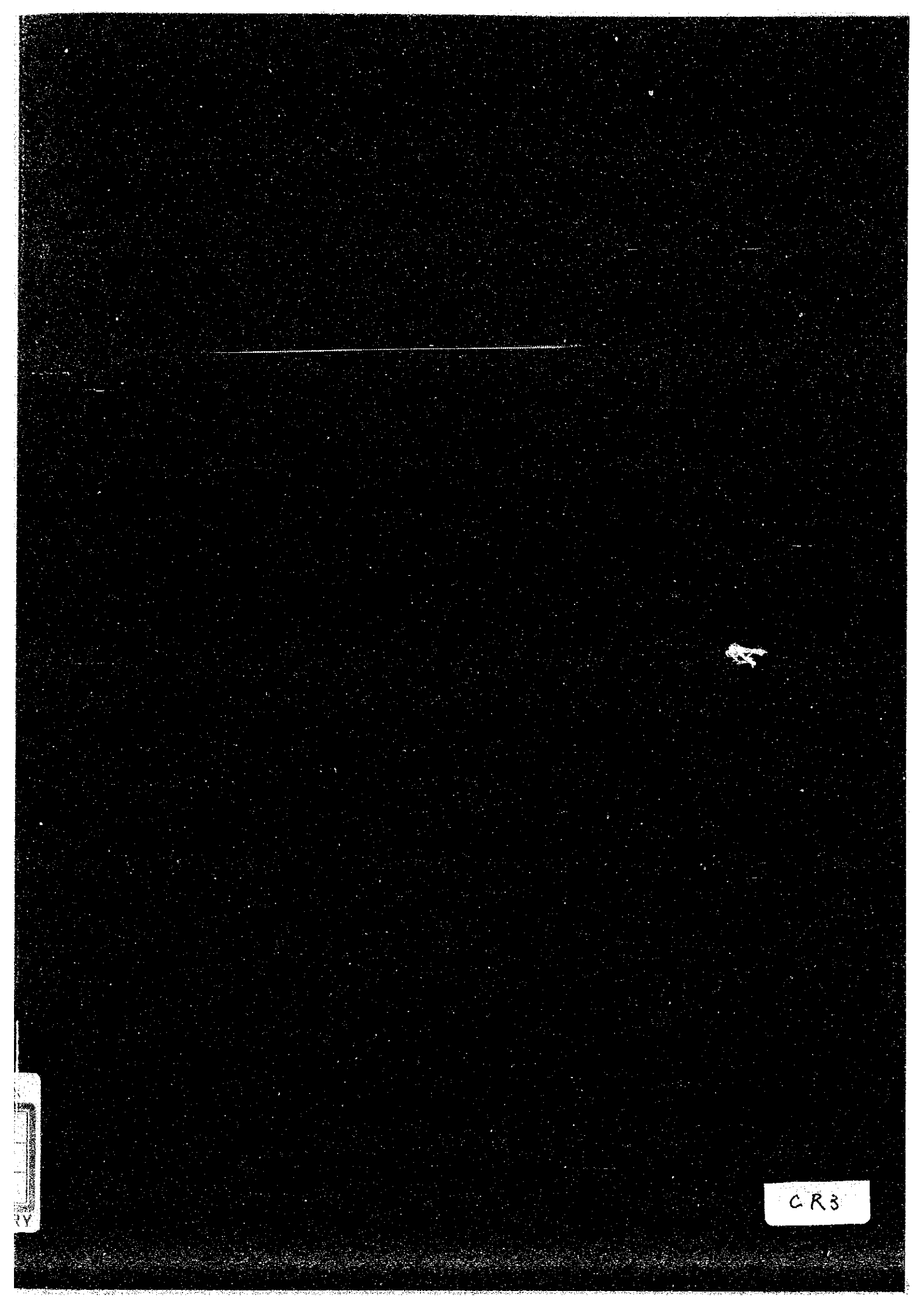
BASIC DESIGN STUDY REPORT
ON
PROVISION OF HEAVY EQUIPMENT
AND SPARE PARTS FOR
MT. PINATUBO RELIEF
AND REHABILITATION OPERATION
IN
THE REPUBLIC OF THE PHILIPPINES

FEBRUARY 1992

JAPAN INTERNATIONAL COOPERATION AGENCY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PREFACE

In response to a request from the Government of the Republic of the Philippines, the Government of Japan decided to conduct a basic design study on provision of heavy equipment and spare parts for Mt. Pinatubo relief and rehabilitation operation and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to the Philippines a study team headed by Mr. Koichi Miyoshi, Director, Second Basic Design Study Division, Grant Aid Study & Design Department, JICA, from September 29 to October 18, 1991.

The team held discussions with the officials concerned of the Government of the Philippines and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to the Philippines in order to discuss the draft report and the present report was prepared.

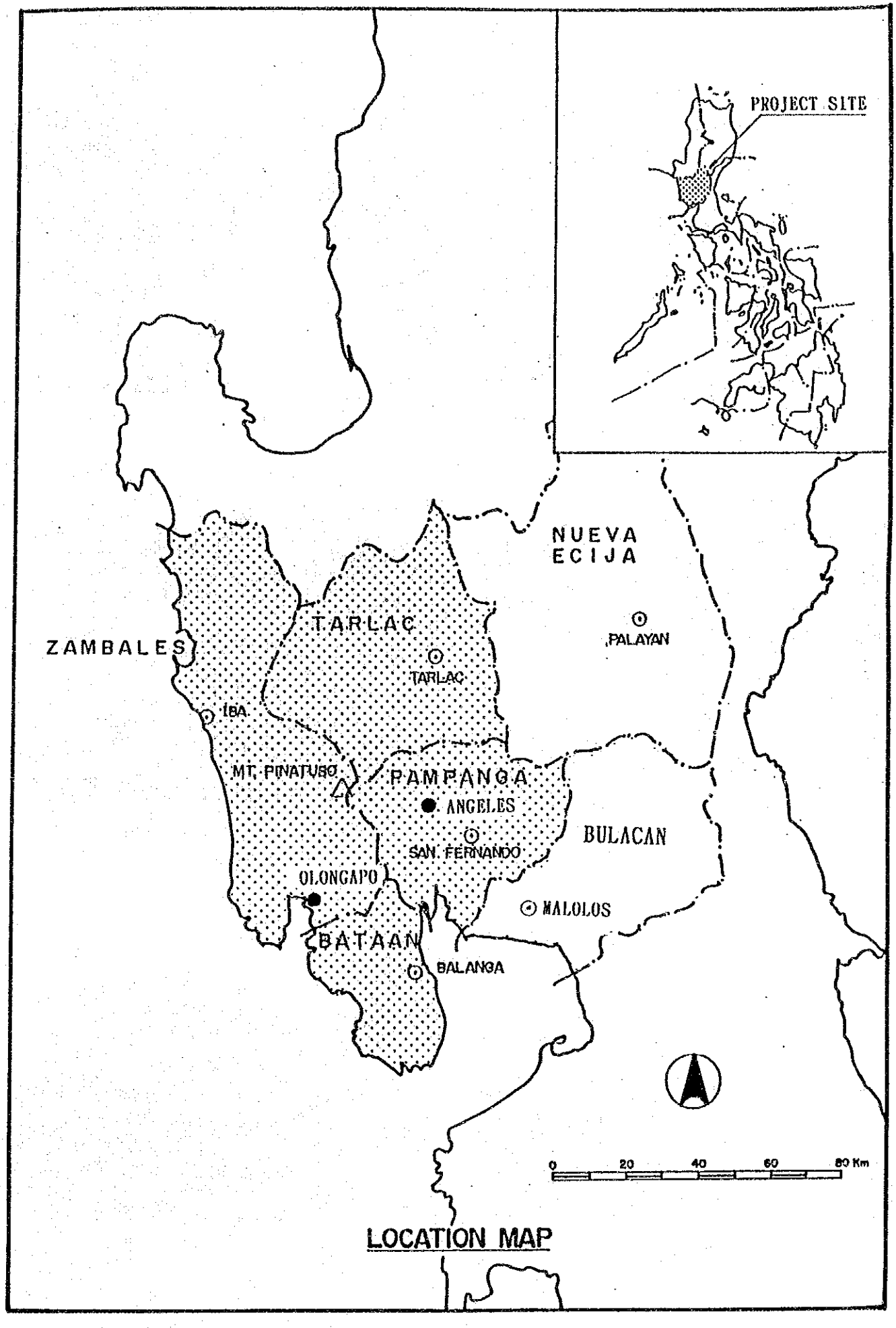
I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between the two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of the Philippines for their close cooperation extended to the teams.

February, 1992

Kensuke Yanagiya

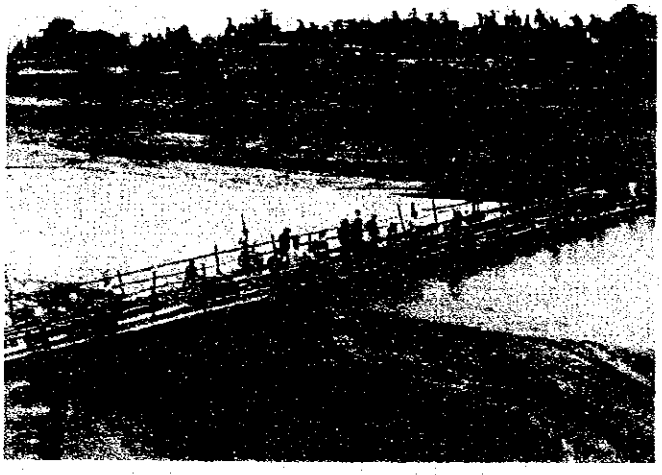
Kensuke Yanagiya
President
Japan International Cooperation Agency



LOCATION MAP

Flood Damage

Flood Damage



Temporary Bridge

Constructionof Tentative Bridge

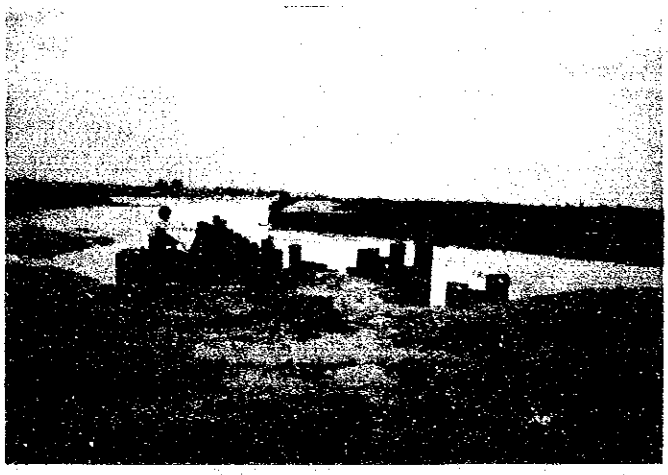
House Destruction

Evacation Center

Riverbed Excavation

Gabion Net

Protection by Sand Bag



Protection by Sheet Pile

Road Embankment at Overflow Area

Temporary Bridge

S U M M A R Y

After 611 years of dormancy, and on 12 June 1991, Mt. Pinatubo which is located on the boundary of three provinces -- Pampanga, Zambales and Tarlac in Luzon Island, unleashed a series of eruptions resulting in the ejection of massive volcanic debris, which are said to be the biggest in this century. Heavy rains triggered mudflows which have buried populated areas and farmlands and seriously damaged infrastructures including roads, bridges and river systems. It is supposed that the damages will long in the foot of the mountain.

The Government of the Philippines has responded to the calamity. Four committees, ie., Infrastructure Committee, Resettlement Committee, Livelihood Committee and Social Services Committee, have been organized, corresponding to the major concerns of the Task Force on the Rehabilitation of Areas Affected by Eruption of Mt. Pinatubo and its Effects, and inaugulated the respective approach to the rehabilitation works.

The Department of Public Works and Highways under the Infrastructure Committee has started the rehabilitation works of the damaged infrastructure especially roads, bridges and adjoining river systems. However, the program is estimated to require a lengthy project duration to cover extensive damaged area due to absolute lack of equipment to be utilized.

In this context, the Government of the Republic of the Philippines requested the Government of Japan to provide heavy equipment for Mt. Pinatubo Relief and Rehabilitation Operation in the affected area. This aims at providing equipment to facilitate relief and rehabilitation works of infrastructure, and revitalize the socio-economic activities.

In response to the request of the Government of the Philippines, the Government of Japan decided to conduct the Basic Design Study of the Project for Providing Heavy Equipment and Spare Parts for Mr. Pinatubo Relief and Rehabilitation Operation in the Republic of the Philippines, and Japan International Cooperation Agency (JICA) sent to the Philippines the Basic Study Design Team from September 29 to October 18, 1991.

The Study Team executed the field survey consisting of reviewing the background and objectives of the Project, investigating the devastation and the effect on the socio-economic recovery in the affected areas, and evaluating the propriety as Japan's Grant Aid. Also, the Study Team collected the necessary data for basic design of the Project, and inspected the construction field.

Based on the survey and collected data, the Study Team carried out the analysis in Japan which consisted of reviewing the necessity, urgency, propriety, socio-economic impact, organization of exiting agency for the Project, selecting the type of required equipment and analyzing the number of required equipment.

JICA prepared the draft final report of the Basic Design Study based on the results of the field survey and the analysis in Japan, and dispatched an Explanation Team for explaining and discussing the report from December 8th to December 15th, 1991.

The Study Team prepared the basic design considering the magnitude of relief and rehabilitation works, construction condition and environmental condition. Based thereof, the type and number of equipment were selected as shown in the following table.

LIST OF EQUIPMENT

TYPE OF EQUIPMENT	QUANTITY
1. Earth Moving Equipment	
1.1 Crawler Tractor (Bulldozer)	10
1.2 Crawler Tractor (Swamp Bulldozer)	9
1.3 Towed Scraper	10
2. Earth Excavator	
2.1 Hydraulic Excavator	10
3. Material/Equipment Transportation	
3.1 Truck Mounted Crane	8
4. Other	
4.1 Gabion Fabrication Machine	1
4.2 Jack Hammer	4
4.3 Diesel Hammer	4
4.4 Mighty Mite (Equiv.) Multi Purpose Maint.	7
4.5 Sewer Vacuum	2
5. Spare Parts	15%
Total Number of Equipment	65

The time period required for the detailed design, procurement and construction supervision are estimated to be five (5) months, seven (7) months and eight (8) months, respectively.

The executing agency of the Government of the Philippines for the Project is the Department of Public Works and Highways. The Task Force for Mt. Pinatubo Rehabilitation Projects created in the Department shall be responsible for the operation and maintenance of the equipment provided under the Project. The equipment shall be limited to be utilized for the relief and rehabilitation works of the devastations brought about by Mt. Pinatubo eruptions.

The provinces that will receive benefit are 4 provinces and 2 cities around Mt. Pinatubo. The Project will not only contribute in facilitating the relief and rehabilitations program, but also improving the living standard of people and revitalizing socio-economic activities in the affected area.

The mission, therefore, judges that the Project has the significance to be executed under Japan's Grant Aid.

Meanwhile, careful attention shall be paid, for effective execution of the Project, to the following points:

1) Construction of gabion factory
2) Operators for each equipment
3) Budget for maintenance and management

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CHAPTER ONE

INTRODUCTION

CHAPTER 1

INTRODUCTION

In June 1991, Mt. Pinatubo erupted. Large volumes of pyroclastic rocks have fallen down to the surrounding area and the ash debris has flown down together with heavy rainfall by typhoon in the monsoon season, formed mudflows and greatly damaged the resident area, farm land and the public facilities such as road and bridge in the provinces of Zambales, Pampanga, Tarlac and Bataan.

The Government of the Philippines has responded to the calamity. Four committees, ie., Infrastructure Committees, Resettlement Committee, Livelihood Committee and Social Service Committee have been organized, and each committee has been working for rehabilitation of the damages in the respective field. Among the rehabilitation projects, the Department of Public Works and Highways (DPWH) under (control of) the Infrastructure Committee has entered upon rehabilitation work of infrastructure facilities, especially bridges, road and river system damaged by the eruption, putting available construction machines not only of Region III but from other region. However, equipment owned by DPWH is insufficient in comparison with the magnitude of the damages, and the equipment do not work enough due to lack of spare parts. In this context, the Government of the Republic of the Philippines requested the Government of Japan to provide heavy equipment for Mt. Pinatubo Relief and Operation in the affected area.

In response to the request of the Government of the Philippines, the Government of Japan decided to conduct the Basic Design Study on the project for provision of heavy equipment and spare parts for Mt. Pinatubo relief and rehabilitation operation in the Republic of the Philippines. Japan International Cooperation Agency (JICA) dispatched the Basic Design Study Team headed by Mr. Koichi Miyoshi, Director of Second Basic Design Study Division, Grant Aid Study & Design Department, JICA from

September 29, 1991 through October 18, 1991 for the field investigation.

