

**Seminars on Trench Excavation Works  
at the Sites of Cagsawa and Sto. Domingo  
(March 10 – 12, 1999)**

**1. Background**

In the specifications of the Study, core-drilling surveys are contemplated to examine the foundation of the proposed structure, the magnitude of pyroclastic and debris flow and the potential of unstable materials. The first field survey conducted in October to December 1998 indicates that the sites are formed by sand and gravel and the foundation has sufficient bearing force for structure. The surveys also indicate that core drilling is not recommendable because of boulder. Meanwhile the deposits of unstable materials should be enumerated taking large view through the interpretation of satellite image rather than core drilling in view of the wide spread of material.

In order to investigate the magnitude of the eruptions, the trench excavation survey on the trench wall at the supposed end of pyroclastic flows is one of the most realistic methods. The Study Team prepared a technical specification for the survey and duly contracted with Apex Builder. The excavation works commenced on 9 February 1999.

**2. Trench Survey Plan**

**2.1 Method**

The trace of an eruption enunciates the magnitude of the eruption. The eruption of Mayon Volcano has developed its mountain slope by lava flow pyroclastic flow ash fall and mud and debris flow. Accordingly geologic analysis of the layer afford to specify the development process of the formation.

There are lots of outcrops of layer in the upstream reach of the river channel. A volcano-geologist surveyed such outcrops during the first field works period (from 1 October to 15 December 1998).

No such outcrop is found in the downstream reach of rivers, around 8 to 10 km from the crater of the Volcano, where pyroclastic flow or ash fall reached and deposited debris thereof. However mud and debris flows occurred later have covered the deposit several times. Thus the layer comprises the deposit by pyroclastic flow implies the magnitude of the eruption. The trench excavation method is applied to provide a man-made outcrop of layer so that the volume of the pyroclastic flow deposit can be estimated.

## 2.2 Objectives of the Works

Trench excavation survey was carried out around the Mayon Volcano to investigate the layer of soil to estimate the situations and magnitudes of the eruptions occurred in 1814 and 1898 eruptions.

## 2.3 Location and Quantity of the Works

The above trench excavation surveys were carried out at the following two (2) sites. Locations of the site to be surveyed are shown in Figure 1. The Engineer shall instruct the precise sites for trench works at the field.

Location	Qty	Depth (m)	Access (m)	Volume (m <sup>3</sup> )
1. Near Cagsawa Ruins	1	15	75	20,300
2. Near downstream of Basud River	1	10	50	4,700
Site reconnaissance surveys at the upstream reaches of the Basud river and the Budiao river are recommendable				
Grand Total	2	25	125	25,000

## 2.4 Design of Trench

The Study Team designed the trench. According to the design, the trench shall have the sufficient depth to estimate the deposition depth of pyroclastic flow. The depth of Cagsawa ruin was designated to be 15m since the Cagsawa ruin was said to be buried for 10 to 12 m. Meanwhile, no record is available with regard to the deposition depth for Santo Domingo. The deposition depth of debris by pyroclastic flow is less than 5 m in general. There is no record that deposit of mud and debris flow covered the pyroclastic deposit. Consequently the depth of 10 m is judged lobe sufficient. Design drawings of trench are shown in figure 2 and 3.

The soil are sand and gravel in general for both sites. And the excavated slopes are designated as follows:

- Cagsawa : 1:1.5 or more
- Santo Domingo : 1:1.2 or more

A berm with a width of 1 m is provided at 5 m interval to secure the stability of the slope and the convenience of surveys. The bottom of the trench has the width of 3.5 m to afford space for the heavy equipment to excavate, to turn, to haul the excavated material and to load. The slope of the access is 1:5 for the convenience of conveyance.

The estimated excavation volumes are;

- Cagsawa : 20,300 cubic meter
- Santo Domingo : 4,700
- Total : 25,000

Figure 2 shows the designed plan and profile of the trench excavation in Cagsawa. Meanwhile Figure 3 shows that of Santo Domingo.

## 2.5 Geologic Survey

Geologic surveys were conducted on the natural outcrops and excavated slopes focussing on the order of the layer, external from of the materials and formation structure. And the interpretation thereof enables to specify the year of deposit, cause of deposit and the magnitude of the deposit. Surveys on natural outcrops are to be carried out at:

- Upstream reach of the Budiao river or the Anoling river
- Upstream reach of the Basud river

## 3. Work Schedule and Work Items

### 3.1 Excavation Works

- Commencement dates of the works:
  - Cagsawa : 9 February 1999
  - Santo Domingo : 10 February 1999
- Completion of the works : March 1999 for both sites
- Utilized heavy equipment:
  - Cagsawa : a bulldozer (21ton) and a backfoe (0.3 m3)
  - Santo Domingo : a backfoe (0.3 m3)

### 3.2 Groundwater

The removal of groundwater from trenches was done using pumps by the Contractor's own

responsibility.

