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Report No. 19378

**IMPLEMENTATION COMPLETION REPORT**

**INDONESIA**

**FLORES EARTHQUAKE RECONSTRUCTION PROJECT**

**(LOAN 3589-IND)**

**May 11, 1999**

Transport Sector Unit  
East Asia and Pacific Region

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## CURRENCY EQUIVALENTS

(As of March 1993)

### Currency Unit

Indonesian Rupiah

US\$1.00 = Rp 2,066

Rp 1 million = US\$484

As of November 30, 1998

US\$1.00 = Rp 7,685

Rp 1 million = US\$130

### Fiscal Year

April 1 – March 31

## ABBREVIATIONS AND ACRONYMS

ADB	–	Asia Development Bank
AusAID	–	Australian International Development Assistance Agency
EIRR	–	Economic Rate of Return
FERP	–	Flores Emergency Reconstruction Project
GOI	–	Government of Indonesia
GRG	–	General Reconstruction Guidelines
Kabupaten	–	District
MPW	–	Ministry of Public Works
NTT	–	(the province of) Nusa Tenggara Timur
PIU	–	Project Implementation Unit
RMT	–	Reconstruction Management Team

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**INDONESIA**  
**FLORES EARTHQUAKE RECONSTRUCTION PROJECT**  
**(LOAN 3589-IND)**  
**IMPLEMENTATION COMPLETION REPORT**

**PREFACE**

This is the Implementation Completion Report (ICR) for the Flores Earthquake Reconstruction Project (Loan 3589-IND) to the Republic of Indonesia for which a loan of US\$42.1 million equivalent was approved on April 13, 1993 and made effective on July 7, 1993.

The Loan 3589-IND was closed on November 30, 1998 after three extensions totaling a year and eleven months from the original closing date of December 31, 1996. The final disbursement was made on May 10, 1999.

The ICR was prepared by Mr. William Hardi, Task Manger (EACIF), and Mr. Ephrem Asebe, Consultant. It was reviewed by Messrs. Mark Baird, Director, Indonesia and Jitendra N. Bajpai, Manager, Transport Sector Unit, East Asia and Pacific Region.

Preparation of this ICR began during the Bank's final supervision mission in November 1998. It is based on material in the project file. The Borrower contributed to the preparation of the ICR by stating its views as reflected in the mission's Aide-Memoire (Annex A), and by preparing its own evaluation of the project's execution (Annex B).

**INDONESIA**  
**Flores Earthquake Reconstruction Project**  
**(Loan 3589-IND)**

**EVALUATION SUMMARY**

**Introduction**

i. **Background.** At 1:30 PM on December 12, 1992, an earthquake measuring 7.5 on the Richter scale, affected an area of about 10,000 square kilometers on Flores island, in the eastern part of Indonesia. The tremor generated tidal waves (tsunami) and liquefaction along the north coast of the island of Flores. The most serious damage occurred over an area of 6,000 square km affecting the kabupatens of Ende, Flores Timur, Ngada and Sikka and the towns of Ende and Maumere. The earthquake killed 1,951, and injured 2,126 people. More than 25,000 houses, 600 schools and 135 health facilities were destroyed or severely damaged. The damage to homes, roads, bridges, jetties, airport facilities, irrigation works, water supply and distribution systems, schools, health facilities, and government buildings totaled an estimated Rp.564 billion (US\$273.5 million equivalent). The damage to agriculture (livestock and crops), fishing (boats, nets and other equipment), and commercial and other private buildings (including private schools and facilities) was also extensive. Total aid for the reconstruction, and associated awareness training was US\$125 million. The World Bank contributed US\$39.58 million primarily for roads, schools and medical facilities, whilst other lending agencies/donors also assisted the Government: the Asian Development Bank contributed about SDR 13.7 million (US\$20.1 equivalent) for provincial roads and water resources; and AusAID contributed about AUD 23.0 million (US\$15.0 million equivalent) for sanitation and water supply.

**Bank Project**

ii. **Project Objective.** The objectives of the World Bank funded component of this multi-sectoral Project, as outlined in the Memorandum and Recommendation of the President of IBRD (Report No. P-6026-IND), were to: (i) minimize the adverse economic impact of the disaster by promptly restoring economic activity and social services in the affected areas, at the same time, supporting the Bank's assistance strategy of poverty reduction for Indonesia in line with OD 8.50; (ii) introduce measures to minimize the impact of possible future earthquakes; and (iii) improve the standard of construction of the infrastructure. These objectives were maintained throughout project implementation.

iii. **Project Components.** To achieve these objectives the project financed reconstruction investments in (i) national and kabupaten roads and bridges; (ii) education and health facilities; and (iii) market redevelopment and fishing port facilities; and funded technical assistance in the management of the overall reconstruction program and in the development of measures to mitigate effects of earthquakes, landslides and tidal wave (tsunami) damage in the future. The total project cost, including contingencies, was estimated at US\$62.9 million equivalent, with a foreign exchange component of 32%. The Bank loan of US\$42.1 million was to finance about 68% of the total project cost, over a three-year period.

iv. **Project Covenants.** The critical conditions agreed at project negotiations were: (i) the preparation of General Reconstruction Guidelines (GRGs) and area-specific reconstruction guidelines by July 31, 1993; (ii) their submission for review and comment by a technical panel established by the Government in consultation with the Bank; and (iii) finalization and implementation by September 30, 1993.

## Implementation

v. **Achievement of Objectives.** The project has substantially achieved its objectives, albeit after initial delays in the repair works during the first year of reconstruction. Nevertheless, the project has realized most of the original reconstruction program. The first year program quality was not of high standard. There were also major developments in the quality, design and costs of construction of schools using bamboo. The innovations can have important contributions in earthquake prone Indonesia. The Project also initiated policy measures and behavioral changes aimed at reducing vulnerability to future earthquakes. In terms of poverty alleviation, over the last six-year period, the money spent in Flores has had a visible qualitative and quantitative effect on the island's economy. Roads have improved and commerce has increased. Schools and health facilities have improved. Per capita income has increased. More goods are available in the markets.

vi. **Costs and Implementation timetable.** At completion, the total funds expended on the project were US\$57.93 million compared with an appraisal estimate of US\$62.9 million. Main variance was the underspending of contingency funds in the initial allocation. Overall, the estimated EIRR based on an evaluation study for the road works ranged between 15.3% and 41.8% with the exception of the Nebe Mudajebak link, which had an EIRR of 8.9%. Time of completion was considerably longer than originally anticipated, with completion in November 1998, compared to an initial expectation of December 1996. Main reasons for the extension were the later inclusion of non-government schools in the re-construction program, and delays by the contractor on the Maumere Hospital.

vii. **Main Factors Affecting Implementation.** Significant factors noted during project implementation which influenced project outcome included: GOI implementation arrangements, contractors' and consultants' inadequate attention to quality, and remoteness of Flores from major manufacturing centers. GOI lost momentum in the *reconstruction stage*, and the delays in recruiting staff to work in Flores island resulted in a shortage of both skilled and non-skilled labor during the implementation of the Project. At implementation agency level, weak management of some of the provincial and local firms was a major contributing factor to the below standard quality, especially in the first year program. Inadequate details on drawings, inadequate contractor resources and in-experience and poor workmanship were evident. Major delays effecting time of completion of the project were experienced in both the construction of new Maumere Hospital, and the water supply installation for resettlement areas of new Wuring; whilst the Indonesian financial crisis from early 1998 onward was also a significant factor.

## Results and Performance

viii. **Project Sustainability.** Overall, the sustainability of the project is assessed as *uncertain on account of the macroeconomic situation of Indonesia*. The sustainability of benefits from the major physical achievements of the project: road infrastructure, schools, and health center facilities will depend on the GOI's ability and preparedness to commit adequate funds for maintenance of the facilities. More importantly, however the culture of awareness of earthquake disasters and preparedness, developed through the activities of the Project, is likely to be sustainable. School children and health staff drill twice a year. The knowledge base for seismic resistant construction technology has been enhanced. The General Reconstruction Guidelines, the seismic zone maps, the project supported training, and the various related technical studies are likely to have a long lasting impact not only in Flores but also in other areas of earthquake prone Indonesia.

ix. **Bank Performance.** Bank performance during identification and preparation was *satisfactory*. Bank response to the government's three-staged reconstruction program was innovative, swift and in line with the Bank's OD 8.50. The Bank's main contribution was its emphasis on sound seismic resistant design and quality assurance in the reconstruction work, as reflected in the objectives of the project. The Bank performance in appraisal was also *satisfactory*. Assessment of potential risks facing project implementation was correct but reliance on the Central Government for project management, although designed to assure quality, proved to be troublesome in subsequent implementation. Bank performance during implementation was also assessed to be *satisfactory*. Supervision and reporting was adequate.

Implementation problems were identified and assessed frankly. Unfortunately, partly because of the governments central management policy, the Bank's initial commitment to frequent supervision to Flores did not fully materialize as the main issues which need resolving during much of the project were in Jakarta with MPW/RMT. Although the Bank Task Manager was changed after the mid-term review, the fact that the Task Manager throughout the project was Jakarta based was considered beneficial, as it enabled decisions to be made in conjunction with MPW/RMT more expeditiously.

x. **Borrower Performance.** The borrower had a three-staged strategy that was workable. However, overall, the borrower performance in implementation was *marginally satisfactory*. The momentum did not continue in project implementation into the third stage; four months passed before loan effectiveness after Board approval. Delays were experienced in the issuance of the General Reconstruction Guidelines. Reliance on central government for decisions and management also proved troublesome, and although it was intended to hand management back to local authorities in Nusa Tenggara Timur (NTT), this took longer than anticipated. As a result the problems in Flores tended to become magnified because of the need and time taken for resolution in Jakarta. While physical objectives were achieved or exceeded, insufficient attention was given to quality assurance of work in the first year of project implementation. Bank's insistence on quality assurance resulted in considerable reworking of design and this delayed procurement processing.

xi. **Project Outcome.** Overall, the outcome of the project is assessed as *satisfactory*. Despite initial delays and quality problems, the project generated momentum and completed most of the original reconstruction program. Economic and commercial activities, and provision of services have been restored. Significant technological transfer has taken place in seismic resistant design and construction. Public awareness of disaster preparedness has deepened.

#### **Key Lessons and Future Actions**

xii. **Key Lessons Learned.** Overall, the implementation experience has provided valuable lessons for Bank emergency lending operations. These can be summarized as follows:

- a) The policies set out in OD 8.50 for emergency projects need critical assessment in light of local conditions in formulating program objectives, and developing implementation arrangements. The balances between the "emergency response" and the desire to develop innovative mitigating measures for future emergencies, and the Government's central management structure compared to a participatory management, which mobilizes local participation, are issues that need addressing for future emergencies.
- b) The General Reconstruction Guidelines for earthquake reconstruction should be a living document, updated frequently to take into account development in applied earth science, and should form a necessary part of disaster preparedness.
- c) The use of bamboo for construction of seismic resistant structures is an important innovative outcome of FERP. Preliminary studies have shown that construction combining bamboo with steel can be implemented at 86% of the price of wood and steel construction. The economic feasibility of the proposition is an area for further research.
- d) The FERP implementation experience amply demonstrated that the state of development of the contracting industry in Flores is quite low. In the interest of efficient and sustainable development, the Bank may want to design an appropriate response for improving the performance of the contracting industry in Indonesia, especially in remote provinces like NTT.

- e) With the significant knowledge that has emerged from this and other Bank financed emergency projects, the Bank may wish to consolidate these experiences with those from other similar projects, with the objective of mitigating the socio-economic impact of future disasters, especially on the poor, and preferably with the participation of the private sector (e.g. insurance companies).

xiii. **Future Actions.** Future planned actions should focus on: (i) the sustainability of the benefits of physical assets; (ii) codification of the knowledge base and expanding public awareness as part of disaster preparedness; and (iii) monitoring of the socio-economic benefits attained under the project. Sustainability of benefits will depend on the provision of adequate maintenance funds and the timely utilization for maintenance purposes. In this area, there is no lack of consciousness on the part of the local (TK. II) government. The main issue will be availability of funds, given the economic-political crisis in Indonesia. With regard to knowledge, and public awareness, the spark ignited by the project from the public training and expanded public knowledge is likely to continue. Indonesia has already one of the foremost authorities in seismology, and the project has now added a pool of professionals who can focus on the issue, given that the whole of Indonesia is prone to earthquake. In addition, most school children and health center staff now undergo regular drills and this must be encouraged to continue. The reconstruction expenditure in Flores has had a significant impact on economic activities and the socio-economic situation in the province. Indicators for increase in personal income, vehicle ownership, vehicle traffic, school attendance, and health delivery service are being monitored by the Statistical Office of the respective Kabupatens. Finally, Maumere Hospital has an environmental management plan incorporated in its management charter and the hospital management has committed to follow it, and this should continue to be monitored.

## INDONESIA

### Flores Earthquake Reconstruction Project (Loan 3589-IND)

#### PART I: PROJECT IMPLEMENTATION ASSESSMENT

##### A. PROJECT OBJECTIVES AND DESCRIPTION

###### Background

1. At 1:30 PM on December 12, 1992, an earthquake measuring the 7.5 on Richter scale, shook an area of about 10,000 square kilometers on Flores Island. This was followed by 148 after shocks between December 12 and December 22 with magnitudes of 3.0 to 6.0 on the Richter scale. The earthquake was one of the strongest and most destructive earthquakes in recent Indonesian history. It was also the first of that magnitude recorded in the Island of Flores. The tremor generated tidal waves (tsunami) and liquefaction along the north coast of the Island of Flores. The most serious damage occurred over an area of 6,000 square km affecting the kabupatens of Ende, Flores Timur, Ngada and Sikka and the towns of Ende and Maumere. The earthquakes killed 1,951, and injured 2,126 people. More than 25,000 houses, 600 schools and 135 health facilities were destroyed or severely damaged. The damage to homes, roads, bridges, jetties, airport facilities, irrigation works, water supply and distribution systems, schools, health facilities, and government buildings totaled an estimated Rp.564 billion (US\$273.5 million equivalent in 1992 Dollars). The damage to agriculture (livestock and crops), fishing facilities (boats, nets and other equipment), and commercial and other private buildings (including private schools and facilities) was also extensive. The World Bank provided US\$39.58 million for rectification of roads, schools, medical facilities, market and fishing port facilities. Other lending agencies/ donors also assisted the Government: the Asian Development Bank contributed about SDR 13.7 million (US\$ 20.1 equivalent) for provincial roads and water resources; and AusAID contributed about AUD23 million (US\$15 million equivalent) for sanitation and water supply, whilst Government matching contribution exceeded US\$ 50 million.

###### Project Objectives

2. The objectives of this multi-sectoral Project, as outlined in the Memorandum and Recommendation of the President of IBRD (Report No. P-6026-IND), were to: (i) minimize the adverse economic impact of the disaster by promptly restoring economic activity and social services in the affected areas, thereby supporting the Bank's assistance strategy of poverty reduction for Indonesia; (ii) introduce measures to minimize the impact of possible future earthquakes; and (iii) improve the standard of construction of the infrastructure. These objectives were maintained throughout project implementation.

###### Project Components

3. To achieve these objectives the project financed: (a) reconstruction investments in (i) national and kabupaten roads and bridges (31% of base costs); (ii) education and health facilities (39% of base costs); and (iii) other facilities including redevelopment of markets in Maumere, and the New Wuring fishing port (10% of base costs); and (b) technical assistance in the management of the overall reconstruction program and in the development of measures to mitigate earthquakes, landslides and tidal wave (tsunami) damage in the future, including technical assistance in spatial planning, training in geology and seismology, and the procurement of equipment for seismological studies (20% of base costs). The total project cost, including contingencies, was estimated at US\$62.9 million equivalent, with a foreign exchange component of 32%. The Bank loan of US\$42.1 million would finance about 68% of the total project cost, over a three-year period. At completion final costs were US\$ 57.93 million of which the Bank contributed US\$ 39.58 million.

4. **Changes in Project Scope.** While maintaining the project objectives, the scope of implementation arrangements and program contents were expanded to include: (i) changes in project management to provide for provincial staff participation in overall project management; (ii) strengthening of Kabupaten staff and their participation in local project execution effectiveness; (iii) introduction of seismic resistant bamboo structures to demonstrate the use and suitability of locally available bamboo; (iv) extension and expansion of community training programs; and (v) introduction of community based disaster mitigation action plans within the urban re-development proposals for Maumere Town. Because of the budgetary operation of the government, most contracts were directly undertaken at Kabupaten level, and the management of project components were performed by the Kabupaten Project Managers (PIMPRO) and not by Project Implementation Units (PIUs) as originally planned. Accordingly, the role of RMT Project Office was redirected to focus on coordination, training, quality assurance, monitoring and evaluation of project activities.