The Basic Design Study Team reviewed the background, objectives and contents of the Project, collected the related data and inspected the conditions of both equipment maintenance and damaged areas. As a result of the inspection and analysis of data in Japan, the Study Team executed the tasks of selecting the required heavy equipment and spare parts and the basic design, and reviewed the priority, rapidity and socio-economic impact of the project.

JICA prepared the Draft Final Report of the basic design study based on the results of the inspection and the analysis, and dispatched a mission for explaining the report, headed by Mr. Hiroshi Ohta, Supervising Engineer of Engineering Affairs Management Section, Minister's Secretariat, Ministry of Construction to the Philippines from December 8, 1991 to December 15, 1991.

As the result of the investigation, analysis and explanation of the Draft Final Report mentioned above, this Final Report was compiled in February 1992 to include the implementation arrangement and evaluation of the project. The member list of the study team, survey schedule, member list of concerning parties in the Philippines, minutes of discussions and other information are attached as the appendices of the report.

CHAPTER 2

BACKGROUND OF THE PROJECT

CHAPTER 2

BACKGROUND OF THE PROJECT

2.1 BACKGROUND OF THE PROJECT

2.1.1 General Description of Mt. Pinatubo Eruption

The following is a report issued by the Philippine Institute of Volcanology and Seismology (PHILVOCS), Department of Science and Technology.

(1) General

Location

Mt. Pinatubo is one of the 22 active volcanoes in the Philippines, located at 15°08.70'N and 120°21.35'E on the boundary of three provinces - Pampanga, Zambales and Tarlac. (See Figure 2.1-1).

Topography

Mt. Pinatubo is a part of the chain of volcanoes which borders the western side of Luzon and lies in the central portion of the Zambales Range, a NNW-trending mountain belt that extends 220 km from Lingayen Gulf in the north to Bataan in the South. The other major volcanic centers forming the chain are Mts. Natib and Mariveles. Smaller volcanic cones include Mts. Malasimbo, Balakibok and Negros. Among the three major volcanic centers, Mt. Pinatubo is the highest, towering to about 1,745 m above sea level. Mt. Natib and Mt. Mariveles are 1,278 m and 1,388 m respectively. All of the three are compound volcanoes characterized by a complex of vents at their craters and flanks.

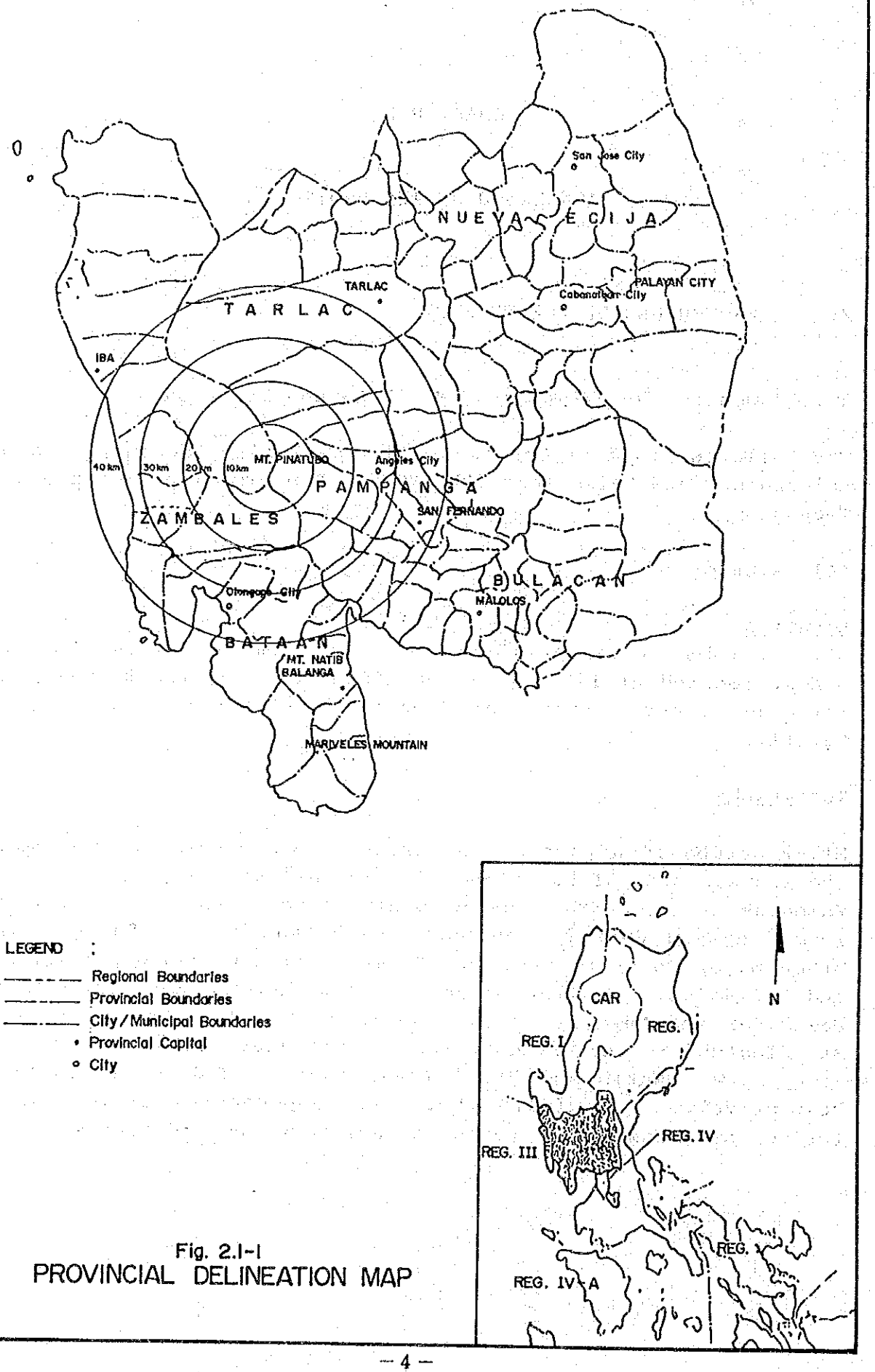


Fig. 2.1-1
PROVINCIAL DELINEATION MAP

Geology

Quaternary and esitic-dacitic volcanic deposits, referred to as Pinatubo Volcanics, comprise Mt. Pinatubo and adjoining peaks. They occur as lava flows, pyroclastic fall and pyroclastic flow deposit. They appear to have originated from several vents near the peak of Mt. Pinatubo. Eruptive activity of the Zambales range started 7 million years ago and extended up to 6 hundred years ago. Its last eruption occurred more than 6 hundred years ago, depositing nearly one-cubic-km of volcanic materials. Older eruptions yielded as much as 6.7 cubic-km deposited on its western flanks.

Socio-economic

Mt. Pinatubo is the home for Aeta or Negrito tribes which are scattered in the Zambales, Tarlac and Pampanga portions of the volcano slopes. Latest count done by the PNOC-EDC (Phil. National Oil Company - Energy Development Corporation) in 1989 listed more than 500 families of Aeta in the vicinity of Mt. Pinatubo. These aboriginal tribes are traditionally nomadic. They thrive on Kaingin farming (cutting small trees), producing mostly coffee, rootcrops and bananas. Some are producing rattan, orchids and yantok (one kind of bamboo) for trading with lowland middleman.

(2) Eruption Activities

Precursors

After 611 years of quiescence, Mt. Pinatubo started showing sign of restiveness on 2 April 1991 when a hydrothermal explosion was observed at the volcano's crater where thermal area is situated. The explosion was accompanied by emission of steam clouds with a small amount of ash, rising to heights varying from 500 to 800 m above the active vents. Five vents at the NNW slope of the volcano became active, emitting white steam plumes at varying intensities.

Explosions

Mt. Pinatubo started spewing ash at 07:03H on 3 June, 1991. This initial ash ejection lasted for 30 minutes and was followed by more at short intervals up to the next day. After a few days lull, the volcano resumed its activities with an ash ejection recorded as an explosion type earthquake at 15:25H on 8 June 1991. The next day, 9 June, the volcano continued to spew out ash-laden steam clouds from 06:00H until 14:50H. Then, at 14:55H, pyroclastic flows started rolling down the WNW and W slope following the gully of the Maraunot River and down the western side toward Moraga River. These pyroclastic flows reached 4 - 5 km from the center of activity.

On Independence Day, 12 June, seismic activity intensified, the volcano emitted voluminous ash-laden steam clouds reaching heights of 2000 m above the vent, and several big explosions occurred, the most powerful of which was registered at 08:51H. This was accompanied by rumbling sounds and ejection of a "huge grey mushroom-shaped cloud" which rose to 20 km above the vent before being drifted by prevailing winds. Ash, pumice and other larger volcanic fragments fell on the western, northwestern and southwestern sides of the volcano, pyroclastic flows cascaded down the major rivers radiating from Mr. Pinatubo, namely Marella, Maraunot and O'Donnell Rivers.

Another series of strong eruptions, some even stronger than the 08:51H June 12 activity, occurred within 48 hours starting 13:09H 14 June to 15 June. The eruption at 15:20H on 14 June ejected a cauliflower-shaped column up to 3000 m above the vent.

(3) Destructive Agents

The vertical ejection of voluminous ash and other ejecta have been carried by Typhoon Diding's winds to as far as Metro Manila and Palawan to the south. The most hazards or destructive agents unleashed by Mt. Pinatubo are lava flows, pyroclastic flows, ashfalls, and mudflows.

Lava Flow

Lava flow is extremely hot (about 1000 deg. Centigrade) when it leaves the vent. Highly viscous lava moves slowly (a few meters per hour) and usually reaches only a short distance from the source. Lava flow has so far not featured in Mt. Pinatubo's present activities as of 15 June, 1991.

Pyroclastic Flow

Pyroclastic flows are extremely hot (up to 1000 deg Centigrade), often incandescent and turbulent blasts of volcanic fragments (boulders, pebbles, sand and dust) and hot gasses that sweep along close to the ground at hurricane speed, sometimes as great as 500 kph. These are horizontally directed usually following topographic depressions and gullies through which they encroach. Because of their high density and mobility, high temperature and abundant load of toxic gases, pyroclastic flows are fatal to nearly all life forms that lie along their path. Standing inanimate objects are either buried or destroyed by direct impact, or baked by the extreme heat.

Bigger pyroclastic flows came after the big explosions on 12-15 June and traveled at a very high speed down the major rivers radiating from Mt. Pinatubo - Marella, Maraunot and O'Donnell Rivers, extending as far as 15 km from the vent. A small and short pyroclastic flow extending 1 km from the source was also observed running down the upper reaches of Sacobia River. Figure 2.1-2 shows pyroclastic deposit hazard areas.

Ashfall

Heavy downfall of volcanic ash can cause harm to human beings, animals, crops, machineries and buildings. Fine volcanic ash (01. mm) is often respirable and may cause harm to people as it usually carries toxic substances. Heavy ash fallout can also cause extreme darkness, damage to aircraft engines and crops, roof collapse if allowed to accumulate in big quantities, and metal corrosion by acid-bearing ashes.

The ash spewed out by the big explosion on 12 June reached as far as 30 km to the South China Sea to the west. Heavy ashfall blanketed several Zambales towns in darkness as Mt. Pinatubo's ejectamenta were drifted toward the west and southwest.

The ash and other ejecta from the 14-15 June eruptions covered more extensive areas and were carried by the winds of Typhoon Diding to as far as Metro Manila and Palawan to the south and Cambodia to the west. These caused night-like darkness at daytime and deposited ash in huge quantities, causing roof collapse in a number of buildings.

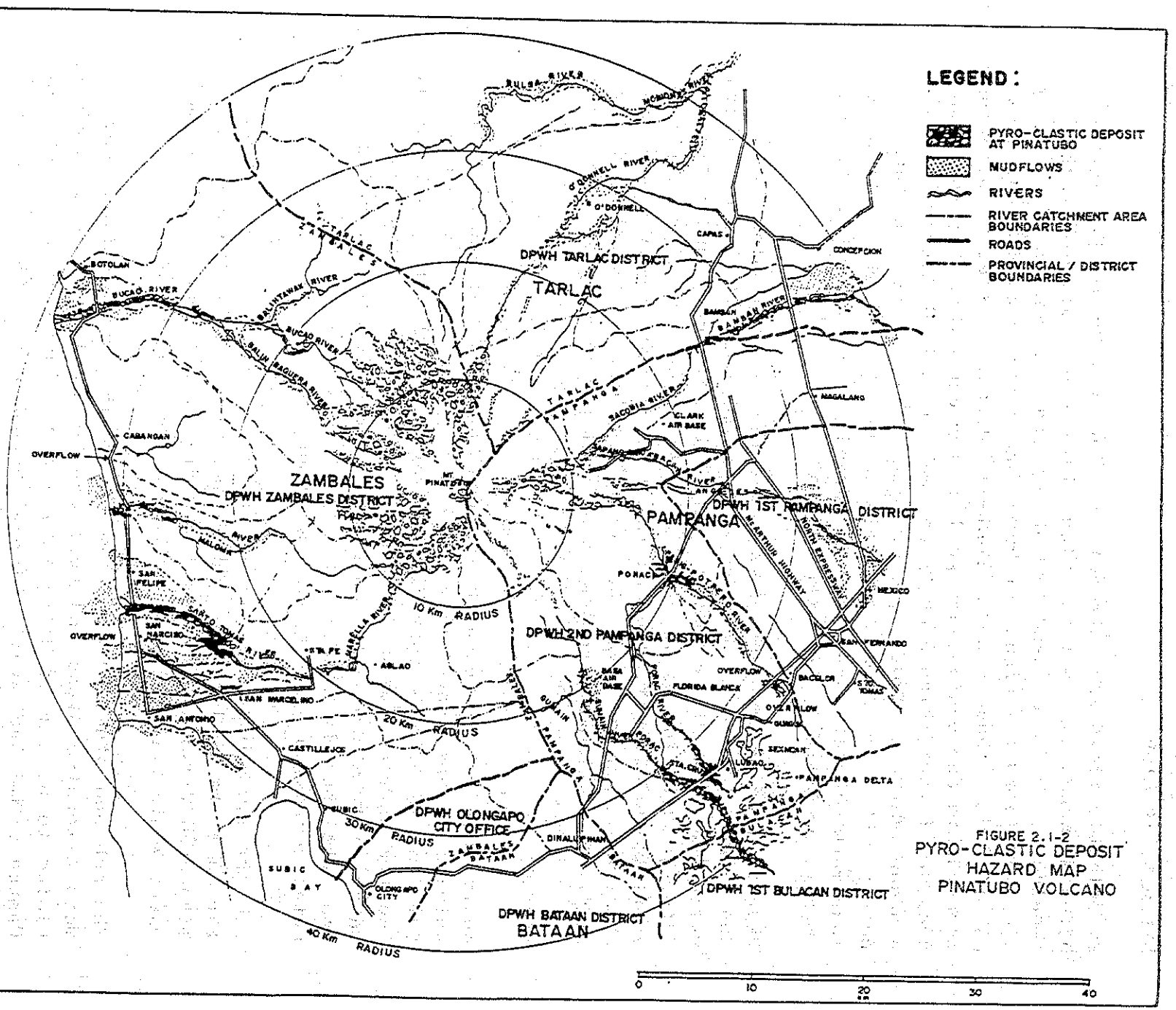


FIGURE 2.1-2
PYRO-CLASTIC DEPOSIT
HAZARD MAP
PINATUBO VOLCANO

Average depths of ash deposition for the June 12-15 eruption are shown in Figure 2.1-3.

Mudflow

Mudflows, sometimes called lahar or volcanic debris flows are flowing mixtures of volcanic materials and water. Ash and other pyroclastic materials deposited on the slopes of the volcano are eroded and then mobilized by heavy rains, causing a debris-water mixture (with the consistency of wet concrete) to cascade downslope. Mudflows usually follow pre-existing gullies and ravines. They are slower than pyroclastics flows but usually cover longer distances and wider areas on the lower slopes.

Mudflows could bury low-lying areas, covering these with boulders, sand and mud. They could destroy buildings and infrastructures, block drainage channels, raise river beds and cause flooding of extensive areas.

Heavy rains that poured on the Mt. Pinatubo area on 12 June triggered mudflows which rolled down the Maraunot River and deposited huge boulders along the lower reaches of the river, rendering the road to Moraza impassable to all types of vehicles. More rains and mudflows occurred after 14 June.

Figure 2.1-4 shows mudflow hazard areas.

2.1.2 Assessment of Damages

(1) General

Immediately after the eruption of Mt. Pinatubo, the Philippine Government organized the National Disaster Coordinating Council (NDCC) in the Department of National Defense in order to control all the activities regarding evacuation of affected peoples, summarizing and releasing the extent of damages, etc. The activities of the NDCC have been then succeeded to the Regional Disaster Coordinating Council (RDCC) in Camp Olivas of San Fernando, Pampanga.