### **3.3 Soil Retaining Works**

Soil retaining works have to be carried out in order to avoid slope collapsing damage on the Contractor's own responsibility after excavation.

### **3.4 Temporary Spoil Bank Yard**

Temporary spoils bank yards are to be prepared close to trench sites so as to accommodate the excavated soil.

### **3.5 Restoration of the Excavated Sites**

After the trench excavation surveys, these two trenches should be filled up immediately.

## **4. Safety Control**

Safety control was strictly carried out, especially paying attention to the following instructions:

- The surface of the excavated trench must be covered by any kind of net to protect the surveyor from the falling stones.
- During precipitation, the surface of the trench must be covered by plastic sheet so that the slope can be retained.
- Fences must be provided along the edge of the trench to avoid intruder from outside.
- Removed soil must be embanked with gentle slope in the temporary spoil bank yard so that collapse can not occur.

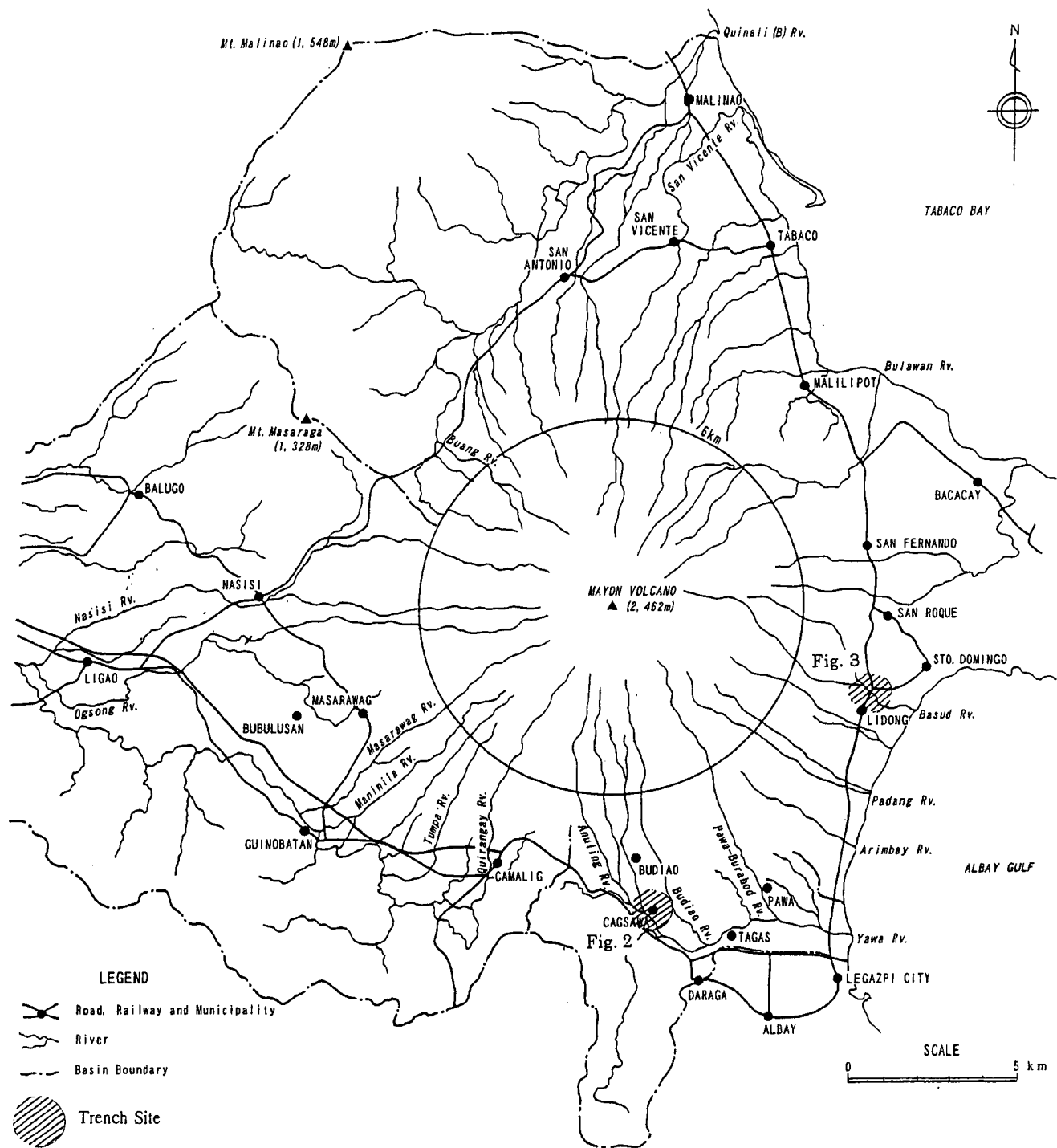


Figure 1 Location Map of Trench Sites

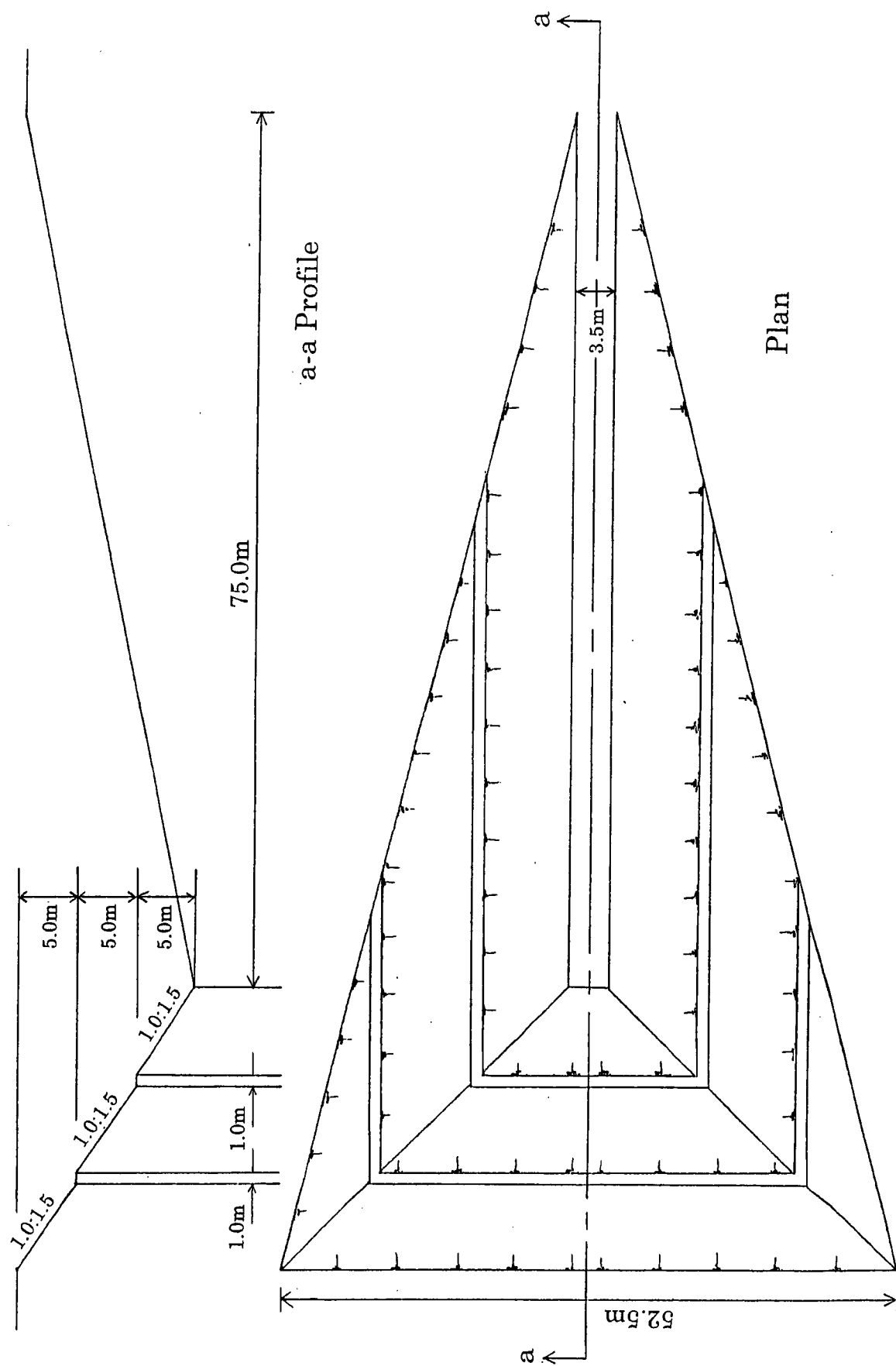


Figure 2 Plan and Profile of Trench Excavation (Cagsawa)

