ii). The Installation of Equipments

Because of delay of the custom clearance, both Indonesian and Japanese are forced to install the equipment for the mud-flow forecasting pilot system before the rainy season starts. Fortunately, in spite of lack of counterparts personnel we have succeeded to instal them due to the big efforts of a few Indonesian Counterparts and Japanese short-term experts and also due to the delay of rainy season.

- (iii). Maintenance System of these Equipments

The Section for Maintenance of these Equipments should be added to the present organization of VSTC, in order to make clear the responsibility of maintenance for regular checking system and trouble shooting and so on.

In addition to maintenance system, the regular and daily running system should be considered deeply and should be organized by consulting with Japanese Experts, of course, Indonesian side should prepared the budget for maintenance system and the regular and daily running system.

- (iv). Spare parts and articles of consumption for these provided equipments

A few years later from the end of the cooperation period, we can easily imagine, VSTC will be faced to the trouble of lack of spare-parts and articles of consumptions. To solve this problem, VSTC should find ways for supply them to VSTC itself in Indonesia and prepare the budget for them.

Concurrently, VSTC should ask JICA to supply spare parts and consumption material for three years consumptions until the end of this cooperation.

For this purpose, VSTC are forced to make the list of spareparts and articles of consumption and to make the official requests to Japanese Government until the end of this fiscal year, because of the budgetary system of Japan.

#### 4-4-2. Facilities Arrangement

- (i). Facilities arrangement by Indonesian Government

According to the Record of Discussion, Indonesian Government will take the necessary measures to consolidate the whole facilities for VSTC Project at its own expense.

In spite of severe budgetary circumstances which VSTC has faced, one more Sabo laboratory for geotechnics are now under construction and it is expected to be completed within F.Y. 1985/1986.

- (ii). Grant Aid assistant by Japanese Government

For the further development and future plan of VSTC, Indonesian Government has made an official request of Grand-Aid assistance to Japanese Government. In order to realize this request, VSTC are forced to make the more precise, detailed and practical plan of further and future development of VSTC consulting with Japanese Experts, for

instance, this plan should consist of the clear purpose and machinery and indispensable necessity of facilities and equipments and so on.

4-4-3. Establishment of Job Execution System and its Responsibilities

Even if there is lack of Maintenance Section, the clear and effective organization of VSTC has been established in this fiscal year as mentioned before by Ir. Subarkah. The real and present situation of VSTC, frankly speaking, is not enough and adequate for the actual operation and execution of VSTC, due to lack of staff who can execute and understand their duty and their responsibilities.

To cope with this situation, one solution is to increase staff in VSTC. However, by severe budgetary circumstances and constant-regular-officials regulation, we can easily imagine, it takes a long-time to solve this situation by increasing staff. Therefore, another way must be selected for near future solution, that is, simple duty-succession system and clear clarified responsibility for their duty, like as follows :

- i. early decision of duty-successor
- ii. clear succession of duty and responsibilities
- iii. clear clarified responsibility for their duty
- iv. early information of the successor and other to staff and Japanese experts

4-4-4. The preparation of budget by Indonesian Government

- i. to cope with the decrease of local-cost expenditure by JICA
- ii. to cope with the grand-aid assistance
- iii. to cope with the daily and regular running and maintenance cost
- iv. Others



4.2 VSTC 機構, スタッフ一覧

