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FOR  
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**FINAL REPORT**

**MARCH 1980**

**VOLUME I**

**PARSONS OVERSEAS COMPANY  
IN ASSOCIATION WITH  
INDEC & ASSOCIATES LTD**

PN-AAJ-027

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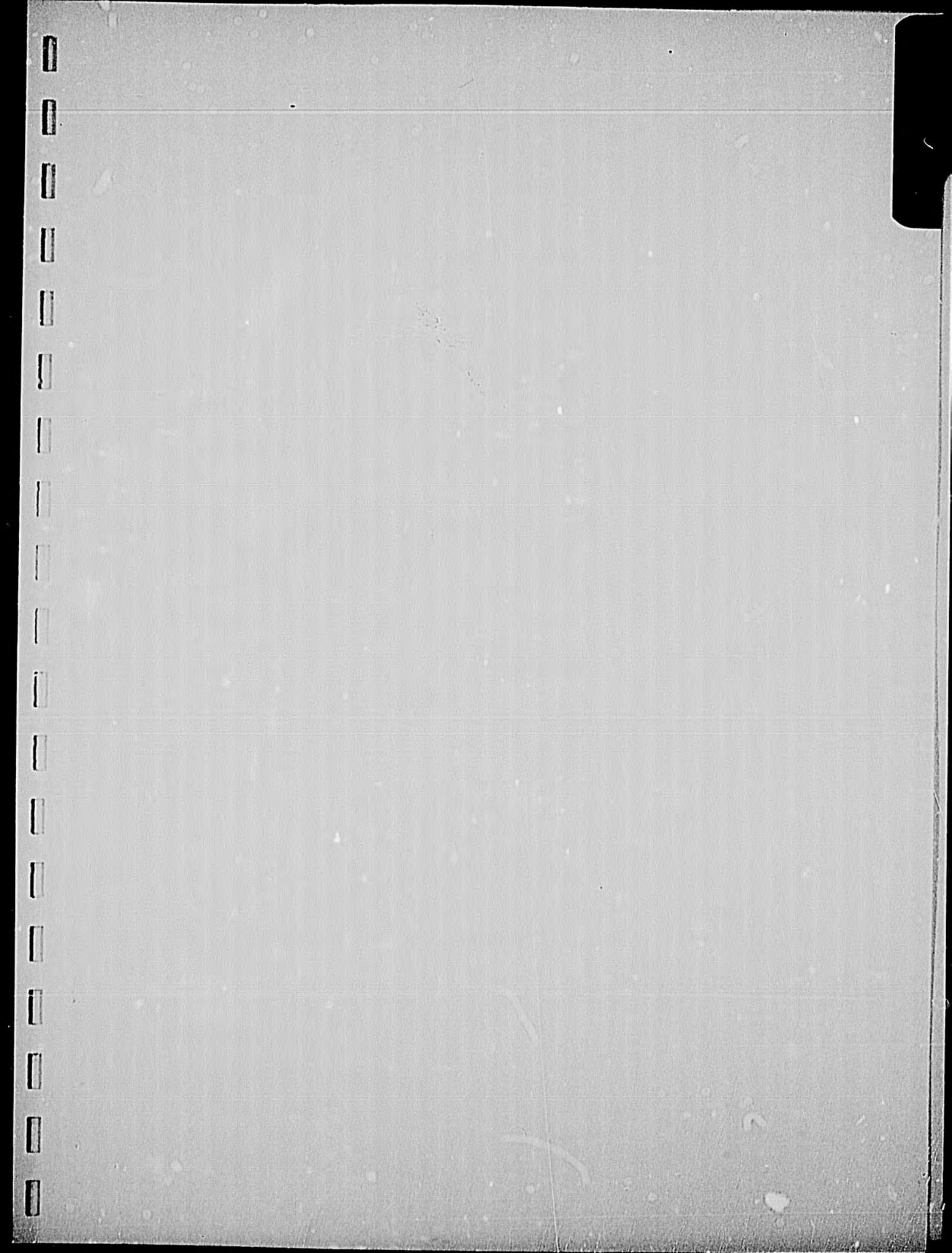
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## SECTION 1 INTRODUCTION

### 1.1. BACKGROUND\*

#### 1.1.1. THE PUBLIC HIGHWAY SYSTEM IN INDONESIA

The road network of Indonesia totals approximately 93,000km of which approximately 11,000 km are classified as "National", 26,000 km as "Provincial" and 56,000 km as "District".

Most of the existing roads were constructed to pre-World War II standards. Until in the late 1960's most of the highway system was neglected leading to serious deterioration in the face of increases in vehicle loads and speed, and intensity of traffic. As a result, approximately 80% of all roads in Indonesia are now considered to be in poor to bad condition.

In recognition of years of neglect of the improvement and maintenance of the road network, the Government of Indonesia (GOI) has embarked upon a very extensive highway improvement program with the assistance of various foreign donors. However, this systematic betterment has been targeted primarily at National and Provincial roads and therefore does not address the need for improvement and expansion of the feeder\*\* road network at the District level.

#### 1.1.2. NEED FOR FEEDER ROADS

One of the major objectives of feeder roads is to permit the development of the nation's agriculture. Rural roads are the key link between farmers and the market and constitute the catalyst that often acts to propel a stagnate rural area into a fresh phase of active development. The immediate beneficiaries of a feeder road program will be the rural agriculturalists, pastoralists, craftsmen and cottage-industry producers and their families living within 5-6 km on either side of the road. This group includes some of the poorest and most disadvantaged rural populace in Indonesia.

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\* Reference : Request for Proposal for Study Program for Feeder Roads Management I, Ministry of Public Works, Directorate General of Highways, July 1978.

\*\* For the purpose of this report "feeder roads" are low volume rural roads which are further defined (i.e., are synonymous with) "District" (Kabupaten) and "local" roads. Reference : IBID

Therefore, the terms "feeder roads", "District roads" and "local roads" are considered equivalent and are used inter-changeably in this report.

The lack of a serviceable feeder road network to adequately serve the rural population of Indonesia remains a major obstacle to national cohesion, civil administration and economic development. Indonesia has a very low road density serving a very high population when compared to other countries in Southeast Asia. As a result, 21% of the villages in Indonesia have no vehicle access roads to the main highways and 30% of the villages outside Java have no such access.

### **1.1.3. CURRENT STATUS OF FEEDER ROAD IMPROVEMENT**

Efforts to finance and implement roads at the District level come from several sources : from Central Government as well as various Provincial and District programs. Planning, design and construction of feeder roads is highly decentralized. Designs are by District (and on occasion, Sub-District) and Provincial technical personnel. Construction is by contractors, paid day laborers and "Gotong Royong" (where village members contribute their time, labor and available materials for community projects). Director General of Highways (Bina Marga) contribution is strictly minor.

The results of the feeder road program have been unsatisfactory. Planning is inadequate. Designs are often made by inexperienced personnel and are not reviewed by qualified staff. Road construction is not adequately supervised and maintenance is nil. Approximately 60% of District roads are earth surfaced and the lack of maintenance leads to the collapse of the road structure with the first rains.

### **1.2. FEEDER ROADS IMPROVEMENT PROGRAM**

The failure of the current feeder road program to meet the needs of the rural areas has become a primary concern to the Central Government. A contributing factor to this program failure has been identified in recent studies as the urgent need for technical assistance to the Provincial Public Works (DPUPs) for any road improvement program. Based on this determination Bina Marga has placed a high priority on developing the capabilities of the DPUPs to carryout a program of road work activities including support to the rural roads program. Bina Marga also is taking action to redefine the respective responsibilities of the Bina Marga and Provincial offices in regard to the District Public Works (DPUPs) in order to provide direct assistance to the DPUKs for improving the feeder road system.

### 1.2.1. "FEEDER ROADS MANAGEMENT I" IMPROVEMENT PROGRAM

As an additional measure to satisfy the need for improved rural road networks the GOI and the United States Agency for International Development (USAID) are considering a three year rural roads improvement program, "Feeder Roads Management I", to improve the capability of selected DPUPs and DPUKs, supported by local consulting and contracting industries, to successfully plan, design, construct and maintain a feeder roads network\*. This program will be specifically targetted to the following tasks :

- (1) Development of a methodology for establishing the long term rural transport requirements of the Provinces/Districts based on existing demand and expected general economic growth in accordance with regional development plans;
- (2) Development of a system to select rural roads for improvement and establish priorities and integrate such improvements with rural development programs/activities;
- (3) Analysis of selected DPUPs and DPUKs including formulation and execution of action programs to overcome identified weaknesses;
- (4) Review of manpower training requirements and preparation and implementation of detailed training programs to plan, design, construct and maintain feeder roads;
- (5) Formulation of a management system for control of construction and maintenance programs;
- (6) Development of the local road consulting and construction industry;
- (7) Research and experimentation in the use of materials, techniques of construction, economical designs, etc.;
- (8) Development of planning procedures, standard designs and specifications, and construction/maintenance operations manuals; and
- (9) Provision of appropriate plant, equipment and materials in support of basically labor intensive construction. It should be noted that the degree of labor-intensive construction recommended will depend to a large degree on the availability of local labor.

### 1.2.2. STUDY PROGRAM FOR FEEDER ROADS MANAGEMENT I.

In preparation for the program outlined in paragraph 12.1, the GOI and USAID sponsored the "Study Program for Feeder Roads Management I" the results of which are the subject of

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\* The programs developed for these selected Provinces/Districts will be applicable for subsequent repetition in other areas in Indonesia with appropriate technical assistance.

this Final Report. This study was undertaken by the consultant in four selected Provinces, i.e. Aceh, Jambi, Central Sulawesi and West Nusa Tenggara (See Figure 1.1), of the institutional relationships within the existing program and preliminary analysis of the financial, manpower, equipment and training needs for executing an improved feeder roads program. The consultant also developed recommendations under this study to serve as the basis for possible USAID or other donor agency assistance to the program and prepared a detailed scope of work for technical assistance to accomplish the tasks outlined in paragraph 1.2.1.

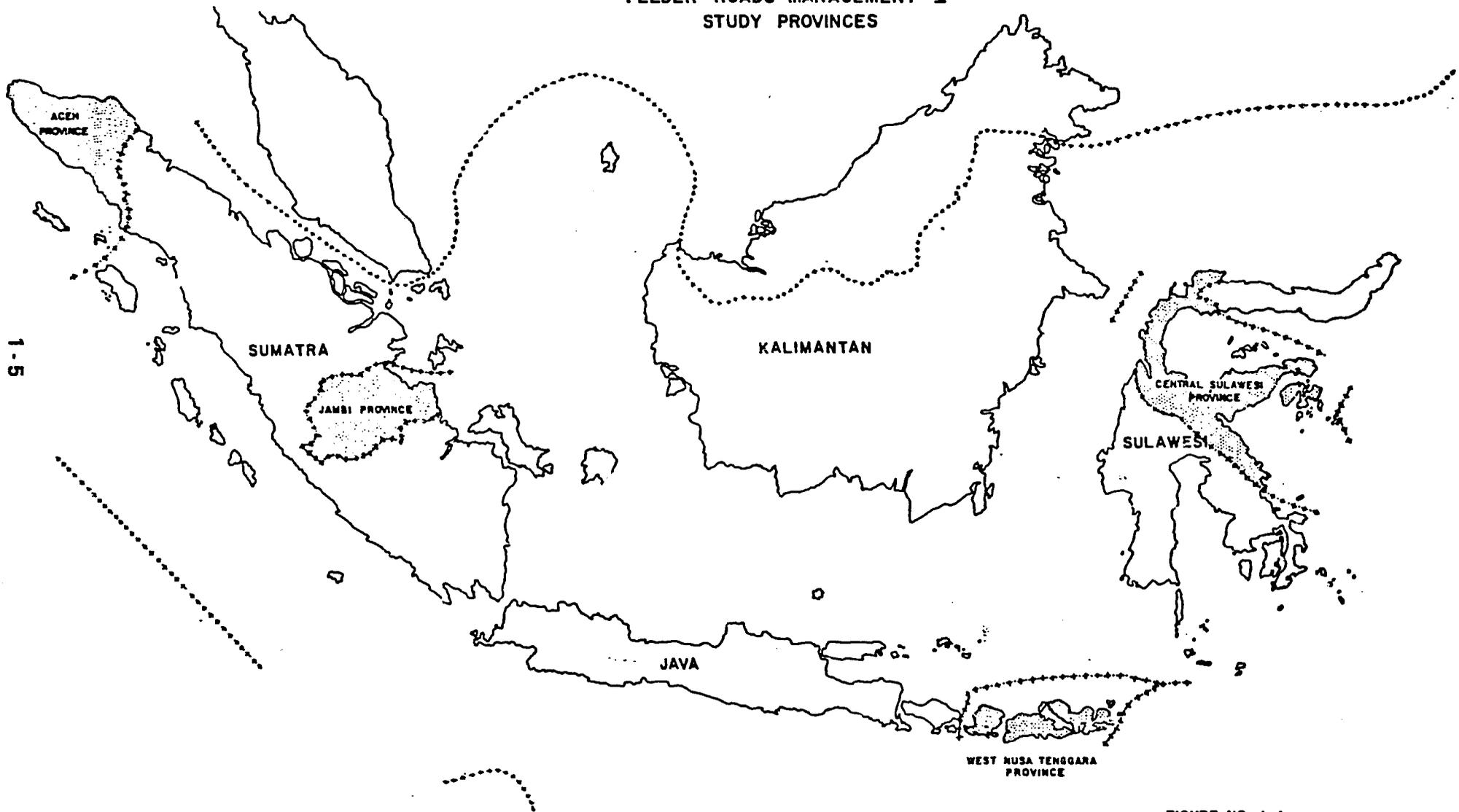
To perform the study, the consultant with assistance from GOI counterparts spent time in each study Province and District :

- (1) Reviewing the existing institutional framework for executing the rural road improvement program;
- (2) Making a preliminary assessment of the present rural road network noting general condition of roads, improvement activities, types of vehicles and magnitude of traffic;
- (3) Reviewing the planning, design, construction and maintenance of rural roads and assessing the strengths and weaknesses of this process;
- (4) Assessing the capability of each DPUP and DPUK in terms of existing manpower, construction techniques, equipment and funding to plan and implement a road improvement program; and
- (5) Assessing the capability of local consultants and the local construction industry.

The consultant assisted by GOI counterparts also spent time in Jakarta and at regional workshops, training centers and other educational institutions, interviewing government officials, engineers and managers, and reviewing data from current GOI studies and studies by other international lending agencies.

The Final Report of the Study Program is in two parts; Part I consists of the consultant's findings and assessments and Part II consists of the consultant's recommendations. Section 2 should be consulted for a more detailed outline of the scope and organization of the report.

FEEDER ROADS MANAGEMENT I  
STUDY PROVINCES



1-5

FIGURE NO 1.1



## **SECTION 2**

### **S C O P E**

Section 3 of the report summarizes the assessments and recommendations set forth in the Parts I and II of the report.

Part I of the report includes assessments of the following existing conditions :

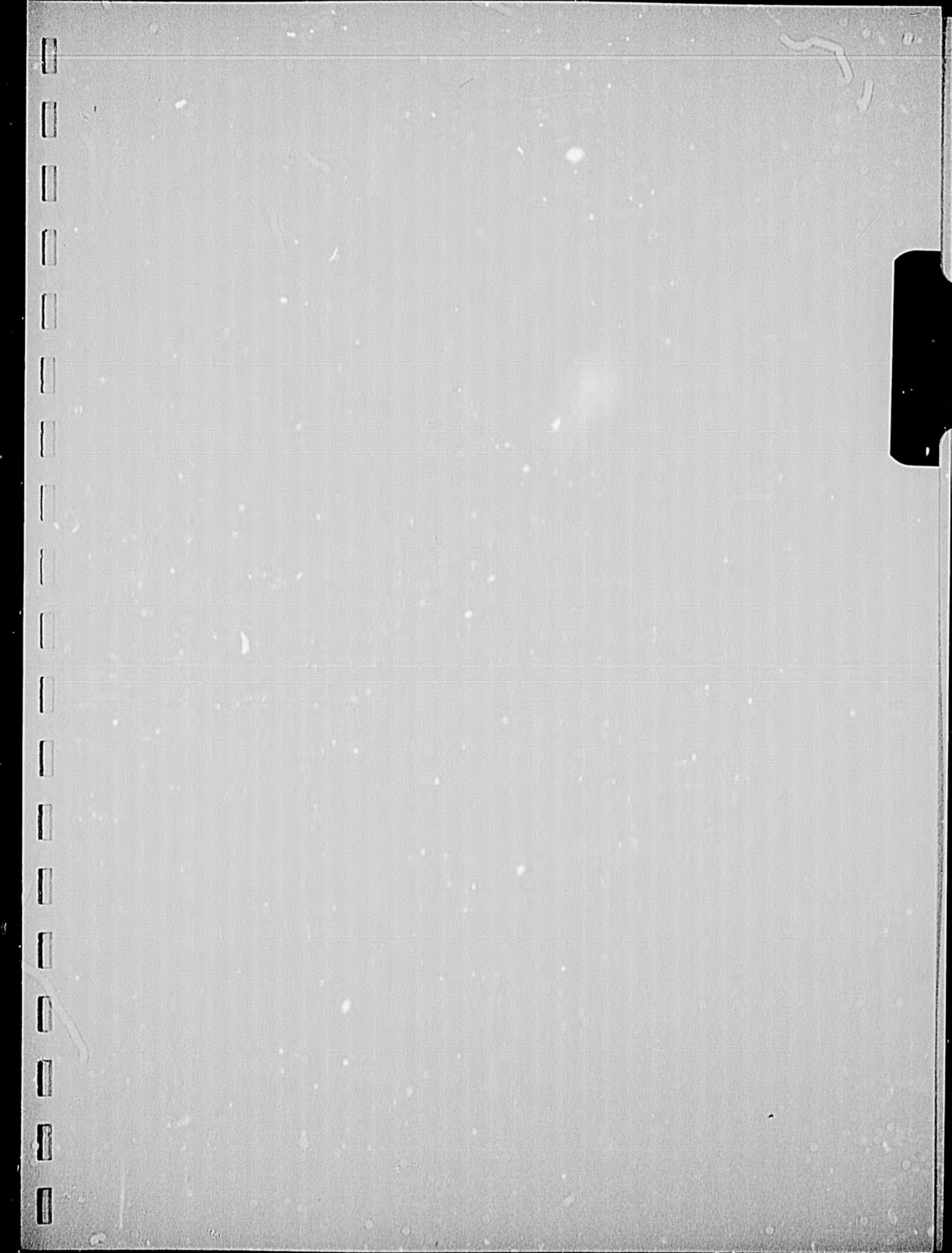
- (1) Provincial and District organizations associated with feeder roads, and their relationships, manpower, training and physical plants involved in the planning, design, funding, construction and maintenance of feeder roads.
- (2) Other organizations, institutions and agencies associated with feeder roads. Included is an assessment of private construction contractors and consultants and their capabilities to plan, design, construct and maintain feeder roads.
- (3) The overall institutional framework for managing and implementing rural road construction and maintenance programs.
- (4) Funding and budgeting of feeder road programs.
- (5) The strengths and weaknesses of the existing institutional framework, organization, procedures and physical plant in the management and execution of a feeder roads program. Included is a broad assessment of the types and volume of traffic, and an inventory of roads and bridges and their conditions reflecting the strengths and weaknesses of current organizations, procedures and physical plants in constructing and maintaining feeder road systems.