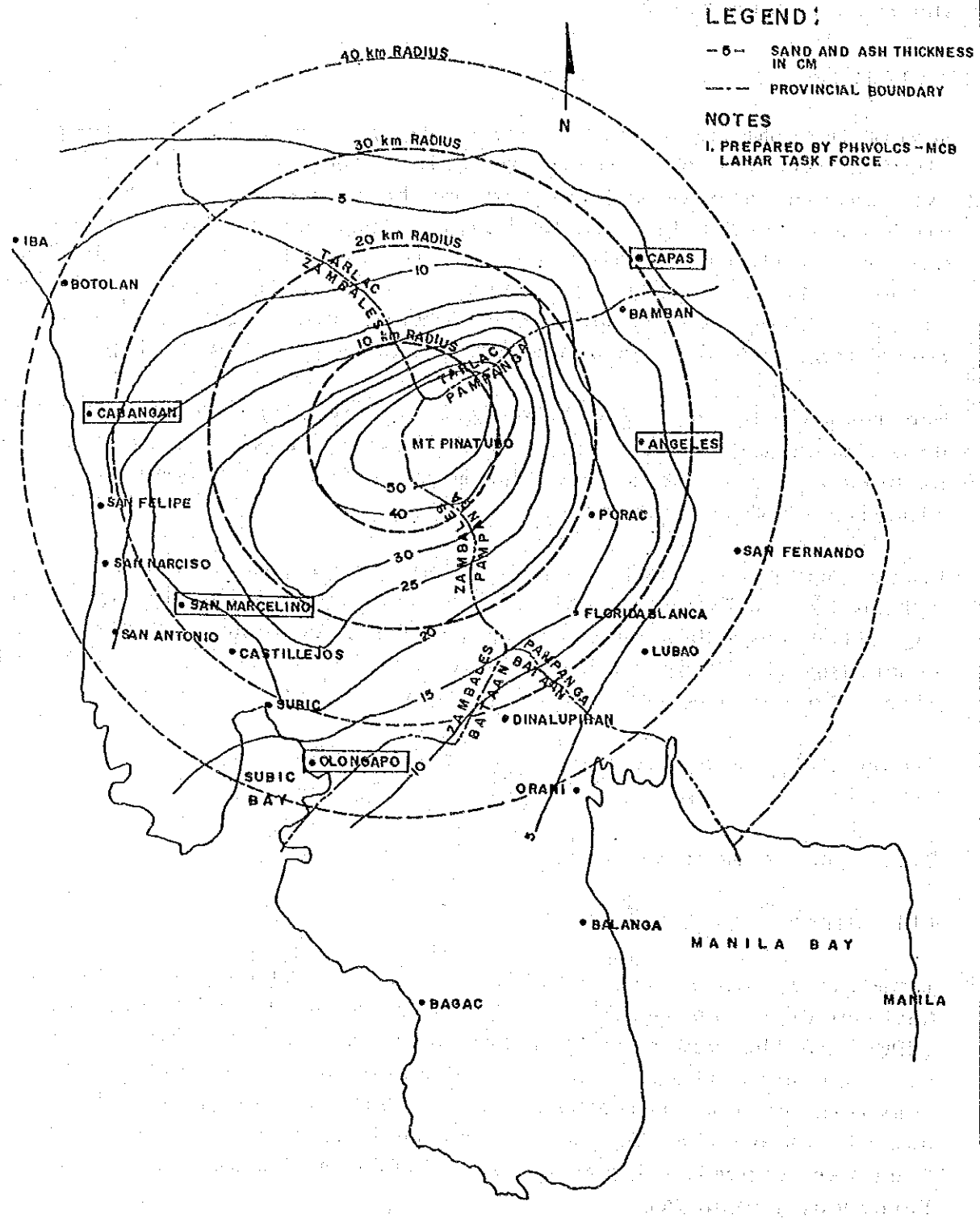


FIGURE 2.1-3
ISOPACH MAP
AIRFALL DEPOSITS
MT. PINATUBO ERUPTIONS
12 - 15 JUNE 1991

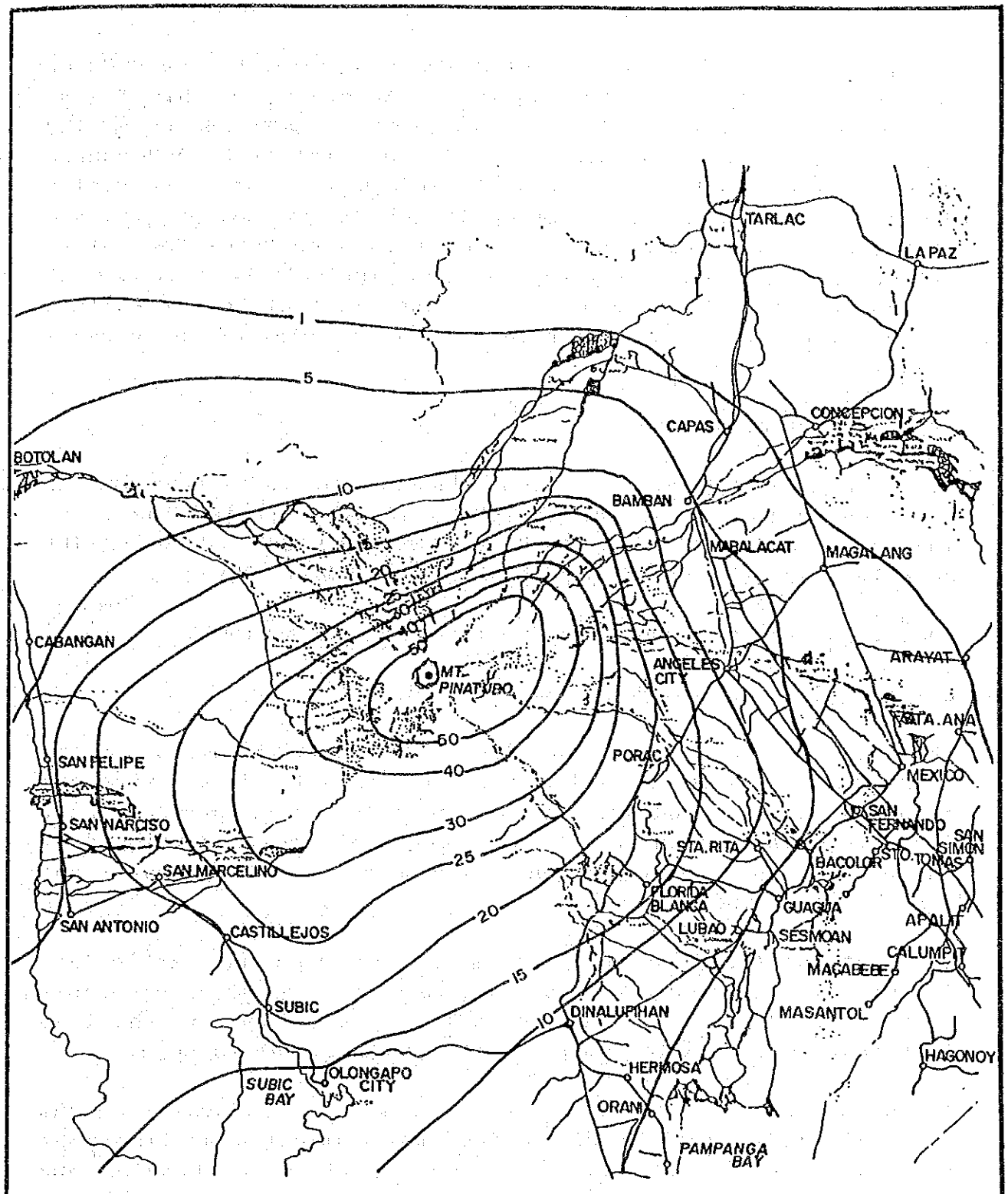


FIGURE 2.1-4
MUDFLOW HAZARD MAP

Figure 2.1-5 shows the extent of damages reported by the RDCC on 26 June, 14 July and 19 August 1991. According to this figure and as of 19 August 1991, a total of 505 persons dead, 180 injured and 23 still be missing. Also a total of 39,960 houses were totally destroyed, while 70,466 houses were partially damaged. The estimated amount of damaged properties has reached at 5,135 million Pesos including 3,286 million Pesos for infrastructure and 1,849 million Pesos for agriculture. As of 29 September after RDCC's report, the Department of Social Welfare and Development, Region III have reported a total of 657 persons dead.

(2) Summary of ADB report

ADB conducted the assessment of damages to infrastructure in response to the request of the DPWH and has reported the findings in "ASSESSMENT OF DAMAGES TO INFRASTRUCTURE CAUSED BY THE JUNE 1991 ERUPTION OF MOUNT PINATUBO, SEPTEMBER 1991".

Summary of the findings in above report is as follow:

Summary of the Findings

The consultants reviewed the list of damages complied by the DPWH Regional Office, Region III and used the data and costs reported therein, modifying where necessary to conform to their findings. In particular, the team found the costs developed by the DPWH as they relate to the ash removal, mudflow removal and schools to be understated.

The costs developed by the team in relation to roads particularly in the intermediate and long-term are also considerably higher than those developed by DPWH. This is because the team felt that considerable damage to the roads is yet to come.

It is informed that in relation to the mudflow removal from the river channels, the costs are the best estimates available at this point in time. Conditions are continually changing and therefore the estimates must be treated with a wide margin of latitude.

(RDCC PROGRESS REPORT
19 AUGUST 1991)

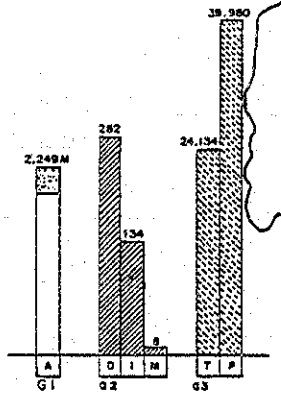
REFERENCE BETWEEN 26 JUNE AND 19 AUG. REPORT

	26 JUNE	14 JULY	19 AUG.
DEAD	289	297	505
DAMAGE TO PROPERTY			
INFRASTRUCTURE	821.0 MP	3,056.6 MP	3,286.4 MP
AGRICULTURE	545.7 MP	1,232.5 MP	1,848.7 MP
TOTAL	1,366.7 MP	4,289.1 MP	5,135.1 MP

AMOUNT OF DAMAGED PROPERTIES
AS OF 19th AUG. 1991

UNIT : MILLION PESOS

DESCRIPTIONS	ZAMBALES	PAMPANGA	BATAAN	TARLAC	BULACAN	NUEVA ECIJA	TOTAL
A. INFRASTRUCTURE							
ROAD AND BRIDGE	207.042	326.034	67.540	11.837	25.983	7.320	645.766
FLOOD CONTROL	434.663	371.460	7.278	153.700	5.960	—	973.061
PUBLIC BUILDINGS	535.411	104.944	3.230	33.550	0.400	0.153	677.688
SCHOOL BUILDINGS	710.391	103.690	32.825	16.900	3.907	0.230	868.143
IRRIGATION SYSTEM	—	47.225	2.569	—	—	71.975	121.789
SUB-TOTAL	1,887.727	953.340	113.442	215.987	36.250	79.678	3,286.427
B. AGRICULTURE							
RICE	19.961	189.075	23.950	106.908	15.772	—	350.684
VEGETABLE	4.710	23.089	5.122	24.093	1.657	—	58.671
FRUITS	300.636	382.057	131.533	65.629	—	—	879.955
LIVESTOCK	13.696	127.279	3.547	7.603	0.349	—	152.676
FISHERIES	7.577	53.332	5.000	1.596	—	—	69.505
ROOT CROPS	14.970	222.778	—	8.113	—	—	245.861
Y/CORN	—	0.106	—	—	—	—	0.106
SUGAR CANE	—	—	—	91.275	—	—	91.275
SUB-TOTAL	361.552	994.716	169.252	305.415	17.778	—	1,848.715
TOTAL	2,249.279	1,946.061	282.694	521.402	54.028	79.678	5,135.142



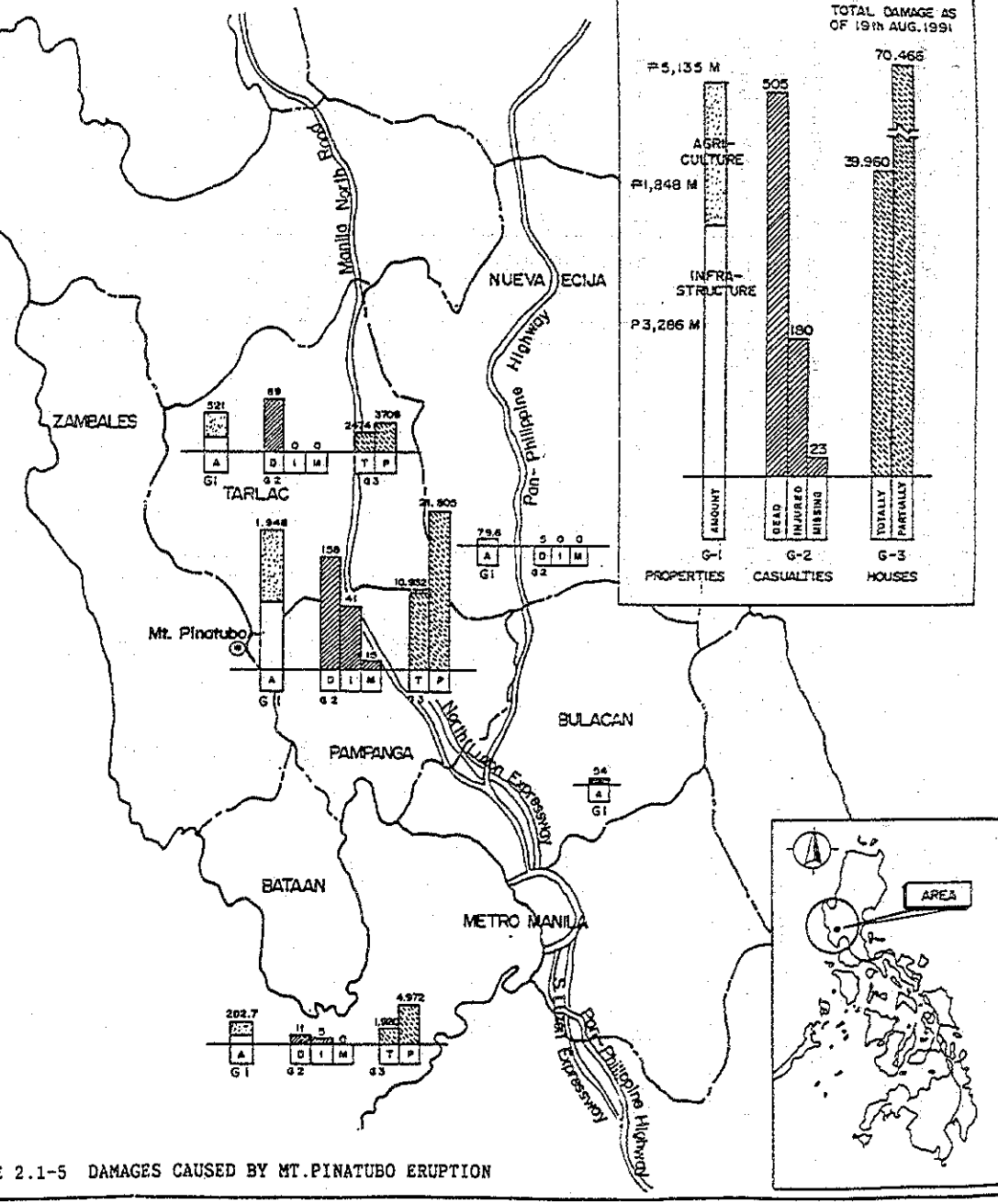


FIGURE 2.1-5 DAMAGES CAUSED BY MT.PINATUBO ERUPTION

Recognizing the above, flood control and river training works should be treated in a dynamic manner, i.e. allowing for ever changing conditions.

It is anticipated that some structures of a largely temporary nature, such as check dams, may be destroyed after the construction and may require reconstruction. Such items have been considered in the estimates.

The Summary of Costs of the various work items appears in Table 2.1-1 to 2.1-4.

Table 2.1-1 ESTIMATED COST OF DAMAGES TO PUBLIC INFRASTRUCTURE
-- OVERALL SUMMARY --

(Pesos 1,000)

Province/ City	Urban Ash Removal	Nat'l. Roads	Nat'l. Bridges	Prov'l. Roads	Mun./ City Roads	Brgy. Roads	Flood Control	Irriga- tion Systems	Water Supply	School Buildings	Health Facili- ties	Public Build- ings	Totals
Immediate-Term	60,000	670,343	387,855	107,897	88,053	276,654	1,082,510		24,142	1,350,546	141,635	434,649	5,164,284
Medium-Term	0	610,416	0	0	0	0	1,189,126		156,435	0	0	0	1,955,977
Long-Term	0	1,225,459	0	0	0	0	626,600		0	0	0	0	1,852,059
Grand Total	60,000	2,506,218	387,855	107,897	88,053	276,654	2,898,236	N.A.	180,577	1,350,546	141,653	434,649	8,972,320

Notes:

1. All costs include an allowance for:
   20% contingencies
   20% escalation for Medium-Term Costs only
   10 design & const. supervision

2. Damage to Irrigation Systems has been estimated but is not included in this summary as it is included as part of the "Damage Assessment to Agriculture Report" prepared by the Asian Development Bank (ADB).