5. **Project Covenants.** The critical conditions agreed at negotiation were: the preparation of General Reconstruction Guidelines (GRGs) and area-specific reconstruction guidelines by July 31, 1993; their submission for review and comment by a technical panel established by the Government in consultation with the Bank; and finalization and implementation by September 30, 1993.

### Evaluation of Objectives

6. The project objectives were *very important for the affected people, and the Bank's assistance strategy of poverty alleviation*. Flores is one of the poorest and most backward islands in the province of Nusa Tenggara Timur (NTT). The project components reflected NTT's Seven Point Strategic Development Program: which emphasizes: human resources, poverty eradication, agro-industry, science & technology, spatial planning, transport and tourism.

7. The design of the project objectives was *conceptually clear*. Nevertheless, achieving the right balance between focussing on urgent reconstruction on one hand and long-term sustainability on the other (seismic resistance and quality construction) was not always apparent to the participants in practice, largely due to initial administrative arrangements with management based in Jakarta. This improved after the mid-term review, when the project implementation arrangements were formally revised to include the participation of provincial and local governments.

8. The design of the project was in line with the Bank's Emergency Assistance Strategy (OD8.50 then effective)<sup>1/</sup>. However, while relying on existing implementation channels, the project design did not provide adequate scope for mobilizing local and provincial governments' participation fully. The original project design overestimated the implementation capacity of the central government and relied on it for speedy preparation and dissemination of the "General Reconstruction Guidelines", which it failed to do on schedule. It also underestimated the generally poor quality of communications within Flores. These factors contributed to the delayed mobilization of contractors and loan utilization, factors that necessitated taking corrective measures during the mid-term review.

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<sup>1/</sup> The OD8.50 called for: (i) early involvement of the Bank staff; (ii) prior working relation with the country and sector agencies; (iii) strong government commitment to recovery, and access by the emergency coordination unit to the highest levels of government; (iv) limited objectives and realistic time schedule; (v) rapid agreement on the strategy and scope of the overall recovery program; (vi) conditionalities linked directly to the emergency, rather than to long-term macro-economic policies; (vii) commitment to restoration of standard cost recovery practices; (viii) simple implementation arrangements and full use of existing institutions, including sector agencies, NGOs, and community groups; (ix) use of disaster resilient reconstruction design standards; and (x) inclusion of measures for preventing and mitigating the impact of future disasters.

## B. ACHIEVEMENT OF PROJECT OBJECTIVES

9. **Overall Assessment.** The project has substantially achieved its objectives, albeit after initial delays in the repair works and in the late completion of the first year reconstruction works program. Nevertheless, the project recovered momentum to realize most of the originally scheduled reconstruction works, with some exceptions. The first year program quality was not of high standard which required rectification. There was also extensive innovative work done in design and construction of school buildings using bamboo. This work could provide an important contribution to building performance in earthquake prone areas in Indonesia. The Project has also encouraged policy measures and behavioral changes, which would reduce vulnerability to future earthquakes. In terms of poverty alleviation, over the last six year period, the expenditure of close to US\$125 million in Flores, financed by external assistance funds from IBRD, ADB, AusAID and other donors and government counterpart funds, has made a visible qualitative and quantitative improvement to the island's economy. Roads have improved and commerce has increased. Schools and health facilities have improved. Per capita income has increased. More goods are available in the markets. In the words of one senior planning official in local Government, "the situation now is very much better than before the earthquake".

### Physical Objectives

10. **Roads and Bridges.** Table 5B Annex A summarizes the main physical achievements in road and bridge reconstruction. All the badly damaged national provincial and kabupaten roads and bridges have been reconstructed and traffic flows and trade networks now operate smoothly. A total of 279.6 km of kabupaten roads, 50 km of national roads and 357 meters of bridges were reconstructed. This was well in excess of the initial plan to re-construct 169 km of kabupaten roads, 55.5 km of national roads and 226 m of bridges. An evaluation study for the road works showed that the economic rate of return (EIRR) estimates for the road links range between 15.3% and 41.8% with the exception of the Nebe Mudajebak link which included the new two-span Nebe Bridge. The latter has an EIRR of 8.9%.

11. Overall quality of the reconstructed roads and bridges is assessed as *good*. Concerted efforts were made to improve the *quality* of road reconstruction. Structural designs incorporating seismic factors were used. Stability analyses were undertaken and road alignments were adjusted optimally to mitigate slope failures when rain increases embankment soil pore pressures. Seawall structures were used where appropriate to provide added stability and to protect coastal roads from future affect by tidal waves (tsunami). To reduce formation and pavement failures, Public Works code of practice was enforced. Drainage and retaining walls were built to improved standards to avoid frequent failure. As in the case of roads, quality assurance was also given special attention in bridge reconstruction. Geo-technical investigation of foundations preceded reconstruction to avoid approach and abutment failures. In two cases, following investigation of sites, the bridge locations were relocated to sites with better founding conditions.

12. **Schools.** The impact of the rehabilitation and upgrading of schools on the learning environment was significant. Structures were designed to ensure that in the event of future earthquake, failure would not be catastrophic. The use of steel frame and plywood panel inserts has provided this assurance and thus risks to pupils and teachers from future earthquake have been diminished. However, quality during the first year (1993/94) of the reconstruction program was not high and a considerable effort was necessary to improve the standard of construction. Table 5C, summarizes the rehabilitation and upgrading/reconstruction works and the schedule of implementation activities. After an initial lag in implementation, all of 343 of the schools initially identified for repair, and/or reconstruction were completed, most by the original closing date of December 31, 1996 and all by the actual loan closure. A total of 160 schools were rehabilitated and 183 schools were upgraded/ reconstructed compared with the originally planned 179 and 164 respectively. The increased number for reconstruction was because more schools had been seriously damaged than initially assessed. The innovative use of bamboo and steel for construction was developed late in the project, and was shown to cost 86% of steel and timber, but further detailed feasibility studies are needed. One hundred and forty-seven "core units" consisting of

four classroom have been constructed using bamboo technology for non-governmental schools (Table 5E) and the quality appears to be satisfactory.

13. **Health Centers.** A total of 124 health centers were rebuilt to new and more effective standards providing both improved service and structural safety. The total number of facilities included in the revised plan for repair and rectification was 129. The provision of solar cells financed under the project has enabled some of the remote centers to now store medicines and vaccines in refrigerators. In addition housing for the medical and paramedical staff have attracted quality staff and thus reduced the travel time for patients to centers where qualified staff are available. As in the case of the schools, the first year (1993/94) was subject to many design and construction revisions.

14. **Hospitals.** In addition to the health centers, the project financed the construction of large hospitals at Ende and Maumere. The reconstruction at Ende was basically a restoration and replacement of damaged buildings. Construction began in March 1993 and was completed by November 1995. Maumere Hospital, however was on a new site and was designed to upgrade and replace the old hospital operating in Maumere Town. At loan closing, hospital construction which had been considerably delayed (July 1995 – November 1998) because of design changes, contractor performance, changes in contractor project management, and poor workmanship, had been completed, and was partially operational. Some equipment to be provided by Department of Health from outside the loan, or to be transferred from the old Maumere hospital had not been installed.

15. **Other facilities.** A new large Maumere Market Complex (Feb. 1996 to May 1997) has been jointly financed with the active contribution of the local Sikka kabupaten government to replace the original structure in Maumere. The rent collected from the shops is assessed to cover maintenance and operating costs. Sikka Kabupaten has also now a more versatile, useful and well fenced sport stadium. The Natural Hazards Information Center, currently used by Cipta Karya, will be handed over to Natural Disaster Committee of Sikka. The water supply to New Wuring to be operated by the City of Maumere was extended and public hydrants installed on the system, and improved access and breakwater facilities were provided at the New Wuring fishing port.

### Quality Assurance

16. Because of the low level of development of the contracting industry in Flores, it was decided to advertise nationally for contractors. However in many cases, the successful national contractors subcontracted their work to local contractors. As a result, the quality of the buildings, especially schools and health centers, suffered from poor workmanship in the first year. The second year program showed significant improvement following close supervision of contractors. With respect to the bamboo construction of schools quality appears good, and treatment of the bamboo cladding and the bamboo structure prevents attack by insects. Maumere Hospital also suffered from poor workmanship. The contractor's attempt to address the quality problems by bringing in skilled workers from outside of Flores suffered setbacks due to the opposition of local labor. The initial hospital layout as regards relative positioning of intensive care unit, operating theater, radiology, surgical wards and emergency ICU internal needed significant adjustment to improve serviceability. The ICR mission observed deteriorated condition of some concrete floors built during the first year of the project (Annex B, ICR Mission Report). However throughout the project, a genuine attempt has been made to address the major quality issues identified at appraisal and progressive improvement was been achieved throughout.

17. **Environmental Impact.** All roads that the Bank funded in Flores were on existing rights of way and no land acquisition was required. Most of the land through which the roads pass is uncultivated and /or unoccupied. None of the road sections inspected present environmental problems that will not be restored by natural process of re-growth within one or two years. Following an environmental impact assessment for Maumere Hospital, an environmental management and environmental plan was prepared. The hospital management has committed to follow this. Because of the risk of liquefaction of the sand at the location of the old Wuring fishing village, it was initially proposed to abandon the old site and to relocate people to the new development at New Wuring. However, despite the risks, it has not been

possible to persuade the people of the fishing village, to settle in New Wuring Village and many have returned to live in the buildings at the original site.

### **Earthquake Disaster Prevention and Seismic Resistance Construction**

18. **Training.** Extensive training was provided to all segments of society through workshops and formal training (Annex A, Table 5F). Programs were provided for community (2967 participants), skilled and unskilled workers (250), government officials (1117), university staff (32), and practicing professionals (1149). The Ministry of Public Works (MPW) engineers and administrators received training in both disaster management and technical aspects of reconstruction after an earthquake. A product from these courses was a manual for the MPW's role in disaster management. In addition 46 students attended courses in earthquake and disaster management at the University of New South Wales in Australia.

19. **Skill Transfer in Seismic Resistant Construction.** Skill transfer in seismic resistant technology including bamboo technology has been achieved. Considerable transfer of technology involving both international and national experts as well as government employees has taken place.

20. **Studies.** Several spatial planning studies were carried out during the reconstruction period. The Maumere City Plan was useful in designing the new market for Maumere. The Extended Area of Maumere City, covering a development plan of Maumere City including a "Fishing Boat Anchorage at Wuring Baru" was completed. The spatial Plan for Environs of Maumere Market and Maumere Hospital synthesized the above two studies. Spatial Planning of Vulnerable Areas of Flores Island identified the areas that would be exposed to serious loss or damage due earthquake and tidal wave. The study served as a basis for approval of disaster management strategies for East Flores, Sikka, Ende and Ngada (see further details in Table 7).

### **C. MAJOR FACTORS AFFECTING THE PROJECT**

21. **Major Factors.** The major factors which affected the quality and timely achievement of the physical project objectives were: Government implementation arrangements with central Government management remaining in Jakarta for a long period before transferring project control to Provincial Management; Bank implementation arrangements (operational arrangements, OD8.50, frequency of Bank supervision); contractors and consultants inadequate attention to quality; natural conditions (adverse rough seas created by monsoon); and remoteness of Flores from the major manufacturing centers, shortage of skilled and non-skilled workers; and the Indonesian financial crisis from early 1998 onwards.

#### **Factors not Generally Subject to Government Control**

22. **Bank Implementation Arrangements.** The Bank implementation requirement that the project reconstruction program should incorporate OD8.50 guidelines in the early stages was seen to be often in conflict with need for immediate and local action. The OD8.50 guidelines took longer to establish and implement. The OD requirements for "access to highest levels of government" resulted in an arrangement involving a Reconstruction Management Team (RMT) in Jakarta at the central government level for project implementation and quality assurance reporting to the Secretariat in the Ministry of Public Works (MPW) in Jakarta, with a Project Manager in Flores. Implementation experience however quickly indicated the need to strengthen the local government agency and its participation in the management process. This was unfortunately not adopted until after the mid-term review. At appraisal, the Bank correctly assessed the project risks and proposed "frequent Bank supervision in the first two years of the three years period so that adjustments to the program can be made as needed to resolve promptly problems causing delays" as mitigating measure. However, Bank's commitments for frequent missions to Flores did not materialized, (Annex A: Table 13). Partly because the main issues that needed resolving during the period were in Jakarta with MPW/RMT and whilst the presence of the Bank Team Leader in Jakarta was useful, it diminished the frequency of site supervision visits.

23. **Remoteness and Local Conditions.** The remoteness of Flores sites from the industrial centers of Indonesia made supply of steel trusses difficult. In the early stage of the project, late 1993 and early 1994, Flores harbors were closed due to the rough seas created by monsoons. Also, high tides on the north coast in Sikka and Ende possibly coupled with geological tilting from the earthquake damaged several km of roads washing away pavement and base courses. This necessitated the subsequent building of extensive 1.5 meter high protective sea walls using masonry and reinforced concrete for road protection.

#### **Factors Generally Subject to Government Control**

24. After successfully executing the first two of a three-stage program to cope with the disaster, the Government lost momentum in the *third stage*, the reconstruction stage. The delay in distribution of the General Reconstruction Guidelines to both the public and other donor agencies meant that initial corrective design work failed to incorporate the required seismic resistant reconstruction. The delays in recruiting staff to work in Flores resulted in shortage of staff during project implementation that contributed to construction delays, and inadequate quality assurance. This also contributed to weak coordination between the reconstruction agencies concerned. As many of these risks were identified at appraisal, the government could have taken measures to mitigate these anticipated problems. The government could have provided the right incentive to attract key staff for project implementation; the benefits of such actions would have outweighed their costs.

#### **Factors Generally Subject to Implementing Agency**

25. Although, the general low level of development of the contracting industry and lack of a pool of skilled labor in Flores may be the real underlying causes, the weak management of some of the provincial and local firms engaged in the project was a major contributory factor to the sub-standard quality, especially in the first year of the program. Inadequate details on drawings, insufficient contractor resources, and in-experience and poor workmanship were evident. Inadequate structural bracing and support for roof and ceilings to resist multi-dimensional earthquake force, the use of timber construction in locations subject to moisture, insect attack and wet rot were examples of shortcomings in the first year.

### **D. PROJECT SUSTAINABILITY**

26. **Project sustainability.** The sustainability of the project is assessed as *uncertain, mainly on account of the macroeconomic situation of Indonesia*. The sustainability of benefits from the major physical achievements of the project; road infrastructure, schools, and health center facilities will depend on the timely provision of funds for maintenance. Most importantly, the culture of consciousness of earthquake disasters and preparedness, developed through the activities of the project, is likely to be sustainable. School children and health staff drill twice a year. The knowledge base for seismic resistant construction technology has been enhanced. The General Reconstruction Guidelines, the seismic zone maps, the project supported training, the seismic resistant bamboo structures and the various related technical studies are likely to have a long lasting impact not only in Flores but also in the rest of earthquake-prone Indonesia. These benefits could be easily sustained with grants to Indonesian institutions for research in earth sciences, and the periodic publicizing of their findings.

### **E. BANK PERFORMANCE**

27. **Identification and preparation.** Bank performance in project identification and preparation was *satisfactory*. The Bank's response to the government's three-staged reconstruction program was innovative, swift and in line with Bank's OD8.50. The initial damage assessment mission comprising three staff from the resident mission were in Maumere on December 19, one week after the earthquake. Staff visited Flores again between January 25-29, 1993, to identify and appraise the project. The Bank's main innovative contribution in the design of the project was its emphasis on sound seismic resistant design and quality assurance in the reconstruction work. This led subsequently to experimentation with bamboo technology for school construction. Much of this innovative approach may be attributed to the

involvement the RSI Bank staff and the Task Manager as evidenced from project file. The Bank role was even more significant because according to paragraph 2, of the decree of the MPW, the primary aim of the project was to "reconstruct the structure and basic infrastructure destroyed by earthquake in Flores using foreign aid (loan and grants) and local funds from APBN<sup>2/</sup> or APBD<sup>3/</sup>". In this regard, the advisory role of the RMT focused mainly on the reconstruction aspects of the project, and the Bank played an active role in ensuring that quality assurance and seismic resistance were focal points throughout project implementation.

28. **Appraisal and Implementation.** The Bank performance at appraisal and implementation was *satisfactory*. Initial identification was timely, and the Bank implementation adopting the Bank Emergency Assistance Strategy (OD8.50) was effective. Assessment of potential risks facing project implementation was correct but reliance on the Central Government, although designed to assure quality, proved to be troublesome for both staffing and management in Jakarta and Flores island.

29. **Supervision.** Bank performance during implementation was *satisfactory*. Supervision reporting was adequate. Implementation problems were identified and assessed frankly. Full supervision missions maintained a basic core staff for continuity and were heavily focused on quality assurance measures. Because of the central Government management arrangement, the Bank's commitment to frequent supervision to Flores did not materialize as the main issues which need resolving during this period were in Jakarta with MPW/RMT. Although the Bank task manager was changed after the mid-term review, the ongoing presence of the Bank's task manager in Jakarta was considered beneficial as it enabled decisions to be made more expeditiously.