Part II of the report includes recommendations and estimates for the implementation of the basic three year feeder road program extended to five years at the direction of the GOI study steering committee. This includes :

- (1) A proposed scheduling and phasing of the total program with estimated costs by year through a five year implementation period.
- (2) Specific recommendations for changes in organizations and institutional relationships, planning, funding, equipment, equipment maintenance and facilities, training, design, construction, supervision and quality control.
- (3) An outline of a training program including management, budgeting and finance, planning, design and field engineering, and equipment operation and maintenance.
- (4) Individual order-of-magnitude cost estimates for additional GOI staff, additional

maintenance facilities, road maintenance equipment, training program, and the physical program consisting of road and bridge maintenance, rehabilitation/replacement and new construction/major upgrade.

- (5) A scope of work for consultant follow-on support including an estimate of staffing requirements.
- (6) Proposed international donor agency assistance.



## **SECTION 3**

### **S U M M A R Y**

The purpose of the feeder roads management study and this report is twofold :

First, to assess existing conditions, organizations, systems, procedures, standards, funding, equipment, equipment maintenance, manpower and training as it applies to District or feeder roads in the four selected Provinces; and,

Second, to recommend changes in these same areas required to successfully carry out a three-year feeder road program (extended to a five year period at the direction of the Study Program Steering Committee ) provide an outline of a training program, provide estimates for the recommended program, provide a scope of work for follow-on consultant support, and provide a recommendation for international donor agency assistance.

**PART I** of the report ( in particular Sections 4 through 8 ) is the assessment.

**PART II** of the report ( in particular Sections 9 through 14 ) consists of the consultant's recommendations, outline of a proposed training program, estimates, proposed scope of work for follow-on consultant support and proposed international donor agency assistance.

The summary which follows is organized in the same order. For a more complete discussion and detailed information, the referenced sections should be consulted.

#### **PART I**

### **3.1. EXISTING PROVINCIAL AND DISTRICT ORGANIZATIONS ASSOCIATED WITH DISTRICT ROADS**

Overall planning and programming for nationwide rural development including feeder roads, and standardization of design and prioritization is being centralized at the Central Government. The actual execution of the feeder road projects is at the Provincial and District ( Kabupaten ) levels.

#### **3.1.1. ORGANIZATIONS ( Reference : Section 4 and 6 )**

The principal organizations at the Provincial and District levels associated with feeder roads at the present time are the Provincial (DPUP) and District (DPUK) Public Works Departments (specifically the Roads (Bina Marga) and Equipment Divisions ), the Provincial Regional Planning Boards (Bappeda) and the Development and Sub-Development Bureaus respectively of the Provincial and District Secretariats.

At the present time, District road improvement and development is restricted by the very limited amount of available funds. Within this context, the roadwork that is actually performed is usually low cost and relatively simple in nature. The main effort appears to be in completing all the documentation required to obtain the limited amount of funds. In this process, the more important agencies are the District Governments (specifically, Public Works Departments and the Roads Divisions ), Bappeda and the Development Bureau of the Provincial Secretariat ( which in concert with Bappeda ) essentially acts, at Provincial level, as the centralizing agency between District, Provincial, and National agencies involved in the District road programs. It should be noted that in the Inpres II Program ( which is the main source of District development and improvement funds ), roads are only one part of the total funding package. Thus the road agencies must work in concert with other District agencies which are also applying for funds. The complete Inpres II package is therefore put together at the highest level of District Government ( the Bupati's office ), with review and approval by a range of Provincial and Central Government offices.

The District Planning Boards (Bappeka), which are expected to act as the District arm of the parent Provincial Bappeda and thus perform much needed planning functions at the District level, have not been activated to date in any of the Districts of the study Provinces.

### 3.1.2. MANPOWER ( Reference : Section 4 ).

Manpower has been assessed on the basis of ( 1 ) the extent of participation in the District roads program by Department, Division, Section, and Sub-Section heads and their staffs in the Provincial and District Public Works Departments in the four Study Provinces; and ( 2 ) by comparing the numbers and qualifications of existing staff in Bappeda and the Provincial and District Road Divisions with the organizations and staffing complements required to carry out the District road program recommended in this report.

In the first of these two assessment techniques, only those persons with some policy or staff functions with reference to District roads have been included in the analysis. Based on available data, it was determined that of the 316 Provincial Public Works personnel in road or road associated Divisions or Sections in the four provinces, 217 persons ( 69 percent ) participated in the program on a part-time bases, 9 persons ( 3 percent ) on an advisory basis, and 90 persons ( 28 percent ) to a limited extent only. Of the 601 District Public Works personnel, 285 ( 47 percent ) participated in the District roads program on a fulltime basis, and 316 ( 53 percent ) on a part-time basis.

On the basis of present staff capabilities and sufficiency to carry out the proposed District road program, it was determined that Aceh Province has a surplus of academically trained personnel at both the Provincial Highway Division and Bappeda levels, with Central Sulawesi adequately staffed ( except for new positions such as Inventory and Mapping Engineers ),

and Jambi and West Nusa Tenggara seriously understaffed\*. At the District Highway Division level, all District in all four study Provinces are seriously deficient in the numbers and qualifications of staffs required to carry out the proposed District road program.

The number assigned and the qualifications of the equipment maintenance personnel assigned to the five Provincial workshops are inadequate.

Laboratory personnel staffing in the four Provincial material testing laboratories are generally qualified and adequate in numbers to assume District road testing support. It is noted that testing for District road and bridge projects is rarely done at present.

### **3.2. CENTRAL GOVERNMENT AND OTHER ORGANIZATIONS, INSTITUTIONS AND AGENCIES ASSOCIATED WITH DISTRICT ROADS (Reference : Sections 5 and 6 ).**

The Central Government is the major source of funding of District roads. Within the last year there has been a major move to implement a further centralization of planning and programming, and to initiate development of national physical standards for rural roads, and to establish criteria for their selection for development.

The Central Government agencies with principal involvement in rural roads are the National Development Planning Board (Bappenas), the Department of Public Works (DPU) and the Department of Home Affairs ( DOHA ).

Bappenas is the Central Government Agency with primary responsibility for development of national planning policy, approval of planning activities of other agencies and for assuring that Regional and District programs are in concert with national goals.

The Department of Public Works(DPU) is responsible for the development and maintenance of the road network throughout the nation. The two DPU Directorates with most relevance to the rural road program are the Directorate General of Highways (Bina Marga) and the Directorate General of Housing and Buildings( Cipta Karya ).

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\* It should be noted that although Aceh and Central Sulawesi Provinces are judged to have adequate Provincial staff in number of personnel with adequate formal academic training the consultant believes that essentially all Provincial and District personnel associated with District Roads should receive additional training in order to successfully carry out the much more intensive (and sophisticated) three year District Roads program.

Proposed to be activated within Bina Marga's Directorate of Planning (Bipran) is a new Sub-Directorate for Rural Roads. This new Sub-Directorate is to organize road inventories and other data needed to support National, Regional and District development programs; analyze local road transportation and traffic; standardize planning; develop construction programs; and develop standard technical procedures, standards, manuals, and organization and equipment requirements.

Bina Marga's Directorate of Land Preparation for Transmigration Settlement (PTPT) is responsible for land clearing and site preparation within each selected settlement area. This includes overall project implementation, including whatever rural roads may be included.

Within Cipta Karya is the Directorate of City and Regional Planning. This Directorate assists Bappenas in providing planning and programming guidelines and is expected to provide Bappenas and various government departments advice, recommendations, planning and programming assistance, and coordination of a wide range of programs including District roads. This Directorate is developing a long range planning/programming sequence consisting of a "Long Range" (20–30 years) plan, 20 year plans, 5 year programs, and annual plans.

The Department of Home Affairs has overall responsibility for Inpres II and Inpres Jalan programs which are the principal sources of funds for District roads. The Department is a key participant in the annual review and approval at Central Government level of the Provincial and District programs.

Of the various Indonesian training institutions, those with the most impact on training associated with rural roads are the DPU Central Training Centers and the five DPU Regional Training Centers. These centers are to provide limited "in-house" and yearly "on-site" training to the Provinces and Districts. The DPU Central Training Center also provides on request packaged audio visual and workbook study courses.

### **3.3. PRIVATE SECTOR (Reference : Section 5)**

#### **3.3.1. CONSTRUCTION CONTRACTORS**

Similar contractor prequalification standards are used in the four study provinces. These prequalification standards represent a satisfactory means of contractor evaluation.

The private sector has in the past been able to execute the work contracted for District road projects. It is the consultant's judgement that construction contractors have been performing satisfactorily to the standards imposed up to the present time. With proper guidance/supervision from DPUK/DPUP (and with follow-on consultant assistance), the consultant believes these contractors are capable of expanding the current volume of work and of meeting improved quality standards where required. Introduction of new types of

construction such as precast/prestressed concrete bridges would require additional contractor training, staffing, or use of other higher qualified contractors (such as Java based contractors in joint venture with local contractors).

### **3.3.2. CONSULTING FIRMS**

Local consulting firms (i.e., those based within the study Provinces and Districts) have not been employed to any appreciable extent in the area of feeder roads development. Those local firms organized to perform engineering service are very limited in their management and professional staff qualifications. However, there are Java based consultant firms capable of performing feeder roads consultant work.

### **3.4. FUNDING (Reference : Section 7)**

There are two basic sources of funds for District roadworks, Central Government and local funds. The Central Government sources consist of the INPRES II program, the new INPRES Jalan program and the Padat Karya program. Local funds come mainly from the Ipeda (local land taxes) via District (APBD II) budgets with occasional small contributions from the Provincial budget (APBD I).

Funding levels for rehabilitation, new construction and support works for District roads are marginal in Central Sulawesi and West Nusa Tenggara Provinces. Both Aceh and Jambi rural road programs are seriously underfunded.

Maintenance programs are virtually non-existent in all District of all four Provinces. It would be erroneous to say maintenance is "underfunded". It is virtually "unfunded".

Funding sources for District bridgeworks follow the same pattern as those for roadworks. Aceh and Jambi bridgeworks follow the same pattern as roadworks—seriously underfunded.

However, the INPRES funding programs are basically sound. The new INPRES Jalan program makes a significant amount of new funds available for District road and bridgework but even more funding will be required in the future, especially for maintenance.

Given existing capabilities, District and Provincial organizations involved in District roads and bridgeworks will require upgrading in terms of training, organization and equipment before they are able to effectively apply the increase in funding required to rehabilitate and maintain the existing rural road system. In addition Bappeda and District level planning organizations require further training to enable more effective screening and prioritization of project proposals given limited funding resources relative to needs. (See Sections 4, 5, 10 and 11 for evaluations and recommended organizational changes, equipment and trainees .

### **3.5. STRENGTHS AND WEAKNESSES . OF EXISTING PROCEDURES (Reference : Section 8).**

#### **3.5.1. PLANNING**

The structures of the various planning institutions are in a transitional stage of development. There is a move toward centralization of long range planning, programming, and the standardization of technical criteria, design, standards and data base. This is a definite strength since it should help put the development of District roads on a rational and common footing throughout the Republic. Key factors in this movement are the expanding efforts of two DPU organizations : the Directorate of City and Regional Planning, Cipta Karya ( in overall planning and coordination), and Bina Marga (in specific planning/programming, and technical standardization).

A weakness is Provincial (particularly Bappeda) level of planning. A cause is an insufficient number of qualified planning personnel (particularly in Jambi and West Nusa Tenggara). Also contributing to this weakness is a lack of clear definition of authority, responsibility and functional/institutional relationships between Bappeda and Bappenas and between Bappeda and the Provincial Development Bureau.

Planning capability at the District level is very inadequate. None of the Districts have established a District Planning Board (Bappeka); thereby having no effective planning element in being at the District Government level.

Other weaknesses at District level noted were :

- (1) A lack of funds available to implementing agencies; thereby resulting in unskilled planners, hampered in their efforts to assess needs and plan rationally.
- (2) The apparent lack of coordination and planning for Districts to assume maintenance responsibilities for feeder roads constructed under other programs, e.g., transmigration.
- (3) The lack of planning and technical coordination between District and Provincial Public Works Departments (with the exception of West Nusa Tenggara Province where the Provincial Public Works Sectors and the District Public Works organizations are combined under a single chief).
- (4) A lack of planning coordination of village and sub-District project with District road programs.

### **3.5.2. FUNDING**

A major strength of the INPRES II program is the comprehensive system of built-in checks and balances. A weakness of this program is lack of qualified personnel to carry out reviews in an efficient manner. Another weakness is the allocation formula based on a per capita basis rather than on need, thus tending to favor heavily populated areas.

The new INPRES Jalan allows for more flexibility than INPRES II. It is targeted for road and bridgeworks at the District level on the outer islands. Although allotment schemes are not completely formulated it is intended to redress the inequities inherent in the per-capita based Inpres II program.

A major weakness of both Inpres II and Inpres Jalan (as well as the relatively small Padat Karya program) is the lack of maintenance funding.

The main sources of funds for routine maintenance are the District budgets. The level of funding from these budgets is without exception totally inadequate.

### **3.5.3. ROAD AND BRIDGE DESIGN, CONSTRUCTION AND MAINTENANCE**

#### **A. Roads**

Standards and specifications for District roads do not exist.

A review of existing procedures and methodology employed in the Districts revealed that road designs are prepared by the DPUK technical staff in a very simple format and not up to a professional standard. A design is rarely reviewed by qualified engineers.

There is no true quality control in construction of District roads; supervision is based on visual inspection. Local construction practice is followed, i.e., construction is with simple hand tools and very little heavy equipment.

More than 70% of all District roads are in poor to very poor condition with most in of this condition being earth (unpaved) roads. Most observations were made in the dry season; during the wet season the percentage of very poor condition roads is estimated to be higher.

The failure and deterioration of District roads is attributed to a lack of maintenance and to drainage problems.

There is one DPUP laboratory in each Province. All laboratories follow the AASHTO and ASTM standards and specifications. Most of the laboratory personnel have been trained in DPMTJ, Bandung. However, almost no testing is done on District road or bridge projects.

Three types of maintenance activities are performed for District roads,, namely, annual maintenance, major maintenance and emergency maintenance or repair.

Annual maintenance is routine activities consisting of grass cutting, cleaning drainage ditches and patching potholes. The work is let to labor-only contractors with essentially all operations being carried out by hand labor. The overall results are ineffective.

Major maintenance consists essentially of contractor performed upgrading of road surfaces. Documents for the design of upgrading work are prepared by the DPUK. The construction work is carried out using non-standard, local practice techniques emphasizing labor-intensive methods. Although overall quality of work and service life of upgraded surface is questionable, several completed projects observed appeared to be acceptable.

No funding is provided for emergency repair work. When emergencies occur (usually in the rainy season), the remedial action undertaken is usually a "Gotong Royong" activity.

### **B. Bridges**

Bridge design for District roads is for the most part performed by often unqualified DPUK staff with occasional assistance in design and design review from the DPUP. The design effort very rarely includes siting studies or foundation investigations. Detailing for the designs is very limited.

Quality control of construction is limited to visual inspection and the effectiveness thereof is dependant on the experience and judgement of the inspector.

Maintenance of bridges consists primarily of major and/or emergency repairs. No effective program for routine maintenance was found in any of the study provinces. A critical lack of funds is a primary factor in this weakness. As a result over 50% of existing District bridges are rated by District personnel (and confirmed by consultant observations) as damaged and in very poor condition.