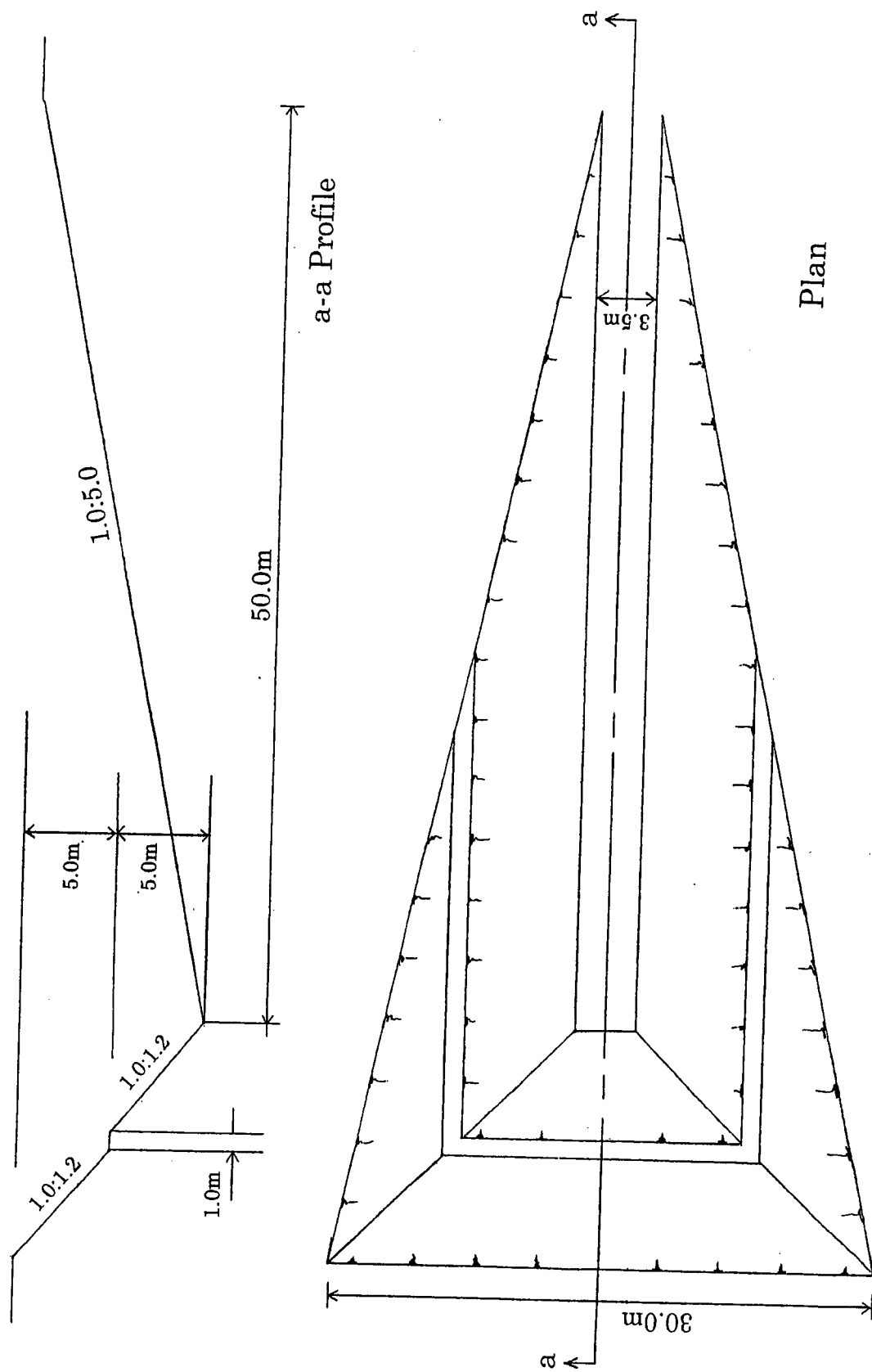


Figure 3 Plan and Profile of Trench Excavation (Sto. Domingo)

**REPORT ON THE 1<sup>ST</sup> TECHNOLOGY TRANSFER SEMINAR  
OF THE STUDY ON COMPREHENSIVE  
DISASTER PREVENTION AROUND MAYON VOLCANO**

Casablanca Hotel, Convention Hall  
Legazpi City  
August 25, 1999

**PROCEEDING:**

- |     |   |   |   |  |
|-----|---|---|---|--|
| (1) | - | Invocation and Pambansang Awit by                                 | - | Engr. Eleonor A. Bertillo  |
| (2) | - | Introduction of Participants from<br>Concerned Agencies - - - - - | - | Engr. Orlando B. Roces<br>Asst. Regl. Director   |
| (3) | - | Opening Remarks - - - - -   | - | Engr. Eleno U. Colinares<br>Regional Director<br>- Mr. Hideki Sato, Team<br>Leader of JICA Study<br>Team |

- Dir. Colinares gave the opening remarks. He said that sometimes beauty is deceiving, like Mayon Volcano which is beautiful but dangerous to the people living nearby Mayon Volcano during eruption. He emphasized the importance of the seminar and suggested punctuality among the participants. He extended the gratitude to the Japanese government through the JICA Study Team in conducting this kind of Seminar in order to prevent disaster around Mayon Volcano. There was a big applause to the Japanese Study Team.