## F. BORROWER PERFORMANCE

30. **Preparation.** Borrower performance during preparation was *satisfactory*. To cope with the disaster, the government formulated a three-stage program. The first stage, **rescue and relief** operation, directed by the national coordinating Board for Disaster Control (BAKORNAS), focused on the immediate actions needed to help the people affected. The second stage, **rehabilitation and recovery**, was carried out by the Ministry of Public Works and other line departments in BAKORNAS, UN relief agencies, NGOs, and bilateral agencies. It focused on providing temporary accommodation and on specific rapidly executed projects necessary to put vital infrastructure back into service. The third stage, the **reconstruction program**, was supported and financed separately together with IBRD, ADB and AusAID.

31. **Implementation.** Overall, the borrower performance in implementation was *marginally satisfactory*. The momentum in project implementation did not continue into the third stage, four months passed between Board approval, and Loan Effectiveness. Delays were experienced in the issuance of the General Reconstruction Guidelines. While physical objectives were achieved or exceeded, insufficient attention was given to quality assurance of works executed in the first year of project implementation. Bank insistence on quality assurance required considerable reworking of design that delayed procurement of construction materials. The borrower's management philosophy, with MPW/RMT based in Jakarta delayed decisions to the field. Although it was intended to hand management back to local authorities, because of the role of the local government in project implementation under the combined budgetary and loan financing arrangement, it took longer than anticipated. As a result the problems were magnified by having to continually refer to Jakarta for decisions. Implementation was designed to be under the broad authority of BAPPENAS. The Deputy Chairman of Regional Development of BAPPENAS was made responsible for overall project management coordination.

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<sup>2/</sup> APBN—funding provided by central Government

<sup>3/</sup> APBD—funding provided by provincial Government

## G. ASSESSMENT OF OUTCOME

32. Overall, the outcome of the project is assessed as *satisfactory*. Despite initial delays and quality problems, the project generated momentum to improve construction quality and most of the original reconstruction program was completed within the original loan closing date. Economic activities and service delivery have been restored. Significant technological transfer had taken place in seismic resistant design and construction. Public awareness of disaster preparedness has deepened.

## H. FUTURE OPERATIONS

33. Future planned operation would focus on: (i) the sustainability of the benefits of physical assets; (ii) codification of the knowledge base and expanding public awareness as part of disaster preparedness; (iii) monitoring of the socio-economic benefits attained under the project; and (iv) Maumere Hospital. The provision of adequate funds for timely maintenance purposes will be the prime factor in sustainability of the assets. In this area, there is no lack of commitment on the part of the local level government. The main issue will be availability of funds, given the present economic-political crisis in Indonesia. As regards the knowledge base, the spark ignited by the project is likely to continue. In this regard Indonesia has already one of the foremost authorities in seismology and has added a pool of professionals who can focus on the issue, given that the whole of Indonesia is prone to earthquake. As regards to public awareness, most school children and health center staff now undergo regular drills. With reference to the socio-economic benefits of the project, the expenditure in Flores had significant impact on economic activities. Indicators have already shown an increase in personal income, vehicle ownership, vehicle traffic, school attendance, and health delivery services and these are continuing to be monitored by the Statistical Office of the respective Kabupatens. Maumere Hospital, has an environmental management plan and the hospital management has committed to follow it.

## I. KEY LESSONS LEARNED

34. **Key Lessons Learned.** Overall, the implementation experience has provided valuable lessons for Bank emergency lending operations. These can be summarized as follows:

- a) The policies set out in OD 8.50 for emergency projects need critical assessment in light of local conditions in formulating program objectives, and developing implementation arrangements. The balances between the "emergency response" and the desire to develop innovative mitigating measures for future emergencies, and the Government's central management structure compared to a participatory management, which mobilizes local participation, are issues that need addressing for future emergencies.
- b) The General Reconstruction Guidelines for earthquake reconstruction should be a living document, updated frequently to take into account development in applied earth science, and should form a necessary part of disaster preparedness.
- c) The use of bamboo for construction of seismic resistant structures is an important innovative outcome of FERP. Preliminary studies have shown that construction combining bamboo with steel can be implemented at 86% of the price of wood and steel construction. The economic feasibility of the proposition is an area for further research.
- d) The FERP implementation experience amply demonstrated that the state of development of the contracting industry in Flores is quite low. In the interest of efficient and sustainable development, the Bank may want to design an appropriate response for improving the performance of the contracting industry in Indonesia, especially in remote provinces like NTT.

- e) With the significant knowledge that has emerged from this and other Bank-financed emergency projects, the Bank may wish to consolidate these experiences with those from other similar projects, with the objective of mitigating the socio-economic impact of future disasters, especially on the poor, and preferably with the participation of the private sector (e.g. insurance companies).

**INDONESIA**  
**FLORES EARTHQUAKE RECONSTRUCTION PROJECT**  
**(LOAN 3589-IND)**

**PART II: STATISTICAL TABLES**

**TABLE 1: SUMMARY OF ASSESSMENTS**

<b>A. Achievement of Objectives</b>	Substantial	Partial	Negligible	Not Applicable
Macroeconomic policies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sector policies	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Financial objectives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Institutional development	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physical objectives	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Poverty reduction	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gender issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other social objectives (Disaster Preparedness)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental objectives	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public sector management	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Private sector development	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Economic benefits	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>B. Project Sustainability</b>	Likely		Unlikely	Uncertain
	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>C. Bank Performance</b>	Highly Satisfactory		Satisfactory	Deficient
Identification	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Preparation assistance	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Appraisal	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Supervision	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>D. Borrower Performance</b>	Highly Satisfactory		Satisfactory	Deficient
Preparation	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Implementation	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Covenant compliance	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Operation (if applicable)	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
<b>E. Assessment of Outcome</b>	Highly Satisfactory	Satisfactory	Unsatisfactory	Highly Unsatisfactory
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**TABLE 2: RELATED BANK LOANS/CREDITS**

Credit Title	Purpose	Year of approval	Status
<b>Preceding Operations:</b> Highway Sector Loan	Highway sector loan in East Indonesia	1990	Now complete
<b>Following Operations</b> None	N/A	-	-

**TABLE 3: PROJECT TIMETABLE**

Steps in project cycle	Date planned	Date actual/ Latest estimate
Identification/First Mission	December 19, 1992	December 19, 1992
Appraisal	January 25-29, 1993	January 25-29, 1993
Negotiations	March 11-13, 1993	March 11-13, 1993
Board presentations	April 13, 1993	April 13, 1993
Signing	May 26, 1993	May 26, 1993
Effectiveness	June 30, 1993	July 7, 1993
Mid-term Review	N/A	September 4-8, 1995
Project completion	December 31, 1996 December 31, 1997 November 30, 1998	November 30, 1998
Loan closing	April 30, 1996 April 30, 1997 March 31, 1998	March 31, 1998

**TABLE 4: LOAN/CREDIT DISBURSEMENT—CUMULATIVE ESTIMATE AND ACTUAL  
(US\$ million)**

	FY93	FY94	FY95	FY96	FY97	FY98	FY99
Appraisal estimate	6.00	19.00	37.3	42.1	42.1	42.1	42.1
Actual	.	10.41	23.45	32.54	38.65	40.61	<b>39.60</b>
Actual as % of estimate	0.0%	54.8%	61.9%	77.3%	91.8%	96.5%	94.6%
<b>Date of final disbursement</b>	<b>May 10, 1999</b>						

**TABLE 5A: KEY INDICATORS FOR PROJECT IMPLEMENTATION  
IMPLEMENTATION TIMETABLES**

Key implementation indices	No. of Contract Packages/ Locations	Starting date		Completion Date	
		Planned	Actual (commence-ment)	Planned	Actual (FHO)
<b>Construction/Rehabilitation</b>					
A. Roads and Bridges	21/21	07/01/93	12/13/93*	06/30/95	01/30/98
B. Schools –Total	388/555				
– Standard		07/01/93	09/11/93	12/31/96	12/24/97
– Pilot Scheme		07/01/95	12/18/95	12/31/96	03/04/96
C. Hospitals and Clinics	135/195	07/01/93		03/31/96	
– Clinics			09/02/93		03/30/95
– Maumere Hospital			07/27/95		11/30/98
D. Other facilities	5/5	07/01/93	02/26/96	03/31/96	03/09/98
E. Equipment (school, medical, earth science)	14/_		10/30/93		08/21/97
<b>Consultant Services</b>					
A. Reconstruction Services	18/_	03/31/93	07/31/93	03/31/96	11/20/98
B. Project Management Services	10/_	07/01/93	06/02/93	03/31/96	11/30/98
C. Earth Sciences, Spatial Planning & Training	16/_	07/01/93	11/15/93	12/31/95	11/17/97

Source: Final Contract Details, FERP, Reports.

\*Retroactive financing



**TABLE 5B: KEY INDICATORS FOR PROJECT IMPLEMENTATION**  
**Road and Bridge Program Originally Proposed & Implemented**

Description of Links			Road Length (km)		Bridges Length (m)		Cost		Construction Days		Maintenance	PHO	FHO
			Appraisal	Actual	Appraisal	Actual	Appraisal	Actual	Contract	Actual			
ENDE													
Puukungu	-Orakose	K 10	15.00	15.00	-	-	1,682.10	1,626.59	240	492	90	3/11/95	6/80/95
Puukungu	-Orakose	K 10		10.00	-	-		1,038.46	20	240	60	10/10/97	12/10/97
Orakose	-Kamubeka	K 11	18.00	-	-	-	2,018.52	-	-	-	-	-	-
Kamubeka	-Maukaro	K12	4.00	-	-	-	448.56	-	-	-	-	-	-
Maukaro	-Nabe	K13	13.00	-	-	-	1,457.82	-	-	-	-	-	-
Nabe	-Ranokalo	K14	11.00	-	-	-	1,232.70	-	-	-	-	-	-
Nabe	-Ranokalo	K14	11.00	-	-	-	1,232.70	-	-	-	-	-	-
Ranokalo	-Nabe-Maukaro	K	-	21.50	-	-	-	2,098.09	210	754	60	10/31/97	12/21/97
Maukaro	-Kaburea	K	-	1.00	-	-	-	97.59	-	-	-	-	-
Magapanda	-Maurole-Kotabaru	K	-	41.50	-	-	-	6,027.69	210	783	160	11/30/97	4/30/98
Dalam Kota Ende			-	3.20	-	-	-	522.14	180	180	60	5/8/95	5/8/96
Loworea Bridge I*		K14	-	-	160.00			350.14	180	480	90	2/42/95	5/5/95
Loworea Bridge II		K14	-	-	-	60.00		915.83	210	330	90	10/29/96	12/28/96
Ende	-Detusuko	N07	-	15.00	-	-		2,268.34	190	190	90	5/10/95	3/9/96
River Bank Protection			-	-	-	-		454.73	180	180		11/13/96	12/9/96
Ende	-Paga	N	31.50	-	-	-	6,510.00	-	-	-	-	-	-
Ndond	-Maurole Bridge	K	-	-	29.00	-	-	-	-	-	-	-	-
Ende	-Detusuko	N07	-	5.00	-	-	-	-	-	-	-	-	-
NGADA													
Dadiwuwu	-Kaburea I	K08	14.00	15.00			1,757.80	1,464.24	300	360	120	3/11/95	7/10/95
STA 29 Bridge		K08	-	-	25.00	19.60							
Dadiwuwu	-Kaburea II	K08	15.00	13.80	-	-	1,882.35	2,812.54	610	772	90	10/4/96	4/10/96
Raja Dombe		K05	-	5.21	-	-	-	-	-	-	-	-	-
Tot. Kabupaten Rd		K	169.50	229.60	226.00	357.00	19,394.35	31,800.55	-	-	-	-	-
Tot. National Road		N	55.50	50.00	-	-	11,340.00	12,152.35	-	-	-	-	-

\* Original bridge abandoned

**TABLE 5C: KEY INDICATORS FOR PROJECT IMPLEMENTATION  
SCHOOL CONSTRUCTION PROGRAM ORIGINALLY PROPOSED AND IMPLEMENTED**

Kabupaten	Fiscal Year	SDI		SDN		SDLB		Total SD		SMPH		SMAN		STMN		SMEA		Grand Total		
		RH	UP	RH	UP	RH	UP	RH	UP	RH	UP	RH	UP	RH	UP	RH	UP	RH	UP	All
FLOTIM	Appraisal	NA	NA	NA	NA	NA	NA	13	22	4	1	0	0	0	0	0	0	17	23	40
	Actual	34	19	3	1	1	0	38	20	1	1	0	0	0	0	0	0	39	21	60
	Implementation Schedule:																			
	1993/94	17	4	3	1	1	-	21	5	1	1	-	-	-	-	-	-	22	6	28
	1994/95	15	15					15	15									15	15	30
1995/96	2						2										2	0	2	
SIKKA	Appraisal	NA	NA	NA	NA	NA	NA	64	63	4	3	0	2	0	1	0	0	68	69	137
	Actual	62	59	0	8	1	0	63	67	3	5	0	2	0	1	0	0	66	75	141
	Implementation Schedule:																			
	1993/94	17	14		5	1		18	19	3	4		2		1			21	26	47
	1994/95	42	45		3			42	48		1							42	49	91
1995/96	3						3	0									3	0	3	
ENDE	Appraisal	NA	NA	NA	NA	NA	NA	53	70	6	3	1	2	0	2	0	0	60	69	129
	Actual	29	66	0	3	0	1	29	70	1	5	0	2	0	0	0	1	30	78	108
	Implementation Schedule:																			
	1993/94	16	14		2			16	16	1	1		2			1		17	20	37
	1994/95	11	52		1		1	11	54		4							11	58	69
1995/96	2						2	0									2	0	2	
NGADA	Appraisal	NA	NA	NA	NA	NA	NA	33	3	1								34	3	37
	Actual	22	6	3	1	0	0	25	7									25	9	34
	Implementation Schedule:																			
	1993/94		1		1			0	2		1							0	3	3
	1994/95	22	5	3				25	5		1							25	6	31
1995/96																				
<b>Total Appraisal</b>		<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>163</b>	<b>150</b>	<b>15</b>	<b>7</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>179</b>	<b>164</b>	<b>343</b>
<b>Total Actual</b>		<b>147</b>	<b>150</b>	<b>6</b>	<b>13</b>	<b>2</b>	<b>1</b>	<b>155</b>	<b>164</b>	<b>5</b>	<b>13</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>160</b>	<b>183</b>	<b>343</b>

Symbols: RH = Rehabilitation  
UP = Upgrading/Reconstruction

SDK = Catholic Primary Schools (Community Schools)  
MIS = Islamic Primary School (Community Schools)  
SDI = Primary Schools Funded by Presidential Decree Process (Government)  
SDS = Private Primary Schools (Community)

SDLB = Special Primary Schools (Government)  
SDN = Primary Schools Funded by Normal Budget Process (Government)  
SMEA = Technical High School (Government)  
SMAN = Senior High School (Government)  
SMPN = Junior High School (Government)  
STMN = Senior High School (Government)

**TABLE 5D: KEY INDICATORS FOR PROJECT IMPLEMENTATION**  
**SUMMARY OF HEALTH FACILITIES IMPLEMENTED**

Kabupaten	Year	PUSKES TT		PUSTU		PKSKES		TOTAL			RMH DOKER		RMH-PMD		RUMKIT	
		RH	RC/UP	RH	RC/UP	RH	RC/UP	RH	RC/UP	All	RH	RC/UP	RH	RC/UP	RH	RC/UP
Flotim	1993/94	-	2	4	-	-	-	4	2	6	6	-	5	-	-	-
	1994/95	-	-	-	12	-	4	0	16	16	-	2	-	2	-	-
	Sub-total	0	2	4	12	0	4	4	18	22	6	2	5	2	0	0
	Technical Annex	0	2	0	13	0	3	0	18	18	0	0	0	0	0	0
Sikka	1993/94	1	-	-	19	2	8	3	27	30	-	3	-	5	-	-
	1994/95	-	-	-	16	-	1	0	17	17	-	3	-	4	-	-
	1995/96	-	-	-	-	0	-	0	0	0	-	-	-	-	-	1
	1996/97	-	-	-	-	0	-	0	0	0	-	-	-	-	-	-
	1996/98	-	-	-	-	0	-	0	0	0	-	-	-	-	-	-
	Sub-total	1	0	0	35	2	9	3	44	47	0	6	0	9	0	1
Technical Annex	1	1	0	38	0	10	1	49	50	0	0	0	0	0	1	
Ende	1993/94	-	-	2	10	2	5	4	15	19	-	-	-	-	2	12
	1994/95	1	-	7	21	-	3	8	24	32	-	3	-	3	-	4
	Sub-total	1	0	9	31	2	8	12	39	51	0	3	0	3	2	16
	Technical Annex	1	3	8	29	0	8	9	40	49	0	0	0	0	4	14
Ngada	1993/94	-	-	-	-	-	3	0	3	3	-	-	-	-	-	-
	1994/95	2	-	3	2	-	5	5	7	12	-	3	-	3	-	-
	Sub-total	2	0	3	2	0	8	5	10	15	0	3	0	3	0	0
	Technical Annex	0	1	0	0	0	6	0	7	7	0	0	0	0	0	0
	Total	4	2	16	80	4	29	24	111	135	6	14	5	17	2	17
Technical Annex	2	7	8	80	0	27	10	114	124	0	0	0	0	4	15	