#### **3.5.4. EQUIPMENT**

From the preliminary assessment of the overall equipment management and maintenance, and the equipment assigned to District road works, it is concluded that many weaknesses exist in the present system of allocations and maintenance support policies. Some of the more critical weaknesses are the limited number of Provincial maintenance facilities, the limited capabilities within these facilities to do major repairs (due to inadequate tooling, test equipment, trained personnel, spare parts, etc.), remoteness of the equipment to the maintenance facility, uncontrolled cannibalization, and the lack of enforcement of the established government maintenance policies and procedures.

Correction of these weaknesses requires immediate attention if the proposed feeder road management program is to be successful. The equipment assignments and maintenance are currently restricted by administrative and organizational policies and funding sources rather than by project requirements.

### **3.5.5. TRAINING**

The established DPU Central and Regional Training Centers are considered a strength in that they are geographically located to provide training services to all Provinces. However, the lack of qualified instructors, in depth course material and the lack of adequate training aids/equipment are considered weaknesses that should be corrected on a priority bases.

The present training programs offered by the DPU Training Centers to the DPUP/DPUK personnel are considered adequate for subject orientation and familiarization but inadequate to qualify a student for a specific assignment.

### **3.6. SUMMARY OF RECOMMENDED FEEDER ROADS PROGRAM SCHEDULE, PHASING AND COSTS (Reference : Section 9).**

A summary of the recommended feeder roads program schedule, phasing and costs is provided at Section 9. Since Section 9 is a summary itself, that section should be consulted directly for an understanding of the overall recommended program and estimated costs.

### **3.7. RECOMMENDATIONS (Reference : Section 10).**

Recommendations are based on the findings and conclusions of Part I of the report necessary to improve the capability of the Government of Indonesia to successfully implement a three year District (feeder) road program in the four selected Provinces.

Recommendations cover six broad areas :

- (1) Organizations, Functions and Responsibilities.
- (2) Funding
- (3) Equipment and Maintenance Facilities.
- (4) Training.
- (5) Road Engineering, Construction and Maintenance.
- (6) Bridge Engineering, Construction and Maintenance.

Section 10 should be consulted for details of the recommendations, discussions of each and where appropriate, advantages and disadvantages. A summary of the recommendations themselves follows.

### **3.7.1. REQUIRED ORGANIZATIONS, FUNCTIONS AND RESPONSIBILITIES FOR DISTRICT ROAD PLANNING, DESIGN, CONSTRUCTION AND MAINTENANCE**

#### **A. Sub-Directorate of Rural Roads**

Activate, staff and implement operations of the proposed Sub-Directorate for Rural Roads (Directorate of Planning, Directorate General of Highways) as soon as possible. (For proposed organization, responsibility and staffing, see paragraph 10.2.1).

#### **B. Bappeda**

Institutionalize District road planning as an on-going activity at Bappeda. (For proposed organization, responsibilities and staffing, see paragraph 10.2.2).

#### **C. Provincial Roads Division**

Institutionalize responsibilities for District road and bridge design, construction and maintenance as an integrated activity of the Provincial Road Division (Bina Marga). (For proposed organization, responsibilities and staffing, see paragraph 10.2.3).

#### **D. District Planning Boards**

Activate District Planning Boards (Bappeka). (For proposed organization, responsibilities and staffing, see paragraph 10.2.4).

#### **E. Combining Provincial Public Works Sector Offices with District Public Works Organizations**

Combine Provincial Public Works Sector Offices with existing District Public Works Organizations (DPUK/S) similar to those in West Nusa Tenggara. (See paragraph 10.2.5 for rationale).

#### **F. District Road Division Functions and Responsibilities**

Establish functions and responsibilities for District road and bridge design, construction and maintenance within the District Road Organization. (For proposed organization, responsibilities and staffing, see paragraph 10.2.6).

#### **G. Definition of Relationships between Planning Organizations**

Clearly define relationships and assign specific responsibilities and lines of authority between the following organizations.

- (1) Bappenas — Bappeda
- (2) Bappeda — Provincial Development Bureau
- (3) Bappeda — Bappeka
- (4) Bappeka — District Development Bureau

(Note : in response to the request by GOI representatives at the review meeting of the "Initial Report" and "Outline of Final Report", the consultant has listed a number of definitions or questions that should be established or answered to satisfy this recommendation. These are included in paragraph 10.2.7).

H. Implement the planning, funding, approval and implementation procedure as shown in Figure 10.7. (Reference, paragraph 10.2.8).

### **3.7.2. FUNDING**

#### **A. Speed up and Improve the Funding Process**

1. Speed up and improve the funding process so that funding is provided early enough to complete the annual program within the construction season; make available fifty percent or more of development and maintenance funds at the beginning of the fiscal year. (Reference : paragraph 10.3.1).

2. Review existing technical and fund procedures with a view toward eliminating duplication of effort and redundancy and speeding up the overall process. (Reference : paragraph 10.3.2).

#### **B. Road and Bridge Maintenance Funding**

1. Continue the Inpres II program as is but eliminate maintenance "loading". (Reference : paragraph 10.3.3).

2. Establish a five year "rolling" maintenance program and determine funding needs at the District level. (Reference : paragraph 10.3.4).

3. Establish a "rolling" maintenance fund in Inpres Jalan. Fund District road maintenance programs through Inpres Jalan with matching funds required through audit of District finances. (Reference : paragraph 10.3.5).

4. Charge Bappedas with coordinating Inpres II, Inpres Jalan and Padat Karya development funds with the District road maintenance program. (Reference : paragraph 10.3.6).

#### **C. Emergency Funding**

Establish an emergency fund (Inpres Emergency) to provide required funding for repair and rehabilitation and reconstruction caused by natural disasters. (Reference : paragraph 10.3.7).

**D. Allocation of Emergency Resources to Aceh and Jambi Provinces**

Allocate emergency resources (money, and priority of manpower and equipment) to Aceh and Jambi Provinces for special assistance in District road and bridge rehabilitation (Reference : paragraph 10.3.8).

**3.7.3. EQUIPMENT AND MAINTENANCE FACILITIES**

**A. Decentralization**

Decentralize road equipment, spare parts and material control and support, and administratively assign this responsibility to each Province. (Reference : paragraph 10.4.1).

**B. Procurement Capabilities**

Increase the capabilities of the procurement section within each DPUP. ( Reference : paragraph 10.4.2).

**C. Increase Provincial Workshop Support**

1. Increase the number of Provincial workshops and their capabilities through personnel training and tooling provisions (Reference : paragraph 10.4.3).

2. As the Provincial workshops are up-graded and become self-sufficient, the supportive role of the Regional workshop should be eliminated (Reference : paragraph 10.4.4).

**D. Road equipment**

1. Establish equipment pools at each Provincial workshop. (Reference : paragraph 10.4.5).

2. Standardize the equipment within each workshop area. (Reference : paragraph 10.4.6).

3. Limit procurement of new equipment to only those manufacturers who have maintenance capability and spare parts provisions in Indonesia, or to those who are willing to establish this capability. (Reference : paragraph 10.4.7).

**E. Funding of Equipment and Parts**

Provide directly to the DPUP all Central Government funding for equipment, spare parts and materials for distribution to the workshops. (Reference : paragraph 10.4.8).

**F. Phase-out of Equipment Leasing**

Over the next three years, phase out leasing and/or hire purchase of Government equipment to contractors and concurrently through training provide government personnel more capability for doing roadworks, (particularly road maintenance). (Reference : paragraph 10.4.9).

**G. Equipment Maintenance Procedures**

Institute, update or enforce existing procedures for spare parts inventory control, maintenance training, workshop administration, maintenance records, contractor equipment maintenance, etc. (See paragraph 10.4.10 for complete listing).

**3.7.4. TRAINING**

Implement a training program to upgrade the skill levels of incumbent staff (particularly at the Provincial and District levels) and to train additional recruited personnel. (Reference : paragraph 10.5, and Section 11. Also see 3.8 "Training Program" in this Section).

**3.7.5. ROAD ENGINEERING, CONSTRUCTION AND MAINTENANCE.**

**A. Survey and Design**

**1. General (Reference : paragraph 10.6.1).**

- (1) Upgrade capabilities of DPUP and DPUK personnel through training.
- (2) Standardize designs (additional reference : 10.2).
- (3) Emphasize drainage and slope stability and protection design.

**2. Road Inventory**

Conduct and maintain a comprehensive road inventory at District level with emphasis on drainage conditions. (Reference : paragraph 10.6.1A).

**3. Surveys**

Perform route surveys and soils classification surveys on all new District road construction and improvement projects. (Reference : paragraph 10.6.1B).

**4. Geometric Design**

Modify the "Geometric Design Standards" (Class III) by the the DGH for application to District roads. (Reference : paragraph 10.6.1C).

**5. Pavement Design**

Consider the use of bituminous surface treatment on the steeper slopes in mountainous areas. Consider the use of soil stabilization in areas where granular materials are lacking. (Reference : paragraph 10.6.1D).

**6. Drainage**

Drainage design standards should be established by the Sub-Directorate for Rural Roads and should be applied where necessary to raise the road profile of flooded areas above flood water level. (Reference : paragraph 10.6.1E).

**7. Plans and Specifications**

Develop standard District road construction drawings and details, and standard specifications. (Reference : paragraph 10.6.1F).

**8. Contract Tendering**

Develop standard road construction tender documents. (Reference : paragraph 10.6.1G).

**B. Road Construction Materials**

Review all available information on road construction materials for suitability for use in the District road program and investigate/explore the quality and quantity of materials available in areas where the data is presently lacking. (Reference : paragraph 10.6.2).

**C. Supervision of Construction/ Quality Control**

1. Recruit and train an adequate number of qualified personnel to supervise and monitor all construction projects to assure compliance with contract documents. (Reference paragraph 10.6.3; additional reference : 10.2).

2. Institute adequate quality control for all new road construction and improvement projects and employ construction control methods to monitor works and effect progress payments. (reference : paragraph 10.6.3).

**D. Maintenance**

1. Develop standards, procedures and manuals for District road maintenance. (Reference : paragraph 10.6.4).

2. Realign accomplishment of maintenance, rehabilitation, betterment, and new

construction of District roads by government force-account vs. contractor performed as follows : Government (DPUK) maintenance crews should be established to perform routine, programmed District road maintenance, phasing out contractor performance. Contractor accomplishment of rehabilitation, betterment, and new construction should continue. (Reference : paragraph 10.6.4).

### **3.7.6. BRIDGE ENGINEERING CONSTRUCTION AND MAINTENANCE**

#### **A. Precast Concrete Bridge Program**

1. Investigate instituting a precast concrete District bridge construction/replacement program (Reference : paragraph 10.7.1).
2. Establish guidelines, criteria and design and construction standards for District bridges. (Reference : paragraph 10.7.2).
3. Review construction techniques and equipment needs established by D.P.M.T. and J. for adaption to District road bridge construction (Reference : paragraph 10.7.3.).
4. Review the material requirements established by DPMT and J and adapt them to the needs of the District bridge construction program.
5. Establish management and operations training as an integral part of the prestressed concrete production program.

#### **B. Surveys, Inventories and Maintenance**

Conduct new construction and replacement surveys, condition inventories, and maintenance programs similar to those outlined for roads (Subsection 10.6). (Reference : paragraph 10.7.6).

### **3.8. TRAINING PROGRAM (Reference : Section 11).**

Some training is required, essentially for all government staffs at the Provincial and District levels, (current and to be recruited) which will be associated with the execution of the expanded and somewhat more sophisticated three-year District (feeder) roads program. The training recommended is a basic three-year program, with some additional equipment operation and maintenance training to be conducted in the fourth and fifth years as additional government road maintenance crews are formed and additional workshops are built.

### **3.8.1. MAJOR DISCIPLINES**

The major disciplines in which training is required are :

- (1) Management Development.
- (2) Finance and Budgeting.
- (3) Transportation Planning.
- (4) Engineering (Design and Field).
- (5) Equipment (Operations, Maintenance and Repair).

### **3.8.2. TRAINING LEVELS**

Training is programmed to be given at two levels – Central and Provincial (with an exception being recommended off-shore, U.S. classroom training for selected Bappeda and Bina Marga personnel in transportation/planning management). Classroom training is generally followed by and with emphasis on on-the-job training, which in turn is to be followed by short refresher/"checkup" training for technical/non-professional training such as for mechanics, equipment operators, etc. Training is to be conducted by expatriate consultants, local associate consultants, and GOI counterpart instructors.

### **3.8.3. TRAINING SCHEDULE**

The training schedule incorporates the phasing outlined above. In addition, initial instructor training will be conducted for Indonesian associates and GOI counterpart instructors. During the first year, most instruction will be by consultant instructors, with consultant conducted instruction peaking in the second year and ending early in the third year. GOI instructors will assume the instructional load as the consultant-conducted training phases out, with GOI instructors assuming full instructional responsibility during the third year.

### **3.8.4. TRAINING PRIORITIES**

Training requirements are seen to be in three priorities.

#### **A. Priority One**

GOI counterpart instructors, training of equipment workshop personnel, management training for supervisors, GOI counterpart and consultant associate OJT indoctrination in production methods of precast/prestressed concrete bridge components.

## **B. Priority Two**

Planning and management training for all others, technical and engineering training at the DPUK level, equipment operator training, and OJT "pilot project" training of teams of survey, design, construction, etc. personnel on selected pilot road and bridge projects.

## **C. Priority Three**

Training for DPUP technical and engineering personnel, and refresher or "check-up" training particularly in equipment operation and maintenance.

### **3.9. ESTIMATES ( Reference : Section 12, Table 9.1 and Figures 9,2 through 9.7).**

Estimates and basis of estimates with order-of-magnitude costs are provided for the following :

- (1) Equipment and spare parts. (paragraph 12.1).
- (2) Bridge structural steel. (actually included in item (7) below). (paragraph 12.2).
- (3) Provincial workshops. (paragraph 12.3).
- (4) Training aids, facilities and equipment. (paragraph 12.4).
- (5) Additional GOI staff costs. (paragraph 12.5).
- (6) Consultant costs. (paragraph 12.6).
- (7) Physical program execution. (paragraph 12.7).

Cost estimates are given in constant FY 79/80 rupiahs. Where foreign currency cost estimates were made, they were made in U.S. dollars and converted to rupiahs at Rp 625/\$.

Estimated costs by type, location and year have been tabulated in Table 9.1 and plotted on Figures 9.2 through 9.7.

#### **3.9.1. EQUIPMENT AND SPARE PARTS**

The only road equipment recommended by the consultant is for in-house government road maintenance crews performing mixed "labor intensive" and "equipment-intensive" scheduled maintenance. Some of this equipment also will be used for training. This equipment/crew mix with equipment (and repair parts) acquisition and operations costs (phased in over a five -year period) are shown on Tables 12.1 through 12.5: Total estimated cost of

equipment procurement =  $11.7 \times 10^9$ . Total estimated procurement and operation cost over a five year period = Rp  $27.6 \times 10^9$ . ( Note : this second figure includes all maintenance crew salary costs as well ).

### **3.9.2. BRIDGE STRUCTURAL STEEL COSTS.**

Costs are included in 3.9.7.

### **3.9.3. PROVINCIAL WORKSHOPS**

An order-of-magnitude estimate to upgrade five existing workshops and construct and equip fifteen additional workshops (over a five year period) is summarized as follows :

- (1) Renovate five existing workshops = Rp  $312.5 \times 10^6$
  - (2) Construct fifteen new workshops = Rp  $211 \times 10^9$
  - (3) Tools and equipment for workshops = Rp  $474 \times 10^9$
  - (4) Diesel injection system diagnostic and repair equipment (at four workshops only)  
= Rp  $375 \times 10^6$
- Total = Rp  $7.53 \times 10^9$

### **3.9.4. TRAINING**

- A. Estimated course development time = 11,447 man hours.  
Estimated order of magnitude cost = Rp  $179 \times 10^6$
- B. Estimated translation time = 1,150 hours  
Estimated cost = Rp  $3.2 \times 10^6$
- C. Consultant instructor time = 103 expatriate man months and 190 associate man - months.
- D. Training equipment (tractors, etc.) as shown on Table 12.7.  
Estimated cost = Rp  $922 \times 10^6$
- E. Training aids, are listed on Table 12.8.  
Estimated cost = Rp  $110.6 \times 10^6$
- F. Training facilities (four each) are shown at Figure 12.2.  
Estimated cost = Rp  $345.6 \times 10^6$

### **3.9.5. ADDITIONAL GOI STAFF COSTS**

#### **A. Additional Provincial and District staffs**

Estimated for five year period = Rp  $1.57 \times 10^9$

#### **B. GOI Instructors Wage costs**

Estimated for five year period = Rp  $103.4 \times 10^6$ .

#### **C. Out-of-Station Allowances for GOI Instructors and Trainees**

GOI instructors, estimated for five years = Rp  $0.4 \times 10^6$

Trainees, estimated for five years = Rp  $67.6 \times 10^6$

### **3.9.6 CONSULTANT COSTS**

Consultant costs, for the recommended three-year consultant services period are estimated to total Rp  $4.05 \times 10^9$ .

### **3.9.7. PHYSICAL PROGRAM**

Estimated cost for the recommended five year program of maintenance, rehabilitation and new construction/major upgrade = Rp  $73.3 \times 10^9$

### **3.10 CONSULTANT FOLLOW-ON SUPPORT (Reference : Section 13).**

The recommended scope of work for consultant follow-on support designed to support the GOI in executing the feeder road program in the four study Provinces, is organized in four parts :

- (1) An outline of a scope of work for a follow-on consultant.
- (2) A recommended consultant organization.
- (3) Proposed schedules of major consultant activities and staffing.
- (4) A list of recommended consultant staff qualifications.

#### **3.10.1. OUTLINE OF SCOPE OF WORK**

In summary, the consultant's scope of work is tailored to accomplish assistance to Central, Regional, Provincial and District organizations, and in training and equipment maintenance.