3. Damage to the Housing Sector is not included in this Report nor is proposed funding for resettlement communities and industry relocation assistance.

Table 2.1-2 ESTIMATED COST OF DAMAGES TO PUBLIC INFRASTRUCTURE (IMMEDIATE-TERM)

(Pesos 1,000)

Province/ City	Urban Ash Removal	Nat'l. Roads	Nat'l. Bridges	Prov'l. Roads	Mun./ City Roads	Brgy. Roads	Flood Control	Irriga-tion Systems	Water Supply	School Buildings	Health Facili-ties	Public Build-ings	Totals
Bataan		119,397		1,520	351	3,337			910	67,469	-	1,542	194,526
Bulacan		11,323		4,811		19,040				37,263	-	449	72,886
Nueva Ecija		8,475			722	5,616				14,905	-	-	29,718
Pampanga		196,798	87,555	89,839	27,066	130,458	348,400		9,055	335,829	975	105,179	1,331,154
Tarlac		60,682		514	332	14,286	208,000			31,365	-	187	315,366
Zambales		178,951	11,700	11,214	4,225	57,361	526,110		5,948	562,426	8,541	109,006	1,475,481
Angeles City	300,000	35,003	288,600						819	19,749	60,619	202	704,992
Cabanatuan City		1,885				1,950				1,944	-	-	5,779
Olongapo City	300,000	51,979			48,078	27,642			7,410	266,962	71,500	218,084	991,655
Palayan City		1,950			7,150	11,050				-	-	-	5,779
San Jose City		3,900			130	5,915				12,633	-	-	22,578
Total	600,000	670,343	387,855	107,897	88,053	276,654	1,082,510	N.A.	24,142	1,350,546	141,635	434,649	5,164,284

Note

1. All costs include an allowance for:
   20% contingencies
   20% escalation for Medium-Term Costs only
   10 design & const. supervision

2. Damage to Irrigation Systems has been estimated but is not included in this summary as it is included as part of the "Damage Assessment to Agriculture Report" prepared by the Asian Development Bank (ADB).

3. Damage to the Housing Sector is not included in this Report nor is proposed funding for resettlement communities and industry relocation assistance.

Table 2.1-3 ESTIMATED COST OF DAMAGES TO PUBLIC INFRASTRUCTURE (MEDIUM-TERM)

(Pesos 1,000)

Province/ City	Urban Ash Removal	Nat'l. Roads	Nat'l. Bridges	Prov'l. Roads	Mun./ City Roads	Brgy. Roads	Flood Control	Irriga-tion Systems	Water Supply	School Build-ings	Health Facili-ties	Public Build-ings	Totals
Bataan		32,760							1,950				34,710
Bulacan													0
Nueva Ecija													0
Pampanga		162,540					379,688		27,195				569,423
Tarlac		101,700					257,625						359,325
Zambales		242,433					551,813		24,285				818,531
Angeles City		36,675							14,055				50,730
Cabanatuan City													0
Olongapo City		34,308							88,950				123,258
Palayan City													0
San Jose City													0
Total	0	610,416	0	0	0	0	1,189,126	N.A.	156,435	0	0	0	1,955,977

Note

1. All costs include an allowance for:
   20% contingencies
   20% escalation for Medium-Term Costs only
   10 design & const. supervision

2. Damage to Irrigation Systems has been estimated but is not included in this summary as it is included as part of the "Damage Assessment to Agriculture Report" prepared by the Asian Development Bank (ADB).

3. Damage to the Housing Sector is not included in this Report nor is proposed funding for resettlement communities and industry relocation assistance.

Table 2.1-4 ESTIMATED COST OF DAMAGES TO PUBLIC INFRASTRUCTURE (LONG-TERM)

(Pesos 1,000)

Province/ City	Urban Ash Removal	Nat'l. Roads	Nat'l. Bridges	Prov'l. Roads	Mun./ City Roads	Brgy. Roads	Flood Control	Irriga-tion Systems	Water Supply	School Build-ings	Health Facili-ties	Public Build-ings	Totals
Bataan		66,690											66,690
Bulacan													0
Nueva Ecija													0
Pampanga		322,920					245,700						568,620
Tarlac		198,900					37,700						236,600
Zambales		490,172					343,200						833,372
Angeles City		73,613											73,613
Cabanatuan City													0
Olongapo City		73,164											73,164
Palayan City													0
San Jose City													0
Total	0	1,225,459	0	0	0	0	626,600	N.A.	0	0	0	0	1,852,059

Note

1. All costs include an allowance for:
   20% contingencies
   20% escalation for Medium-Term Costs only
   10 design & const. supervision

2. Damage to Irrigation Systems has been estimated but is not included in this summary as it is included as part of the "Damage Assessment to Agriculture Report" prepared by the Asian Development Bank (ADB).

3. Damage to the Housing Sector is not included in this Report nor is proposed funding for resettlement communities and industry relocation assistance.

2.1.3 Reconstruction and Rehabilitation Plan

(1) Outline of National Plan

The Government established framework encouraging the development efforts in the area affected by the Mt. Pinatubo eruptions, which shall be guided by the principle that rehabilitation of previously existing conditions and putting in place added measures to minimize if not eradicate the disastrous effects of similar and other calamity that may happen in the future. This development framework is therefore geared not only in restoring normalcy but will also take the calamity as an opportunity to do something better.

The specific development objectives are as follows:

a. Mitigate further destruction brought about by the adverse effects of the eruption particularly lahar/mudflows.

b. Normalize and accelerate economic recovery including the creation of an alternative investment climate.

c. Provide adequate livelihood and employment alternatives especially for displaced farmers and workers (including those from Clark Air Base and Subic).

d. Promote growth and development in resettlement and new settlement areas serving as alternatives to permanently damaged/high risk areas.

e. Ensure the continuous flow of goods and services especially during relief operations when calamity strikes (lahar has made many areas inaccessible).

f. Strengthen institutional structures, arrangements and mechanism for disaster preparedness/responsiveness and raise public awareness on natural disaster mitigation and reduction.

g. Reduce susceptibility of vertical and horizontal infrastructure of damages due to lahar and other natural disasters.

h. Prevent further degradation of environment and rehabilitate damaged ecosystems.

In order to vigorously pursue the above objectives and to attempt overall approach to rehabilitation, Malacanang organized the four committees corresponding to the major concerns of the TASK FORCE ON THE REHABILITATION OF AREAS AFFECTED BY ERUPTION OF MT. PINATUBO AND ITS EFFECTS under the MEMORANDUM ORDER NO. 369 done on the 26th June 1991.

(i) Infrastructure Committee

Chairman - Department of Public Works and Highways

Members - Department of Transportation and Communication
- Local Waterworks and Utilities Administration
- National Irrigation Administration
- National Electrification Administration
- National Power Corporation

(ii) Resettlement Committee

Chairman - Department of Environmental and Natural Resources

Members - Department of Agrarian Reform
- Department of Social Welfare and Development
- National Housing Authority
- Office of Northern Cultural Communities

(iii) Livelihood Committee

Chairman - Department of Trade and Industry

Members - Department of Agriculture
- Department of Labor and Employment (National Manpower and Youth Council)
- Department of Science and Technology
- Technology and Livelihood Resource Corporation

(iv) Social Services Committee

Chairman - Department of Social Welfare and Development

Members - Department of Health
- Department of Education, Culture and Sports
- Department of Labor and Employment
- Office of Northern Cultural Communities

Specific strategies to be performed by the four committees are as presented in governmental report, BRIEF ON REHABILITATION AND RECONSTRUCTION EFFORTS.

Following is strategy of Infrastructure Committee, formed in the said report.

Infrastructure Committee

The main concern in the rehabilitation and reconstruction of the eruption-affected areas is to put back in place their infrastructure base, upgrading them in the process, and bring back to normal condition the lives of thousands of families displaced by the Calamity.

The rehabilitation activities to be undertaken will be determined by the following priority concerns and consideration:

a. Uninterrupted movement of people, goods and services which could be realized upon clearing of major transport routes of volcanic dust and restoration of collapsed, weakened and damaged transportation system structures and facilities;

b. Restoration and improvement of communication facilities of the region for better and more efficient exchange of information and messages particularly in areas where the lahar threat is imminent;

c. Protection, from further destruction, by the dangerous of areas that are devastated and could be endangered flow of lahar and pyroclastic deposits through mass fortification of river banks, provision of slope protection, channeling and dredging of waterways, the construction of diversion channels and sabo/retarding dams, and the application of other measures to mitigate the threats of flooding;

d. Restitution and improvement of power and water utilities needed for the normal operation of affected communities and institutions;

e. Instituting measures to restore the productive capacities of farmlands by rehabilitating and improving their irrigation systems;

f. Continuous provision of basic social services such as education and health by rehabilitating and improving their irrigation systems;

g. Putting back in place the economic and administrative functions in the municipalities affected through the rehabilitation and reconstruction of public markets, slaughterhouses, municipal halls and other public structures;

h. Provision of the required infrastructure support to resettlement and new settlement areas for the displaced population;

i. Preference shall be accorded to the restoration and rehabilitation of facilities that benefit the greater number of people and which can commence and be completed in the earliest possible time so as not be deprive the users of prompt services; and

j. Ensure that the design of the infrastructure facilities is upgraded and much more improved so that they could withstand the pressures of similar calamities which may occur in the future.

To operationalize the policies and strategies adopted in the pursuit of the rehabilitation and reconstruction objectives for the Mt. Pinatubo affected areas, programs and projects have been identified and prioritized in consultation with local officials and beneficiaries. The resulting list, however, cannot be considered complete and comprehensive. Since the calamity is still on-going, the needs or problems arising from future destructions cannot be accounted yet. Also anticipated to be identified at some later dates are proposals arising from more informed analysis of the disaster situation.

As shown in Table 2.1-5, total requirements for the rehabilitation of areas affected by eruption of Mt. Pinatubo and its effects amounts to approximate 23,700 million pesos, and about 91% of said amount, i.e., 21,650 million pesos, is subject to priority projects.

Table 2.1-5 SUMMARY OF REQUIREMENTS

Phases	Amount (P million)	Distribution %
Relief	785.74	3.32
Mitigation	1,512.93	6.38
Rehabilitation	8,455.37	35.68
Reconstruction and Development	12,945.81	54.62
Total	23,699.85	100.00

There can be listed 8 (eight) of the priority projects which should be implemented by DPWH and plural agencies including DPWH. The former includes reconstruction and/or rehabilitation of roads, bridges, schools, public buildings and river systems and reconstruction of three roads, amounting 7,539 million pesos. The latter amounting 7,138 million pesos are resettlement program for lowlanders and Aetas, including construction of physical structures, i.e., roads, drainage, school, public market, etc., and land preparation which may be DPWH's role.

(2) Outline of DPWH Action Program

In response to national reconstruction and rehabilitation plan outlined in previous section, DPWH was instructed, under Secretary Order dated on 01 July, 1991, to organize a Task Force Team and provide for the effective implementation of the program for the rehabilitation of infrastructure damaged by the eruptions of Mt. Pinatubo.

Outline of a Task Force for Mt. Pinatubo Rehabilitation Projects is as follow:

Organization

1. A Task Force for Mt. Pinatubo Rehabilitation Projects is hereby created in the Department with the following composition:

   a. Director Vicente B. Lopes,
      concurrently DPWH Action Officer
      for Earthquake Rehabilitation ------- Chairman

b. Director Marcos B. Kabiling, Region III ---------- Co-Chairman

c. Assistant Regional Directors, concerned District Engineers, City Engineers, Project Managers, Regional Equipment Engineer, and Technical Division Chiefs of Region III ---------- Members

d. Other personnel that may be assigned on detail upon approval by the DPWH Secretary ---------- Members

2. Under the said task Force, a Sub-Task Force for River and Debris Flow Control Works is also hereby created headed by Director Antonio A. Alpasan. Project Manager for Flood Control and Drainage projects, as Chairman, and Composed of appropriate personnel from the Bureau of Design, the Bureau of Construction, the Planning Service, the Regional and District/City Offices, and other personnel, that may be assigned on detail upon approval by the Secretary. The Japan International Cooperation Agency (JICA) Expert on Rivers assigned to the DPWH shall serve as an adviser of the Sub-Task Force.

Functions and Authorities

1. The Task Force shall be responsible for undertaking the DPWH operations for the rehabilitation of infrastructure damaged by the Mt. Pinatubo eruptions and their after effects.

2. The Task Force Chairman shall provide the overall direction, and supervision of field operations in this rehabilitation program. He shall report to the DPWH Secretary thru the Undersecretary in charge of Infrastructure Committee, Task Force for Mt. Pinatubo, and will have direct control and authority over the field implementing areas of Region III. For this purpose, he is authorized to enter into and approve contracts - after either public bidding or simpli-

fied bidding - for civil works, goods and services up to P10 million per contract, including variation orders, time extensions, and price escalation therefor. He is also authorized to approve plans, programs of work, and estimates for such projects, and to approve fund disbursements for the same based on approved contracts. The Task Force Co-Chairman shall assist the Chairman in the performance of these functions.

3. The Sub-Task Force for River and Debris Flow Control Works is responsible for the planning and implementation of structural and related non-structural measures to prevent or minimize the damage to infrastructure and to avoid loss of lives and properties that might be caused by the flow of water, lahar and other materials.

4. The regular implementing units of Region III shall be responsible for actual management of the rehabilitation works for specific projects. These include the District and City Engineers and the Project Managers. The District and City Engineers are authorized to approve plans, programs of work, and estimates, as well as fund disbursements, for projects costing not more than P3 million, to approve contracts for such projects after public bidding, and to supervise the implementation of projects, regardless of amount, as may be assigned by the Task Force Chairman.

Costs of rehabilitation works which were completed and/or have been under implementation by site offices of DPWH region III construction office is:

		(as of September, 1991)
Road Drainage System	;	570.24 million Pesos
Bridge	;	161.42 million Pesos
River	;	836.98 million Pesos

Breakdown and details are shown in Table 2.1-6.

TABLE 2.1-6

LIST OF PROJECTS FOR REHABILITATION OF INFRASTRUCTURE DAMAGED BY MT. PINATUBO

Description	Number of Projects / Cost of Projects (Million P)							
	Pampanga 1st District Office	Pampanga 2nd District Office	Bulacan District Office	Tarlac District Office	Bataan District Office	Zambales District Office	Olongapo District Office	T O T A L (Per Type of Project)
A. Clearing of Roads: A.1 Road Proper	47 Projects ₱ 19.40 M	1 Project ₱ 1.94 M	14 Projects ₱ 3.75 M	81 Projects ₱ 39.85 M	202 Projects ₱312.64 M	117 Projects ₱ 80.30 M	3 Projects	465 Projects ₱457.88 M
A.2 Road Drainage	20 Projects ₱ 9.54 M		25 Projects ₱ 9.90 M	1 Project ₱ 0.50 M	74 Projects ₱ 73.32 M	7 Projects ₱ 19.10 M	2 Projects	131 Projects ₱112.36 M
B. Reconstruction of Bridge	22 Projects ₱ 14.45 M			6 Projects ₱ 5.45 M	69 Projects ₱ 51.47 M	47 Projects ₱ 90.05 M		142 Projects ₱161.42 M
C. River System/Control	58 Projects ₱ 52.19 M			3 Projects ₱ 13.50 M	144 Projects ₱147.33 M	24 Projects ₱623.96 M	6 Projects	235 Projects ₱836.98 M
D. Reconstruction of Buildings	178 Projects ₱ 46.49 M	51 Projects ₱122.15 M	32 Projects ₱ 1.79 M	38 Projects ₱ 46.56 M	191 Projects ₱213.98 M	468 Projects ₱482.76 M	81 Projects	1,039 Projects ₱913.73 M
E. Monitoring of Mudflows								
F. Other Support Services	16 Projects ₱ 1.85 M		13 Projects ₱ 7.77 M		25 Projects ₱ 9.33 M	113 Projects ₱ 1.67 M		167 Projects ₱ 20.62 M
Total (Per District Office)	341 Projects ₱143.92 M	52 Projects ₱124.09 M	84 Projects ₱ 23.21 M	129 Projects ₱105.86 M	705 Projects ₱808.07 M	776 Projects ₱1,297.84 M	92 Projects	2,179 Projects ₱2,502.99 M

Source: D.P.W.H. District Offices, September 1991

The Task Force for Mt. Pinatubo Rehabilitation Projects also presented on 25 September, 1991, an action program for river systems including roads/drainage and bridges, as shown in Table 2.1-7. A total cost of said action program amounts approximately 1,140 million Pesos including followings:

Road·Drainage System;	12.00	million Pesos
Bridge ;	156.84	million Pesos
River ;	967.58	million Pesos

686 of machines listed in Appendix 7 are proposed by site offices of DPWH Region III Construction Office to successfully response to the above mentioned plan and program, while 415 machines are now under operation for rehabilitation projects in the affected areas of Mt. Pinatubo eruptions.