- Mr. Hideki Sato mentioned the study on comprehensive Disaster prevention around Mayon Volcano started last Oct. 1998 and will be completed on July 2000. Hence, we are almost at midpoint of the whole study. He also mentioned that during the meeting at the DPWH Central Office last 23<sup>d</sup> of August, the master plan and priority projects they presented were duly accepted.

The technology transfer seminar is aimed at exchanging views from all participants, providing time for open forum and giving an open-minded opinions or suggestions. He also asked cooperation from both government and Non-government organization in making the study success. He also mentioned that disaster comes anytime, so we have to come on time because disaster will not wait for us.

**(4) - Presentations**

- Mr. Furuichi, Deputy Team Leader of the JICA Study Team presented the



Briefing of Interim Report (Master Plan). By using the overhead projector, he presented and explained chapter by chapter the outline of the “Master Plan on Comprehensive Disaster Prevention around Mayon Volcano”, focusing on their formulated master plan on the basis of the findings and analyses thereof.

- Mr. Laguerta of PHIVOLCS, introduced the historical background of the Mayon Volcano and the disaster brought about by its eruptions since 1814 up to the latest eruption in February 2, 1993.
- Mr. Takayanagi, JICA Study Team explained the following:

- Part I - Hazard Related to Volcano Eruption and Mud and Debris Flow
- Part II - Proposed Mud and Debris Flow control

He explained the changeable topography due to eruption and mud and debris flow in the Part I. Then he briefed the proposed alternative structural plans to prevent life and property of the residents who live in the area to be affected by the hazard.

**(5) – AM Open Forum**

- There was an open forum with the resource speakers
  - Question - Engr. Miraballes referred to Fig. 10-12 (used in Part II) and then asked a question: On the downstream from the proposed structure, there are areas inhabited by the barangay people. What is your proposal for these people? Should they be relocated or not?
  - Answer - It's not necessary to relocate them, because construction of sand pocket will protect the areas.
  - Question - Based on the Master Plan, what are the alternative measures?
  - Answer -
    1. Preventive structures
    2. Evacuation
    3. Resettlement
    4. Forecasting, warning and evacuation
  - Question - Mr. Juan Tulod of NEDA suggested that the history of Mayon Eruption needs analysis. Assessment of Mayon Sabo works constructed in previous years should also be presented. Were they effectively constructed? What happened to previous study? What were the modifications made with previous plan? Give some options.
    - Some programs and projects presented show economic viability of less than 15%. Can you cite some financing

institutions to help us finance these huge projects?

*Answer* - The land situation is changing rapidly. Hence, the Master Plan also should be reviewed. As to funding, we have just started to conduct the feasibility study. Perhaps, we can clarify whether financial assistance is necessary or not in the feasibility study. In this respect, we are quite aware that EIRR of 15% is the border to apply a foreign financial assistance.

*Question* - Engr. Talastas referred to page 59 – Fig. 4 and then asked question. “Why not include in the feasibility study, all the seven (7) rivers in the 1<sup>st</sup> Phase of the Study?

*Answer* - Prioritization of the projects considering the budget allocation, economic feasibility and social impact. Priority programs selected for feasibility study in the 1<sup>st</sup> Phase are also important, then those programs will be investigated in detail in 2<sup>nd</sup> Phase.

*Question* - Is right-of-way included?

*Answer* - Yes, from now on we will conduct an inventory and make local assessment. About this matter, we will make recommendations latter on.

*Question* - Engr. Abareta remarked that DPWH has constructed several sabo facilities but some were destroyed (e.g. sabo dam). What kinds of measures are needed to avoid such collapse of the structures?

*Answer* - River channels are very changeable. We make a plan and proceed to the design, and construct the structures. After several years they are destroyed. We will give more time to study and propose solutions to such situations so that it will not be repeated.

*Question* - After the Feasibility Study, who will prepare the detailed design?

*Answer* - Right now, it's not yet fixed on who will implement.

Mr. Watanabe presented additional information on sustainable disaster prevention (inter-related mechanism) after the open-forum.

- Mr. Sakatani, JICA-DPWH Expert on Sabo with assistance of Mr. Orlando Casio – Bureau of Design (DPWH-Manila) explained the Mechanism of Sediment Disaster. He presented the Hydrological Model Test.

Its demonstration showed how is the sediment flow from Mayon Volcano and its effect to the inhabitants living around Mayon Volcano during disaster.

- Mr. Tachiyama, JICA Study Team presented the Socio-economy Framework (Population and GRDP) using the overhead projector, he explained the present conditions of Study Area, Province and Region.
- Mrs. Cynthia Oreste, BSBI (Bicol Small Business Institute Inc.) presented the result of the questionnaire surveys to the people around Mayon Volcano.
- Dr. Watanabe, Head of JICA Advisory Committee presented the Community Empowerment.
- After the discussion of the topics as scheduled, an open forum followed.