### **3.10.2. RECOMMENDED CONSULTANT ORGANIZATION**

The proposed consultant organization and main interfaces with GOI organizations is shown on Figure 13.1. This organization is to be staffed by a combination of expatriate and local associate Indonesian personnel.

### **3.10.3. SCHEDULES**

Schedules of major consultant activities and consult staffing are shown on Figures 13.2 and 13.3 respectively. Also see Section 9 for a plot of the phasing of this support with other road program activities. Major consultant activities are :

- (1) Institutional support : first year.
- (2) Engineering/technical support : first year to the Central Government, first year and a half to Provinces and Districts.
- (3) Maintenance support into the third year.
- (4) Training program into the third year (with GOI instructors assuming the full instructional load during the third year).

Total estimated in-country consultant man-months are :  
Expatriate 443 and Indonesian Associates 829.

### **3.10.4. CONSULTANT QUALIFICATIONS**

Consultant qualifications in education and experience are tabulated in paragraph 13.4.

In general, most expatriate and associate consultant staff require an appropriate bachelors' degree (except maintenance/supply/equipment technicians). Expatriates should have prior overseas experience in rural areas or in developing countries and Indonesian associates should be conversant in everyday and technical English.

## **3.11 FOREIGN ASSISTANCE**

Assistance by an international donor/assistance agency is recommended in execution of the feeder road program in the following areas :

- (1) Expert assistance (consultants).
- (2) Training program, aids, equipment and facilities.
- (3) Equipment maintenance workshop facilities.
- (4) Road maintenance equipment.
- (5) Funds for the above.

This assistance is recommended in three priorities.

**3.11.1 PRIORITY ONE ASSISTANCE**

Consultant assistance; training equipment, aids and facilities; and upgrade of four maintenance facilities ( for training ).

**3.11.2 PRIORITY TWO ASSISTANCE**

Upgrade of the fifth existing maintenance facility, construction and equipping of fifteen new facilities, and equipment for road maintenance (for the first three years' requirements).

**3.11.3 PRIORITY THREE ASSISTANCE**

Additional road maintenance equipment (for fourth and fifth years' requirements).

## **PART I**

# **ASSESSMENT OF EXISTING ORGANIZATIONS, PROGRAMS, AND PHYSICAL CONDITIONS OF DISTRICT ROADS IN THE FOUR STUDY PROVINCES**



**SECTION 4**  
**EXISTING PROVINCIAL AND DISTRICT ORGANIZATIONS**  
**ASSOCIATED WITH DISTRICT ROADS**

The overall planning and programming for nationwide rural development, including District/feeder roads, and the standardization of feeder road and bridge designs, criteria and prioritization of selection is being centralized at the Central Government level in Jakarta. The major portion of existing funding for feeder roads is also provided by the Central Government. The specific Central Government organizations and institutions involved in feeder roads are addressed in Section 5, with District road funding discussed in detail in Section 7.

However, the actual execution of feeder road projects is centered principally at the Provincial and District (Kabupaten) levels. This section addresses those existing Provincial and District organizations associated with feeder roads, their functions, procedures and relations.

**4.1. PROVINCIAL LEVEL ORGANIZATIONS**

A typical Provincial Government organization is shown in Figure 4.1. In the Provincial Government Organization the agencies that are primarily associated with the local road development program include the Province Secretary (Secretariat), Regional Planning Board (Bappeda), and the Public Works Department (indicated in Figure 4.1 as "Regional Office of Central Government Department"). Each of these agencies and the extent of their participation in the local roads development program is discussed below.

**4.1.1. PROVINCE SECRETARY (SECRETARIAT)**

A typical example of the Provincial Secretariat is shown in Figure 4.2. In this organization for Aceh Province, the Secretariat is divided into three main Division, i.e., Government Sector; Economy, Development, and People's Prosperity; and Public Sector. Each of these main Divisions, under the control of an Assistant Secretary is subdivided into three Bureaus.

Inquiries at the Provincial Secretary level in each of the study Provinces indicates that the main responsibility of the Secretariat, with reference to District roads at the present time, is the processing of Inpres and Provincial local road funding programs. It was further learned that this processing was carried out within the Development Bureau (Shown in Figure 4.2 as one of

the three Bureaus Under the Economy, Development, and People's Prosperity Division ). Inquires at the Development Bureau indicated that their function was to receive the annual feeder road improvement programs from the various Districts\*, to distribute these programs to various agencies such as Bappeda and the Public Works Department for review and approval, and in the case of Inpres, to submit the approved funding package to the Central Government for necessary processing and allocation of funds. After approval of funding the Development Bureau was responsible for distributing the funds to the Districts. Further discussion of feeder road fund and budgets can be found in Section 7.

#### 4.1.2. BAPPEDA

The Bappeda organization is shown in Figure 4.3. The organization is the same for all the study Provinces. As can be seen from Figure 4.3, Bappeda has four operating divisions : i.e. Facilities and Infrastructure, Economics and Finance, Social and Culture Development, and Control. Bappeda's main function in local road development is to insure that new construction and improvement is in accordance with national, regional, and Provincial development plans and programs. This review of locally developed road plans is carried out in the City/Regional Planning Section of the Facilities and Infrastructure Division.

#### 4.1.3. PROVINCIAL PUBLIC WORKS

Although the Provincial Public Works Department (DPUP) in each of the four study Provinces carried out essentially the same functions each department was organized differently. Common to all four Provinces were operational Divisions under the chief of Public Works, i.e. Irrigation, Roads/Highways (Bina Marga) and Buildings (Cipta Karya).

Organization charts for DPUP are shown in Figure 4.4 (Aceh), Figure 4.5. (West Nusatenggara), Figure 4.6 (Jambi), and Figure 47 (Central Sulawesi ).

Table 4.1 indicates the type of function and its organizational location in the Public Works Department in each of the study Provinces. In this table, Division is noted by a "D" and section by an "S".

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\* It is noted that roads were only one item in these development programs. Other items of the development package include necessary funds for schools, buildings, irrigation, etc.

**TABLE 4.1**  
**TYPE OF FUNCTION AND ORGANIZATION LOCATION**

FUNCTION	ACEH	JAMBI	W. NUSA Tenggara	CENTRAL SULAWESI
Highways ( Bina Marga )	D	D	D	D
Irrigation	D	D	D	D
Buildings ( Cipta Karya )	D	D	D	D
Equipment	D	D	D	D
Laboratory ( Soil/Mat )	S	S	D	S
Hwy. Survey / Design	S	S	D	S
Hwy. Planning	S		S	S
Training		S	D	S

Within the Provincial Public Works Departments, the main organizations concerned with roads are Bina Marga, Equipment, Laboratory, Highway Survey/Design, Highway Planning, and Training. However, the DPUP involvement in various local road activities differs in each of the study Provinces. The extent of involvement in each Province is indicated in Table 4.2.

**TABLE 4.2**  
**PROVINCIAL PUBLIC WORKS DEPARTMENT INVOLVEMENT IN  
LOCAL ROAD DEVELOPMENT, CONSTRUCTION, AND MAINTENANCE**

WORK ITEM	ADVISORY ONLY	PROVIDES FUNDS	PROVIDES EQUIP.	PERFORMS WORK	REVIEWS PLAN/ DESIGN
CENTRAL SULAWESI					
Road/Bridge Design		x		x	x
Prep. of Contract Doc.				x	
Contract Letting.				x	
Soils/Materials testing		x	x	x	
Planning/Programming				x	
Road/Bridge Rehab.		x	x	x	
Road/Bridge Construction		x	x	x	
Road/Bridge Improvement		x	x	x	
Road/Bridge Maintenance		x	x	x	

( Sheet 1 of 2 )

WORK ITEM	ADVISORY ONLY	PROVIDES FUNDS	PROVIDES EQUIP.	PERFORMS WORK	REVIEW PLANS/ DESIGN
<b>WEST NUSA TENGGARA</b>					
Road/Bridge Design					X
Prep.of Contract Doc.	X				
Contract Letting	X				
Soils/Materials testing				X	
Planning/Programing	X				
Road/Bridge Rehab		X	X		
Road/Bridge Construction	X		X		
Road/Bridge Improvement		X	X		
Road/Bridge Maintenance	X				
<b>ACEH</b>					
Road/Bridge Design	X				X
Prep. of Contract Doc.					
Contract Letting					
Soils/Materials testing			X	X	
Planning/Programming	X				
Road/Bridge Rehab			X		X
Road/Bridge Construction	X		X	X	X
Road/Bridge Improvement			X		X
Road/Bridge Maintenance					
<b>J A M B I</b>					
Road/Bridge Design					
Prep.of Contract Doc.					
Contract Letting					
Soil/Materials testing				X	
Planning/Programming	X				
Road/Bridge Rehab		X	X		
Road/Bridge Construction			X		
Road/Bridge Improvement			X		
Road/Bridge Maintenance		X			

( Sheet 2 of 2 )

From Table 4.2, it can be seen that Central Sulawesi, Aceh and West Nusa Tenggara Provincial Public Works Departments are much more active in the local road programs than they are in Jambi. In the latter Province, even where indicated, the extent of such involvement is very limited.

#### 4.1.4. PROVINCIAL BINA MARGA

Provincial Bina Marga organizations are shown for all four study Provinces, i.e. Aceh (Figure 4.8), Jambi (Figure 4.6), West Nusa Tenggara (Figure 4.9) and Central Sulawesi (Figure 4.10). Although all Bina Marga organizations carry out essentially the same functions they are structured quite differently. The various titles for these units as used in the different Provinces is shown in Table 4.3.

TABLE 4.3

#### BINA MARGA UNITS WITHIN PROVINCIAL BINA MARGA ORGANIZATIONS

NAME OF UNIT	ACEH	JAMBI	WEST NUSA TENGARA	CENTRAL SULAWESI
Roads	x	x	x	
Bridges	x	x	x	
Soils / Mat. Lab.	x	x		x
Survey / Design	x	x		
Training	x	x		
Administration	x	x		x
Planning	x		x	
Construction Develop.				x
Maintenance				x
Transmigration				x
Betterment			x	
Support			x	
Budget Development			x	x
Drafting	x			
Performance	x			
Technical Development				x

#### **4.1.5. PROVINCIAL PUBLIC WORKS SECRETARIAT**

With the exception of Aceh Province, each of the study Provinces had a Secretary and a Secretariat in the Provincial Public Works Department. The location and function of the Secretariats are shown in Figures 4.5 (West Nusa Tenggara), 4.6 (Jambi), and 4.11 (Central Sulawesi). In all cases the Secretariat is organized as a separate division under the chief of Public Works. Its primary activities are to provide Program and Information, Public Relations, Personnel, Finance, and Records and Expenditures services to the other public works divisions and sections. Its activities with reference to feeder road development are very marginal and limited to the extent to which the DPUP as a whole is involved in local roads. The Secretary himself is usually more involved as he is either the chairman or a member of the contractor prequalification selection committee who designate the contractors who are qualified to work on National, Provincial and District roads.

#### **4.1.6. PROVINCIAL PUBLIC WORKS EQUIPMENT AND SUPPLY DIVISION**

As indicated in Table 4.2, the Provincial Public Works Department supplies equipment for different types of District road activities in all the study Provinces. To a limited extent they also service this equipment as described more fully in Section 8. Provincial Public Works Department Equipment and Logistics (or Supply) Divisions are shown in Figures 4.6 (Jambi) and 4.12 (Central Sulawesi).

### **4.2. DISTRICT LEVEL ORGANIZATIONS**

Government organizations at the District level are structured quite similar to those at the Provincial level. The chief executive officer of the District Government is the Bupati. The Secretary is head of the Secretariat.

As in the Provincial Organization, the District Secretariat also contains a Development Bureau. The remaining agency of importance in local road development at the District level is the Public Works unit.

#### **4.2.1. DISTRICT SECRETARIAT**

A typical Secretariat is shown in Figure 4.13 (Bungo-Tebo District, Jambi). A comparison with the Provincial Secretariat of Aceh, Figure 4.2 indicates that both the Provincial and District organizations have essentially the same structure. Mention has already been made of the Development Bureau. In the Bungo-Tebo Secretariat, the Development Bureau was responsible for collecting the data and assembling the annual report concerning the number, type and condition of District roads and bridges in the District. The completion of this report by the Development Bureau instead of the Public Works agency which performs this function in all the other Districts was due to the fact that the Public Works unit was included in the Secretariat under the Development Bureau.

#### **4.2.2. BAPPEKA**

Although planning units at the District level (BAPPEKA) have been authorized for all four study Provinces, no Bappekas had been formed in any District in any of the Provinces at the time of this report. The Bappeka functions will be similar to those of the Provincial Bappeda.

#### **4.2.3. DISTRICT PUBLIC WORKS ORGANIZATIONS**

The Bungo-Tebo District Government (Jambi) is the only government in Jambi, or in any of the other study Provinces and Districts which has located the Public Works unit in a very subordinate position in the Secretariat. All other Districts of which four examples are given in this report have placed Public Works at the division level outside of the Secretariat.

The Aceh District Public Works Departments are all structured the same (Figure 4.14). In this structure, Sections for Roads/Bridges, Equipment and Engineering Administration are all located in the Engineering Division.

Poso District Public Works (Central Sulawesi) is shown in Figure 4.15. This organization contains separate sections for the following agencies concerned with local roads ; Administration, Bina Marga, City and Regional Planning, Equipment and Supervision.

Figure 4.16 shows the Public Works Department organization for Batang Hari District, Jambi. This organization is quite similar to the Jambi Provincial Public Works Department (Figure 4.6).

East Lombok District, West Nusa Tenggara Public Works Department organization is shown in Figure 4.17. In this organization the Bina Marga division is divided into Road and Bridge Sections while the Equipment Division is divided into Equipment and Logistics Sections.

One major difference in West Nusa Tenggara is that the chief of the District Public Works Department is also the head of the Sectoral office of the Provincial Public Works Department. Thus Provincial and District Public Works responsibilities at the District level are combined under a single head.

#### **4.3. AVAILABLE MANPOWER – PROVINCIAL AND DISTRICT PUBLIC WORKS ORGANIZATIONS**

The manpower evaluation has been made for the Provincial and District Public Works organizations only because the road/bridge functions, as presently carried out, are better defined in these agencies, although it is acknowledged, in accordance with the degree of involvement of the Provincial office in the local roads programs, that officials and other divisions and sections, outside of Public Works, may also be involved.

#### 4.3.1. EXISTING STAFF PARTICIPATION IN DISTRICT ROADS PROGRAM

Staff members in the Provincial and District Public Works agencies with regular positions, either permanent or temporary, were categorized in terms of their participation in the District roads program, i.e. fulltime, part-time, advisory, or limited. The number of persons in each category were then determined for each division, bureau, section, etc., for both the Provincial and District Public Works organizations. This data has been tabulated in Tables 4.4 through 4.7, one Table for each of the study Provinces. The totals are summarized below.

#### SUMMARY OF EXISTING MANPOWER IN THE FOUR STUDY PROVINCE

PARTICIPATION IN THE LOCAL ROADS PROGRAM	NUMBER OF PERSONS	
	PROVINCIAL PUBLIC WORKS	DISTRICT PUBLIC WORKS
Full-time	—	285
Part-time	217	316
Advisory	9	—
Limited	90	—
T o t a l (4 study Provinces)	316	601

#### 4.3.2. CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF

The simplicity of the construction and the limited amount of work that Provincial and District agencies are presently performing on District roads does not provide a means of precisely evaluating either the capabilities of individuals or the sufficiency of the total staff to carry out a comprehensive, greatly expanded District roads program, as recommended in this report.

In Section 10 (Recommendations) the number qualifications of the Public Works and Bappeda staffs which would be required to implement the Three-Year District Road Program were determined. Based on the number, job positions, and qualifications of the proposed staff, an evaluation was made of existing staffs in Bappeda and Provincial and District Public Works agencies with reference both to number and type staffs to fill these positions. These evaluations for Bappeda and Public Works agencies at the Provincial and District levels in all four study Provinces are summarized below and shown in detail in Tables 4.8 through 4.45. The Consultant's proposed provincial workshop organization chart is shown on Figure 10.8.

These summaries indicate that Aceh Province has a surplus of academically trained personnel at both the Provincial Bina Marga and Bappeda levels, with Central Sulawesi adequately staffed (except for new positions such as Inventory and Mapping Engineer), and Jambi and West Nusa Tenggara seriously understaffed. At the District Highway Division (Bina Marga) level, all Districts in all the study Provinces are seriously deficient in the numbers and qualifications of staffs required to carry out the Proposed Three-Year District Road Programs.

It is the conclusion of the Consultants that all personnel, existing and those to be recruited to fill the proposed job positions, need to be trained in the specific requirements and procedures of the District road program.

**SUMMARY OF  
STAFF CAPABILITIES AND SUFFICIENCY  
PROVINCIAL HIGHWAY DIVISION ( BINA MARGA )**

PROPOSED STAFF POSITION	NO* REQ	EXISTING STAFF								ADDITIONAL STAFF TO BE RECRUITED			
		QUALIFIED ** PERSONNEL				REQUIRES ADDITIONAL TRAINING							
		ACH	JMB	WNT	CS	ACH	JMB	WNT	CS	ACH	JMB	WNT	CS
Inventory & Mapping Engineer	1	2	1					1				1	
Hwy. Design Eng.	1	4	1	1	1								
Bridge Design Eng.	1	3	1	1	1								
Maintenance Eng.	1	1			1					1	1		
Cartographer	2	2								2	2	2	
Structural Draftsman	2	3	1	1	1		1	1	1				
Hwy. Draftsman	2	3	3	1	3			1					
Hwy. Design Tech.	2	3	2	2	2								
Bridge Design Tech.	2	2	1	2	2					1			
Inventory Tech.	2	3	1		1				1	1	2		
Maintenance Tech.	2	4			1		1	1	1	1	2		
<b>T o t a l</b>	<b>18</b>	<b>30</b>	<b>11</b>	<b>8</b>	<b>13</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>0</b>	<b>6</b>	<b>8</b>	<b>2</b>

\* To carry out the proposed three year feeder roads program.