Table 2.1-8 NUMBER OF EQUIPMENTS UNDER OPERATION AND PROPOSED

	Under Operation	Proposed
Earth Moving Equipment ;	194	232
Earth Excavator ;	72	100
Material/Transportation Equipment ;	4	12
Others ;	145	341
Total	415	686

Lahar within the river systems as a result of the eruption of Mount Pinatubo has resulted in serve damage to the relevant rivers, and in some cases, total destruction of river and flood control structures. Since only less than 10% of the source of lahar, pyroclastic flow deposit, has been discharged and 90% yet discharged, lahar will probably occur in the future. At the present time, the following countermeasures are under consideration.

TABLE 2.1-7 ACTION PROGRAM FOR RIVER SYSTEM (SEPTEMBER 25, 1991)

COST IN MILLION PESOS

RIVER SYSTEM		DREDGING OF RIVER OUTLET	SAND POCKET	DESILTING/ CHANNELING AT VICINITY OF BRIDGES	ROAD AND DRAINAGE CLEARING	CHANNELING OF OTHER SECTIONS	DIKE RESTORATION RECONSTRUCTION	SABO DAM RELATED WORKS	REPAIR OF DAMAGED BRIDGES	TOTAL
A. DELTA AREA PAMPANGA	NO. OF PROJECT	8								8
	LENGTH	58.2 Km								
	COST	₱ 314.18								₱ 314.18
B. PASIG-POTRERO PAMPANGA	NO. OF PROJECT	1	4	2	1	1	1			10
	LENGTH	2.0 Km	34.0 Km	4.0 Km	3.0 Km	8.0 Km	4.0 Km			
	COST	₱ 4.50	₱ 25.32	₱ 14.40	₱ 1.00	₱ 28.80	₱ 2.40			₱ 76.42
C. GUMAIN-PORAC PAMPANGA	NO. OF PROJECT	1	5	1	2	1	3	3	2	18
	LENGTH	2.0 Km	11.0 Km	2.0 Km	2.0 Km	7.0 Km	4.8 Km	190 m		
	COST	₱ 9.00	₱ 17.44	₱ 5.00	₱ 3.30	₱ 17.50	₱ 7.40	₱ 33.00	₱ 1.80	₱ 94.44
D. ABACAN PAMPANGA	NO. OF PROJECT		1	1	2	4	2	3		13
	LENGTH		7.0 Km	2.0 Km	1.15 Km	10.0 Km	5.3 Km	162 m		
	COST		₱ 4.48	₱ 9.00	₱ 3.00	₱ 48.20	₱ 3.50	₱ 21.90		₱ 90.08
E. SACOBIA-BAMBAN-PARUA TARLAC	NO. OF PROJECT		1	1	1	1	2	2		8
	LENGTH		10.0 Km	2.0 Km	0.30 Km	23.0 Km	4.3 Km	65 m		
	COST		₱ 6.40	₱ 7.20	₱ 0.70	₱ 82.80	₱ 16.70	₱ 17.00		₱ 130.80
F. O'DONNEL-TARLAC TARLAC	NO. OF PROJECT			2		1	1	3		7
	LENGTH			3.0 Km		23.0 Km	3.0 Km	180 m		
	COST			₱ 10.80		₱ 82.80	₱ 5.80	₱ 24.00		₱ 123.40
G. STO. TOMAS ZAMBALES	NO. OF PROJECT	1		1	1	1	3			7
	LENGTH	3.0 Km		1.0 Km	1.0 Km	15.0 Km	6.5 Km			
	COST	₱ 27.00		₱ 3.60	₱ 1.50	₱ 54.00	₱ 1.20	₱ 88.00		₱ 175.30
H. MALOMA ZAMBALES	NO. OF PROJECT	1		1		1	1			4
	LENGTH	3.0 Km		1.0 Km		5.0 Km	3.0 Km			
	COST	₱ 18.00		₱ 3.60		₱ 18.00				₱ 39.60
I. CABANGAN ZAMBALES	NO. OF PROJECT	1		1	2	1	1			6
	LENGTH	3.0 Km		1.0 Km	0.5 Km	4.0 Km	4.5 Km			
	COST	₱ 13.50		₱ 3.60	₱ 1.70	₱ 14.40				₱ 33.20
J. BUCAO ZAMBALES	NO. OF PROJECT	1		1	1	1	2			6
	LENGTH	4.0 Km		1.0 Km	2.0 Km	5.0 Km	12.5 Km			
	COST	₱ 30.00		₱ 3.60	₱ 0.80	₱ 18.00	₱ 3.60			₱ 56.00
K. STA. RITA OLONGAPO CITY	NO. OF PROJECT	1								1
	LENGTH	1.0 Km								
	COST	₱ 3.00								₱ 3.00
TOTAL	NO. OF PROJECT	15	11	11	10	12	16	11	2	88
	LENGTH	76.2 Km	62.0 Km	17.0 Km	9.95 Km	100.0 Km	47.9 Km	597 m		
	COST	₱ 419.18	₱ 53.64	₱ 60.80	₱ 12.00	₱ 364.50	₱ 40.60	₱ 183.90	₱ 1.80	₱ 1,136.42

(1) Urgent Plan

- Establishment of mudflow warning system
- Establishment of public education and awareness program
- Desilting of channel and channelization to maintain enough water flow area
- Installation of check dams and groundsills in the river channel
- Reestablishment of original drainage patterns
- Construction of ring dikes
- Construction of refuge islands
- Development of mudflow retention basins

(2) Intermediate Plan

- Reestablishment of river/drainage system
- Conduct of topographic survey
- Construction of river dike

(3) Long-term Plan

- Construction of Sabo works
- River planning and implementation

2.2 OUTLINE OF THE REQUEST

This plan covers the relief and rehabilitation program for damaged infrastructures caused by the eruption of Mt. Pinatubo.

The Government of Philippines has appropriated the amount of P14 billion for immediate aid, relief and rehabilitation services to persons and areas hardest hit by the eruption. In line with the national government's rehabilitation and recovery program, the Department of Public Works and Highways, realizing the magnitude of the reconstruction and rehabilitation activities of the damaged facilities and in an effort to facilitate and assist the national government as well as the particular local government unit concerned as it is mandated to do so, has initiated a move to solicit foreign assistance, in the hope that much can be accomplished sooner than expected. Without any available re-

sources on hand, DPWH expects the much needed assistance in the form of infrastructure materials and heavy equipment to come as soon as possible. Thus the need for an equipment Grant-in-Aid Program (EGIAP) in the disaster striken areas of Region III.

Table 2.2-1 shows the list of equipment required by the Government of the Philippines. The rsponsible organization for the project is the Department of Public Works and Highways. Executing Agency is DPWH Task Force of Mt. Pinatubo Rehabilitation Program.

Table 2.2-1 LIST OF REQUIRED EQUIPMENT

		Quantity
1.	Earth Moving Equipment	39
2.	Earth Excavator	20
3.	Truck	25
4.	Material/Equip. Transportation	22
5.	Foundation Work Equipment	27
6.	Earth Solidifying Equipment	15
7.	Road Maintenance Equipment	27
	Total	175

Type of Equipment:
1. Bulldozer, Swamp bulldozer, Motor Grader
2. Hydraulic Excavator, Wheel Loader
3. Dump Truck, Stake Truck
4. Truck Mounted Crane, Multi Purpose Maint
5. Diesel Hammer, Jack Hammer
6. Vibro Roller
7. Street Sweeper, Water Jet Cleaning, etc.

2.3 OUTLINE OF THE PROJECT AREA

2.3.1 Socio-economic Conditions

Major socio-economic data of Region III are listed in Table 2.3-1.

Table 2.3-1 MAJOR SOCIO-ECONOMIC DATA

	Region III		Philippines	
1. Total Land Area (km^2) (1990)	19,231		299,970	
2. Population (1,000 prs.) (1990)	6,199		60,685	
3. Pop. Density (pns/km^2) (1990)	340		202	
4. GRDP (Million Pesos in current price) (1989)	84,075		963,997	
5. Per Capita Income (Pesos in current price) (1989)	14,008		16,040	
6. Number of Employed Persons by Industrial Sector in 1990 (1,000 persons)				
· Agricultural	759	(35%)	10,185	(45%)
· Industry	412	(19%)	3,391	(15%)
· Services	988	(46%)	8,946	(40%)
· Undefined	2	(-)	10	(-)
Total	2,161	(100%)	22,532	(100%)
7. Road Length (km) (1989)	13,075		132,949	

Source: 1991 Philippine Statistical Yearbook

Location

The Philippines is an archipelago lying within a Pan-Pacific Seismic Belt Zone where earthquakes and volcanic eruptions are common occurrence. The zone is running along the Pacific Coast of North and South America and bordering Continental Asia. In other words, the archipelago is one of the world's most tectonically and seismically active areas. The archipelago is composed of over 7,100 islands and islets.

Mt. Pinatubo which is one of the 22 active volcanos in the Philippines is located at 15°08.20'N and 120°21.35'E on the boundaries of three provinces Pampanga, Zambales and Tarlac of the central Luzon.

Population and Land Area

The population and land area of Region III are approximately 6.2 million and 18,000 km² respectively, so the population density is 340 persons/km² which is higher than 202 persons/km² of country average (Table 2.3-2).

Mt. Pinatubo is the home for Aeta of Negrito tribes which are scattered in the Zambales, Tarlac and Pampanga portions of the volcano slopes. The latest count done by the PNOC-EDC (Phil. National Oil Company - Energy Development Corporation) in 1989 listed more than 500 families of Aeta in the vicinity of Mt. Pinatubo. These aboriginal tribes are traditionally nomadic. They thrive on Kaingin farming (cutting small trees), producing mostly coffee, rootcrops and bananas. Some are producing rattan, orchids and yantok (one kind of bamboo) for trading with lowland middleman.

Table 2.3-2 LAND AREA, POPULATION AND POPULATION DENSITY

	Land Area (km²)	Population (1,000 pns)	Population Density (pns/km²)
Whole Country	299,970.4	60,685	202
Region III	18,230.8	6,199	340
Bataan	1,373.0	426	310
Pampanga	2,180.7	1,533	703
Tarlac	3,053.4	860	282
Zambales	3,714.4	563	152
Olongapo City	464.3	193	278
Angeles City	60.3	237	3,930

Source: 1991 Philippine Statistical Year book.

Gross Regional Product and Per Capita Income

GRP (Gross Regional Product) of Region III in 1989 is 84,075 million Pesos (at current price) which is 8.7% of that of whole Philippines' 963,997 million Pesos.

Per Capita Income of Region III in 1989 is 14,008 Pesos (in current price), while that of the whole Philippines is 16,040 Pesos.

Major Industry

According to the number of employed persons by major occupation group, 46%, 35% and 19% of all employed persons in Region III occupy in services sector, agriculture, fishery and forestry sector and industry sector respectively.

Major agricultural products in Region III are rice, sugarcane and corn.

Road

Roads in the Philippines are categorized into five, i.e. National and Provincial Road jurisdictioned by DPWH, City, Municipal and Barangay Road jurisdictioned by Local Autonomy Agency. Total road length in Region III is 13,075 km (Figure 2.3-1) and composition ratio of each type are as shown in Table 2.3-3.

Table 2.3-3 COMPOSITION RATIO OF ROADS

	National Road	Provincial Road	City Road	Municipal Road	Barangay Road
Region III	13	18	2	8	59
Whole Country	17	18	3	8	54

Pavement ratios of reads by type are presented in Table 2.3-4.

Table 2.3-4 PAVEMENT RATIO BY ROAD TYPE (%)

	National Road	Provincial Road	City Road	Municipal Road	Barangay Road
Region III	76.8	26.8	66.6	40.0	1.3
Whole Country	45.9	11.4	66.6	25.3	1.0

Pavement ratios of the roads in Region III are relatively high comparing with the average figures of whole country.

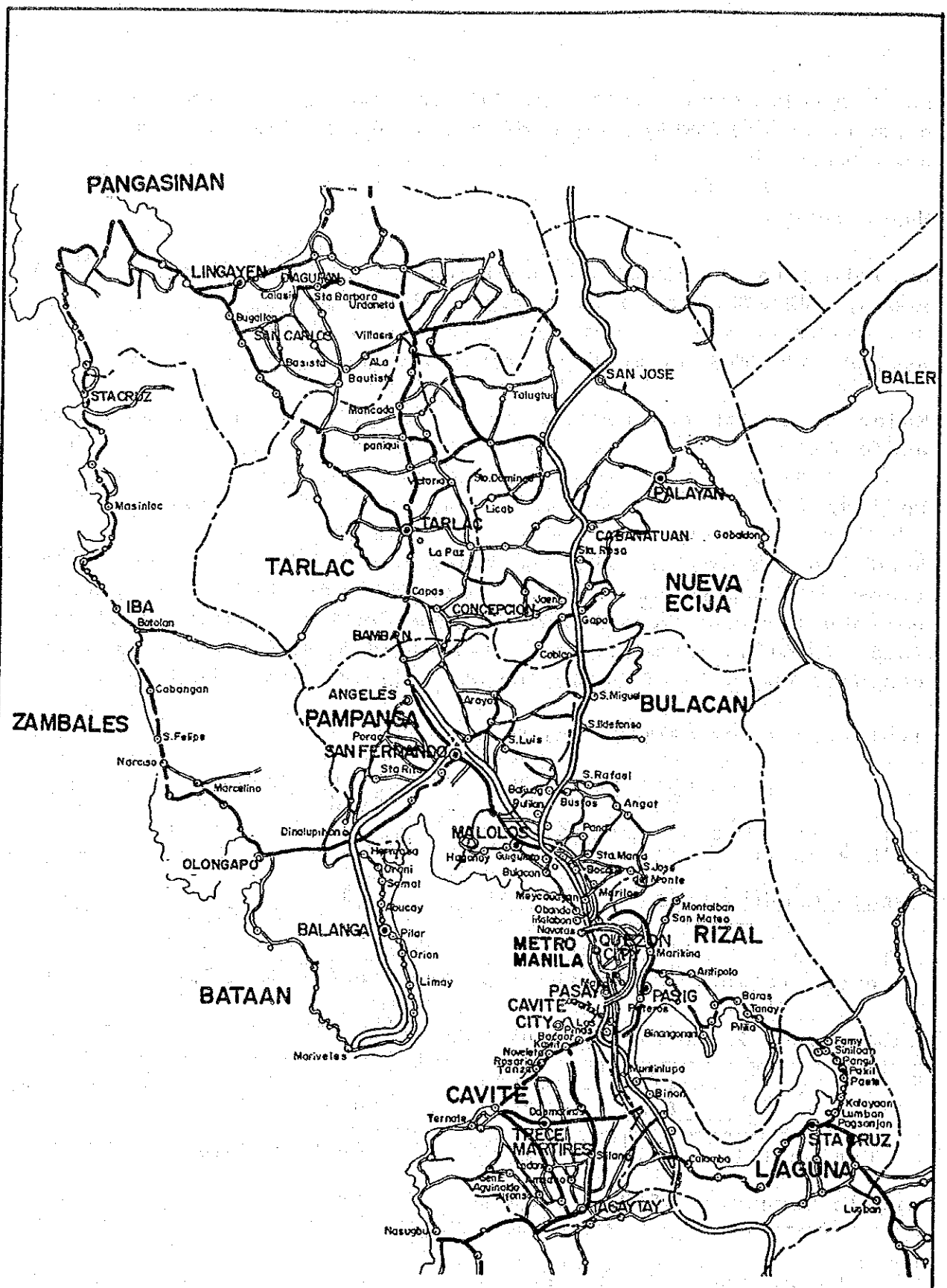


FIGURE 2.3-1 ROAD NETWORK IN REGION Ⅲ

2.3.2 Natural Conditions

Topography

The central Plain of Luzon, where Region III is located, is drained by the Agno River and its tributaries to Lingayen Gulf in the north and by the Pampanga River and its tributaries to Manila Bay in the south. The depths of these rivers vary with the seasons, and at times the rivers are navigable only by small launches and bancas. This plain has an area of about 10,000 km² and is separated from the Cagayan Valley by the Caraballo Mountains. The Zambales Mountains, where Mt. Pinatubo is located towering to about 1,745 m, lie to the west of the Central Plain of Luzon.

Meteorology

The climate of the Philippines is classified into four (4) types by PAGASA, as shown in Figure 2.3-2. Climate type in Region III belongs to Type 1 which has two pronounced seasons, dry in winter and spring, wet in summer and autumn. Maximum rain period is from June to September during the prevalence of the southwest monsoon. The dry season lasts from three to six or seven months.