**(6) – PM Open Forum**

Question - (Mr. Tulod of NEDA) Do you have a computer program for the computation of GRDP?

Answer - The method of estimating the GRDP is by using Windows Excel and you may just drop by the JICA Office if you're interested to know how it was calculated.

Suggestion - One DILG representative (Mr. Villareal) suggested that the result of 2 surveys conducted by BSBI be furnished to different BDCCs.

- Dr. Ofelia Vega, Executive Director of BSBI recommended that working people of the barangays affected by the disasters may be trained by the TESDA (Technical Education Skills and Development Authority). Through the assistance of the TESDA, they may not be paralyzed during the disaster and after the disaster.

- Some agencies informed that the people affected by disasters are given aide and the kinds of livelihood they are engaged in include livestock, industrial works and others.

Question by Dr. Watanabe

- How much can the Community people contribute to disaster prevention? What's their role?

*Answer by Dr. Vega*

- The respondents of the study belong to depressed areas. Few reached tertiary level education. From experience, when they pack up & leave, there's no enough amount of money to sustain long evacuation. The DSWD, NGO and other agencies have corporate network for disaster response.

**(7) – Closing Ceremony**

- Closing Remarks by Mr. Bernardo P. Aman, Assistant Project Director
- Distribution of Certificates to the participants
- The Seminar ended at 5:20 PM.

Notes Taken by: Engr. Eleanor A. Bertillo, Engr. II  
and Yolanda E. AZUCENA, HRMO I  
Verified by: JICA Study Team and Chief of  
Planning and Design Division, DPWH Region-V

**LIST OF PARTICIPANTS TO THE  
1<sup>ST</sup> TECHNOLOGY TRANSFER SEMINAR OF THE  
STUDY OF COMPREHENSIVE DISASTER PREVENTION  
AROUND MAYON VOLCANO  
HELD AT CONVENTION HALL, CASABLANCA HOTEL  
LEGAZPI CITY ON AUGUST 25, 1999**

<b>NAMES</b>	<b>DESIGNATION</b>	<b>OFFICE</b>
<b>A. LINE AGENCIES</b>		
1. Eleno U. Colinares, Jr.	Regional Director	DPWH R.O.V.
2. Orlando B. Roces	Asst. Regional Director	DPWH R.O.V.
3. Vicente A. Miraballes	Engineer III	DPWH R.O.V.
4. Eleanor A. Bertillo	Engineer III	DPWH R.O.V.
5. Bernardo P. Aman	Asst. Proj. Director	PMO-MFCD, Manila
6. Alejandro A. Sosa	Engineer V	-do-
7. Jose T. Abareta	Engineer III	DPWH R.O.V.
8. Dexter I. Atutubo	Engineer III	DPWH R.O.V.
9. Jesus R. Villareal	Asst. Chief, OSD	DILG V
10. Ignacio T. Odiaman	Engineer III	DPWH R.O.V.
11. Orlando M. Casio	Engineer III	DPWH-Manila
12. Benjamin G. Buitre, Jr.	Engineer III	DPWH R.O.V.
13. Minda L. Pineda	CARDO	DAR V
14. Orlando S. Arevalo	CDO	OCD V
15. Felix M. Armena	PO III	DSWD V
16. Ma. Julie Cristina Lorbes	TIDS	DTI V
17. Cristeta E. Mesias	Engineer "A"	NIA-Albay
18. Eduardo Laguerta	Resident Volcanologist	PHILVOCS
19. Rosy A. Cantara	Engineer III	DPWH R.O.V.
20. Eduardo B. Talastas	Engineer V	DPWH R.O.V.
21. Alexander Mandac	CDO II	OCD V
22. Alejandro C. Dolot	Engineer III	DPWH R.O.V.
23. Feliciano M. Medina	Engineer III	DPWH R.O.V.
24. Teodoro D. Donor	Engineer III	DPWH R.O.V.
25. Romeo F. Cielo	Engineer III	DPWH R.O.V.
26. Guillermo Tulod	CEDS	NEDA V
27. Alex M. Rogando	Engineer IV	DPWH R.O.V.
28. Edwin C. de la Cruz	Architect IV	DPWH R.O.V.
29. Godofredo P. Beltran	Engineer IV	DPWH R.O.V.
30. Hillery O. Lucila	Engineer V	DPWH R.O.V.
31. Isabel Cruz	Sec. To the JICA River/ SABO Experts	DPWH Manila
32. Mila Mateum-Rico	Economist II	DPWH R.O.V.
33. Ma. Fe Valenzuela	Eng'g, Asst.	DPWH R.O.V.
34. Yolanda Azucena	HRMO I	DPWH R.O.V.
35. Anita Z. Palima	HRMO III	DPWH R.O.V.
36. Eduardo Dacuno		DPWH R.O.V.
37. Agaton Espares		DPWH R.O.V.