\*\* Generally qualified by formal (academic) training and years of experience. All personnel (existing staff and additional staff to be recruited) require some training.

**SUMMARY OF  
STAFF CAPABILITIES AND SUFFICIENCY  
BAPPEDA**

ESTIMATED PERSONNEL REQ'D FOR THREE YEARS PROGRAM POSITION	NO REQ	EXISTING STAFF								A.DDITIONAL STAFF TO BE RECRUITED			
		QUALIFIED * PERSONNEL				REQUIRES ADDI- TIONAL TRNG							
		ACH	JMB	WNT	CS	ACH	JMB	WNT	CS	ACH	JMB	WNT	CS
Transportation Planner/Pro- grammer	1	3	1	1	1								
Trans./Development Economist	1	1	1	1	4	1							
Financial Analyst	1	3	1	1	3								
Statistician	1	2	1		1							1	
Trans.Planner/Prog. Assistant	2	2			1	1					2	2	1
Economic Tech.	2	3			1						2	2	1
Financial Tech.	2	2			4						2	2	
Statistical Asst.	2	3				1					2	2	2
<b>Total</b>	<b>12</b>	<b>19</b>	<b>4</b>	<b>3</b>	<b>15</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>9</b>	<b>4</b>

\* Generally qualified by formal ( academic ) training and years of experience. All personnel ( existing staff and additional staff to be recruited ) require some training.

**SUMMARY OF  
STAFF CAPABILITIES AND SUFFICIENCY  
DISTRICT HIGHWAY DIVISION ( BINA MARGA )**

PROPOSED STAFF POSITION	NO. REQ.	NUMBER OF DISTRICTS				EXISTING STAFF								ADDITIONAL STAFF TO BE RECRUITED			
						QUALIFIED * PERSONNEL				REQUIRES ADDI - TIONAL TRAINING							
		ACH	JMB	WNT	CS	ACH	JMB	WNT	CS	ACH	JMB	WNT	CS	ACH	JMB	WNT	CS
Survey & Inventory Engineer	1					2						1	3	6	5	7	1
Road Design Eng.	1					8	1	1	2	1	4	7					2
Bridge Design Eng.	1					7			1		3	7		1	2	1	3
Maintenance Eng.	1									2		6		6			4
Surveyor	2					8	5		4	2	1		4	6	4	16	
Survey Technician	4						6		6		1		2	32	13	32	8
Inventory Tech.	4					6	5	3	2		2	4	5	23	13	25	9
Maintenance Tech.	2							1				26		16	10		8
Maint. Supervisor	2							1	1	5		25	3	16	9		1
Road Design Tech.	2					4	2	8	2		1	8	3	12	7	1	3
Bridge Design Tech.	2					3	1	7	2		1	5	3	13	8	3	3
Inventory Tech.	2						4		3			9	3	16	6	8	2
Const. Supervision Tech	2					13	7	4	3	2	3	6	7	3	1	6	
<b>Total</b>	<b>26</b>	<b>8</b>	<b>5</b>	<b>** 8</b>	<b>4</b>	<b>51</b>	<b>32</b>	<b>25</b>	<b>30</b>	<b>7</b>	<b>16</b>	<b>104</b>	<b>33</b>	<b>150</b>	<b>78</b>	<b>99</b>	<b>44</b>
<b>Average No per District</b>						<b>6.8</b>	<b>6.4</b>	<b>3.1</b>	<b>7.5</b>	<b>0.9</b>	<b>3.2</b>	<b>13.0</b>	<b>8.2</b>	<b>18.8</b>	<b>15.6</b>	<b>12.3</b>	<b>11</b>

\* By formal academic training and years of experience. All personnel ( existing staff and additional staff to be recruited ) require some training.

\*\* West Nusa Tenggara has 6 Districts but is organized into 8 DPUK's.

**SUMMARY OF  
STAFF CAPABILITIES AND SUFFICIENCY  
PROVINCIAL WORKSHOPS**

PROPOSED STAFF POSITION	(2) NO REQ.	EXISTING STAFF										ADDITIONAL STAFF TO BE RECRUITED				
		NUMBER OF PERSONNEL					(3) CAPABLE OF QUALIFI- CATION W/ADDITIONAL TRAINING									
		(1) JMB	(1) WNT	(1) WNT	(1) ACH	(1) CS	(1) JMB	(1) WNT	(1) WNT	(1) ACH	(1) CS	(1) JMB	(1) WNT	(1) WNT	(1) ACH	(1) CS
Workshop Manager	1	1	0	0	1	0	1	0	0	1	0	0	1	1	0	1
Ch. Of Warehouse	1	1	1	0	1	1	0	1	0	1	1	1	0	0	0	0
Field Inspectors	4	2	4	1	6	0	2	4	1	4	0	2	0	3	0	4
Service Manager	1	0	1	1	1	1	0	0	0	1	0	1	1	1	0	1
Ch. of Hvy. Mech.	1	0	1	0	1	1	0	1	0	1	0	1	0	1	0	1
Ch. of Lt. Mech.	1	0	1	0	1	1	0	0	0	1	0	1	1	1	0	1
Ch. of Mech. Shop	1	1	1	0	1	0	0	0	0	1	0	1	1	1	0	1
Ch. of Lube Section	1	1	1	1	1	1	1	0	0	1	1	0	1	1	0	0
Ch. Electrician	1	1	1	0	1	1	0	0	0	1	1	1	1	1	0	0
Master Mechanics	8	3	8	2	8	4	2	0	0	6	4	6	8	8	2	4
Hyd. Sys. Spec.	1	0	1	0	2	1	0	0	0	1	1	1	1	1	0	0
Fuel Sys. Spec.	1	0	1	0	2	1	0	0	0	1	1	1	1	1	0	0
Gen. Machinist	2	0	1	1	3	1	0	0	0	1	0	2	2	2	0	2
Body & Fender Mech.	2	1	1	0	3	2	1	0	0	2	1	1	2	2	0	2
Welder	1	1	1	0	2	1	1	0	0	1	1	0	1	1	0	0
Ign. Sys. Spec.	1	1	0	0	2	1	0	0	0	1	1	1	1	1	0	0
Elec. Sys. Spec.	1	1	0	0	2	1	0	0	0	1	1	1	1	1	0	0
Inj. Sys. Spec.	1	1	0	0	0	1	0	0	0	0	1	1	1	1	1	0
<b>Totals</b>	<b>30</b>	<b>15</b>	<b>24</b>	<b>6</b>	<b>38</b>	<b>19</b>	<b>8</b>	<b>6</b>	<b>1</b>	<b>27</b>	<b>13</b>	<b>22</b>	<b>24</b>	<b>28</b>	<b>3</b>	<b>17</b>

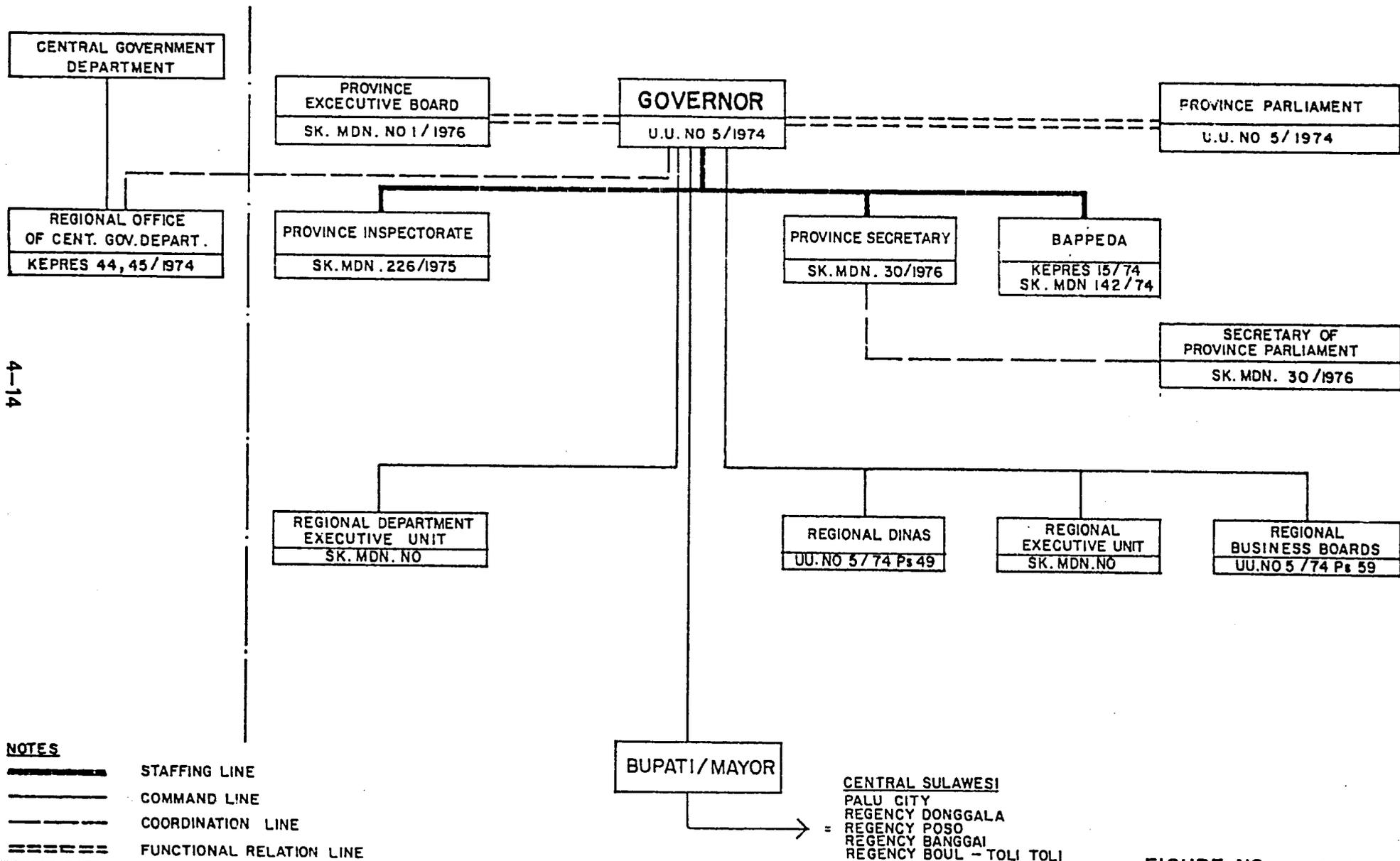
4-12

See "Notes" on next page

**SUMMARY OF**  
**STAFF CAPABILITIES AND SUFFICIENCY**  
**PROVINCIAL WORKSHOP (CONTINUED)**

- NOTES** : (1) Aceh, Jambi and Central Sulawesi have only one workshop per province, West Nusa Tenggara has two.
- (2) Quantities shown are the requirements for one typical provincial Workshop and do not include semi-skilled and unskilled shop employees or office personnel.
- (3) Indicates the number of existing personnel who could profit from further training.

# CENTRAL SULAWESI PROVINCIAL GOVERNMENT ORGANIZATION CHART



4-14

FIGURE NO. 4.1

ACEH PROVINCE  
 PROVINCIAL SECRETARIAT ORGANIZATION CHART  
 1976

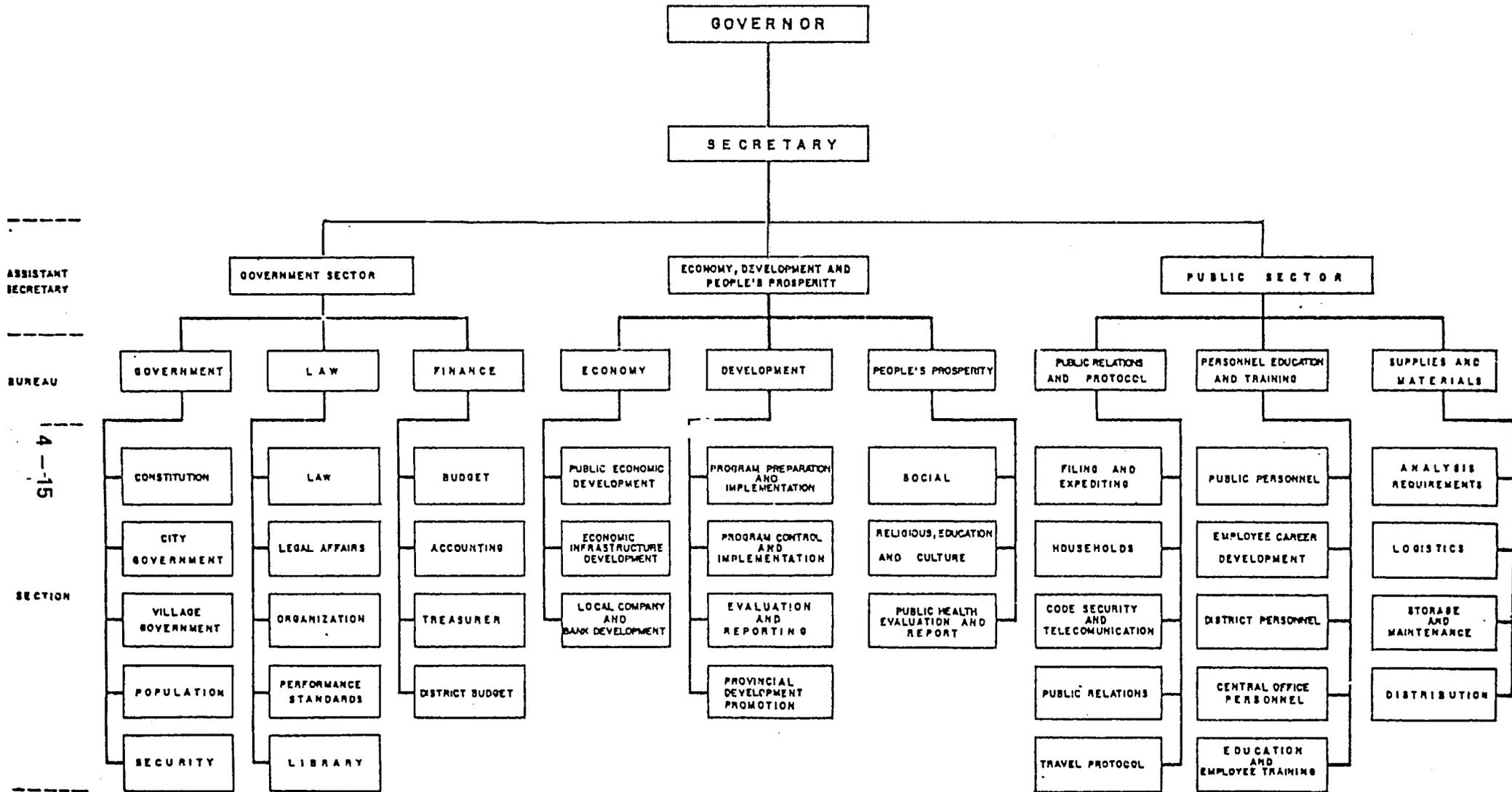
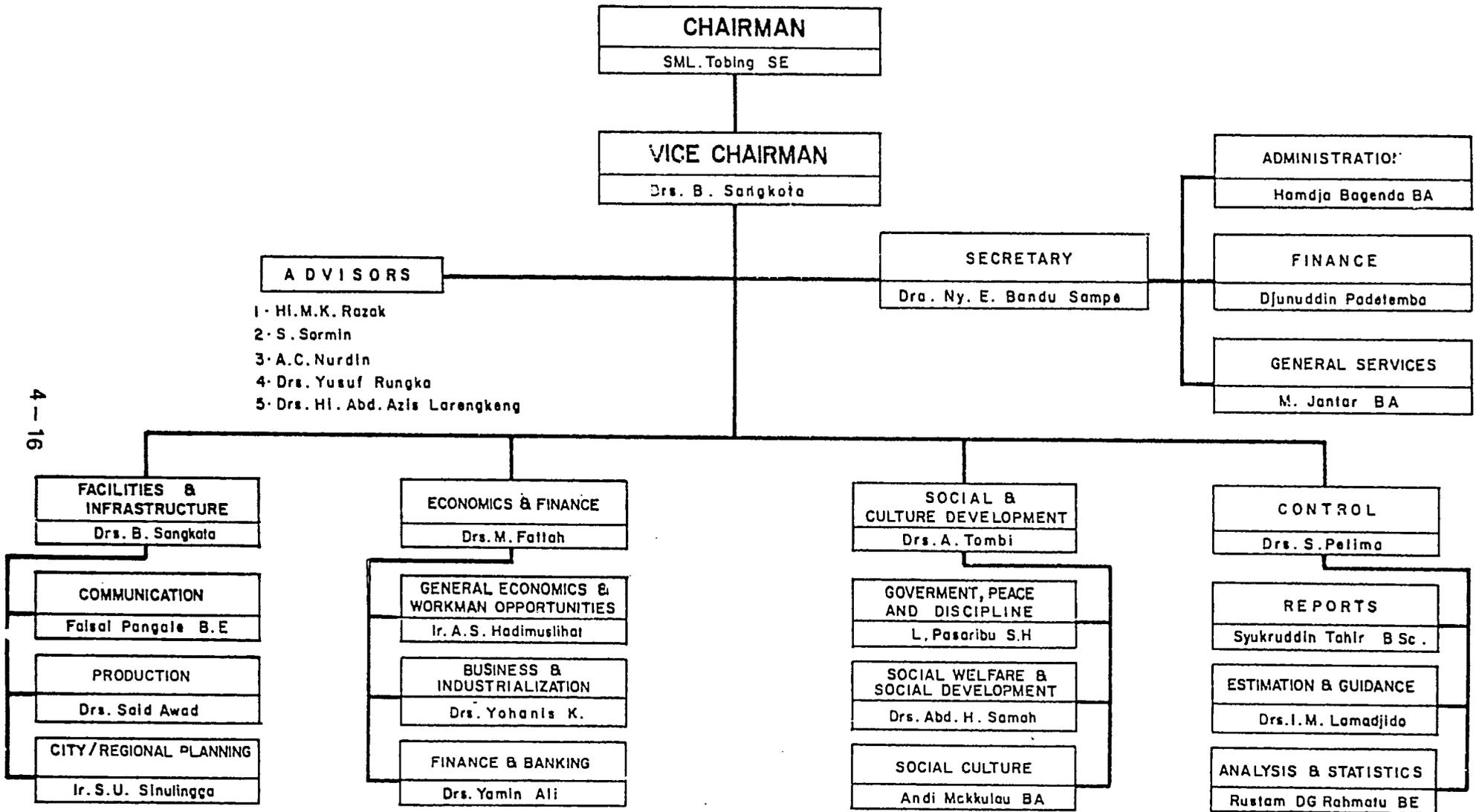