Mean annual rainfall is about 2,100 mm measured almost during wet season.

The tropical cyclone season in the Philippines is from June to December, with an average monthly frequency of more than one tropical cyclone. The period of the other months, however, is not free from tropical cyclones.

A total of 690 tropical cyclones of all intensities during 35-year period or an average of 19.7 cyclones per year crossed the Philippine Area of Responsibility (PAR).

By PAGASA, 5-year average frequency of passage of tropical cyclone's center for the period from 1884 to 1975 (91 years) is presented as in Figure 2.3-3. An average of 22 tropical cyclones form annually in the northwest Pacific Ocean, about 19 of which enter the Philippine Area of Responsibility (PAR) and 4-5 of them cross Region III per year.

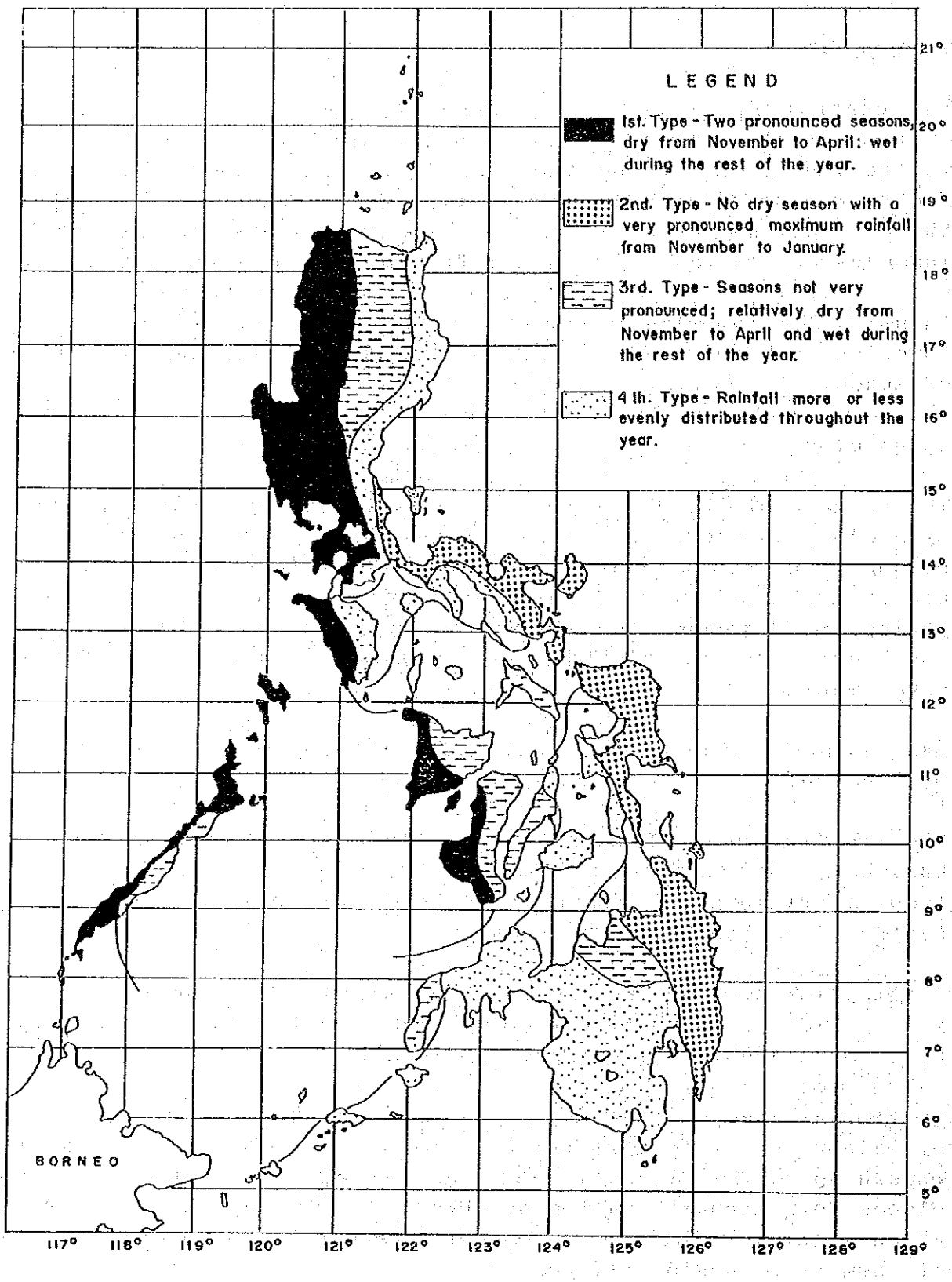


FIGURE 2.3-2 Type of Climate and Distribution of Rainfall

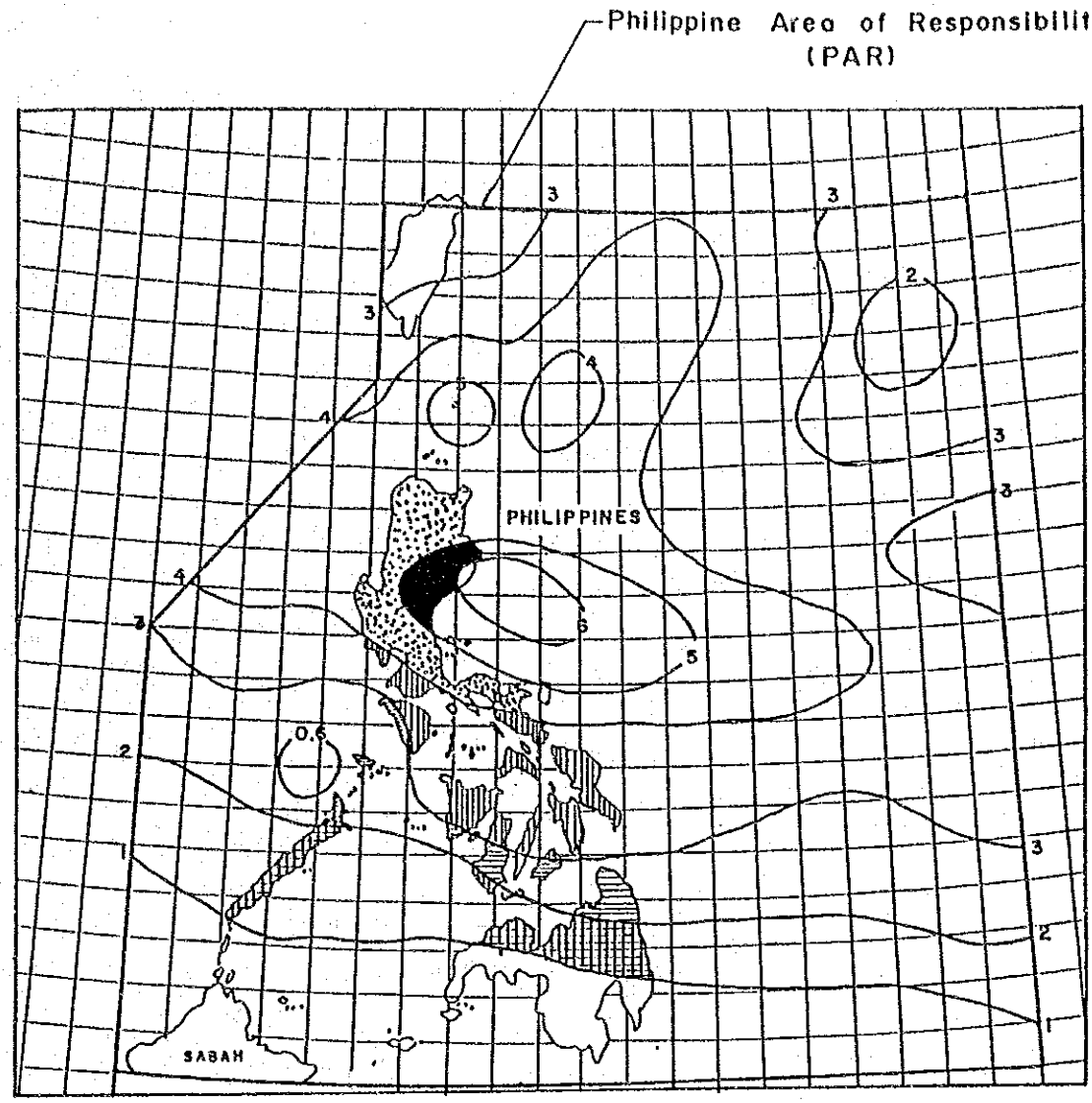


FIGURE 2.3-3 5-YEAR AVERAGE FREQUENCY OF TROPICAL CYCLONE PASSAGE

Source: PAGASA, 1987

CHAPTER 3

OUTLINE OF THE PROJECT

CHAPTER 3

OUTLINE OF THE PROJECT

3.1 OBJECTIVE

The eruption of Mt. Pinatubo has greatly damaged social infrastructures such as roads and water pipes in the nearby provinces; Zambales, Pampanga, Tarlac and Bataan. Furthermore, the accumulated ash debris has flown down due to heavy rainfall by Typhoon in the monsoon season, formed mudflows and seriously destructed the surrounding area extensively.

For the rehabilitation of these disaster damage, the Department of Public Works and Highways (DPWH) has set up a Task Force for Mt. Pinatubo Rehabilitation Projects and has been reconstructing the damaged roads and other infrastructure facilities, putting construction equipment from not only Region III but also nearby districts. In comparison with the extent of damage, the number of equipment is absolutely insufficient. So, effective recovery cannot be attained.

In urgent rehabilitation program by the Task Force for Mt. Pinatubo Rehabilitation Projects, cleaning and reconstruction of road and river systems, bridge rehabilitation, dike, river dredging have been planned and carried out by the operational equipment owned by both Government and private. However, such rehabilitation works are far behind as the magnitude of the damages are extending from the foot of the mountain to the lower reaches.

Under the above situation, this project aims to supply urgently the earth moving equipment, earth excavators, trucks, material/equipment transportation, foundation work equipment, earth solidifying equipment and road maintenance equipment which are now short for early recovery of the damages. Furthermore, it is expected that this equipment supply will increase DPWH's capability of the rehabilitation works for damage recovery, and gives DPWH mobility for urgent recovery work against damages which may be caused by mud-flow and/or avalanche of earth and rocks in rain season.

3.2 STUDY AND EXAMINATION ON THE REQUEST

3.2.1 Necessity and Appropriateness of the Project

In spite of endeavours of DPWH, equipment used for the rehabilitation works is insufficient qualitively or quantatively to conform with the magnitude of disaster damages in the surrounding area of Mt. Pinatubo.

The necessity and appropriateness of the project as well as its socio-economic effects are summarized as below;

Necessity of the Project

- The rehabilitation of the damaged infrastructure facilities such as roads, bridges and rivers is to support recovery of fundamental living environment and socio-economic activities in the area. It should be, therefore, implemented urgently.

- The Task Force of Mt. Pinatubo Rehabilitation Projects scratched up 415 equipments including vehicles for rehabilitation activities to date, and has been implementing recovery works of infrastructure facilities such as cleaning and rehabilitation of roads and river systems, bridge rehabilitation, dike and river dredging. However, suffered area is extensively wide and the equipment is insufficient. And the distribution and operation of equipment of both Government seems not to be properly made.

In order to fasten effectively the recovery work and to rehabilitate the infrastructure facilities, it is necessary not only to increase equipment mobility by supply of equipment, but to prepare guidance for recovery plan, effective equipment operation and equipment management by experts.

Appropriateness of the Project

- The equipment to be provided in the project is to support rehabilitation work conducted by DPWH, necessary for urgent rehabilitation work against the damages of roads, bridges and river systems.

- Beneficiary of the Project is the residents of the provinces

of Zambales, Pampanga, Tarlac and Bataan nearby Mt. Pinatubo, and beneficial population is many.

- Equipment to be donated will have the same level of those used now in the Philippines so that maintenance and management can be attained with present technical level and administration of the Philippines.

Socio-Economic Effect

- The rehabilitation of the devastated infrastructure facilities such as roads, bridges and river systems re-opens the traffic in the affected area, which will give the stabilization of people's living, and activities in food supply, medical care, trade and so on, eliminating people's unsecureness and loneliness, and to help promotion and stabilization of the regional economy.

Appendix 7 shows the list of equipment owned by District (DPWH) and by Private contractor and equipment needed for the rehabilitation.

3.2.2 Implementation Plan

The Department of Public Works and Highways (DPWH) is responsible for implementing the whole plan and the Task Force for Mt. Pinatubo Rehabilitation Projects directly manages all equipments. In detail, the equipment to be supplied will be allocated to Regional Equipment Services of Regional III of the DPWH and used by the Task Force for this rehabilitation work.

The project is to support rehabilitation work conducted by DPWH. The equipment to be provided in the project will be owned by DPWH. Many equipment, operators and maintenance facilities introduced by private sector for this rehabilitation works will be substituted partially or wholly by DPWH's equipment.

As of September, 1991, the cost/budget of rehabilitation works which were completed and/or has been under implementation by both site offices of DPWH region III construction office and the Task Force are:

	Region III	Task Force
Road/Drainage	570.24 M.P	12.00 M.P
Bridge	161.42 M.P	156.8 M.P
River	836.98 M.P	957.58 M.P
Total	1,568.64 M.P	1,126.38 M.P

The management and maintenance cost for the equipment to be provided in the Project will be covered in budge (1,568.64 M.P.) of the Region III construction office. Cost for the management and maintenance is roughly estimated 22.8 M.P., which falls to 1.5% of the total Budge.

3.2.3 External Assistances

The project is to provide heavy equipment and spare parts for rehabilitation works managed by DPWH. Most of external assistances from countries other than Japan and international organizations are aimed to cover suffered human related projects such as food, medicine, cash donation and so on as shown in Appendix 8, and this type of project are hardly seen in it.

3.2.4 Content of the Requested Equipment

The types of requested equipment are classified in accordance with its purpose as below, and all of them are directly used for the rehabilitation program including road clearing and rehabilitation of roads, bridges and river systems:

- Earth Moving Equipment	39
- Earth Excavator	20
- Transportation Equipment	25
- Loading Equipment	22
- Foundation Work Equipment	27
- Earth Solidifying Equipment	15
- Road Maintenance Equipment	27
Total	175

The damage survey cannot be made satisfactionary because Mt. Pinatubo is still active but not so big. Immediate task, therefore, will re-open the traffic on the roads and bridges at least.

Figure 3.3-1 shows type of disaster and rehabilitation work in the area. The type of damage in each area is divided into 6 and equipment used in rehabilitation method is shown in Figure 3.3.2 in which type of equipment is clarified to match with the rehabilitation method.

The urgent rehabilitation works include cleaning and rehabilitation of roads and river systems, bridge rehabilitation, road embankment construction of temporary bridges, river bank protection work, and river-bed excavation, and the equipment for such rehabilitation works includes bulldozer, scraper, hydraulic excavator, truck mounted crane, jack hammer, diesel hammer, multi-purpose vehicles, sewer vacuum and so on, by which the requested equipment is most judged reasonable.

Among above equipment, transportation equipment is marketable in the Philippines, and earth solidifying equipment is, in comparison with other equipment, supposed to be less used and its urgency is low. It is, therefore, suggested that both equipment shall be acquired by the Government of Philippines itself.