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<b>NAMES</b>	<b>DESIGNATION</b>	<b>OFFICE</b>
<b>LGUs/NGO</b>		
1. Cedric Daep	Department Head	PDMO-Albay
2. Manuel S. Realuyo, M.D.	Operator PDCC	PDMO-Albay
3. Rodrigo U. Bilan	MPDC	Malilipot
4. Alfredo Escoto, Jr.	Executive Assistant	Malilipot
5. Rey Benedict Rico	Engineer III	City Planning-Legazpi
6. Francisco Bron, Sr.	Asst. Prov,l Agriculture	PAS-Albay
7. Romeo S. Cabria	MPDC	Sto. Domingo
8. Hermez S. Austero	MPDC	Malinao
9. Juan G. Rivera	Municipal Mayor	Guinobatan
10. Tirso C. Paguio	MPDC	Sto. Domingo
11. Juan D. Berces	MPDC	Tabaco
12. Anselmo Cerdino	PDO II	Tabaco
13. Simeon A. Sato	Planning Officer	Malinao
14. Loida H. Onate	MPDC	Daraga
15. Cynthia C. Oreste	CEO	BSBI
16. Dr. Ofelia S. Vega	President	BSBI
<b>OTHERS (Japanese Experts)</b>		
1. Masayuki Watanabe	JICA Advisory Committee	JICA
2. Yukihiro Sakatani	JICA-DPWH Expert	JICA
3. Hideki Sato	JICA Team Leader	JICA
4. Fumihiko Furuichi	JICA Study Team	JICA
5. Norio Takayanagi	JICA Study Team	JICA
6. Kiminari Tachiyama	JICA Study Team	JICA
7. Shinichi Fukasawa	JICA Study Team	JICA

**Schedule for  
the 1<sup>st</sup> Technology Transfer Seminar  
of the Study  
on Comprehensive Disaster Prevention around Mayon Volcano**

**1. Date : 25 August, 1999**

**2. Venue : Casablanca Hotel, Convention Hall**

**3. Participants : around 50 persons**

- 1) Mayors and/or City/Municipal Planning and Development Coordinators of the ten Municipalities concerned in the Study Area
- 2) Representatives of the central, regional and provincial government agencies (especially those engaging in the disaster-related activities and area development planning)
- 3) Representatives of the interested organizations like NGOs & POs, the private sector and international institutions

**4. Agenda**

- 1) 8:00 A.M. — 8:15 A.M. : Registration
- 2) 8:15 A.M. — 8:30 A.M. : Opening Ceremony
- 3) 8:30 A.M. — 9:10 A.M. : Opening Remarks

(By Mr. Eleno U. Colinares, Director of DPWH,  
Region V and Mr. Hideki Sato, Team Leader of  
JICA Study Team)

- 4) 9:10 A.M. — 9:50 A.M. : Briefing of Interim Report (Master Plan)  
*(By Mr. Furuichi, JICA Study Team)*
- 5) 9:50 A.M. — 10:10 A.M. : Break

- 6) 10:10 A.M. — 10:50 A.M. : Introduction of the Historical Eruption Records of Mayon Volcano and Its Observation System  
(by Mr. Laguerta, PHIVOLCS)
  
- 7) 10:50 A.M. — 11:30 A.M. : Part I : Hazard Related to Volcanic Eruption and Mud & Debris Flow  
Part II : Proposed Mud & Debris Flow Control  
(by Mr. Takayanagi, JICA Study Team )
  
- 8) 11:30 A.M. — 12:00 A.M. : Open Forum with the Resource Speakers
  
- 9) 12:00 Noon — 1:00 P.M. : Lunch
  
- 10) 1:00 P.M. — 1:40 P.M. : Mechanism of Sediment Disaster(Hydrological Model Test)  
(By Mr.OrlandoCASIO, Bureau of Design, DPWH)
  
- 11) 1:40 P.M. — 2:20 P.M. : Socio-economy Framework (Population & GRDP)  
(By Mr. Tachiyama, JICA Study Team)
  
- 12) 2:20 P.M. — 3:00 P.M. : Results of the Questionnaire Surveys to the People around Mayon Volcano  
(By Ms. Cynthia Oreste , BSBI)
  
- 13) 3:00 P.M. — 3:20 P.M. : Break
  
- 14) 3:20 P.M. — 4:00 P.M. : Community Empowerment  
(By Dr. Watanabe, Head of JICA Advisory Committee)
  
- 15) 4:00 P.M. — 4:30 P.M. : Open Forum
  
- 16) 4:30 P.M. — 5:00 P.M. : Closing Ceremony



## Evaluation of the 1<sup>st</sup> Technology Transfer Seminar by the Participants

Total Number of the Philippine Participants: 53

Total Number of the respondents: 34 (64.2% of All Participants)