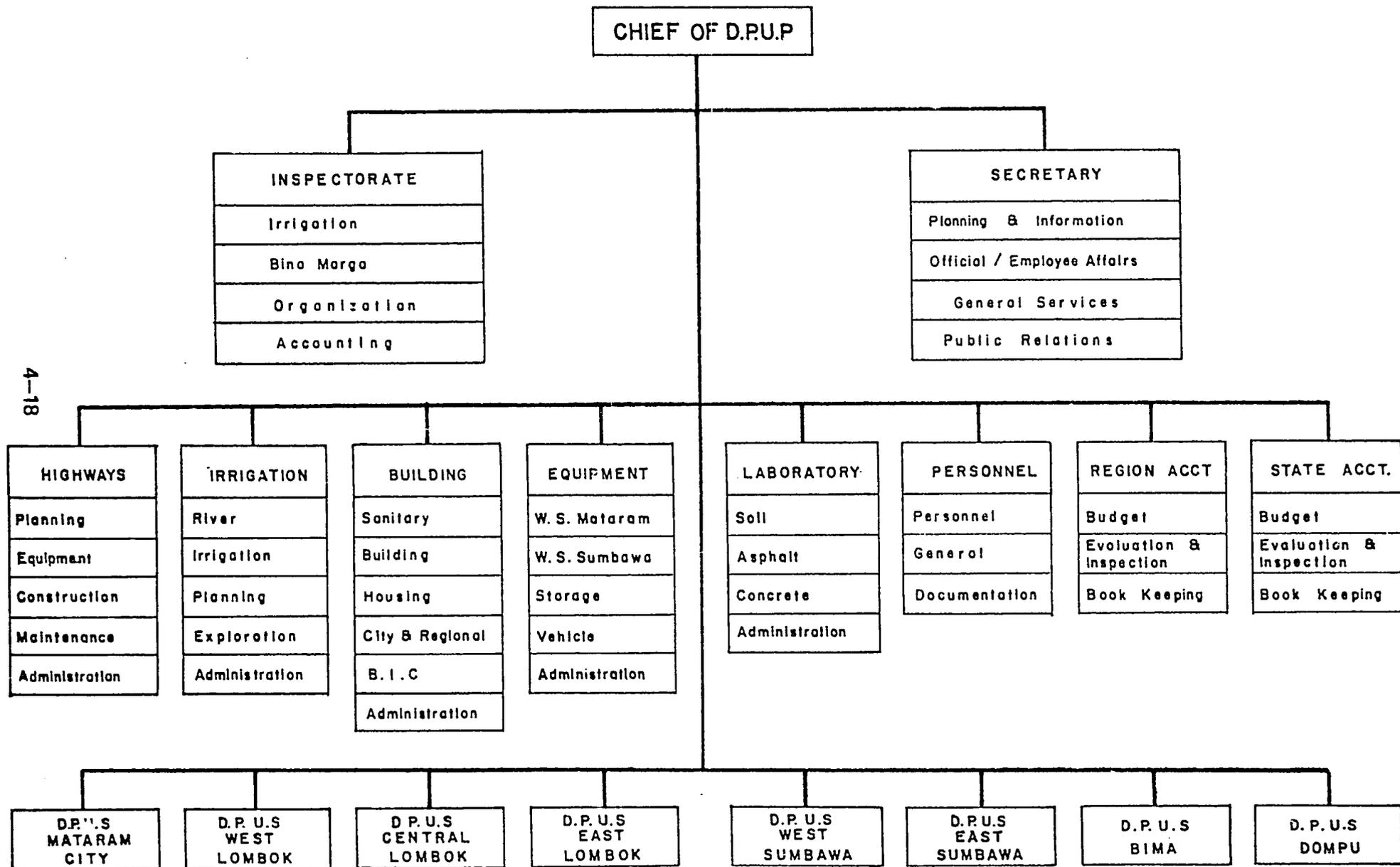
FIGURE NO. 4.2

# CENTRAL SULAWESI BAPPEDA ORGANIZATION CHART





# WEST NUSA TENGGARA PROPOSED ORGANIZATION OF D.P.U.P.



4-18

FIGURE NO. 4.5

JAMBI PROVINCE  
PROVINCIAL PUBLIC WORKS  
ORGANIZATION CHART

CHIEF OF D.P.U.P.  
Ir. Imam Mursid

INSPECTION  
Aswir As BE.

SECRETARIAT  
Ir. Anas Idris

TECHNICAL INSPECTION  
Dadang Sutarya BIE

ADMINISTRATION, FINANCE AND  
PERSONNEL INSPECTION  
Wewpi Simamora

GENERAL  
Drs. Anis Idris

PERSONNEL &  
ORGANIZATION  
Vacant

FINANCE  
Muhtar Ya.

RECORDS/  
EXPENDITURES  
Vacant

PUBLIC  
RELATIONS  
Vacant

BINA MARGA  
S. M. Tempubalan BRE

IRRIGATION  
Syafiq BIE

CIPTA KARYA  
Hardino BAE

EQUIPMENT & LOGISTICS  
Ir. B. Tempubalan

- ROADS  
Djamaris BRE
- BRIDGES  
Halmi BRE
- SOILS/MATERIALS LABORATORY  
Nursirwan BRE
- SURVEY/DESIGN  
W. Hulebaral
- TRAINING  
R. Perdeda BA
- ADMINISTRATION  
R. Jaya Kusuma BRE

- WORKSHOP  
Sidi's Hutaga
- SURVEY & DESIGN  
Vacant
- LOGISTICS/SUPPLY  
Nurdell
- ADMINISTRATION  
AT. Simanjuntah
- QUARRY  
Aswiray

4-19

PUBLIC WORKS SECTION . BATANGHARI  
Seriase BRE

PUBLIC WORKS SECTION  
SAROLANGUN-BANGKO  
Serjono BE

PUBLIC WORKS SECTION . BUNGO - TEBO  
R. Manan BMUE

PUBLIC WORKS SECTION KERINCI  
Muchlis BRE

PUBLIC WORKS SECTION  
TANJUNG JABUNG  
Anwar BE

- MUARA TEMBESI BRANCH  
Supardi
- MUARA BULIAN BRANCH  
Vacant
- JAMBI BRANCH  
Vacant

- SAROLANGUN BRANCH  
Omentulla
- PEMENANG BRANCH  
Vacant
- BANGKO BRANCH  
Vacant

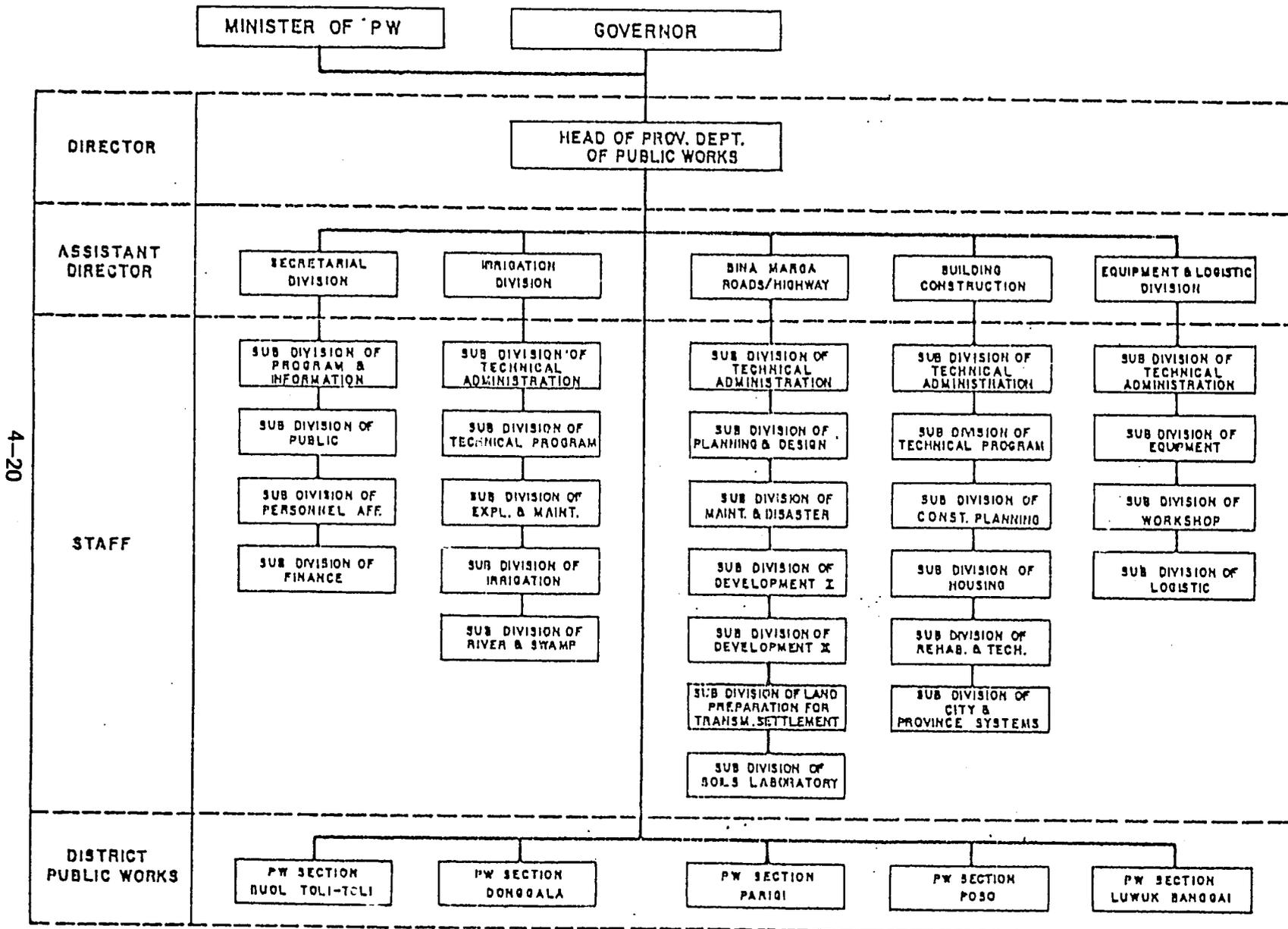
- MUARA TEBO BRANCH  
Vacant
- LB. LANDAI BRANCH  
Vacant
- MUARA BUIGD BRANCH  
Vacant

- PENETAI JUAR BRANCH  
Vacant
- SAKO LETER BRANCH  
Vacant

- TUNGKAL ILIR BRANCH  
Vacant
- TUNGKAL ULU BRANCH  
Vacant

FIGURE NO. 4.6

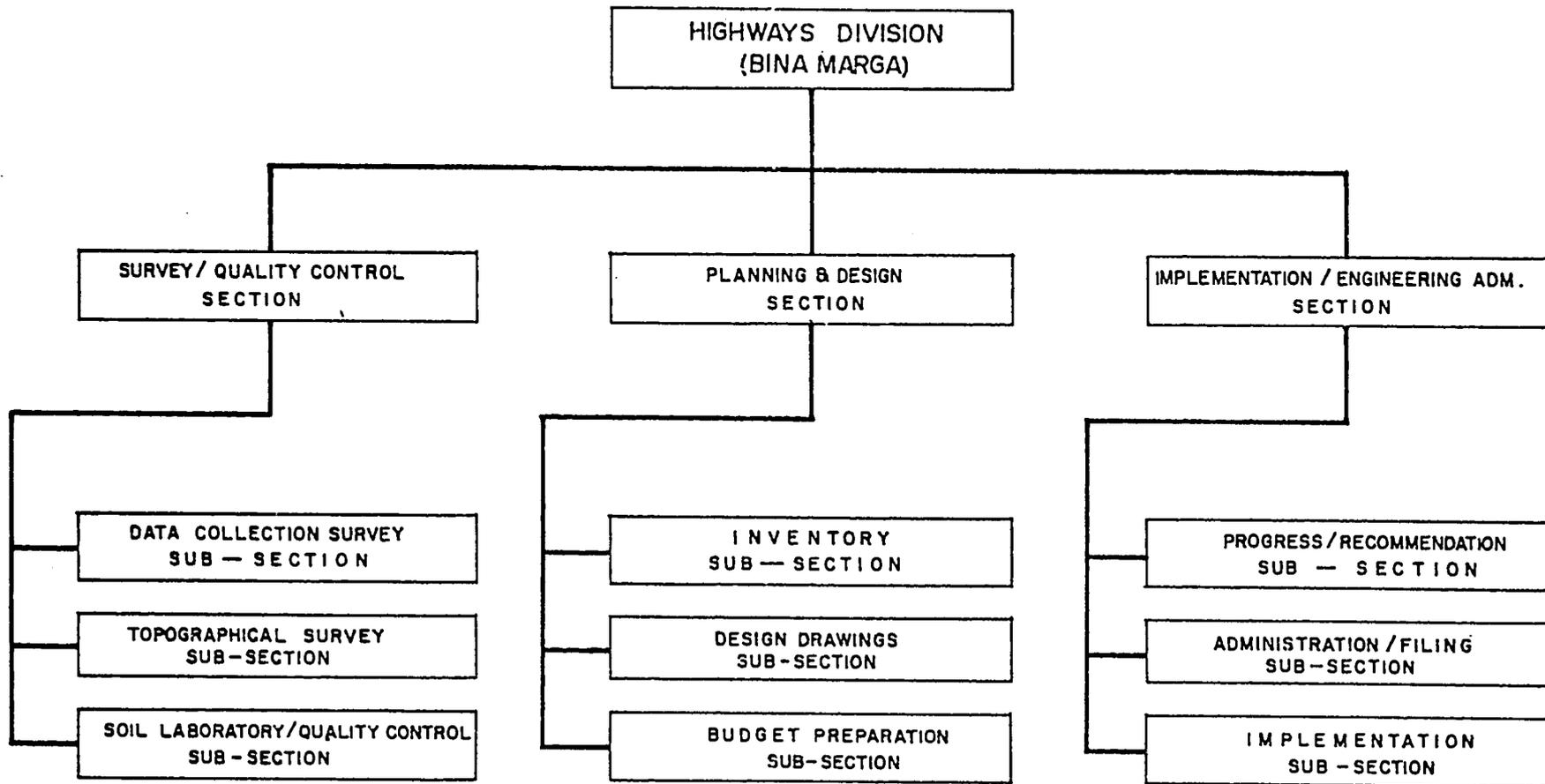
CENTRAL SULAWESI  
PROVINCIAL PUBLIC WORKS  
ORGANIZATION CHART



4-20

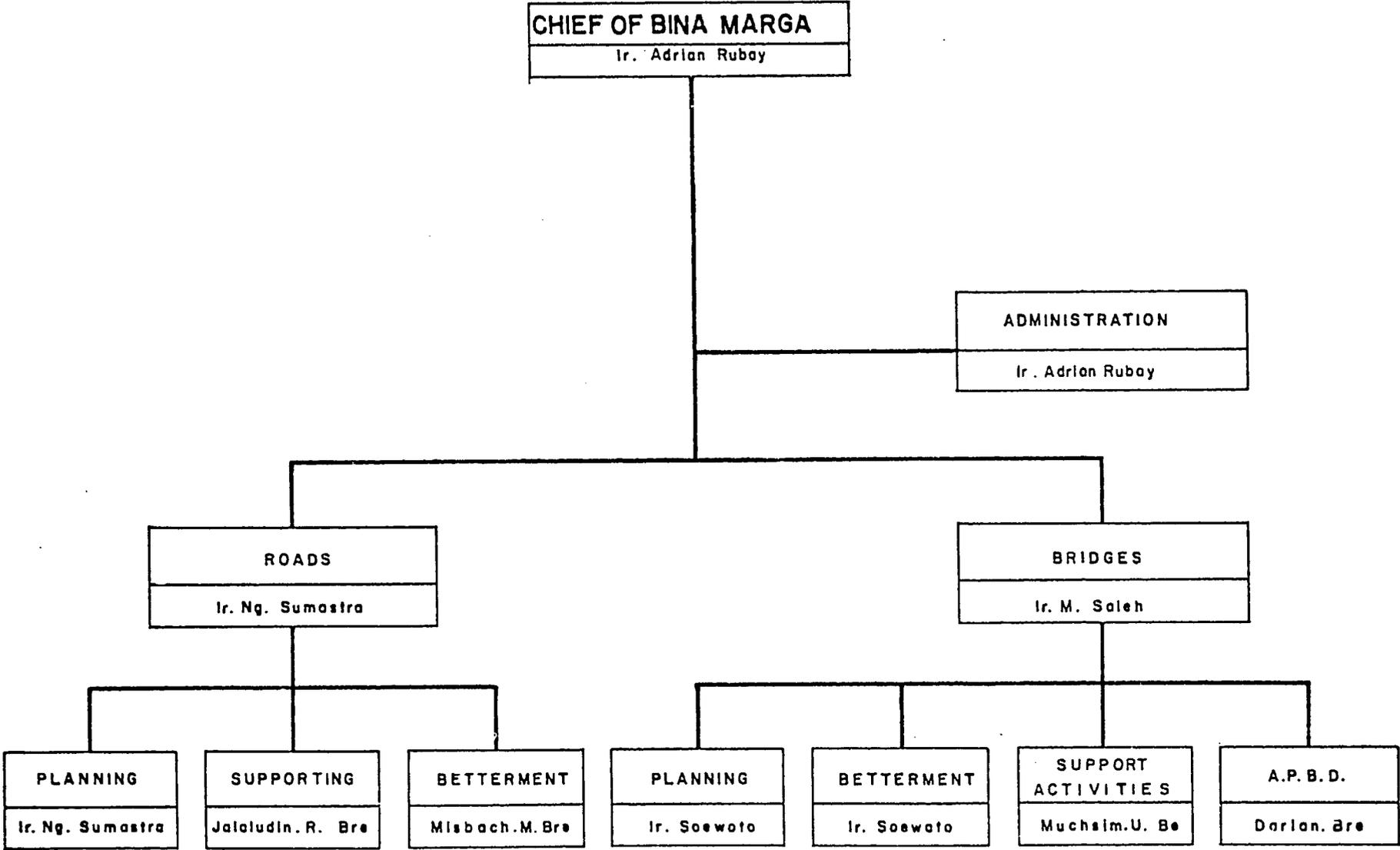
FIGURE NO. 4.7

ORGANIZATION CHART  
ACEH PROVINCE HIGHWAYS DIVISION (BINA MARGA)