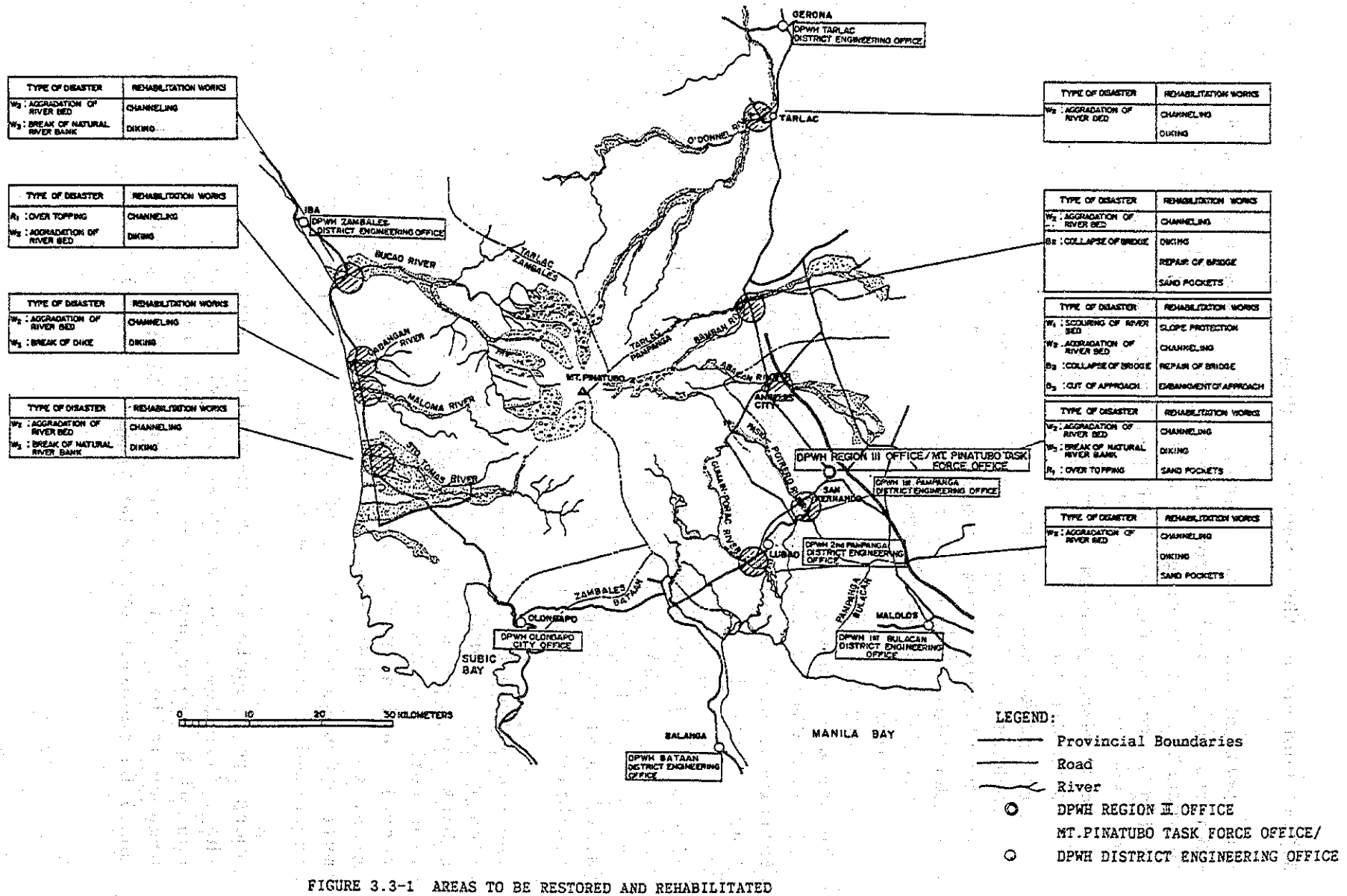


FIGURE 3.3-1 AREAS TO BE RESTORED AND REHABILITATED

FIGURE 3.3-2 Type / Description / Rehabilitation Method of Damage (1/6)

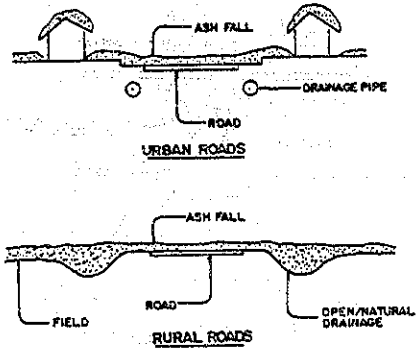
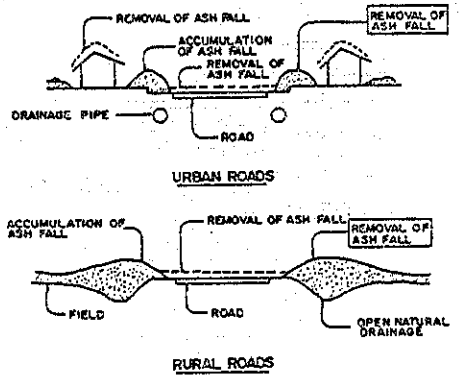
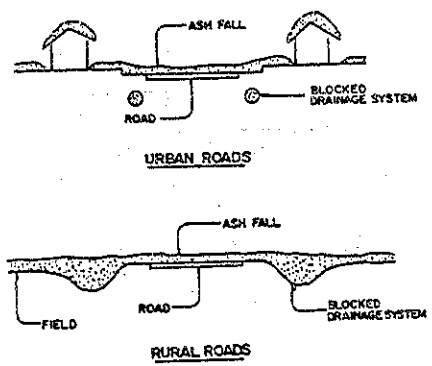
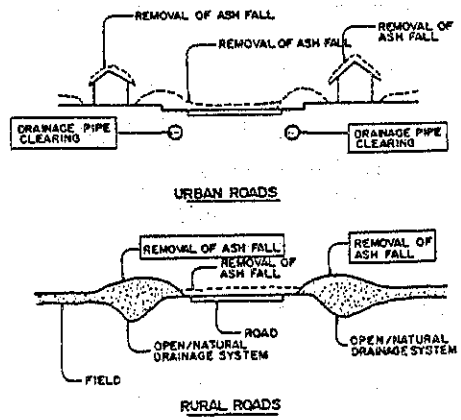
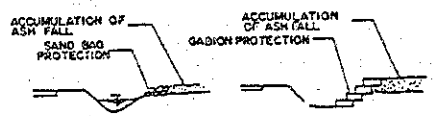
Type of Damage	Existing Condition	Rehabilitation Method / Objective	Procedure of Rehabilitation Work
A : Damage for Accumulation of Ash Fall A1 : Accumulation of Ash Fall on Road Surface 		· Rehabilitation Method · Road Clearing / Rehabilitation · Objective · Maintain Basic Transport Facilities · Removing of Traffic Obstructions	· Urban Roads : Loading (Wheel Loader) -> Transportation (Dump Truck) -> Leveling (Bulldozer) -> Clearing (Water Jet) · Rural Roads : Excavation / Loading (Crawler Shovel) -> Transportation (Dump Truck) -> Leveling (Bulldozer) -> Slope Adjustment of Open Drainage (Manpower)
A2 : Accumulation of Ash Fall inside Drainage System 		· Rehabilitation Method · Drainage Clearing / Rehabilitation · Objective · Maintain Basic Transport Facilities · Removing of Traffic Obstructions · Securing People Living in Affected Areas	· Urban Roads : Drainage Pipe Clearing / Loading (Sewer Vacuum) -> Transportation (Dump Truck) -> Leveling (Bulldozer) -> Pipe Clearing (Water Jet) -> Inlet Protection (Sand Bags / Gabion) · Rural Roads : Excavation / Loading (Crawler Shovel) -> Transportation (Dump Truck) -> Leveling (Bulldozer) -> Protection against Sediment Flow into Drainage (Sand Bags / Gabion)  Accumulated Layer: Thin Accumulated Layer: Thick

FIGURE 3.3-2 Type / Description / Rehabilitation Method of Damage (2/6)

R : Damage of Road

Type of Damage	Existing Condition	Rehabilitation Method / Objective	Procedure of Rehabilitation Work
R1 : Mud Flow on Road (River Overflow)		· Rehabilitation Method · Excavation of Riverbed / Sediment · Diking · Objective · Protection against Overflow · Protection against Extension of Sediment Area · Protection against Extension of Mud Flow on Road · Removing of Traffic Obstructions	· Riverbed : [Case 1] Excavation of Riverbed / Loading (Bulldozer, Crawler Shovel) -> Transportation (Dump Truck) -> Diking (Bulldozer) -> Slope Protection (Gabion Machine, Truck Mounted Crane, Mighty Mite) [Case 2] Excavation of Riverbed / Loading / Transportation / Leveling (Towed Scraper) -> Diking (Bulldozer) -> Slope Protection (Gabion Machine, Truck Mounted Crane, Mighty Mite) · Overflow Area : Excavation of Sediment / Loading (Swamp Bulldozer, Crawler Shovel) -> Transportation (Dump Truck) -> Diking (Bulldozer) · Temporary Bridge : Set Bridge Footing on Road Surface (Jack Hammer, Diesel Hammer, Truck Mounted Crane, Crawl Shovel) -> Erection of Temporary Bridge (Truck Mounted Crane, Mighty Mite)
R1 : Mud Flow on Road (River Shifting)		· Rehabilitation Method · Excavation of Riverbed / Sediment · Diking · Objective · Protection against River Shifting · Protection against Extension of Sediment Area · Protection against Extension of Mud Flow on Road · Removing of Traffic Obstructions	· Riverbed : [Case 1] Excavation of Riverbed / Loading (Bulldozer, Crawler Shovel) -> Transportation (Dump Truck) -> Diking (Bulldozer) -> Slope Protection (Gabion Machine, Truck Mounted Crane, Mighty Mite) [Case 2] Excavation of Riverbed / Loading / Transportation / Leveling (Towed Scraper) -> Diking (Bulldozer) -> Slope Protection (Gabion Machine, Truck Mounted Crane, Mighty Mite) · River Shifted Area : Excavation of Sediment / Loading (Swamp Bulldozer, Crawler Shovel) -> Transportation (Dump Truck) -> Diking (Bulldozer) -> Slope Protection (Gabion Machine, Truck Mounted Crane, Mighty Mite) · Temporary Bridge : Set Bridge Footing on Road Surface (Jack Hammer, Diesel Hammer, Truck Mounted Crane, Crawler Shovel) -> Erection of Temporary Bridge (Truck Mounted Crane, Mighty Mite)

FIGURE 3.3-2 Type / Description / Rehabilitation Method of Damage (3/6)

R : Damage of Road

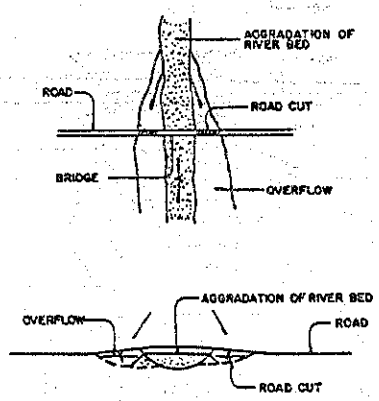
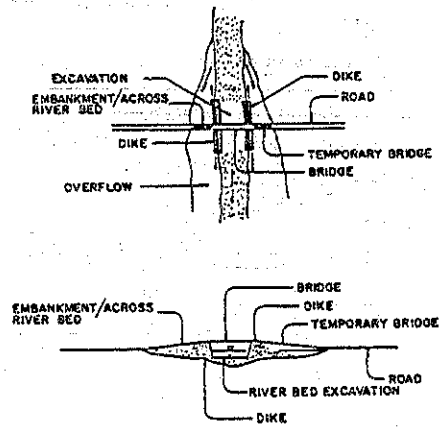
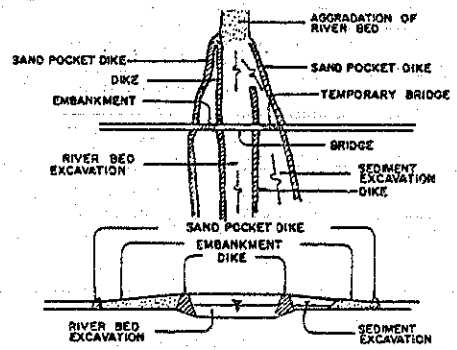
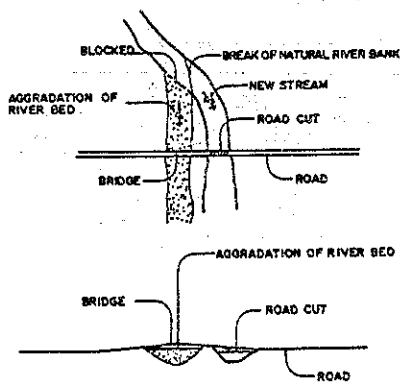
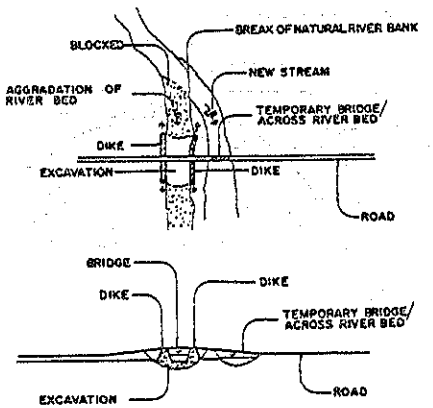
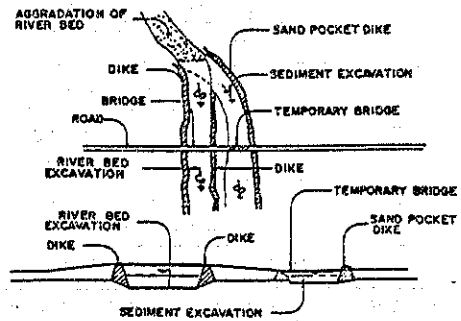
Type of Damage	Existing Condition	Rehabilitation Method / Objective	Procedure of Rehabilitation Work
R2 : Road Cut due to Overflow 		· Rehabilitation Method · Excavation of Riverbed / Sediment · Diking with/without Spur Dike · Objective · Protection against Overflow · Protection against Extension of Sediment Area · Protection against Extension of Road Cut Area · Removing of Traffic Obstructions 	· Riverbed : [Case 1] Excavation of Riverbed / Loading (Bulldozer, Crawler Shovel) -> Transportation (Dump Truck) -> Diking (Bulldozer) -> Slope Protection (Gabion Machine, Truck Mounted Crane, Mighty Mite) [Case 2] Excavation of Riverbed / Loading / Transportation / Leveling (Towed Scraper) -> Diking (Bulldozer) -> Slope Protection (Gabion Machine, Truck Mounted Crane, Mighty Mite) · Overflow Area : Excavation of Sediment / Loading (Swamp Bulldozer, Crawler Shovel) -> Transportation (Dump Truck) -> Diking (Bulldozer) -> Road Embankment (Bulldozer, Compaction Machinery) -> Slope Protection (Gabion Machine, Truck Mounted Crane, Mighty Mite, Sand Bags) · Temporary Bridge : Substructure (Jack Hammer, Diesel Hammer, Truck Mounted Crane, Crawler Shovel) -> Erection of Temporary Bridge (Truck Mounted Crane, Mighty Mite) -> Slope Protection (Gabion Machine, Truck Mounted Crane, Mighty Mite, Sand Bags)
R2 : Road Cut due to Shifting Flow 		· Rehabilitation Method · Excavation of Riverbed / Sediment · Diking with/without Spur Dike · Objective · Protection against River Shifting · Protection against Extension of Sediment Area · Protection against Extension of Road Cut Area · Removing of Traffic Obstructions 	· Riverbed : [Case 1] Excavation of Riverbed / Loading (Bulldozer, Crawler Shovel) -> Transportation (Dump Truck) -> Diking (Bulldozer) -> Slope Protection (Gabion Machine, Truck Mounted Crane, Mighty Mite) [Case 2] Excavation of Riverbed / Loading / Transportation / Leveling (Towed Scraper) -> Diking (Bulldozer) -> Slope Protection (Gabion Machine, Truck Mounted Crane, Mighty Mite) · River Shifted Area : Excavation of Sediment / Loading (Swamp Bulldozer, Crawler Shovel) -> Transportation (Dump Truck) -> Diking (Bulldozer) -> Slope Protection (Gabion Machine, Truck Mounted Crane, Mighty Mite) · Temporary Bridge : Substructure (Jack Hammer, Diesel Hammer, Truck Mounted Crane, Crawler Shovel) -> Erection of Temporary Bridge (Truck Mounted Crane, Mighty Mite) -> Slope Protection (Gabion Machine, Truck Mounted Crane, Mighty Mite, Sand Bags)

FIGURE 3.3-2 Type / Description / Rehabilitation Method of Damage (4/6)

R : Damage of Road

Type of Damage	Existing Condition	Rehabilitation Method / Objective	Procedure of Rehabilitation Work
R3 : Scouring of Embankment (Mud Flow: Parallel with Road)		· Rehabilitation Method · Riverbed Excavation / Spur Dike · Slope Protection · Objective · Protection against Overflow · Protection against Extension of Embankment Scouring · Removing of Traffic Obstructions	· Riverbed Widening : Excavation of Riverbed / Loading (Bulldozer, Crawler Shovel) → Transportation (Dump Truck) → Road Embankment (Bulldozer, Compaction Machinery, Mighty Mite) · Spur Dike : Leveling of Riverbed (Swamp Bulldozer, Crawler Shovel) → Gabion (Gabion Machine, Truck Mounted Crane, Mighty Mite) · Protection by Gabion : Leveling of Riverbed (Swamp Bulldozer, Crawler Shovel) → Foundation (Gabion Machine, Truck Mounted Crane, Mighty Mite) → Slope Protection (Truck Mounted Crane, Mighty Mite, Sand Bags)
R3 : Scouring of Embankment (Mud Flow: Vertical on Road)		· Rehabilitation Method · Slope Protection · Objective · Protection against Overflow · Protection against Extension of Embankment Scouring · Removing of Traffic Obstructions	· Protection by Sheet Pile : Piling of Sheet Pile (Jack Hammer, Diesel Hammer, Truck Mounted Crane) → Road Embankment (Crawler Shovel, Dump Truck, Bulldozer, Compaction Machinery) · Protection by Gabion : Leveling of Riverbed (Swamp Bulldozer, Crawler Shovel) → Foundation (Gabion Machine, Truck Mounted Crane, Mighty Mite) → Slope Protection (Truck Mounted Crane, Mighty Mite, Sand Bags)