Symbols: Puskesmas = Health Center  
Puskes TT = Health Centers with beds  
Pustu = Sub Health Centers

RH = Rehabilitation  
RC = Reconstruction

Rumkit = Hospitals  
Rmh Pmd = Paramedic house  
Rmh Docter = Doctor house

**TABLE 5E: KEY INDICATORS FOR PROJECT IMPLEMENTATION  
PILOT PROJECT AND COMMUNITY SCHOOL CONSTRUCTION**

Kabupaten	No. of Schools classrooms Frame	Classrooms-Financed under					
		Category 1 (b)		Category 4		PEMDA	
		Built	Material	Built	Material	Built	Material
<b>Flores Timur</b>							
Initially Agreed	45	34	Bamboo	11	Bamboo	135	Bamboo
Subsequently Agreed	45	37	Bamboo	11	Bamboo	132	Bamboo
Actual Built	45	37	Bamboo	11	Bamboo	92	Bamboo
Implementation Schedule							
1995/96	5						
1996/97	40			5			
1996/98		37		6		92	
<b>Sikka</b>							
Initially Agreed	51	38	Bamboo	13	Bamboo	153	Bamboo
Subsequently Agreed	51	38	Bamboo	13	Bamboo	153	Bamboo
Actual Built	51	38	Bamboo	13	Bamboo	153	Bamboo
Implementation Schedule							
1995/96	6						
1996/97	45			6			
1996/98		38		7		153	
<b>Ende</b>							
Initially Agreed	33	23	Bamboo	10	Bamboo	99	Bamboo
Subsequently Agreed	33	27	Bamboo	10	Bamboo	95	Bamboo
Actual Built	33	27	Bamboo	10	Bamboo	95	Triplex (Plywood)
Implementation Schedule							
1995/96	5						
1996/97	28			5			
1996/98		27		5		95	
<b>Ngada</b>							
Initially Agreed	18	14	Bamboo	4	Bamboo	54	Bamboo
Subsequently Agreed	18	14	Bamboo	4	Bamboo	54	Bamboo
Actual Built	18	14	Bamboo	4	Bamboo	54	Bamboo
Implementation Schedule							
1995/96	2						
1996/97	16			2		54	
1996/98		14		2			
<b>Summary</b>							
Initially Agreed	147	109		38		441	
Subsequently Agreed	147	116		38		434	
Actual Built	147	116		38		394	
Implementation Schedule							
1995/96	18						
1996/97	129			18			
1996/98		116		20		394	
<b>Total Program</b>	<b>147</b>	<b>116</b>		<b>38</b>		<b>394</b>	

Note: 1. Category 1 (b) = Civil Works for Education Facilities (50% IBRD, 50% GOI)  
 2. Category 4 = Technical Assistance (100% IBRD)  
 3. PEMDA = Local Government Authority (Funded either from the School Board or PEMDA itself)

**TABLE 5F: KEY INDICATORS FOR PROJECT IMPLEMENTATION  
SUMMARY OF TRAINING PROGRAM**

No.	Training Courses (1)	Number of Trainees						Total Professionals (8)=(6)+(7)
		Community (2)	Craftsmen (3)	Technician (4)	Total Non Professional (5)=(2)+(3)+(4)	Government Officials (6)	University Staff Contractors & Consultants (7)	
1	Hazard Mitigation Study and Implementation Training : Structural and Geo-technical Aspects & Construction Quality Improvement Project, ITB (11/8/93 - 4/15/94)	-		12	12	38		38
2	Technical Assistance Team for Construction of Buildings: Pt. Indra Karya (1994)	2,967			2,967	579		579
3	Second Stage Flores Earthquake Mitigation Study & Training: PT. Bina Karya (1995)							
	Level 1*	-	38	55	93	45		45
	Level 3*	-	95		95	32		32
	Training in Tokyo (1995)					5		5
	Seminar in Ujung Pandang (May 21-22, 1996)					63		63
	Seminar Pandang (June 11-12, 1996)					64		64
	Seminar in Surabaya (July 8-9, 1996)					68		68
4	Spatial Planning for Flores Island, ITB & PT. Bina Karya (5/19/97-11/17/97) ; and Earthquake Hazard Mitigation, ITB & PT. Bina Karya (5/19/97-11/17/97)		15	21	36	20	20	40
5	The Office of Institutional Links Overseas Training in Earthquake Engineering and Disaster Management, University of New South Wales, Sydney, Australia (8/20/96 -2/15/97 & 3/15/97, 3/25/97, 9/25/97)					46		46
7	Planning, Design, Testing and Prototyping of Bamboo School Buildings. Using Steel frame and Bamboo Cladding -Maurere, Flotim, Sikka, Ende, Ngada & Manggarai (8/8- 10/96)			14	14	13	12	25
	<b>Total</b>	<b>2,967</b>	<b>148</b>	<b>102</b>	<b>3,217</b>	<b>1,117</b>	<b>32</b>	<b>1,149</b>
	<b>Grand Total (Col. 5+8)</b>				<b>4,366</b>			

\* Level 1: Pemda Tingkat I NTT: Provincial Development Agency Provincial Officer, Project Managers, from Universities, Contractors and Consultants

\* Level 1: Pemda Tingkat Training Officers, Workshop leaders

**TABLE 6A: KEY INDICATORS FOR PROJECT OPERATIONS  
NUMBER OF PEOPLE UNDER POVERTY LINE**

Kabupaten	1993			2003		
	Rupiah	Total	Percentage	Rupiah	Total	Percentage
Flores Timur	15,767	53,712	20.02			
Sikka	15,612	65,305	25.49			
Ende	13,664	15,095	6.72			
Ngada	20,724	10,983	5.31			

**TABLE 6B: KEY INDICATORS FOR PROJECT OPERATION  
EXPECTED TRAFFIC GROWTH**

		Link No	Length (km)	Traffic (1993)		Traffic (2003)*	
				Car	Motor cycle	Car	Motor cycle
<b>Flo-Tim</b>							
A	Wutun – Nobo I+II	K-014(1)	34.36	100	95		
A	Kawaliwu – Moting	K-03(1)	11.35	115	105		
A	Kawaliwu – Waiwio	K-03(2)	7.47	100	125		
A	Wairunu – Lato	K-08	7.95	100	120		
O	Ebak-Riangkroko	K-07	14.29	115	100		
O	Mudajebak-Kalo	K-09	N/A				
<b>Sikka</b>							
A	Waiara- Btas Flo-Tim I+II	N-017	30.0	84	97		
A	Ende-Detusoko-Naumere	N-07	20.0	110	100		
O	Nebe-Mudajebak I+II	K-032/23/	26.8	125	145		
<b>Ende</b>							
A	Maurole-Katabaru-Magepanda	K-032	41.59	115	95		
O?	Rankeolo-Nabe-Kaburea	K-013/014	22.09	100	105		
	Puukungu-Orakose II	K-010 (2)	10.00	145	100		
	Puukungu-Orakose I	K-010 (1)	15.00	125	100		
<b>Ngada</b>							
O	Dadiwuwu –Kaburea II	K-08	13.8	115	110		
O	Dadiwuwu –Kaburea I	K-08	15.0	105	110		

\* To be compared with estimated traffic for post-construction period Model Used: Kabupaten Model for Project Benefit Monitoring Evaluation (PBME).

Traffic: Normal traffic growth for Car (4WI) = 15%;  
Motor Cycle (MC) = 12%;  
Bicycle (B/C) = 5%;  
Generated traffic factor used 4WI = 0.2; and for MC = 0.2.

**Table 6C: Key Indicators for Project Operation**  
**Budget for Operations, Maintenance & Development**  
**Kabupaten Sikka \*(Rp. million)**

Description	1997/98		1998/99		1999/2000	
	Units	Expenditure	Units	Expenditure	Units	Expenditure
<b>Roads</b>						
a) Routine Maintenance				18,171.6	-	1,01.7
b) Periodic Maintenance				3,74.2	-	1,584.0
c) Betterment				8,723.7	-	1,31.0
<b>Schools</b>						
a) Operational	144	1,592.4				113.4
b) Rehabilitation (total)	2	120.0	4	280.0	3	420.0
c) Rehabilitation (major)	6	120.0	16	480.0		-
d) Rehabilitation (minor)	55	1,066.3	-	1,834.4	24	720.0
e) Furniture	32	87.5	47	164.5	46	168.3
f) Water supply	64	176.4	134	470.5	97	380.0
g) Development	5	30.0	8	383.9	7	490.0
<b>Health Facilities</b>						
a) Rehabilitation		-	10	114.5	9	213.7
b) Maintenance		-	140	100.0	142	154.1
c) Development		672.4	-		5	351.0

\* Sample kabupaten.

**TABLE 7: STUDIES INCLUDED IN PROJECT**

Study	Purpose as defined at appraisal/redefined	Status	Impact of Study
<b>A. Technical assistance Category</b>			
1. Short-term Hazard Mitigation Study and Implementation Training Structural and Geo-technical aspects of construction Study.	Identify the basis for guidelines and manuals for hazard mitigation	Completed	Served as a basis for second stage study. Produced modules for training the community through "training the trainers" strategy in mitigating the effect of earthquake
2. Spatial Planning for Flores Earthquake Reconstruction Project.	Spatial planning	Completed	Served to update the Law no. 24/1992, with respect to Flores
3. Studies of f Liquefaction, Landslides and Geo-technical Aspects of the Affected Areas of Flores Earthquake Reconstruction .	The Study of geo-technical aspects of the land slides, liquefaction, volcanic activity and to produce micro zone maps identifying dangerous areas	Completed	Served as a basis for further study. The finding of the study was widely disseminated to professionals through workshops, seminars.
4. Maumere Urban Development Programs.	Prepare a regional plan of Maumere City	Completed	Identified areas subject to liquefaction
5. Second stage Flores Earthquake Mitigation Study and training.	Incorporate disaster management strategies and also provide relevant training to staff of the four affected districts	Completed	Updated the earlier study with respect to Law No. 24/1992 that promulgates crucial aspects about spatial planning, taking development in research since the earlier one done in 1994. Associate training was provided.
6. Development Plan for Extended Area of the City of Maumere, including the Fishing Boat Anchorage area of Wuring Baru.	Long-term development plan	Completed	Provide development plan for the extended Area of Maumere City including a Fishing Boat Anchorage at Wuring Baru"
7. Earthquake hazard Mitigation Production of training Modules.	Training modules	Completed	Training courses using modules I & II provided.
8. Spatial Planning of Vulnerable Areas of Flores.	Training modules	Completed	Prepared
<b>B. Construction Service Category</b>			
1. Detail Design Review and Construction Supervision, & Project Benefit Monitoring.	Quality assurance and Seismic resistance design & EIRR estimation	Completed	Served as a basis for reconstruction of civil works
2. Environmental Impact Study & Environmental Monitoring Plan of Maumere Hospital.	Environmental impact assessment	Completed	Provided an environmental plan and monitoring plan
3. Project Benefit Monitoring & Evaluation for Schools & Health Services.	Benefit Monitoring	Completed	A report on the effectiveness of the building works was prepared
4. Spatial Planning for Maumere Hospital & Maumere Market.	Development plan of the area	Completed	Beside serving as a basis for the newly constructed market and Hospital, it provided a spatial plan for up to 2007 AD

**TABLE 8A: PROJECT COSTS (US\$ MILLION)**

Category	Appraisal			Actual		
	Local	Foreign	Total	Local	Foreign	Total
Roads and Bridges	11.0	5.1	16.1	12.0	5.6	17.6
Schools	7.6	2.8	10.4	12.3	4.5	16.8
Hospital and Clinics	5.5	2.0	7.5	5.6	1.1	6.7
Other facilities	3.6	1.4	5.0	1.1	0.4	1.5
Equipment and Furniture	1.3	1.7	3.0	1.8	2.2	4.0
Consultant Services	4.5	5.5	10.0	7.0	4.7	11.7
<b>Base Cost</b>	<b>33.5</b>	<b>18.6</b>	<b>52.1</b>			
Physical Contingencies	3.9	2.2	6.1	0	0	0
Price Contingencies	3.7	1.1	4.8	0	0	0
<b>Total</b>	<b>41.1</b>	<b>21.8</b>	<b>62.9</b>	<b>39.8</b>	<b>18.5</b>	<b>58.3</b>

**TABLE 8B: PROJECT FINANCING (US\$ MILLION)**

Category	Appraisal			Actual		
	Local	Foreign	Total	Local	Foreign	Total
Government	20.8	0.0	20.8	18.7	0.0	18.7
IBRD	20.3	21.8	42.1	21.1	18.5	39.6
<b>Total</b>	<b>41.1</b>	<b>21.8</b>	<b>62.9</b>	<b>39.8</b>	<b>18.5</b>	<b>58.3</b>

TABLE 9: ECONOMIC COSTS AND BENEFITS

Kabupaten	Link/Section	Link No.	Length (km)		Estimate. Base Cost ('000Rp) 1993	Actual Cost ('000Rp) 1995	Traffic (1993)		Benefits			
			Appraisal	Actual			Car	Motor cycle	NPV	NPV/Km	IRR (%)	
<b>Flo-Tim</b>	A	Wutun – Nobo I+II	K-014(1)	N/A	34.36		5,388,522	100	95	770.0	22.4	15.6
	A	Kawaliwu – Moting	K-03(1)	N/A	11.35		1,866,015	115	105	485.8	42.8	18.5
	A	Kawaliwu – Waiwio	K-03(2)	N/A	7.47		1,348,468	100	125	275.5	36.9	17.1
	A	Wairunu – Lato	K-08	N/A	7.95		974,229	100	120	288.9	36.3	19.3
	O	Ebak-Riangkroko	K-07	12	14.29	1,324,306.0	1,345,941	115	100	1,059.6	7.2	30.2
	O	Mudajebak-Kalo	K-09	32.1	N/A	3,541,124.0						
<b>Sikka</b>	A	Waiara- Btas Flo-Tim I+II	N-017	N/A	30.00		4,732,891	84	97	910.5	30.3	16.8
	A	Ende-Detusoko-Naumere	N-07	N/A	20.00		4,387,884	110	100	556.6	27.8	15.3
	O	Nebe-Mudajebak I+II	K-032/23/	24.4	26.80	2,691,998.0	6,480,908	125	145	-735.0	-27.5	8.9
<b>Ende</b>	A	Maurole-Katabaru-Magepanda	K-032		41.59		6,027,694	115	95	1,234.0	29.7	17.1
	O?	Rankeolo-Nabe-Kaburea	K-013/014		22.09		2,195,675	100	105	1,131.3	51.2	24.3
		Puukungu-Orakose II	K-010 (2)		10.00		1,038,461	145	100	1,404.6	140.5	41.8
		Puukungu-Orakose I	K-010 (1)		15.00		1,626,592	125	100	1,156.1	77.1	28.6
<b>Ngada</b>	O	Dadiwuwu –Kaburea II	K-08	14	13.80		2,812,545	115	110	475.4	34.5	16.3
	O	Dadiwuwu –Kaburea I	K-08	15	15.00		1,464,241	105	110	1,660.5	110.7	37.8
					269.70		41,690,065					

Source: Bina Marga— Average daily Traffic (ADT) data (prior project); survey for post construction to establish growth rate.

Model Used: Kabupaten Model for Project Benefit and monitoring & Evaluation (PBME) Composition Annual Traffic Growth Rates (1993-1996)—of 15% for 4 WI; 12% for MC; and 5% B/C. Economic life of project assumed is 10-year life.