4-21

WEST NUSA TENGGARA  
PROVINCIAL BINA MARGA DIVISION  
ORGANIZATION CHART



4-22

CENTRAL SULAWESI  
PROVINCIAL BINA MARGA DIVISION  
ORGANIZATION CHART

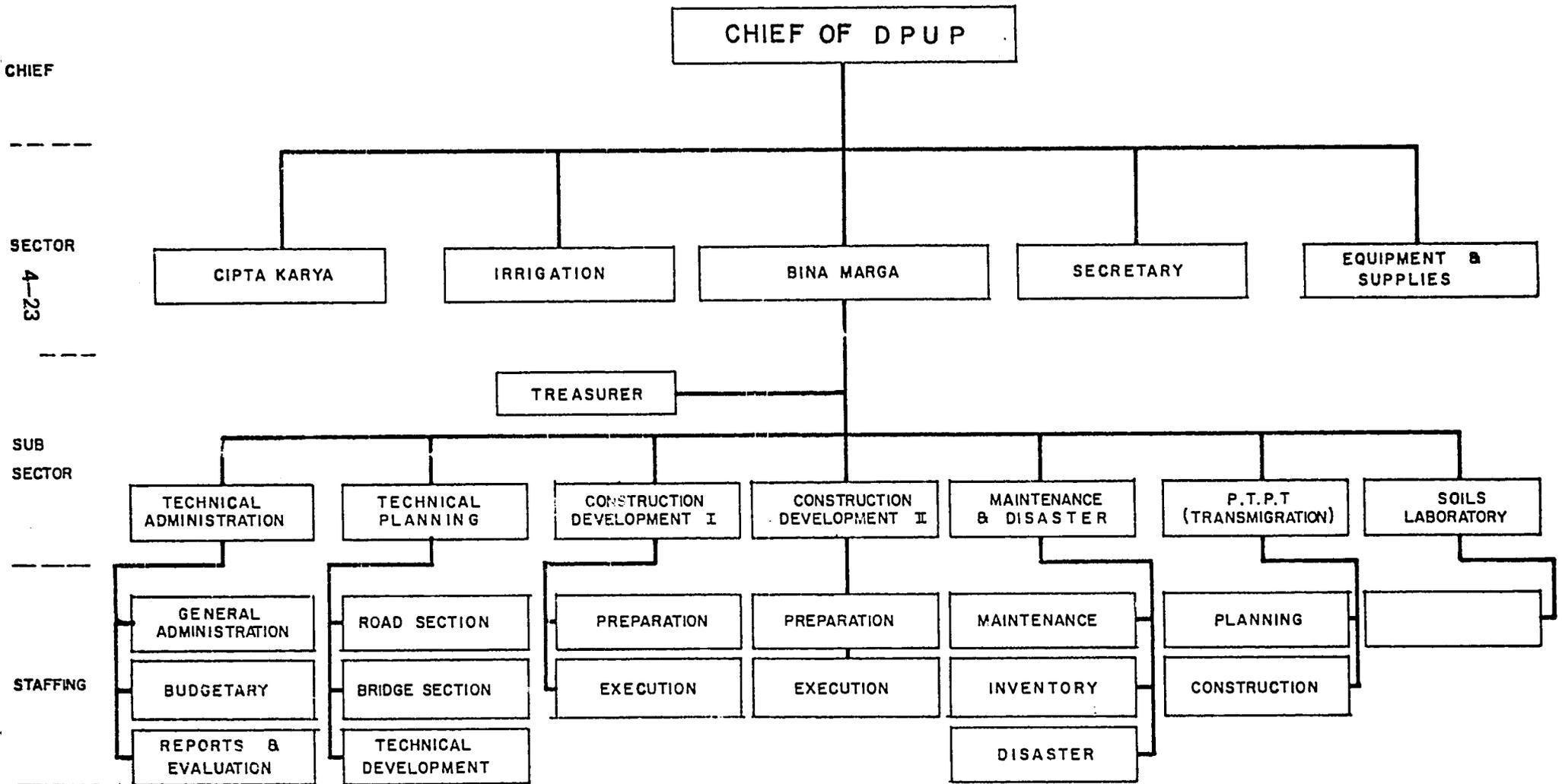


FIGURE NO. 4.10

**CENTRAL SULAWESI  
PROVINCIAL PUBLIC WORKS SECRETARIAT  
ORGANIZATION CHART**

CHIEF

CHIEF OF D P U P

SECTOR

CIPTA KARYA

IRRIGATION

SECRETARY

BINA MARGA

EQUIPMENT &  
SUPPLIES

4-24

SUB SECTOR

PLANNING, INFORMATION,  
EVALUATION

GENERAL SERVICES

OFFICIAL AFFAIRS

FINANCE

STAFFING

PLANNING

REPORTS &  
EVALUATION SECTOR

INFORMATION

LIBRARY

ADMINISTRATION

HOUSE HOLD &  
TRAVEL

SUPPLIES

SOCIAL RELATIONS  
& COMMUNICATION

GENERAL  
OFFICIAL AFFAIRS

PENSION &  
REPLACEMENT

OFFICIAL  
DEVELOPMENT

BUDGETARY

BOOK KEEPING &  
VERIFICATION

TREASURY

FIGURE NO. 4 . II.

CENTRAL SULAWESI  
PROVINCIAL PUBLIC WORKS  
EQUIPMENT & SUPPLIES DIVISION  
ORGANIZATION CHART

CHIEF

CHIEF OF DPUP

SECTOR

EQUIPMENT & SUPPLIES

SUB SECTOR

4-25

TECHNICAL  
ADMINISTRATION

EQUIPMENT

WORKSHOP

SUPPLIES

STAFFING

GENERAL  
SERVICES

BUDGETARY

REPORTS &  
EVALUATION

DEVELOPMENT

OPERATIONAL

EQUIPMENT  
INVENTORY

CONTROL

VEHICLES

HEAVY  
EQUIPMENT

STRUCTURAL

ELECTRIC

SERVICE

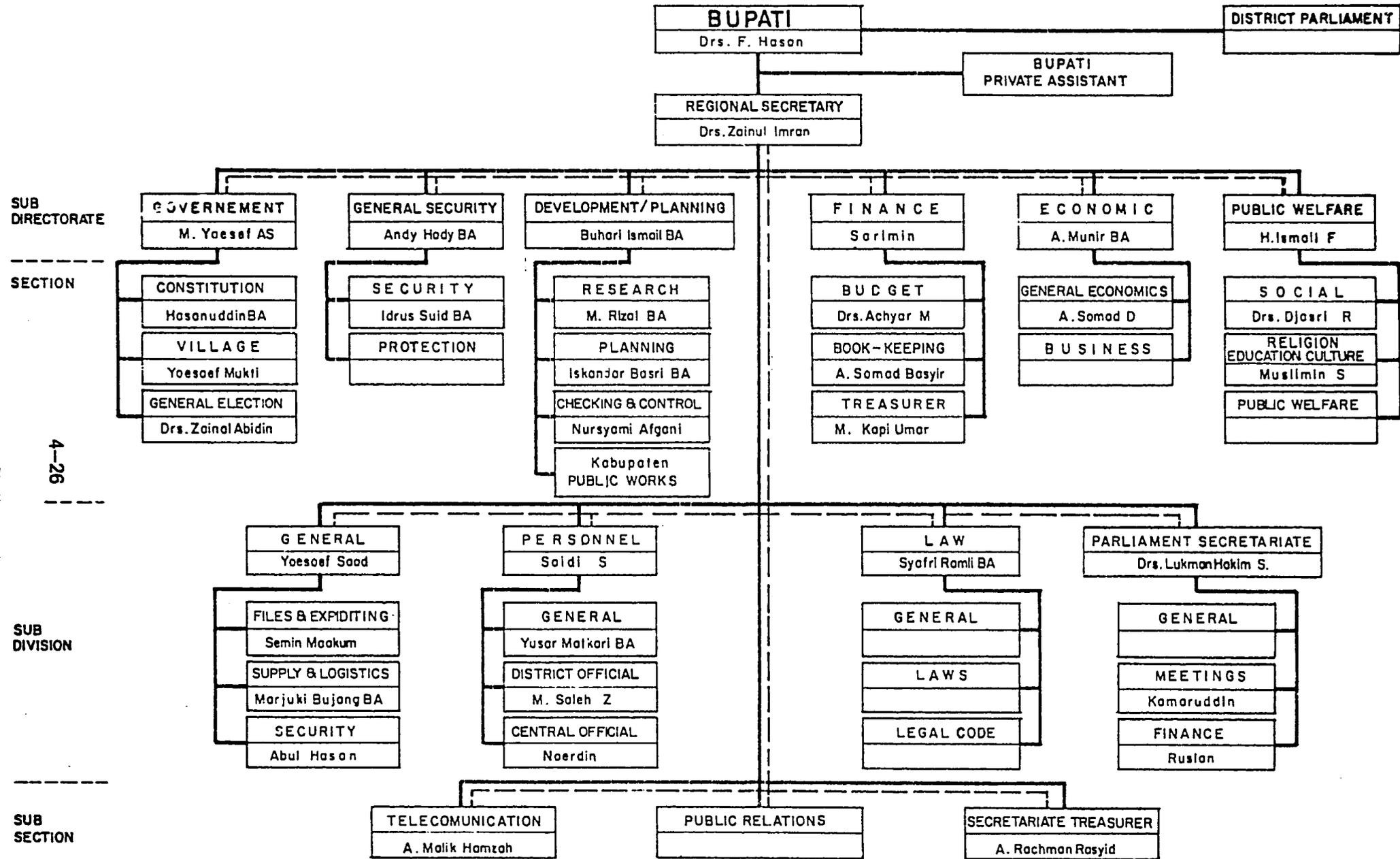
SPARE PARTS

BASIC MATERIALS

GASOLINE, OIL ETC

FIGURE NO. 4.12

# JAMBI PROVINCE : BUNGO-TEBO DISTRICT SECRETARIAT ORGANIZATION CHART



SUB DIRECTORATE

SECTION

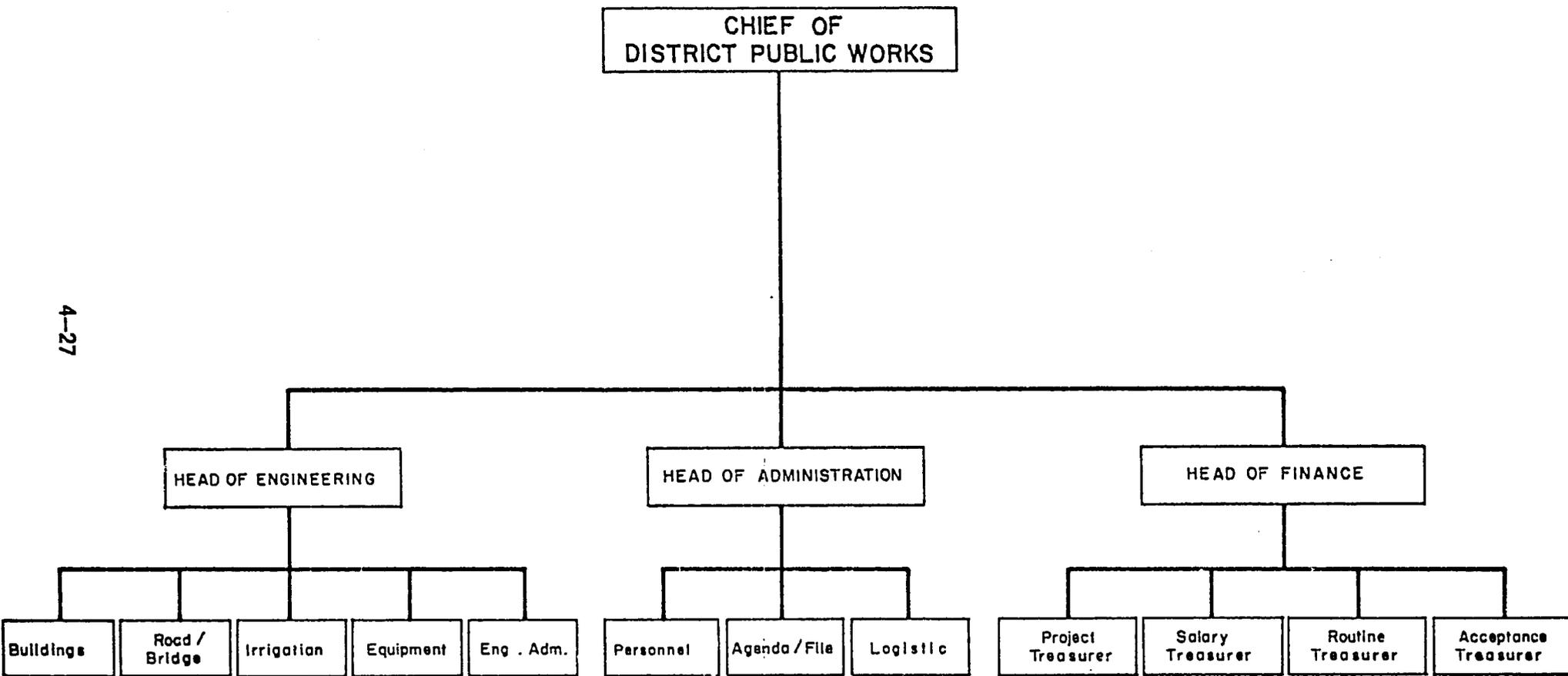
4-26

SUB DIVISION

SUB SECTION

--- COMMAND LINE

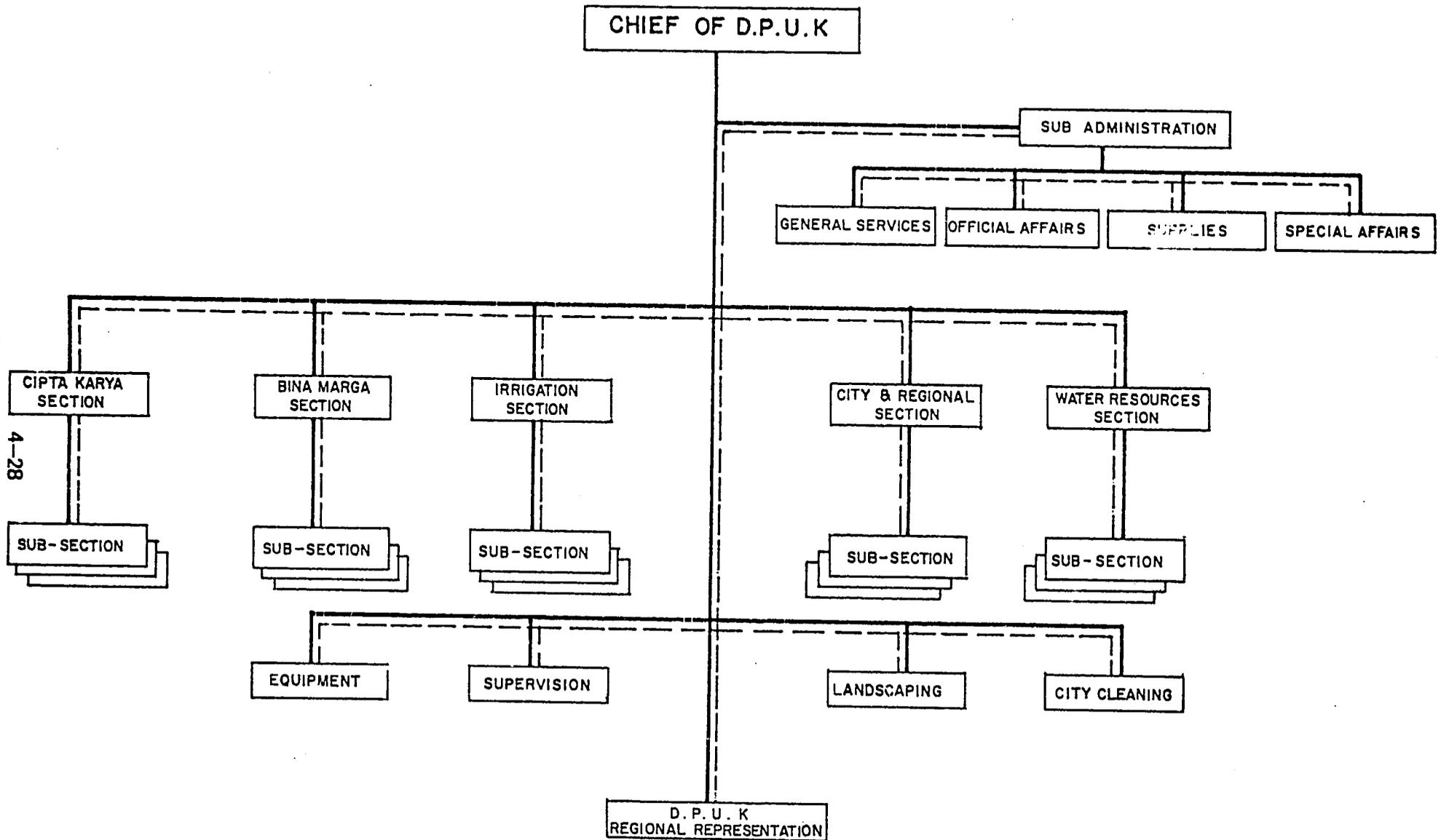
ACEH PROVINCE  
DISTRICT PUBLIC WORKS - LEVEL II (ALL DISTRICTS)  
ORGANIZATION CHART