FIGURE 3.3-2 Type / Description / Rehabilitation Method of Damage (5/6)

W/B : Damage of Bridge / River

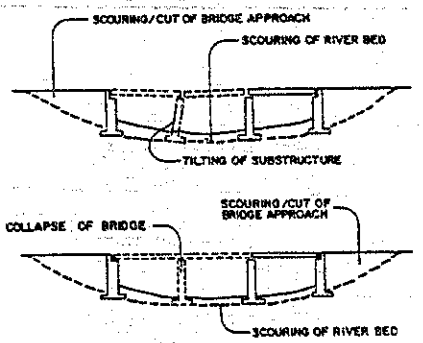
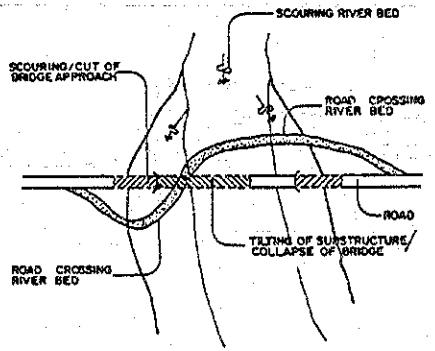
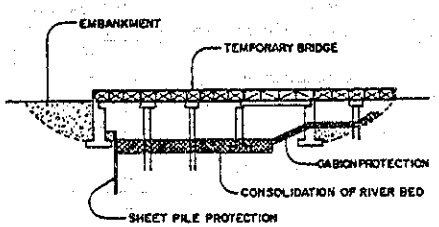
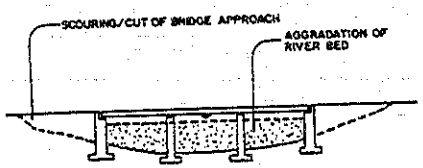
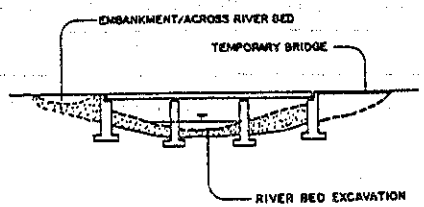
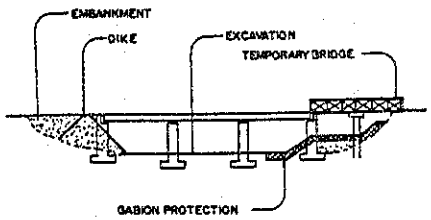
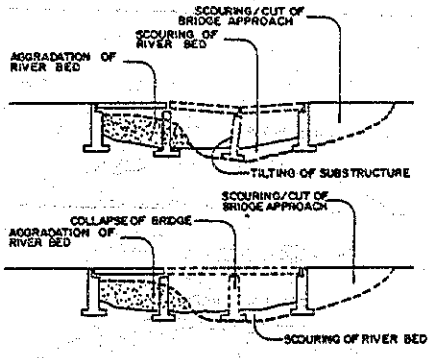
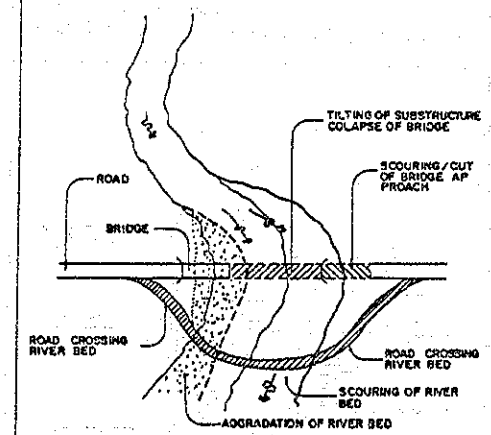
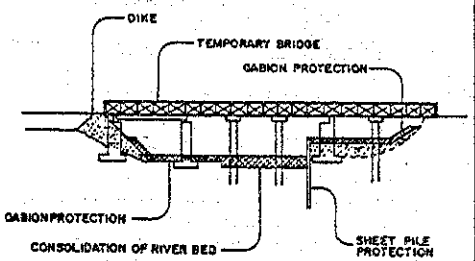
Type of Damage	Existing Condition	Rehabilitation Method / Objective	Procedure of Rehabilitation Work
W1/W3 : Scouring of Riverbed / Cut of River Bank B1 : Tilting of Substructure B2 : Collapse of Bridge B3 : Scouring / Cut of Bridge Approach 	• Road Crossing Riverbed / Traffic Stoppage 	• Rehabilitation Method • Riverbed Consolidation / Protection around Bridge • Erection of Temporary Bridge • Objective • Protection against Scouring of Riverbed • Protection against Overflow • Protection against Extension of Bridge Collapse • Protection against Extension of Approach Cut • Removing of Traffic Obstructions 	• Riverbed Consolidation by Gabion Leveling of Riverbed (Swamp Bulldozer, Crawler Shovel) -> Riverbed Consolidation (Gabion Machine, Truck Mounted Crane, Mighty Mite) • Slope Protection by Gabion : Slope Adjust (Crawler Shovel, Bulldozer) -> Slope Protection (Gabion Machine, Truck Mounted Crane, Mighty Mite) • Protection by Sheet Pile : Piling of Sheet Pile (Jack Hammer, Diesel Hammer, Truck Mounted Crane) -> Reclamation (Crawler Shovel, Bulldozer, Compaction Machinery) • Temporary Bridge : Substructure (Jack Hammer, Diesel Hammer, Truck Mounted Crane, Crawler Shovel) -> Erection of Temporary Bridge (Truck Mounted Crane, Mighty Mite)
W2/W3 : Sediment of Riverbed / Cut of River Bank B1 : Flooded to Superstructure B2 : Scouring / Cut of Bridge Approach 	• Temporary Bridge / Crossing Riverbed / Traffic Stoppage 	• Rehabilitation Method • Excavation of Riverbed around Bridge • Diking / Protection around Bridge • Erection of Temporary Bridge • Objective • Protection against Overflow / River Shifting • Protection against Extension of Sediment Area • Protection against Extension of Road Cut Area • Protection against Extension of Bridge Collapse • Removing of Traffic Obstructions 	• Riverbed : [Case 1] Excavation of Riverbed / Loading (Bulldozer, Crawler Shovel) -> Transportation (Dump Truck) -> Diking (Bulldozer) -> Road Embankment (Bulldozer, Compaction Machinery) [Case 2] Excavation of Riverbed / Loading / Transportation / Leveling (Towed Scraper) -> Diking (Bulldozer) -> Road Embankment (Bulldozer, Compaction Machinery) • Slope Protection by Gabion : Slope Adjust (Bulldozer, Swamp Bulldozer, Crawler Shovel) -> Slope Protection (Gabion Machine, Truck Mounted Crane, Mighty Mite) • Temporary Bridge : Substructure (Jack Hammer, Diesel Hammer, Truck Mounted Crane, Crawler Shovel) -> Erection of Temporary Bridge (Truck Mounted Crane, Mighty Mite)

FIGURE 3.3-2 Type / Description / Rehabilitation Method of Damage (6/6)

Type of Damage	Existing Condition	Rehabilitation Method / Objective	Procedure of Rehabilitation Work
W/B : Damage of Bridge / River W1/W2/W3 : Partial Scouring / Sediment of Riverbed / Cut of River Bank B1 : Tilting of Superstructure / Flooded to Superstructure B2 : Collapse of Bridge B3 : Scouring / Cut of Bridge Approach 	• Road Crossing Riverbed / Traffic Stoppage 	• Rehabilitation Method • Excavation of Riverbed around Bridge / Diking • Riverbed Consolidation / Protection around Bridge • Erection of Temporary Bridge • Objective • Protection against Overflow / River Shifting • Protection against Extension of Sediment Area • Protection against Scouring of Riverbed • Protection against Extension of Road Cut Area • Protection against Extension of Bridge Collapse • Removing of Traffic Obstructions 	• Sediment Area : [Case 1] Excavation of Riverbed / Loading (Bulldozer, Crawler Shovel) -> Transportation (Dump Truck) -> Diking (Bulldozer) [Case 2] Excavation of Riverbed / Loading / Transportation / Leveling (Towed Scraper) -> Diking (Bulldozer) • Riverbed Consolidation by Gabion Leveling of Riverbed (Swamp Bulldozer, Crawler Shovel) -> Riverbed Consolidation (Gabion Machine, Truck Mounted Crane, Mighty Mite) • Slope Protection by Gabion : Slope Adjust (Bulldozer, Swamp Bulldozer, Crawler Shovel) -> Slope Protection (Gabion Machine, Truck Mounted Crane, Mighty Mite) • Protection by Sheet Pile : Piling of Sheet Pile (Jack Hammer, Diesel Hammer, Truck Mounted Crane) -> Reclamation (Crawler Shovel, Bulldozer, Compaction Machinery) • Temporary Bridge : Substructure (Jack Hammer, Diesel Hammer, Truck Mounted Crane, Crawler Shovel) -> Erection of Temporary Bridge (Truck Mounted Crane, Mighty Mite)

3.2.5 Study on Need of Technical Assistance

The dispatch of equipment-based construction experts and mechanical engineers is requested by the Government of the Republic of the Philippines as described in the Minutes of Discussions signed on October 7th 1991 at the time of field survey on the Project.

As described in Section 2.1, urgent rehabilitation method for damages of road, bridge and river system is related to the cleaning and rehabilitation of roads and river systems road embankment, bridge rehabilitation construction of temporary bridge, river bank protection work and river bed excavation. And the rehabilitation works are carried out by not only equipment owned by Government but one chartered by private sector. However, number of equipment is shorted and effective operation under proper program is not attained.

In addition to provision of equipment, technical guidance to prepare adequate implementation plan, effective distribution and operation plan of equipment, effective equipment operation, and so on is necessary. Through such technical assistance, provided equipment will be incorporated with present equipment or both Government and private, and the rehabilitation work will be implemented by effective use of the equipment.

3.2.6 Basic Policy for Cooperation

Based on the study and examination mentioned in the previous sections, following points are confirmed;

- It is confirmed the Project aims to support rehabilitation of infrastructure facilities in the recovery program of DPWH.

- The equipment to be procured in this project will be used for rehabilitation of damaged roads, bridges and river systems. As the damages disturb people's fundamental living such as food supply, medical service, educational activities and economic activities, the Project to support rehabilitation of damaged area is necessary and urgent one, and its effects are evaluated high.

- Capability of both implementation, and management and maintenance of the Philippines is confirmed.

- Effects mentioned above is confirmed to be matched with Japan's Grant Aid Program.

From above points of view, the implementation of the Project by Japan's Grant Aid Program was evaluated so adequate.

3.3 PROJECT DESCRIPTION

3.3.1 Executing Agency and Operational Structure

The responsible agency in the Philippines for the implementation of the Project is the Department of Public Works and Highways. The Task Force for Mt. Pinatubo Rehabilitation Projects created in the Department shall be responsible for the operation and maintenance of the equipment provided under the Project.

For the rehabilitation work of the damages caused by Mt. Pinatubo eruption, Government of the Philippines has input more than 400 equipment. Such equipment now used in rehabilitation work consist of those owned by DWPH, those obtained in the contract with private contractors and those chartered from private enterprises. And the total number of equipment from private sector reaches to almost 90 percent.

Organization and number of personnel of the Task Force for Mt. Pinatubo Rehabilitation projects are shown in Tables 3.3-1 and 3.3-2.

TABLE 3.3-1 DPWH TASK FORCE OF MT. PINATUBO REHABILITATION PROGRAM ORGANIZATION CHART

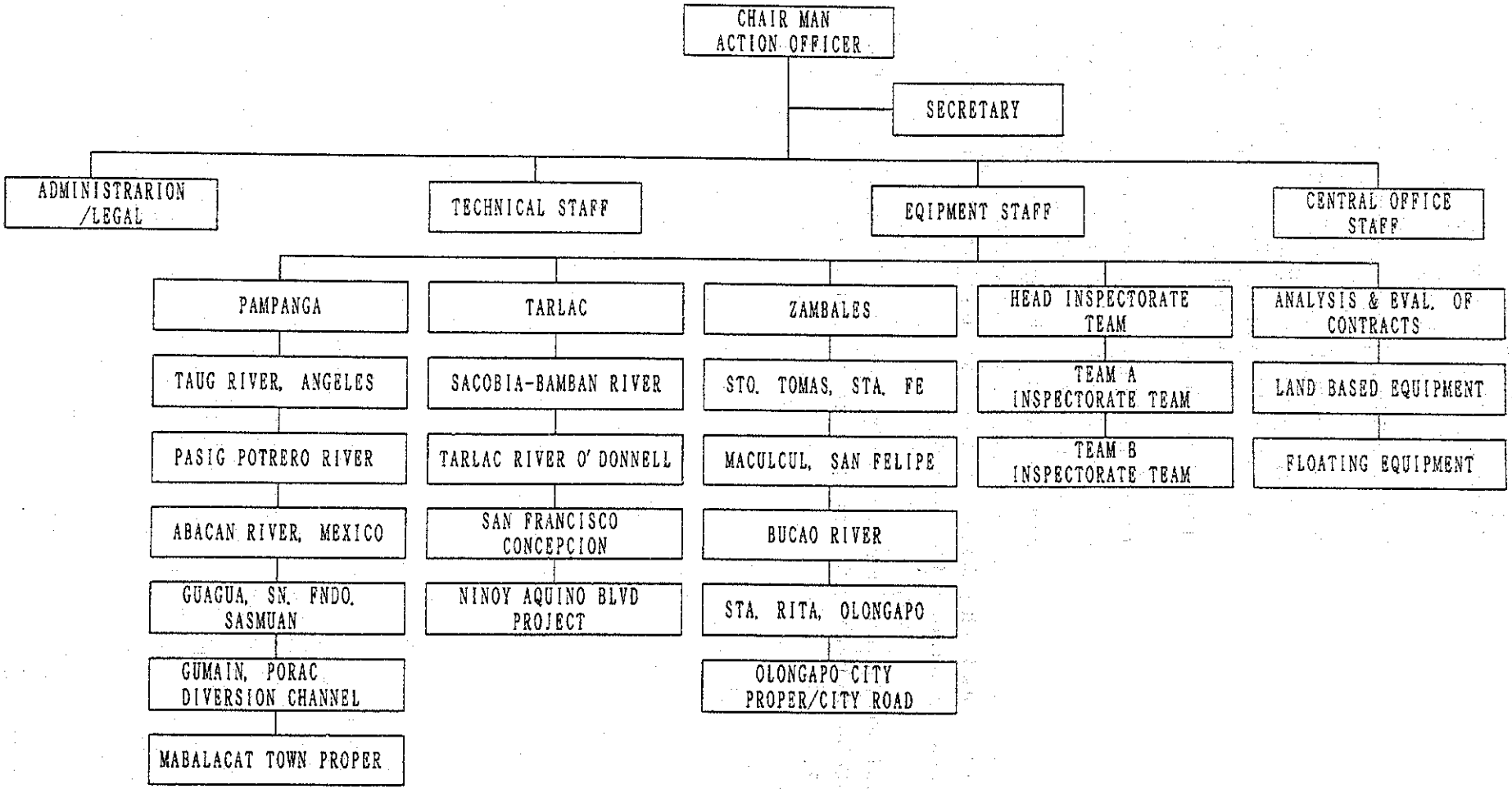


Table 3.3-2 NUMBER OF PERSONNEL OF THE TASK FORCE FOR MT. PINATUBO REHABILITATION PROJECTS

Position	Number
Chairman	1
Secretary	1
Project Manager	2
Chief mechanical Engineer	2
Civil Engineer	33
Chief Area Equipment Services	3
Mechanic	32
Head Administrator	1
Administrator	3
Driver	1
Total	79

As shown in Table 3.3-2, the number of operator in the Task Force is a very few. The operators engaged in the rehabilitation work are about 30 of the Task Force, 11 from Region III construction office and a few from other regions. In addition, there are about 10 2nd class mechanics.

As for the equipment in the Project, the Task Force will handle them directly and will provide operators and necessary facilities for the implementation. For the maintenance of the equipment, the Task Force will offer the necessary engineers and facilities of Equipment Services of DPWH's regional construction offices in the project area, viz., Pampanga, Tarlac, Zambles and Bataan Provinces.

Furthermore, the maintenance service can be obtained in Regional Service Center of San Fernando and Pampamga, where repair by overhaul service is available, Provincial Service Centers of Bulacan, Nueva Ecija and Pangasinan. The maintenance service in the DPWH facilities are such simple works which do not require more engineers and much expense as daily check, oil exchange and change of simple parts. The more complicated services such as periodical check by experts, overhauls and various repair works will be done in the facilities of private enterprises as before in views of availability and cost.