**TABLE 10: STATUS OF LEGAL COVENANTS**

Section. Covenant Type	Present Status	Original Fulfillment Date	Revised fulfillment Date	Description Of Covenant	Comments
Section 4.01a	C			Borrower shall maintain all appropriate expenditure records.	
Section 4.01 (b) (i)	C			Borrower shall have all accounts audited by independent auditors.	Complied with through BPKP
Section 4.01 (b) (ii)	C			Borrower shall provide the Bank with such other information about accounts and records as requested by the Bank.	Complied with
Section 4.01 (c) (i & ii)	C			Borrower shall keep records and accounts of all statements of expenditure (SOE) and retain the same for one year after Bank has received the Audit Report for the last fiscal year in which withdrawal has been made.	Complied with
Schedule 5.2 (a)	C			Borrower shall maintain adequate qualified staff	Complied with
Schedule 5.3 (a)	CD	July 31, 1993		The borrower shall, by July 31, 1993, prepare general and area specific guidelines for reconstruction, under terms of references satisfactory to the Bank.	Complied with but delayed
Schedule 5.3 (b)	CD	September 30, 1993		The borrower shall thereafter, submit for review and comments, the said guidelines to a technical panel established by the borrower in consultation with the bank.	Complied with but delayed
Schedule 5.3 (c)	CD	September 30, 1993		The borrower shall, by September 30, 1993, finalize and implement the same in light of the comments and suggestions of the said technical panel.	Complied with but delayed
Schedule 5.4	NC	Aug.31, 1993		The Borrower shall finalize the selection of all items and facilities for repair, by August 31, 1993.	Due to changing conditions this was not followed.
Schedule 5.5	C			The Borrower shall implement the project in a manner satisfactory to the Bank.	Complied With
Schedule 5.6	C			The Borrower shall carry out training in earth sciences (Schedule 2.b.2) in a manner satisfactory to the Bank.	Complied With
Schedule 5.7	NA			In areas affected by Part A.3 of schedule 2, the borrower shall prepare a relocation plan for any inhabitants in the affected areas.	NA
Schedule 6.2				Payments out of special A/C to be in accordance with Schedule 6.	Complied With
Schedule 6.3 (a)				The Borrower will request the Bank for deposits to be made to the Special A/C within the limit of total allocation.	Complied With
Schedule 6.3 (b)				The Borrower will furnish to the Bank all evidence to show that the Payments out of the Special A/C were made by the Borrower out of the Special A/C.	Complied With

Action Taken:

C = Covenant complied with  
CD = Complied with after delay  
CP = Complied with partially  
NC = Not complied with

Covenant type

1 = Account/Audits  
2 = Financial performance/revenue generation from beneficiaries  
3 = flow and utilization of project funds  
4 = Counterpart funding  
5 = Management aspects of project or executing agency  
6 = Environmental covenants  
7 = Involuntary resettlement  
8 = Indigenous people  
9 = Monitoring, review, and reporting  
10 = Project implementation not covered by categories 1-9  
11 = Sectoral or cross-sectoral budgetary or other resource allocation  
12 = Sectoral or cross-sectoral policy/regulatory/institutional action  
13 = other

**TABLE 11: COMPLIANCE WITH OPERATIONAL MANUAL STATEMENTS**

Statement number and title	Description and comment on lack of compliance
There were no significant lack of compliance with operation Directives	

**TABLE 12: BANK RESOURCES: STAFF INPUTS**

Stage of project cycle	Actual	
	Staff week	US\$ '000
Through appraisal	28.7	54.8
Appraisal- Board effectiveness	8.4	22.5
Supervision	71.4	109.8
Completion	8.8	15.6
Total	116.5	202.7

**TABLE 13: BANK RESOURCES: MISSIONS**

Stage of project cycle	Month/ Year	Number of persons	SW In field	Specialized staff skills represented	Performance Rating		
					IP	DO	Types of problems
Identification/ preparation	December 19, 1992						
Appraisal	January 1993	9	NA	TE (2), AR, CE, GE, EH, HE, ENV, OP			
Board approval to effectiveness	March 1993						
Supervision I	August 1993	4	2.0	UP, EH, HE GE	2	2	<p>Management problem. RMT mobilized but without sufficient budget for vehicles. Project implementation, including procurement, seriously behind schedule on all project components. The situation was especially critical with regard to the quality of the reconstruction and repair of education and health facilities. People began returning to live in Wuring (which is unsafe due to the risk of liquefaction). Adherence to seismic engineering principles appeared weak due to delays in ratification, publication, and dissemination of the general Reconstruction Guideline.</p> <p>Community angry about delays and not well informed about the purpose and role of the Bank in the project. Little awareness in the community or in the officials of disaster mitigation. Moreover, timeliness, in important criteria for effectiveness of emergency reconstruction projects.</p>
Supervision II	August 1994	4	0.4	UP, HE, PR, GE		3	<p>Management weakness in RMT, Flores in effective construction quality control and establishment of mitigation measures. Main symptoms are variations in quality control and hence seismic resistance of buildings. Adequate consultant service made available to resolve the symptom.</p> <p>Delays (i) in distributing construction guidelines to the population; (ii) in planning for the redevelopment of Maumere; (iii) in establishing the Natural Hazards Information Center; and in dealing with the future of the Wuring fishing settlement. Disbursement lagging by 28% from appraisal estimates; Local participation by NGOs, the Bapati of the Kabupaten and the Gov. of NTT in project implementation need formal framework</p>
Supervision III	February/ March 1995	3	3.0	UP, Scouller, Gonzales	NR	NR	<p>The special implementation arrangements took longer to set up and establish than estimated.</p> <p>The difficulty in recruiting staff to work in Flores resulted in staffing shortages in the RTM in Flores resulted in staffing shortages in the RMY for almost nine months; bureaucratic "red tape often caused inflexible inexplicable delays in elementary procedures within the first six months (it took between Sept. and December 1995 to make copies of pages from a manual on simple earthquake resistant construction techniques for distribution to the community due to lack of budget item for "printing"</p> <p>Design and construction involved considerable "re-working" of designs to ensure adequate safety that delayed procurement by up to six in some cases.</p> <p>Delays in duplication of General Reconstruction Guidelines for over six months;</p> <p>Panic and complexity of projects;</p> <p>Delayed mobilization of contractors and site inspection visits during the first year due to poor physical communications within Flores.</p>

Stage of project cycle	Month/ Year	Number of persons	SW in field	Specialized staff skills represented	Performance Rating		
					IP	DO	Types of problems
Supervision IV Mid-term Review Mission	September 1995	4		UP, GE, D/A, HE	S	S	Expected transfer of responsibilities from RMT to Bappeda as agreed in previous mission has not taken place. Completed roads inspected were satisfactory. But, routine maintenance in some instances neglected. Additional river bank protection of Lowerea Bridge rebuilt due to abutments and foundation failures; Wolofeo River against river scour; and Nanga Panda River (additional cost Rp.970 million). Rectification of design shortcomings to be undertaken for schools built in 1993/94 FY. Design of Maumere Hospital, particularly the proximity of functions need careful, adequacy of waste water treatment and quality of concrete aggregates and timber being used on site. Review. Task to be completed by March 31, 1996. Problem with the quality of construction of the Maumere Hospital. Progress in quality of construction in school buildings observed. The local government had a turn around with respect to the declared liquefaction areas which were planned to be developed into a park areas but were being planned for urban development area as against to the original plan of encouraging people to transfer to safe areas.
Supervision V	July 1996	3	3.8	E (2), ENV	S	S	
Portfolio Status Update	July 1997				S	S	Need extension of closing date to December 31, 1997 to complete the civil works. While emphasis has been given to quality assurance in the construction phases, there is still some effort required in carrying out the work properly. The provision of budget in accordance with all the procedures takes considerable time and effort, particularly when budget revision is needed to support additional works.
Supervision VI	August 1997	2	2.0	OP/TR, PS	S	S	Concern that, in view of the approaching of the closing date, the Maumere Hospital, and community schools are not ready for use.
			3.0		S	S	The loan was extended from May 31, to Nov.1998. the main reasons for the extension are (i) continuing effects of the current financial crisis, which increased the prices of imported materials substantially; (ii) delays in construction of eater supply for Baru as part of the resettlement area, Maumere Market Drainage Works and Maumere Hospital. Without completion of these " social infrastructure" components, the project objectives would not be fully achieved.
Supervision VIII	July 1997			HE, Pr, Env.			Problems with Maumere Hospital

AR = Architect  
CE = Civil Engineer  
EH = Education/Health Specialist  
ENV = Environmental Specialist  
HE = Highway Engineer

GE = Geologist/Seismic Engineer  
OP= = Operation Officer  
TE = Transportation Economist  
UP = Urban planner  
D/A = Disbursement/Audits

**INDONESIA**  
**FLORES EARTHQUAKE RECONSTRUCTION PROJECT**  
**(LOAN 3589-IND)**  
**IMPLEMENTATION COMPLETION REPORT**

**ANNEX A: BORROWER CONTRIBUTION TO THE ICR**

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## FLORES EARTHQUAKE RECONSTRUCTION PROJECT (FERP) IMPLEMENTATION COMPLETION REPORT, APRIL 1999

### GOVERNMENT CONTRIBUTION

#### PART 1: BACKGROUND

##### A. Natural Phenomena

1. The project was designed to counter the disastrous effects of the major earthquake and tidal wave which struck the island of Flores in the Province of East Nusa Tenggara (eastern Indonesia) on December 12, 1999.

2. Measured at 7.5 on the Richter Scale, the earthquake was estimated to have a return period of about 50 years. The tidal wave height was between 3 and 5.2 meters, depending on the coast line and penetrated up to 300 m inland. Many areas were subjected to liquefaction: roads subsided so as to become impassable, bridge abutments sank and rotated, buildings dropped several meters.

##### B. Damage

3. **Infrastructure.** Although scattered throughout the Kabupatens of East Flores, Sikka, Ende and Ngada, the damage to infrastructure was mainly in the towns of Maumere and Ende. Hospitals in Maumere and Ende were seriously damaged. Some 25,000 houses, 600 schools and 135 health centers were destroyed or severely damaged. Irrigation networks and weirs were seriously damaged. Nine water distribution networks were damaged. Other infrastructure associated with airports and sea ports were damaged, affecting food supplies. Telecommunications were damaged. The total damage was estimated at over US\$250 million.

4. **Human Impact.** Losses of human lives, mostly in the areas affected by the tidal wave and the liquefaction amounted to 1951 souls. Diseases associated with lack of shelter and sanitation, such as malaria, respiratory and digestive tracks diseases were prevalent.

##### C. Government Action

5. **Phases 1 and 2.** By the end of December 1992 the Government, with the help of the United Nations and other helpful agencies, had taken many emergency measures such as providing food and temporary shelter and some health services. By the end of March 1993 vital infrastructure such as roads, some wooden housing and schools were made functional.

6. **Phase 3.** For the long-term restoration of infrastructure the Government sought and accepted assistance in various sectors from three agencies as follows.

- a) The World Bank, for restoring the functions of roads and bridges, schools, health facilities including hospitals, and community facilities.
- b) The Asian Development Bank (ADB) for roads and bridges and facilities associated with Water Resources such as irrigation schemes and river bank protection.
- c) AusAID, the International Assistance Agency of the Australian Government, for restoring water supply and sanitation systems affected by the earthquake.

7. **Government Roles.** As the Ministry of Public Works (MPW) is normally responsible for the oversight of the facilities mentioned in the preceding paragraph, the MPW under the overall coordination of BAPPENAS took the lead in the reconstruction and restoration work communications, electricity supply, airports, port facilities for ships and fishing boats were within the responsibilities of the Ministries of

Communications, Agriculture, Mines and Energy, and Posts Telegraphs and Tourism. The restoration of services in the last-mentioned sectors was carried out under separate funding.

8. **Aim of the Government.** In addition to restoring functions of the infrastructure, the Government wished that reconstruction be done to contemporary standards in a manner that will mitigate losses in any future earthquake.

#### **D. Action by the World Bank**

9. **Loan.** After two site visits the World Bank proposed a project loan of US\$42,100,000, sufficient to cover about 45% of all external financing required. Negotiations for the loan were held in Jakarta from 11-13 March 1993, the loan was signed on 26 May 1993 and became effective on 7 July 1993. The final Loan Closing Date was 30 November 1998 and only US\$39,377,593 was utilized by the Account Closing Date of 31 March 1999.

#### **E. Scope of Work**

10. Details of the categories and scope of the loan can be seen in Annex 1 that also shows subsequent changes to the category allocations. The locations of the civil works carried out using the loan funds are shown in Annex 2. The physical scope of the completed project is shown in Annex 3. A full description and analysis of the project has been provided in the Government's Project Completion Report (PCR) from which most of the Annexes in this ICR have been taken.

## **PART 2: DESIGN OF THE PROJECT**

#### **F. Objectives**

11. The objectives of the Bank's involvement as agreed with the Government, were:-
- a) The minimization of adverse economic impact of the disaster by restoring economic activity and social services in the affected area through providing technical assistance and reconstruction resources over a period of about 3 years for:
    - i) essential road infra- structure for national and kabupaten roads
    - ii) education facilities
    - iii) health facilities
    - iv) other community facilities
  - b) The introduction of measures to lessen the impact of future earthquakes including:
    - i) hazard mitigation
    - ii) land use controls
    - iii) improvement of building codes and their enforcement

#### **G. General Approach to Achieving The Objectives**

12. In addressing the objectives the Bank and the Government applied the following methodology:
- a) **Reconstruction/Rehabilitation.** In actually reconstructing and providing new buildings, roads and bridges the project achieved the most obvious objective.
  - b) **Mitigation.** This was addressed in both planning and implementation phases. Some typical examples were:
    - i) **Alternative Routes.** Some road links such as Puukungu-Orakose were upgraded to provide alternative access between the north coast and the south coast e.g. Ende and Maumere.

- ii) **Hazard Studies.** These studies focused on the geotechnical aspects of the earthworks and foundations for civil works and were useful in developing spatial plans, the General Earthquake Reconstruction Guidelines (GRG) and in planning for the management of future earthquake disasters.
  - iii) **Spatial Planning.** Through two studies, the areas with minimal risk to earthquake damage were identified so that the type of development would be controlled. These zonings are used in the building approval process.
  - iv) **Building Codes.** Through the publication of the GRG guidelines and very widespread training of all levels in the community, the project can be expected to contribute to improving the overall standard of building or civil works in a manner, which will minimize risk of earthquake damage. These codes are used in the processing of building approvals.
  - v) **Quality Assurance (QA) Practices.** While the project gave QA a high profile, the QA aspects of the implementation proved quite difficult to achieve. The ADB had funded a Chief Design Engineer (CDE) and also required the establishment of a Quality Assurance Panel (QAP) which together with the QA engineer funded by the World Bank, was intended to provide a significant advance in QA practices. However, contractor procurement procedures were not implemented in accordance with the QA, contract completion times were unrealistic. The Quality Control aspect was the main success of the QA plan. For reasons of administrative difficulty in getting access to calculations and drawings, the CDE's tasks were handicapped. Similarly the QAP did not fulfill its intended role as it approved designs post-facto instead of pre-construction.
  - vi) **Community Awareness.** Through training of all levels of the community from school children to University Teachers, Government Officials and professional architects and engineers, people have become aware of the ways to mitigate against damage and injury from future earthquakes. This awareness will need to be maintained through refresher campaigns and continual publicity, a facility for which was provided by the Bank's funding of a building in Maumere to house all relevant information. New-comers and developers are routinely informed of the mitigation measures.
- c) **Training.** A summary of the training effort is shown in Annex 4 Training in mitigation techniques was given high profile throughout the project, some examples were:
- i) Community training, in domestic construction and safety procedures
  - ii) Building tradesmen and professionals, in construction techniques
  - iii) Government officials, planning, construction and management practices
  - iv) Disaster management, for Government Officials
- d) **Focus On Alternative Construction Materials.** In order to demonstrate the possibilities for improving bamboo construction technology, which is more resistant than masonry to earthquake damage, exhibition houses were built in each of the 4 Kabupaten. Using a penetration technique bamboo was treated against insect attack. Full bamboo and combination of bamboo and steel construction was successfully trialled for schools.
- e) **Prediction.** In order to provide the means for early warning of similar disasters such as volcanic eruptions, 3 volcano observation stations were constructed and equipped with seismic instruments. As well, other sophisticated seismic instruments for earthquake measurement were provided to the Department of Mines in Bandung.
- f) **Sustainability.** Promises and demonstrated allocations for O&M were raised, particularly for roads, even though the amount of funding may not have been as much as desired. Some of the O&M budgets are shown in Annex 5.

- g) **Community Welfare.** One of the implied aims of the project was to improve the living conditions of the communities on Flores. The inclusion of community schools into the reconstruction program made a big impact towards achieving this aim. Apart from the obvious benefits of the restored infrastructure less major benefits were the solar-cell powered lighting and refrigerated medicine boxes for remote health centers, new equipment for the new Maumere Hospital and a piped water supply for the resettled population of New Wuring.
- h) **Economic Development.** While not a direct objective, economic development was a natural effect of the spending of over US\$100 million equivalent during the effective 5 years period of the project. The construction of a large new market to replace the old Maumere Market that was damaged by the earthquake, will contribute to the economy.

#### H. Assessment of the Design of the Project

13. From the foregoing it can be seen that the objectives of the project were achievable and beneficial. However, the project implementation period exceeded the original design by nearly 100%, due partly to increased scope. Nevertheless, the overall design can be said to be successful.