Questions	Number of Responses	Percentage (%)
<b>Q.1 Impression</b>		
1. Excellent	5	14.7
2. Very Good	22	64.7
3. Fairly Good	6	17.7
4. Not So Good	0	0
5. No Answer	1	2.9
Total	34	100.0
<b>Q.2 Reasons for Q.1*</b>		
<b>For Excellent</b>	6	100.0
1. Delivering excellent knowledge	3	50.0
2. Nice venue, nice food	2	33.3
3. Well organized presentation	1	16.7
<b>For Very Good</b>	23	100.0
1. Speakers' expertise	7	30.4
2. Gaining new ideas	4	17.4
3. Good explanation	3	13.0
4. Gaining expected ideas	3	13.0
5. Good venue	3	13.0
6. Covering disaster preparedness and mitigation	2	8.7
7. Providing basic information about preparation of Master Plan	1	4.3
8. No Answer	3	
<b>For Fairly Good</b>	4	100.0
1. Insufficient Time	3	75.0
2. Insufficient Explanation	1	25.0
<b>Q.3 Interesting Subject*</b>		
1. Briefing of Interim Report (Master Plan)	12	30.8
2. Questionnaire Surveys to the People around Mayon Volcano	8	20.5
3. Proposed Mud and Debris Flow Control	7	17.9
4. Community Empowerment	5	12.8
5. Demonstration	4	10.3
6. Hazard Related to Volcano Eruption and Mud and Debris Flow	2	5.1
7. Socio-economy Framework	1	2.6
8. Historical Background of the Mayon Volcano	0	0
Total	39	100.0
9. All Subjects	4	

10. No Answer	2	
Questions	Number of Responses	Percentage (%)
<b>Q.4 Finding of the Seminar*</b>		
1. Very good occasion to get the latest information about the disaster prevention	24	43.7
2. Very good for getting the consensus among the agencies and staffs concerned	12	21.8
3. Very good to exchange opinions and views among the participants	17	30.9
4. Others		
a. Occasion to obtain stakeholder's opinion and attitudes on the current state of disaster preparedness	1	1.8
b. Occasion to relay information and suggestions to prioritize in the study component	1	1.8
Total	55	100.0
<b>Q.5 Opportunity to learn something useful</b>		
1. Yes	33	97.1
Yes with reason	(23)	(67.6)
2. No	0	0
3. No Answer	1	2.9
Total	34	100
<b>Reasons for Yes</b>		
1. Gaining insight for disaster prevention.	7	30.4
2. Gaining useful information for current and future work	7	30.4
3. Gaining new information (i.e. GRDP)	6	26.1
4. Gaining information of new technology	3	13.1
Total	23	100.0
<b>Q.6 Suggestions to improve the Seminar</b>		
1. Allot more time to each topic	10	38.5
2. Stick to schedule	4	15.4
3. Introduce technology based topic	4	15.4
4. Use more visual aids	3	11.5
5. Invite people affected by disaster	2	7.7
6. Distribute handout in advance	1	3.8
7. Improve speakers' English	1	3.8
8. Discuss only significant issue	1	3.8
Total	26	100.0
9. No Answer	9	

Questions	Number of Responses	Percentage (%)
<b>Q.7 Expectation for 2<sup>nd</sup> Seminar in May 2009</b>		
1. Focus on technology behind the proposed structural measures	4	22.2
2. Show different solutions or alternatives to prevent or mitigate disaster	3	16.7
3. Focus more on preparedness and mitigation	3	16.7
4. Continue the same topic delivering new information	2	11.1
5. Focus more on livelihood program, resettlement plan at the barangay level	2	11.1
6. Evaluate the performance of the previously completed structure	2	11.1
7. Focus more on mechanism of socio-economic in relation to evacuees	1	5.6
8. Introduce more modern equipment to forecast disaster	1	5.6
Total	18	100.0
9. No Answer	11	

<b>Q.8 Suggestions and expectations regarding the JICA Study</b>		
1. Discuss more deeply on both structural and non-structural measures	5	20.8
2. Implement the outcome of the Study as soon as possible	4	16.7
3. Include the effect of the infrastructure constructed previously	3	12.5
4. Present more detailed O&M plan	3	12.5
5. Reassess the priority projects	2	8.3
6. Accompany design with the proposed structures	2	8.3
7. Present several options regarding measures	1	4.2
8. Familiarize local needs	1	4.2
9. Gain new information to improve disaster preparedness	1	4.2
10. Coordinate with related agencies in conceptualizing the needs on disaster related project	1	4.2
11. Conduct the study more fully	1	4.2
Total	24	100.0
12. No answer	10	

Note: \*Multiple Answer