### PART 3: IMPLEMENTATION

#### I. Project Organization

14. This project involved all the Directorate-Generals of the MPW and other ministries, especially the Ministry of Health (MOH) and the Ministry of Education and Culture. The Ministry of Mines and Energy also played a role. Hence a Core Management Team (TMI) was established in Jakarta to provide overall co-ordination role with all Government agencies and the donor/lending agencies. This proved to be a very necessary function and worked satisfactorily. In order to coordinate all the works on Flores a Reconstruction Management Team (RMT) was established. In the first two years the RMT functioned through the Project Implementation Unit (PIU) system, (Annex 6) with authority which was gradually passed to the regional governments. For the last 4 years of the project in a "decentralized" mode the RMT functioned as an advisory body with a high degree of expertise, supporting and advising individual Project Managers (PM) who reported to the regional governments. This system is shown in Annex 7.

#### J. Consultancy Services

15. **Initial Phase (Management).** These services were by direct appointment. A Program Adviser (International) was appointed in June 1993 to assist the project development by establishing communication and monitoring systems and preparing Terms of Reference. In July 1993, an International Quality Assurance Engineer was appointed and this appointment was followed by the appointment of an International Chief Construction Engineer and a team of national consultants to assist the RMT, in August 1993. These services were extended beyond the original Bank intention of 5 months, because of delays in appointing their replacements, which had to be done through the competitive bidding process.

16. **Initial Phase (Construction).** These contracts were by direct appointment. In order to provide the site supervision for the construction works that began August/September 1993, Supervision Consultants who had been working in Flores at the time of the Earthquake were appointed to supervise road reconstruction, schools, and health facilities.

17. **Study-Type Consultancies.** Early in the implementation phase contracts were placed by direct appointment for the study of the geotechnical features, the characteristic performance of structures during earthquake and for the identification of planning, design and construction of earthquake resistant structures. These studies were extended into a second phase, which included disseminating the new or most important techniques.

18. **Summary of Consultancy Contracts.** Normal Bank procedures were applied to other consultancies. A time-bound bar chart showing the utilization of all Consultancy services is at Annex 8.

#### K. Project Management by the Government

19. By the beginning of 1995 each sub-project was in charge of a Local Government Project Manager (PM). On the whole, the PM concept worked satisfactorily and was preferred to the PIU system.

20. **Maumere Hospital.** This was the largest and most complicated sub-project of the whole FERP and was further complicated by the funding/budgeting process and the management of the sub-project.

- a) **Government PMs.** Initially MPW provided the Project Manager and MOH arranged the budget. Then the MOH official managing the budget withdrew and it was nearly 9 months before a replacement was appointed. During this time no contract payments were made and this undoubtedly contributed to construction delays. Subsequently it was resolved that the PM (MOH) would be responsible for the Rp. portion of the contract (35%) and the PM (MPW) would be responsible for arranging the loan-funded portion of the budget (65%). The PM (MOH) approved all payments taking into account the technical advice of the PM (MPW). This unavoidable dual control exacerbated the difficulties in arranging the funding for addendum's to the contract.
- b) **Occupation Difficulties.** When the physical works for the hospital had reached over 98%, a new problem arose when a senior tradesman involved with the final fitting out works, dissatisfied with his payments occupied the medical supervision wards and refused to hand over the keys to the buildings. The problem was resolved in March 1999. The hospital was handed over to the Bupati Sikka in October 1998.

#### L. Construction Services

21. **Direct Appointments.** As quick progress was necessary to restore some normality to life in Flores, direct appointments to contractors already working in Flores were made for the rehabilitation and reconstruction of schools.

22. **Other Contracts.** The Local Competitive Bid (LCB) process was applied to the vast majority of works contracts and although contracts took up to 4 months to finalize could be said to have been successful.

23. **International Competitive Bids (ICB).** The ICB procedure was only used on one contract, namely, Maumere Hospital. Initially, there was difficulty in obtaining a No Objection Letter from the Bank because the Government-preferred tender from a national company was the second lowest, while the lowest was a Joint Venture between a Korean contractor and a national contractor. Eventually the contract was awarded to the Korean-Indonesian consortium. However, the Korean party was never present and most probably only allowed its name to be used. Hence there was little evidence of the expected superior management approach for which Korean construction firms are noted. Contractual difficulties and changes of the Contractor's Superintendent in the early phases, caused many delays.

24. **Implementation Schedules.** For Roads, Schools, Health Facilities and other Facilities the timings of the contracts are shown in Annex 9.

#### M. Implementation Delays

25. All components were subject to delays.

- a) **Consultancy Services.** Although the initial 5 months direct appointments were intended to make services available as soon as possible after the Loan negotiation, consultants did not commence for at least 3 months later. While the original intention was for the extensions of

these appointments to be tendered, it was not possible to finalize the tendering process within the 5 months and also provide services for the restorative works which had already begun. Hence, the direct appointments were extended by up to 4 months.

- b) **Funding Provision.** The lack of available Rp. budget to support payments to road contractors during the 1994/95 period and again during 1995/96 and 1996/97 for the Maumere Hospital had a clear delaying impact on physical progress. During 1997/98 delays in provision of Central government funding arrangements for the Wuring Water Supply contributed to implementation delays, causing the civil works to be curtailed into a Phase 1 for which funds were available and a Phase 2 for which funds were only available in the following financial year.
- c) **Field Work.** A major cause of delay was a shortage of labor suitably skilled for the construction effort in a remote location. This applied to road works that were also affected by contractors' capability to maintain cash flow to support the operation of heavy road-making equipment. The most difficult problem was in finding sufficient workers for the Maumere Hospital project, which exacerbated the management problems. As there were insufficient resources on Flores, the contractor brought in workers from Java, only to find them rejected by the local workers so that construction progress was ultimately determined by the availability of Flores workers. Slowness in road and bridge work was caused by the necessity to use hand tools for excavation of rock and demolition of broken concrete foundations; explosives were prohibited.
- d) **Weather.** Even though the weather patterns on Flores are well known the timing of certain activities such as the transport of steel frames from Java for the school building reconstruction were unavoidably coincident with the annual period of high seas which frequently close ports in the NTT. This contributed to a construction delay of several weeks during 1994.
- e) **Financial Crisis.** With the onset of a financial crisis in August 1997 the works then outstanding were affected because of the uncertain and extremely high price of steel, cement and other construction materials, which in turn produced a material shortage. This crisis was the grounds for extending the Loan Closing Date from 31 December 1997 to 31 May 1998 and again from 31 May to 30 November 1998.
- f) **Handover-Operation.** Although many parts of the Maumere Hospital were ready for use in May 1998, a delay in the provision of funding by MOH for the cost of moving equipment from the old Maumere Hospital to the new one prevented the use of new facilities such as Radiography, Polyclinic, Pharmacy. The New Maumere Market was unused for 18 months while the property - management aspects were being resolved by the Bupati. By the final Loan Closing Date the Market was operating.

## N. Construction Quality

26. In the first and second years of the project the quality of construction was well below expectations. A contributing factor would have been the urgency to do so much in so little time and the need to improvise by using local green timber. The work supervision teams also needed to adjust to increased quality control concepts. More specifically some of the examples of good and bad construction were:

- a) **Schools.** The first year's Program was the most affected by poor quality construction. Columns were not aligned, roof lines were non-linear, bolted joints of structural steel members were out of alignment, nuts were missing from foundation bolts. Steps were uneven. Building rubbish and remains of earthquake damage were left on site. Timber window frames were ill-fitting and warped. Paint work was too thin. Concrete floors were too thin and cracked. Concrete footings crumbled. In succeeding years the steel works improved, the overall appearance of the buildings was well aligned. Concrete was stronger. Ceilings were fastened better. Rigidity between timber panels and steel frames was greatly improved.
- b) **Bamboo Schools.** The observed extent of insect attack during the early stage of construction and after the treatment of the bamboo raised concerns about the effectiveness of the Boucherie pressure treatment. Subsequently, through spraying, the insect attacks reduced.

The full bamboo schools have been built with the structural columns buried in concrete, a concept that could be expected to encourage damp rot of the bamboo. After the classroom door design was modified, for the steel and bamboo schools, the overall result for bamboo technology was successful.

- c) **Health Facilities.** As with the schools, the later batches of buildings were of much better quality. Ringbeam construction around the floor needed close supervision.
- d) **Hospitals.** The Ende hospital that was only partly reconstructed experienced some poor quality construction in regard to reinforcement steel and ring beams, at the ceiling level. Even though the Maumere Hospital experienced so many other contractual difficulties, the general consensus of opinion rated its construction as satisfactory.
- e) **Other Facilities.** The new wall for the Maumere stadium was of excellent quality. Even though there were some initial design problems with the New Maumere Market (the column base plates had to be redesigned to provide for 4 holding down bolts instead of 2) the final appearance of the building was pleasing.
- f) **Roads and Bridges.** Missing bolts from steel truss splices and missing nuts from holding down bolts, were some of the bridge defects that were eventually corrected. However, a generally poor quality of flush bituminous seals on the roads will contribute to higher O&M.

27. **Quality Assurance (QA).** In reviewing the QA Annex 10 summarizes the assessments for the QA outcomes for Buildings, Roads and Bridges.

#### **O. Disbursements**

28. At times during the project there were unexplained delays in processing the withdrawal applications to the Bank. Towards the end of the project and after the Closing Date, final payment data was very difficult to obtain due to staff being assigned to new projects. The overall disbursement performance is shown in Annex 11 and final details are in Annex 12. The final costs were Rp.144,639,072,215 of which the Bank funded Rp.98,995,464,934. (US\$.39,377,593)

#### **P. Covenants**

29. While the covenants followed the usual pattern for IBRD loans, there were 4 specifically for the FERF, which dealt with the GRG, training in earthscience, and QA. All covenants were complied with eventually as can be seen in Annex 13. The QA aspects were given increasingly successful attention as the project progressed.

### **PART 4: PROJECT BENEFITS**

30. **Roads.** The speed and safety of travel have been improved. Public transport has increased. The number of registered motor vehicles has increased.

31. **Schools.** The learning atmosphere has been improved, risks from future earthquake have been reduced. Full Bamboo schools costs 41% of the costs of steel and timber school buildings and steel frame and bamboo clad school buildings cost 86% of the steel and timber building.

32. **Health Facilities.** Two major hospitals have greatly improved facilities. Health Centers in the villages provide better service. The provision of housing for medical and paramedical staff at remote locations reduces the cost of travel of patients to larger centers and also leads to more effective management of the remote center and less overload in the bigger centers.

33. **Training and Skills Transfer.** A very wide target group in the whole community has been exposed to earthquake mitigation practices and technology National and International experts and broadened their understanding of project management and earthquake engineering. Following the Disaster Management Training, some participants contributed to the initial MPW Disaster Management Plan.

34. **Socio-Economic.** In the words of a senior members of staff of the BAPPEDA, Sikka "The socio-economic at the end of the FERP is greatly different and better than the pre-earthquake condition.

#### **PART 5: BORROWER'S PERFORMANCE**

35. As can be seen from the foregoing the Government eventually accomplished its aims, although it could have been done more efficiently. It certainly improved through the project period.

36. **Procurement.** Largely because of many actors in the decision process this phase mostly takes a longer-than-expected time. The arrangement of the funding sources to support sub-components is an ongoing difficulty. Government misunderstanding of LCB/ICB constraints resulted in the exclusion of 2 links from the project.

37. **Quality Assurance.** Delays in appointing consultants and contractors increased the potential for circumventing the original QA plan. Further familiarization difficulties between consultants assigned to the FERP contributed to difficulty in meeting the target date for the production of the GRG which were only made available well into the second year. Difficulties of communication between consultants affected the availability of designs for checking by the CDE. Acceptable quality was eventually achieved through modifications in the field.

38. **Institutional Development.** The adoption of the decentralized organization will be of continuing benefit to the Government as it has been a means of developing responsibility among the government engineers through on-the-job training from national and international expertise.

39. **Project Organization.** The organization for the FERP was a new concept and with the commitment of the Central Government, the Provincial Government, and the Regional Governments, the organization operated satisfactorily.

#### **PART 6: BANK'S PERFORMANCE**

40. **Bank Supervision.** The Bank Missions were a most effective means of encouraging the many personnel engaged on the FERP. Meetings in Kupang with the BAPPEDA encouraged the higher level managers in each of the project sectors. Likewise on Flores the sub-project staff were encouraged both in technical and management matters. However, as can be seen from Annex 14 the missions could have been more frequent.

41. **Change.** The Bank's role in assisting the development of the decentralized organization as shown in Annex 7, was beneficial for the Government institutional development strategy. Due recognition must also be given to the Bank's support for the Bamboo school program which leads to more economical classroom construction costs, a benefit of great interest to both the community and government education agencies.

42. **Financial Crisis.** The Bank's understanding of the difficulties caused by the financial crisis and the subsequent two loan period extensions to cope with the difficulty was greatly appreciated.

43. **Overall.** Throughout the long project the Bank's performance is rated highly. The Bank was sensitive to the need for adjusting the scope of works as field experience showed additional earthquake damage or as subsequent events showed some items to be unachievable e.g. the Fishing Boat Harbour at New Wuring. The cooperation between the Government and the Bank in preparing the Aide-Memoires of the Supervision Mission was excellent. Procurement approvals were responsive and the Bank's staff was most helpful in advising the FERP staff on administrative procedure.

## PART 7: OPERATIONAL PHASE

44. **Sustainability.** The sustainability of the project will be dependent upon:
- a) Continued awareness of hazard mitigation, this should be coordinated through the Province but must be implemented in each Kabupaten.
  - b) Extension of the technical knowledge gained from the FERP to other parts of Indonesia (even to the production of locality plans showing earthquake forces for different return periods).
  - c) Continuing budgets to maintain the standards of the buildings, roads and bridges.
  - d) Monitoring of socio-economic benefits to the project area such as:
    - i) Personal Incomes
    - ii) Vehicle Populations
    - iii) Traffic Counts
    - iv) School Attendance
    - v) Health Facility Usage
    - vi) Performance of Maumere Market
  - e) The most sensitive 'new' development, the Maumere Hospital is implementing an environment monitoring and management plan.

## PART 8: KEY LESSONS LEARNED

45. From the Government's viewpoint the important lessons to be learned are:
- a) Procurement processes must be in accordance with the lending agency's policies and must be expected.
  - b) The principle of contract variations, such as for extensions to cope with changed site conditions, should be made more acceptable and readily approved.
  - c) The emphasis placed on earthquake-safe construction must be continued, especially through the use of the training modules prepared by the ITB package, updating the GRG and through the expanding use of the Earthquake Information Center in Maumere.
  - d) Regional Governments must provide more funding for O&M of the restored infrastructure.
  - e) Bamboo is an acceptable structural construction material and can be combined with steel frame construction for advantages in cost and safety.
  - f) More attention needs to be given to the techniques of bituminous flush seals.
  - g) Foreign consultants can be used sparingly and effectively with a large force of national consultants.

## COMMENTS ON BANK'S DRAFT ICR

### A. Evaluation Summary

The comments in the Evaluation Summary are fully supported. Section xiii most apt. We endorse the concerns about adequate funding for O & M. However, as we are aware of the priority now being given to O & M, by BAPPENAS, we are optimistic that O & M will be increased.

We are pleased to note that the Bank agrees with our proposed indicators for monitoring the sustainability of the project and we would be pleased to know whether the Bank could support a monitoring effort say at 6 monthly intervals over say 5 years as part of another project loan in NTT.

Our detailed comments against a paragraph are:

- ix. We agree with the intent of this paragraph but would suggest the following substitution in mid paragraph:  
"The Flores Island already had a shortage of skilled personnel delays and difficulties in recruiting exacerbated this during the implementation phase"

### B. Detailed Draft ICR

As with the Summary we agree with the details. Some special comments against respective Draft ICR paragraph numbers follow:

8. We agree with the view that capabilities of government and the contracting industry were over-estimated. Even though the scope of work was significantly increased, there was an underlying prolongation of the implementation time due to the insurmountable slowness of budget approvals, contract administration and contractor activity.
8. The General Reconstruction Guidelines are proving very useful.
25. It was difficult to get government staff to go to Flores and we believe that this is partly due to our pay system that is very difficult to change.
30. We share the Bank's concerns that there could have been more frequent Bank Missions.

### C. Annexes to ICR

- Page 17: Table 5. In the Column PEMDA-material and the Row Ende-Actual the material should be Triplex (Plywood) and not Bamboo.
- Page 32: Annex B: Supplementary Table 1: Although data is available there are no amounts stated for any of the Columns for Row 1D – Other facilities and there is one blank column.

## ANNEX B: SUPPLEMENTARY

TABLE 1: REALLOCATION OF LOAN 3589-IND

No.	Category	Thousands of US Dollars							
		Original	Revised I	Revised II	Revised III	Revised IV	Revised V	Revised VI	Disbursed
1.a	Roads & Bridges	10,500	10,500	10,500	10,500	11,835	12,580	11,435	11,363.0
1.b	Schools	5,200	7,200	9,000	9,000	9,105	8,560	8,435	8,374.1
1.c	Health Facilities	49,000	4,900	5,400	5,400	5,520	5,320	5,030	4,967.2
1.d	Other Facilities	3,300	3,300	1,600	2,000	1,080	1,080	1,080	854.6
2.	Reconstruction services	37,000	3,700	4,700	4,100	4,300	4,300	3,965	3,871.9
3.	Equipment and Furniture	2,000	2,500	3,300	2,900	2,725	2,725	2,725	2,719.2
4.	Consultant Services and Training	5,400	5,400	5,700	6,900	7,535	7,535	7,500	7,432.5
5.	Unallocated	7,100	4,600	1,900	1,300	0	0	0	0
6.	Canceled	-	-	-	-	-	-	1,465.3	2,518.9
	<b>Total</b>	<b>42,100</b>	<b>42,100</b>	<b>42,100</b>	<b>42,100</b>	<b>42,100</b>	<b>42,100</b>	<b>42,100</b>	<b>42,100</b>
<b>Total Cost</b>								<b>39,581.1</b>	

Revision I: Approved by IBRD on 24 August 1994

Revision II: Approved by IBRD on 4 August 1995

Revision III: Approved by IBRD on 10 April 1996

Revision IV: Approved by IBRD on 4 Nov. 1996

Revision V: Approved by IBRD on 20 June 1997

Revision IV: Approved by IBRD 19 June 1998

**ANNEX B: SUPPLEMENTARY**  
**TABLE 2: REVISED HEALTH INFRASTRUCTURE PLAN**

Facility	Kabupaten	No.	No. Units	Area (m2)	Unit Cost (per m2)	Cost	No. Units	Area (m2)	Unit Cost (per m2)	Cost	Equipment	Total	Estimated Total Cost (US\$ m)
Hospitals	ENDE	1	14	5,337	0.367	1,957.7	4	1,680	0.205	344.4	654.0	2,954.6	1.43
	SIKKA	1	1	11,078	0.706	7,821.1					1,256.0	9,076.1	4.40
Total		2	15	16,415		9,779.7	4	1,680	0.205	344.4	1,910.0	12,030.7	5.83
Health Center	ENDE	8	8	3,170	0.170	538.9					76.8	615.2	0.30
	FLOTIM	3	3	1,364	0.212	289.2					28.8	317.4	0.15
	NGADA	3	6	2,628	0.393	1,032.8					57.6	1,089.1	0.53
	SIKKA	10	10	4,683	0.174	814.8					96.0	908.7	0.44
Total		24	27	11,845		2,675.7	0	0			259.2	2,930.4	1.42
Sub-health Centers	ENDE	37	29	2,900	1.168	487.2	8	280	0.201	56.3	74.0	617.1	0.30
	FLOTIM	13	13	1,550	0.212	328.6					32.7	361.5	0.18
	SIKKA	38	38	3,800	0.163	619.4					77.9	697.6	0.34
Total		88	80	8,250			8	280			184.6	1676.2	0.82
Health Centers w/beds	ENDE	4	3	1,979	0.179	354.2	1	189	0.201	37.9	54.9	447.3	0.22
	FLOTIM	2	2	1,319	0.214	282.3					28.1	310.0	0.15
	NGADA	1	1	660	0.202	133.3					14.5	147.7	0.07
	SIKKA	2	1	660	0.174	114.8	1	189	0.196	37.0	16.9	168.8	0.08
Total		9	7	4,618		884.7	2	378	0.397	74.9	114.4	1073.8	0.52
All	ENDE	50	54	13,386	0.249	3,336.0	13	2,149	0.204	439.0	860.0	4,634.0	2.25
	FLOTIM	18	18	4,233	0.212	897.4					89.6	988.8	0.48
	NGADA	4	7	3,288	0.354	1,164.0					72.1	1236.8	0.60
	SIKKA	51	50	20,221	0.463	9,362.3	1	189	0.196	37.0	1,447.0	10,851.0	5.26
Total		123	129	41,128		10,526.3	14	2,338		476.0	2,468.7	17,710.6	8.59

**TABLE 3: PROJECT COSTS (RP BILLION)**

Category	Appraisal			Actual		
	Local	Foreign	Total	Local	Foreign	Total
Roads and Bridges	22.7	10.7	33.4	29.9	14.1	44.0
Schools	15.8	5.8	21.6	28.7	10.5	39.2
Hospital and Clinics	11.3	4.2	15.5	13.8	5.1	18.9
Other facilities	7.5	2.8	10.3	3.5	1.3	4.8
Reconstruction Services	7.6	8.9	16.5	6.0	4.6	10.6
Equipment and Furniture	2.8	3.4	6.2	3.7	4.5	8.2
Consultant Services and Training	1.5	2.6	4.1	8.0	11.0	19.0
Unallocated	15.7	6.6	22.3	0.0	0.0	0.0
<b>Total</b>	<b>84.9</b>	<b>45.0</b>	<b>129.9</b>	<b>93.6</b>	<b>51.1</b>	<b>144.7</b>

**TABLE 4: PROJECT FINANCING (RP BILLION)**

Category	Appraisal			Actual		
	Local	Foreign	Total	Local	Foreign	Total
Government	43.0	0.0	43.0	45.6	0.0	45.8
IBRD	41.9	44.9	86.8	48.0	51.1	99.1
<b>Total</b>	<b>84.9</b>	<b>44.9</b>	<b>129.8</b>	<b>93.6</b>	<b>51.1</b>	<b>144.7</b>

## **ANNEX C: ICR MISSION'S AIDE MEMOIRE**

### **GOVERNMENT OF INDONESIA**

#### **FLORES EARTHQUAKE RECONSTRUCTION PROJECT (LOAN 3589-IND)**

##### **Implementation Completion Mission: November 5-13, 1998 Aide-Memoire**

1. This aide-memoire summarizes the understanding and agreement reached between the Government of Indonesia and the World Bank Implementation Completion Mission that visits Flores, the Nusa Tenggara Timur Provincial Government and Jakarta, Indonesia from November 2, 1998 to November 13, 1998 in accordance with the term of reference of October 29, 1998. The mission comprised of William Hardi, Task Team Leader; and Ephrem Asebe, World Bank consultant. The mission was joined by Mr. Sudarsono, Head of the Core Management Team for the Project; Mr. Lens Messah, Chief Project Manger Reconstruction Management Team; Mr. Simanjuntak, Team Leader PT. Bina Karya (Peresoro); Ms. Indraswari, Project Manger for the Directorate General of Human Settlements; and Mr. Newman Project Coordination Consultant.

2. The mission wishes to express its appreciation to the officials of the Government of Indonesia, the Reconstruction Management Team, the Nusa Tenggara Timur Provincial Government, Kabupaten of Sikka and the representatives of the various agencies involved in the project for their hospitality. The conclusion and recommendations are those of the mission and subject to confirmation by World Bank management.

#### **I. Background**

3. On December 12, 1992 at 1.30 p.m. an earthquake measuring 7.5 on the Richter scale, with epicenter in the Flores Sea and at an estimated depth of 15 km below the sea level and some 50 km from the city of Maumere caused damage over an area of 10,000 square km on the Island of Flores. The tidal wave (tsunami) generated by the earthquake had a maximum height of 5.2 meters and caused serious damages on the north coast of Flores. Most of these areas were also subjected to liquefaction, resulting in a sudden loss of capability of the soil to support any superimposed weight such as a building or a human foot. The most serious damage was caused over an area of about 6,000 square kilometer by combined force of the earthquake, tidal wave and liquefaction affecting Kabupatens: Ende, Flores Timor, Ngada and Sikka and the towns of Ende and Maumere. Some 31 villages were destroyed. Over 1951 persons died of bone fractures, head and chest fractures and drowning and over 2,126 were injured. More than 25,000 houses, 600 schools and 135 health facilities were destroyed or severely damaged. The damage to homes and public infrastructure (roads, bridges, jetties, airport facilities, irrigation works, water supply and distribution systems, schools, health facilities) and government buildings alone was estimated at US\$273.5 million equivalent. The damage to agriculture (live stocks and food crops), fishing (boats, net and other equipment), commercial and other private buildings (including private schools and heath facilities) was also extensive.

4. To cope with the disaster, the government launched a three-stage operation:  
Stage 1: Rescue and Relief Operations, directed by National Coordinating Board for Disaster Control lasted up to December 27, 1992. Stage 2: Rehabilitation and Recovery was directed by Ministry of Public Works and other line departments represented in BAKORNAS put vital infrastructure back to service until end of March 1993. Under stage 1 and stage 2 the government was assisted by United Nations relief agencies, private sector organizations, non-government organizations and bilateral countries. Stage 3 focused on a three-year program with an estimated cost of US\$148.7 million of reconstruction under the responsibility of the coordinating Ministry of Economic Affairs and the State Minister for Development Planning (BAPPENAS) with the cooperation of the implementing agencies, including the MPW.

5. To finance Stage 3 the GOI approached multilateral and bilateral agencies. The World Bank responded with a multi-sectoral project, the **Florence Earthquake Reconstruction Project** with US\$42.1 million emergency loan or some 45% of the external financing sought by GOI; the Asian Development Bank would support the stage 3 program under its **Flores Emergency Reconstruction Project** and Australian Government (AusAID) offered support under **Flores Water Supply and Sanitation Project**. The reconstruction was to be carried out with special emphasis to the use of seismic-resistant construction standards on road and bridges, port facilities, water supply, irrigation and river works, and social infrastructure including homes, hospitals, schools and markets over a three year period.

6. **Flores Earthquake Reconstruction Project (FERP)**. The loan was signed on May 26, 1993 and FERP became effective on July 7 1993. The objectives of FERP were: (i) to minimize the adverse economic impact of the disaster by assisting in the reconstruction of essential infrastructure, health and educational facilities to promptly restore economic activity and social services in the affected areas; and (ii) to introduce measures to lessen the impact of possible future earthquake. As designed, the project was to cost US\$62.9 million with base cost of US\$52.1 million of which 31% was allocated for road and bridges; 39% for education and health; and 10% for other facilities. The balance, 20% was allocated for the reconstruction program and in the development of earthquake, land slide and tidal wave mitigating measures, including technical assistance in spatial planning, the provision of training in geology and seismology and for the procurement of equipment for seismological studies.

7. **Planned Project Implementation**. This was to be carried out in a manner consistent within the normal government organizational framework and in a manner consistent with existing policies, procedures and practices. Special measures were to be limited to those required for accelerated implementation and quality assurance. Accordingly, the organization structure consisted of a steering committee responsible for overall direction and coordination, a reconstruction management team responsible for the coordination and management of project implementation in Jakarta, and a project implementation unit in Flores for carrying out the day to day implementation. In addition, a program for implementation for quality assurance, geo-technical studies and post-reconstruction planning were to be established under Deputy V, BAPPENAS; building codes would be revised if necessary; and environmental and resettlement of indigenous people would be subject to Bank Review.

8. **Sustainability**. The physical investment against possible future earthquake was to be safeguarded by the General Reconstruction Guidelines and construction quality supervision. The benefit is seen in terms of poverty alleviation of the earthquake victims of the Province of Nusa Tenggara Timur (NTT) who in 1990 had a per capita income of IDR. 345,000 (US\$167.15) with an overall incidence of poverty of 46%; while the risk was seen in terms of possible delay due to loss of momentum normally experienced in reconstruction works.

## II. Project Implementation Status

### Overview

9. The ICR mission inspected some of the civil works financed under FERP in Flores. The original scope of the project is fully completed by the loan closing date of November 30, 1998, following three extensions. The project has assisted the restoration of services by reconstruction of essential infrastructure and contributed to policy measures that would reduce the impact of future earthquakes in Indonesia.

### Completed Civil Works.

10. As evidenced from the tables shown below, the civil works was completed generally within budget adjusted to changes in corresponding works.

### Civil Works Implementation Status

Activities	Physical Targets		Cost (US\$ million)	
	Appraised	Completed	Appraised	Completed
<b>Roads and bridges</b>			<b>10.5</b>	<b>11.4</b>
Kabupaten Roads	169.5 km	229.6 km		
National Roads	55.5 km	50.0 km		
Bridges	226 m	407 m		
<b>Schools</b>			<b>5.2</b>	<b>8.4</b>
Government Schools	343 units	343 units		
Community Schools	0 units	147 units		
<b>Health facilities</b>			<b>4.9</b>	<b>5.0</b>
Health Centers	124 units	177 units		
Hospital	2 units	2 units		
<b>Other facilities</b>			<b>3.3</b>	<b>0.9</b>
New Market	1 unit	1 unit		
Stadium Fence	1 unit	1 unit		
Geological Observation Building	3 units	3 units		
Water Supply - New Wuring	0 set	1 set		
Drainage Works	0 set	1 set		
<b>Equipment &amp; Furniture</b>			<b>2.0</b>	<b>2.7</b>
Schools	91 units	84 units		
Hospitals	100 units	100 units		
Health Centers (Solar Power)	0 unit	12 units		
Geological Studies Equipment	31 units	32 units		
<b>Experimental</b>			<b>0.0</b>	<b>0.2</b>
Bamboo School Building	0 unit	5 units		
Bamboo Cladding (classroom)	0 unit	38 units		
Bamboo Houses	0 unit	4 units		

11. **Roads and Bridges.** All the 22 packages of roads and bridges contracts valued at Rp. 40.1 billion have been completed. The mission inspected the roads and bridge in Ende and Sikka districts, and the findings are summarized below:

- a) **Waiwara-Bts. Flotim I and II (S1W & S2W), Sikka.** The approach road works and the construction of Neber Bridge are completed; the mission found its quality satisfactory. There is a joint in the middle of the bridge with six bolts and nuts missing. The mission requested that all the joints in this bridge to be rechecked. There was lack of routine maintenance works along these roads.
- b) **Maurole-Kota Baru- Magepanda (PT. Yetti Dharmawan) (E6W), Ende.** There has been some additional protection wall construction against sea wave along the side of the road using local budget. The mission found the quality of the road and protection walls to be satisfactory.

12. **Roads Routine Maintenance.** The mission found that there has been a lack of routine maintenance on most of the provincial and kabupaten roads. The FERP team should request the Head of BAPPEDA of NTT to allocate sufficient routine maintenance funding for all the roads, particularly the roads constructed under the FY 1997-1998 & FY 1998-1999.

13. **Community Schools (Sekolah Swasta).** All 147 community schools have been completed. The schools that the mission visited in Sikka includes SDS Hikong, SD Geliting (bamboo school) and SD Wuring. The mission found overall the quality of works to be satisfactory. The diagonal steel bracing for SDS Hikong have been erected, the remaining bamboo cladding using local budget have also been completed, as requested in the previous mission. The mission found that maintenance of the completed schools was lacking. Some of the concrete floors of SD Wuring are deteriorating quite seriously. There was no insect attacked found in the bamboo cladding or bamboo structures.

14. **Health Centers (Puskesmas).** The health centers the mission visited includes Puskesmas Kota Baru, Sikka and Puskesmas Boru, Flotim. The mission found that there has been lack of repairs and maintenance of the completed health centers. Some of the concrete floors of Puskesmas Boru are deteriorating quite seriously, and the mission was informed that this health center lacks medical facilities, such as refrigerator for keeping the medicine, vaccines for snake bites etc. Five people recently died from snake bites due to an unavailability vaccines.

**Ongoing Civil Works.**

15. Activities ongoing at present are: Drainage works for Maumere Hospital, Maumere Market and Water Supply for Wuring Baru. The new Maumere Hospital is being upgraded from Class D to Class C. The building construction has been basically completed but minor works of landscaping, drainage and air conditioning are proceeding. Based on the evidence of surcharges of drains in the lower portion of the hospital compound, the mission has recommended the immediate review of the drainage design and subsequent action. The mission noted that the quality of finishing works could have been done better. Currently, the planning for removal and re-installation of equipment from the old to the new hospital is ongoing. However, the handing over of the hospital from MPW to the Bupati has not taken place. Urgent action is required for resolving outstanding misunderstandings over the past payments of two of the subcontractors to the main contractor. Most of the hospital buildings were locked and their keys have been kept by the subcontractors.

16. *Drainage Works for Maumere Market.* After a late start due to changes in the bidding procedures now requiring new bidding instead of amending contracts through addendum, the work is progressing well and should be completed by the closing date of November 30, 1998.

17. *Wuring Baru Water Supply.* Work is progressing well to supply the New Wuring Village. It is expected to be completed before the closing date. The mission has expressed its concern about the potential contamination of the water in case of flood, and the contractor has agreed to take appropriate measures.

18. **Supervision & Consultancy and Training Services.** Overall supervision and consultancy and training services have contributed to the desired quality outcome. The quality of finishing works in the new Maumere Hospital, however could have been significantly raised without any additional cost to the project by using more skilled craftsmen. The original loan allocation for construction supervision services under category 2 of the loan was US\$3.7 million and the committed contracts are US\$3.965 million; for Consultancy and training services. The allocation under category 4 while was originally US\$5.4 million, the committed amount is US\$7.50 million including for the consultant services.

**Supervision & Consultancy and Training Services Status**

Consultancy Services and Training	Appraised			Completed		
	F mm	L mm	Cost (US\$ million)	F mm	L mm	Cost (US\$ million)
Design and Supervision	3.00	636.30	3.70	6.00	1,076.85	3.965
Training & Consultancy Services	65.60	433.60	5.40	160.99	936.13	7.500
Management	65.60	188.60		160.99	395.00	
Training- Indonesia *	0.00	97.00		0.00	252.63	
Training - overseas**						
Geological Studies	0.00	75.00		0.00	185.50	
Spatial Studies	0.00	73.00		0.00	103.00	

F mm = Expatriate man-month  
L mm = Local man-month

\* Local Training: 4159 persons

\*\* Foreign Training: In Japan: 5 persons; Australia 46 persons

### Payment After Loan Closing Date

19. The mission informed the implementing agencies that all civil works and consultancy services should be completed prior to the closing date (November 30, 1998), as only expenditures incurred prior to the closing date could be paid from the loan for up to four months after the closing date (March 31, 1999).

### III. Strategy for Minimizing Risks of Future Earthquakes

20. To minimize the prospect of economic and social disruption that could be caused by earthquakes in the area, a sound strategy was followed. Technical resources were allocated to improve design and construction in the Flores area. These included specialists in earthquake engineering, structural engineering and quality assurance. Some of the specialists contributed to the publication of general reconstruction guidelines. The guidelines are now used by local governments in granting building permits. The dissemination of the guidelines to the general public provided necessary advice to the private sector regarding the number of stories, structural systems, and type of foundations that should be used in the design and construction of new buildings and facilities. In road construction the stabilization of slopes through the reduction of cut angles and where, possible, the re-establishment of ground cover – so as to prevent or limit damage during possible future earthquakes were also addressed.

21. Quality assurance of civil works was given a strategic role in minimizing future risks from earthquakes. Past weakness in civil works were addressed as flows:

#### Quality Assurance

	Issues at Appraisal	Project Response
	<b>Buildings</b>	
1.	Buildings and infrastructure are not designed, located and built to withstand any seismic events of 1992 strength that may occur in the future in Flores.	Designs were developed through extensive interdisciplinary consultation and later reviewed by a specialist geo-technical engineer and the Chief Design Engineer to ensure that design met seismic requirements; guidelines for design & construction were prepared and made available for engineers, architects and the general public.
2.	Inadequate quality control of materials was used in the fabrication of the concrete (in the past the sand was contaminated, and there was inadequate gradation of the aggregate), and the mix of concrete was made by hand without control of the amount of water added.	Concrete aggregates were subjected to sieve analyses and engineer approval was required before use. Job mixes were designed and batch quantities determined. Site supervision involved control of added water, slump tests and compression test of cubic samples.
3.	The steel reinforcement did not follow established practice for reinforced concrete earthquake resistance design, particularly in the spacing of the transverse reinforcement and in the design of the hooks to provide adequate confinement;	Special attention was given to ensuring that the ends of shear reinforcement bars were shaped with adequate loops. The latest MPW codes were applied.
4.	Inadequate form-work in elements with wide variations in their cross sections; and the casting of concrete was done without proper compacting resulting in extensive honey combing and therefore inadequate strength.	Form works and reinforcement bars were approved prior to casting of concrete. Mechanical concrete vibrators were used wherever there was access; otherwise concrete was hand-rodged to minimize honey-combining. If honey-combing occurred it was patched.
5.	Generally, experience showed: <ul style="list-style-type: none"> <li>a) the use of large sections of masonry walls without reinforcement;</li> <li>b) the use of inadequate reinforcement concrete columns and beams (with disproportional small cross-sections, insufficient reinforcement and lack of adequate transverse reinforcement and detailing);</li> <li>c) lack of proper reinforcement at the top of large openings (for doors and windows) in the masonry walls; and</li> </ul>	<ul style="list-style-type: none"> <li>a) Un-reinforced masonry was limited to five square meters in area of wall;</li> <li>b) MPW practices were followed and reinforced columns were 12 cm by 20 cm;</li> <li>c) wall openings were spanned with short beams of 20 cm depth and 12 cm width</li> </ul>

	Issues at Appraisal	Project Response
	d) lack of collar beams.	d) reinforced concrete collar beams were used on all concrete and brick works and steel and timber were used elsewhere.
6.	Wooden buildings suffered due to failure of foundation or due to lack of anchorage of the posts.	Steel holding down brackets for timber columns were installed in masonry/concrete footings.
	<b>Roads</b>	
7.	Works were not designed and implemented in accordance with standards appropriate for the seismic conditions on the island.	Structural designs were developed taking full consideration of seismic factors and then reviewed by geo-technical experts.
8.	Lack of engineered slopes- the slopes fail when rains increase soil pore pressures	Stability analysis was undertaken and road alignments adjusted optimally.
9.	Coastal roads were affected by tidal waves (tsunami)	Seawall structures were used where appropriate or alignment adjusted.
10.	Formation and pavement failures	MPW codes of practice were followed
11.	Collapse of drainage and retaining wall structures.	Drainage and retaining walls were built to new standards.
	<b>Bridges</b>	
12.	Approaches, abutment failures and total destruction	Foundations were investigated before reconstruction and in one case had to be abandoned. Design of bridge and road reconstruction works were preceded by geo-technical investigation.

22. Other related issues raised during implementation and the responses made during implementation are summarized below.

### Other Issues and Responses

	Issue	Project Responses
1.	Natural Hazards Information Center in Maumere	The Natural Disaster Committee participates in the annual exhibition staged by BAPPEDA Sikka in the first week of October that informs the community of the kabupatens plan for the following year. The Committee is yet to move into its newly completed office.
2.	Volcano Observation stations	Three stations were built in Flotim Kabupaten at Lereboleng and in Ende Kabupaten at Kelimutu and at Rokatenda. Recording of volcanic data is proceeding.
3.	Fishing Village of Wuring	Despite the high risk, it has not been possible to persuade the people of Wuring to refrain from returning to live in Wuring where they have been restoring their pre-earthquake dwellings and buildings.
4.	Commercial Center at Maumere	A spatial plan for the business area was prepared, a new market-with the associated drainage was constructed. (The concept of the self-financing of the operation and maintenance of the new Maumere Market is to be commended and encouraged).
5.	New Wuring Village	a) Water supply funded by the Bank and to be operated by Maumere Water Authority is being installed with public hydrants. The mission has raised concern over the possibility of the water supply being polluted during the rainy season; b) The Fishing Boat Harbor was not built because of excessive cost and because a nearby jetty constructed by the Directorate General of Fisheries which provided alternative facilities.

#### IV. Views of the Stakeholders

23. The mission has solicited the views of the provincial and kabupaten governments, direct beneficiaries, consultants and a donor on the implementation experience.

24. **Government officials** in Maumere have affirmed that the education and health services have significantly improved as a result of the project implementation. Availability of public transport has increased. The rehabilitation and reconstruction of the road network has improved access, reduced travel time and significantly reduced the constraints on economic activities. The region's economy has shown growth of the same order of magnitude as the national economy or even better. The reconstruction guidelines and spatial planning studies are being applied in issuing building approvals to reduce risks from future earthquakes. The Kabupaten Disaster Committee is active in providing information to the community.

25. Government officials in Sikka Kabupaten stated that the current socioeconomic conditions are significantly better than they were prior to the earthquake, despite the present economic condition of the country. The combined impact of exchange rate depreciation and world price increases for the region's exports has minimized the adverse impact of the current financial crisis on the well-being of the people of Flores.

26. **Teachers.** In most cases, the teachers were pleased with the facilities provided. In new Wuring government primary school, where 402 student attend, a new school was built to support the new community. There were some shortcomings that were pointed out by the head teacher and also observed by the mission. The cemented floors of the class rooms have disintegrated and were in need of repair. At Hikong community school, where 72 boys and 72 girls attend, the community has completed the remaining three bamboo class rooms; the head teacher expressed his satisfaction. The mission observed that the bamboo work was well finished. The main complaint was about the lack of water supply for the community. Children are often absent from school as they have to fetch water from distance places for family use.

27. **Health Centers Staff.** The mission had opportunity to discuss at length the quality and scope of services provided at Kota Baru in Ende Kabupaten and at Boru Flotim Kabupaten. Both facilities have attracted resident doctors and now provide improved services that attract patients who would otherwise have traveled long distance to the nearest hospital or not sought medical assistance at all. The health center in Kota Baru provides service to some 11,000 persons while the one in Boru provides for some 17,000 persons. Except for lack of electricity and refrigerators for storage of ant-venom for treating snake-bite victims, the staff had no major complains. The mission saw that a solar powered refrigerator can be a good solution.

28. **Consultants.** The mission held discussions with some of the consultants who worked on design and supervision aspects of the civil works, the training of staff, and on the preparation and dissemination of disaster prevention measures. All participants were glad of their involvement and said that they have gained great satisfaction in learning and using available scientific knowledge in the preparation of the design and training material for disaster prevention and mitigation.

29. **Donor.** The mission had opportunity to review the implementation experience of FERP with AusAID staff managing the implementation of Flores Water Supply and Sanitation Project. AusAID confirmed that water is indeed a priority for Flores. While AusAID is providing water supply to 130 villages at a cost of US\$16.0 million equivalent, its plan is likely to meet the need of only about 15% of the villages.

30. **Trainee.** Under the project training material was developed and seminars were provided in the Eastern, Central and Western Regions of the Indonesia and in Flores. Participants, including 2967 persons representing the community, 148 craftsmen and 90 technicians, were trained. In addition 973 government officials and 32 university staff participated in the workshops. The mission has learned from some of the participants that the seminars and workshops were useful.

## V. Views of the Bank Mission

31. Overall the project appears to have achieved its objectives while giving a sense of accomplishment to those involved in its execution. Besides minimize the socioeconomic impact of the earthquake in Flores, the project has instituted measures to help minimize the risks of damages to infrastructure from future earthquakes and has created awareness about natural disasters especially about earthquakes and Volcano disaster damage. The project has also encouraged policy measures and practices that could reduce vulnerability to future earthquakes. These include:

- a) land use, micro seismic zone maps;
- b) disaster impact assessment of project sites;
- c) enforcement of design and construction standards;
- d) encouragement of the use of suitable building and bamboo technology through community training;
- e) design and construction regulations through quality assurance measures during implementation;
- f) enhanced awareness of management and monitoring environmental measures;
- g) establishment of Disaster Hazard Management Committees and exercises twice a year in the case of Maumere hospital and once in the public schools;
- h) establishment and operation of Natural Hazard Information Center in Maumere and Volcano observation stations in Ende and Flotim; and
- i) providing training on earthquake disaster mitigation measures to some 4200 persons among the community government officials, building trades and professional engineers and architects in all the Regions of Indonesia.

32. The mission noted that the International Decade of Disaster Reduction (IDDR) Day is observed during the second Wednesday of October in accordance with the United Nations declaration. The mission suggested to BAPPENDA that, as part of its measures of enhancing disaster preparedness, solidarity with IDDR with may help create further awareness.

## VI. Operational Plan

33. Adequate maintenance funds and timely utilization of available funds for maintenance will be the key indicators of government commitments to the Sustainability of the physical assets and institutional capacities established under the project.

34. The mission reviewed the budget allocated for road infrastructure, school and health facilities for the Kabupaten Sikka. While underscoring the need for provision of adequate operation and maintenance funds, the mission was heartened to note that at kabupaten level there is acute consciousness about the importance of maintenance and it is being accorded due priority in resource allocations even under the present adverse macroeconomic environment. The Maumere Hospital management has allocated adequate budget for maintenance of the hospital facilities. Management is also aware of the need for environmental management and is committed for an ongoing monitoring of environmental factors likely to affect the operation of the hospital and the well-being of the surrounding community.

## VII. Briefing & Schedule of Preparation of ICR

35. The mission briefed staff of the Core Management Team (CMT), charged with the responsibility of drafting the government evaluation report, on Bank's requirement regarding government contribution to the ICR. It was agreed that CTM will finalize its contribution to the ICR by January 31, 1999. The Bank will make available the draft ICR for the Government's comment within 15 days of receiving the government contribution to the ICR. The Bank will make available the final draft ICR for the Government's comment within 15 days after receiving the Government's comment on the initial draft.

### **VIII. Outstanding information**

36. Analysis of the impact of the Flores Earthquake Reconstruction Project may require additional data at *kabupaten* or *provincial* level. The mission has received from Kabupaten Sikka and the Provincial Government of Nusa Tenggara Timur and Maumere Hospital management, budgets and other statistical data.

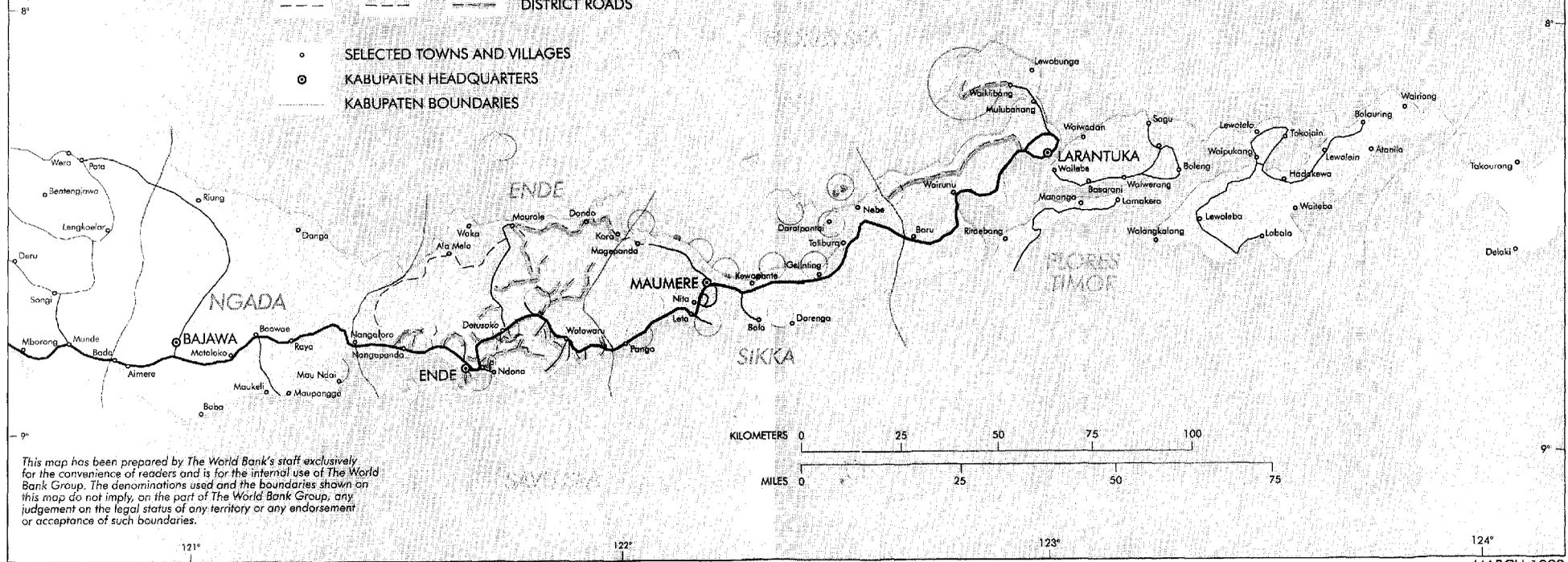
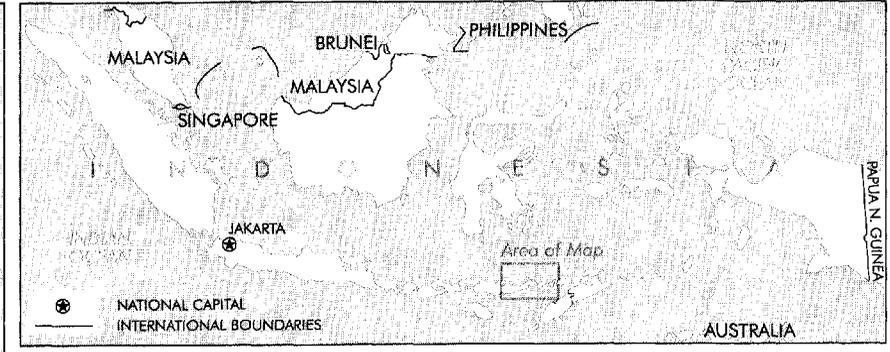
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# INDONESIA EARTHQUAKE IMPACTED AND TSUNAMI DAMAGED AREAS Flores

- PROJECT KABUPATEN
- TSUNAMI LOCATIONS  
AREAS OF IMPACT
- ROAD NETWORK:
 

—	—	—	NATIONAL HIGHWAYS
—	—	—	PROVINCE ROADS
---	---	---	DISTRICT ROADS
- SELECTED TOWNS AND VILLAGES
- ⊙ KABUPATEN HEADQUARTERS
- KABUPATEN BOUNDARIES



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