4-27

FIGURE NO. 4 .14

CENTRAL SULAWESI  
 ORGANIZATION CHART — DISTRICT. PUBLIC WORKS  
 DISTRICT POSO



4-28

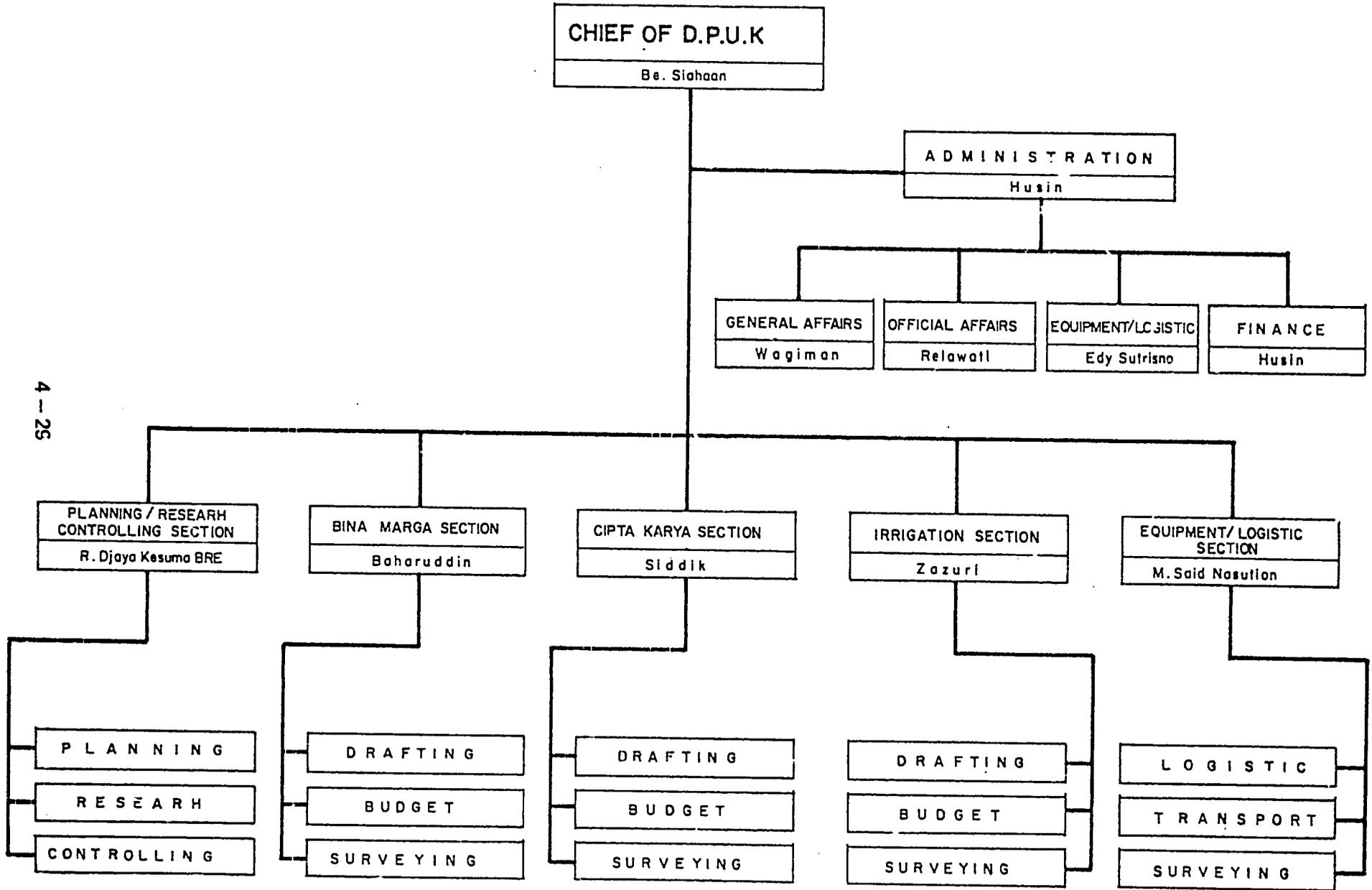
**NOTES**

————— COMMAND LINE

- - - - - ADMINISTRATIVE LINE

FIGURE NO. 4.15

JAMBI PROVINCE  
 BATANGHARI DISTRICT  
 PUBLIC WORKS ORGANIZATION CHART

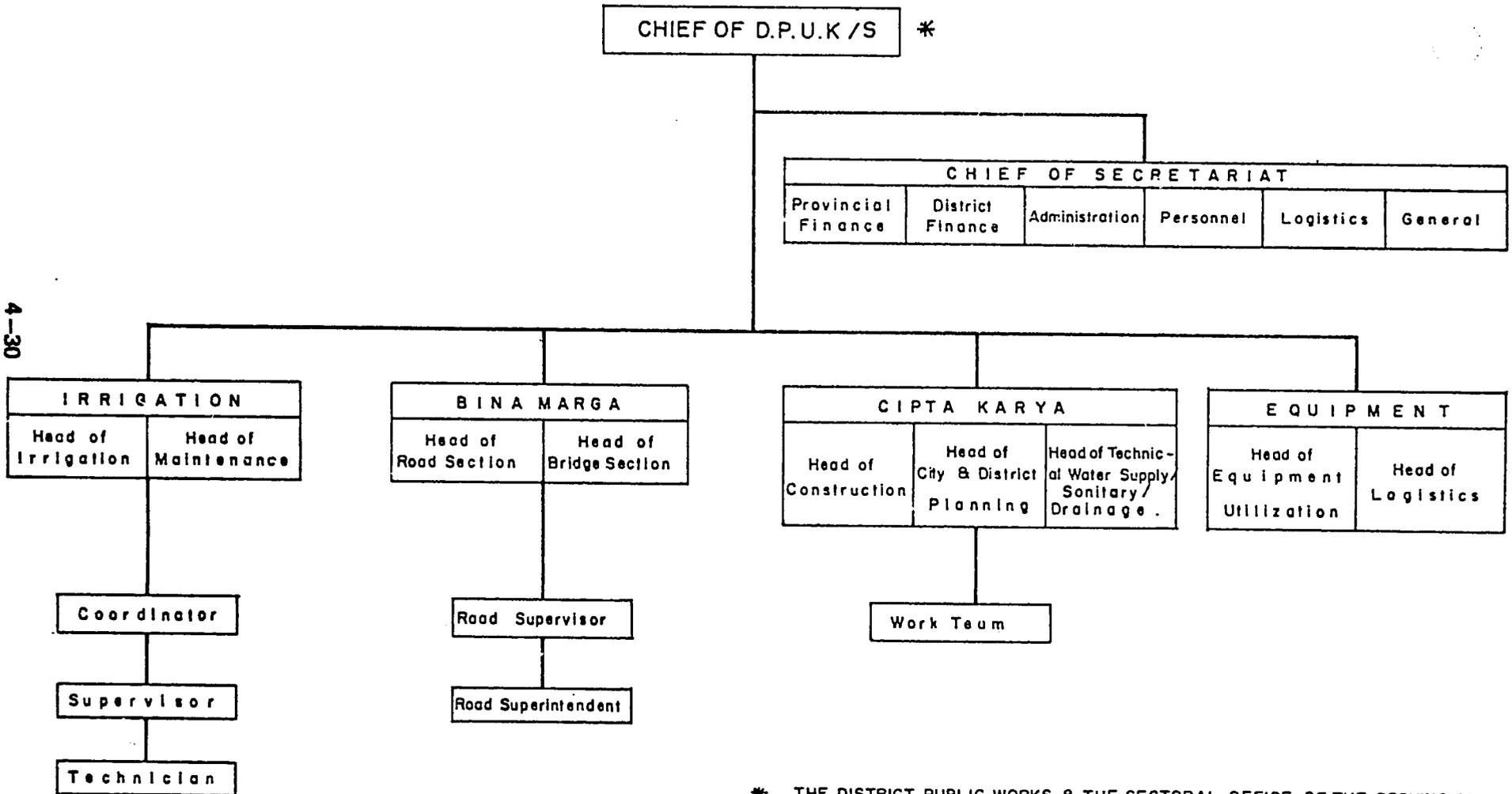


4-25

FIGURE NO. 4.16

**WEST NUSA TENGGARA  
EAST LOMBOK  
ORGANIZATION CHART D.P.U.K /S**

4-30



\* THE DISTRICT PUBLIC WORKS & THE SECTORAL OFFICE OF THE PROVINCIAL PUBLIC WORKS DEPARTMENT ARE COMBINED UNDER A SINGLE CHIEF.

**TABLE 4.4**  
**EXISTING MANPOWER – DISTRICT ROADS**  
**ACEH : PROVINCE AND DISTRICTS**  
**( 8 DISTRICTS + 2 MUNICIPALITIES )**

NO	CLASSIFICATION	PARTICIPATION – RURAL RDS. PROGRAM			
		FULL TIME	PART TIME	ADVISORY	LIMITED
I.	D P U P				
	Chief				1
	Section Chiefs :				
	– Secretariat				4
	– Bina Marga		1		
	– Equipment & Logistic		1		
	– P.U. Sectoral		6		
	Sub Section Chiefs :				
	– Secretariat				5
	– Bina Marga		9		
	– Equipment & Logistic		3		
	– P.U. Sectoral		16		
	Staff :				
	– Secretariat				11
	– Bina Marga		11		
– Equipment & Logistic		5			
– P.U. Sectoral		62			
II.	D P U K				
	Chief		10		
	Section Chiefs :				
	– Administration		10		
	– Planning		8		
	– Bina Marga	10			
	– Reg. Repr.		11		
	Sub Section Chiefs :				
	– Reg. Repr.		15		
	Staff :				
– Administration		35			
– Planning		20			
– Bina Marga	60				
– Reg. Repr.		30			
Province Totals		70	253	–	21

**TABLE 4.5**  
**EXISTING MANPOWER – DISTRICT ROADS**  
**CENTRAL SULAWESI : PROVINCE AND DISTRICTS**  
**( 4 DISTRICTS )**

NO	CLASSIFICATION	PARTICIPATION – RURAL RDS. PROGRAM			
		FULL TIME	PART TIME	ADVISORY	LIMITED
I.	D P U P				
	Chief				1
	Section Chiefs :				
	– Secretariat				1
	– Bina Marga		1		
	– Equipment & Supplies		1		
	– P.U. Sectoral		5		
	Sub Section Chiefs :				
	– Secretariat				4
	– Bina Marga		7		
	– Equipment & Supplies		4		
	– P.U. Sectoral		15		
	Staff :				
	– Secretariat				9
	– Bina Marga		15		
– Equipment & Supplies		9			
– P.U. Sectoral		15		40	
II	D P U K				
	Chief		4		
	Section Chiefs :				
	– Administration		4		
	– Planning		2		
	– Bina Marga	4			
	– Reg. Repr.		7		
	– Equipment & Supplies		2		
	Sub Section Chiefs :				
	– Reg. Repr.		14		
Staff :					
– Administration		33			
– Planning		4			
– Bina Marga	44				
– Reg. Repr.		23			
	Province Totals	48	165	–	55

**TABLE 4.6**  
**EXISTING MANPOWER – DISTRICT ROADS**  
**JAMBI : PROVINCE AND DISTRICT**  
**( 5 DISTRICTS )**

NO	CLASSIFICATION	PARTICIPATION – RURAL RDS. PROGRAM			
		FULL TIME	PART TIME	ADVISORY	LIMITED
I.	D P U P				
	Chief of DPUP				1
	Chief of Section :				
	– Secretariat			1	1
	– Bina Marga				1
	– Equipment & Supplies				1
	– Inspection				1
	– P. U. Sectoral		5		
	Sub Section Chiefs :				
	– Bina Marga's Adm.				1
	– Road			1	
	– Bridge			1	
	– Survey & Design			1	
	– Soil Lab.		1		
	– Training		1		
	Staff :				
	– Bina Marga's Adm				5
	– Bina Marga				15
	– Equipment & Supplies		10		
	– P. U. Sectoral		12		7
	– Inspection				4
II.	D P U K				
	Chief		5		
	Section Chiefs :				
	– Bina Marga	5			
	– Planning		5		
	– Administration		5		
	Staff :				
	– Administration		15		
	– Bina Marga	30			
	– Planning		10		
	Province Totals	35	69	4	36

**TABLE 4.7**  
**EXISTING MANPOWER – DISTRICT ROADS**  
**WEST NUSA TENGGARA : PROVINCE AND DISTRICTS**  
**( 6 DISTRICTS / 8 DPUKS )**

NO.	CLASSIFICATION	PARTICIPATION – RURAL RDS. PROGRAM			
		FULL TIME	PART TIME	ADVISORY	LIMITED
I.	D P U P				
	Chief of DPUP			1	
	Division Chief			1	
	Chief of Road Section			1	
	Chief of Bridge Section			1	
	Head of Road Supp. Sub Sec.			1	
	Head of Rd. Betterment Sub Section				1
	Head of Bridge Supp. Sub Section				1
	Head of APBD's Bridge Sub. Section		1		
	Head of Bridge Planning & Betterment Sub Section.		1		
II.	D P U K				
	Chief of Bina Marga Div.	8			
	Head of Road Section	8			
	Head of Bridge Section	8			
	Supervisor	4			
	Road Sec. Staff	23	8		
	Bridge Sec. Staff	19	6		
	Administration Staff	11	4		
	Road Superintendent	23	26		
	West Lombok only				
	Planning Staff	2			
	Construction Staff	3			
	Maintenance Staff	9			
	Equipment Staff	14			
	<b>Province Totals</b>	<b>132</b>	<b>46</b>	<b>5</b>	<b>2</b>

**TABLE 4.8**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**( BINA MARGA ) ACEH PROVINCE**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ. (1)	EDUCATION/EXPERIENCE (2) (3)	TO-TAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD-NO REQ.
1.	Inventory & Mapping Engineer	1	lr. Degree/ 0 yrs	4	2	-
2.	Hwy. Design Engr.	1	" / 2 yrs	5	4	-
3.	Bridge Design Engr.	1	" / 2 yrs	4	3	-
4.	Maintenance Engr.	1	" / 1 yr	3	1	-
5.	Cartographer	2	Sr. Tech. Sch/1 yr	3	2	-
6.	Structural Draftsman	2	" / 1 yr	5	3	-
7.	Hwy. Draftsman	2	" / 1 yr	5	3	-
8.	Hwy. Design Tech	2	" / 1 yr	4	3	-
9.	Bridge Design Tech	2	" / 1 yr	4	2	-
10.	Inventory Tech.	2	" / 1 yr	6	3	-
11.	Maintenance Tech.	2	" / 1 yr	6	4	-

- NOTE :
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to be recommended lr. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.9**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF TO**  
**IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM**  
**BAPPEDA – ACEH PROVINCE**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ (1)	EDUCATION/EXPERIENCE (2) (3)	TO-TAL #	# QUALIFIED BY EDUCATION & EXPERINCE	ADD NO REQ
1.	Transportation Planner/Programmer	1	Ir. or Drs. Degree/	4	3	–
2.	Trans. / Development Economist	1	Drs. Degree / 2 yrs	2	1	–
3.	Financial Analyst	1	Drs. Degree / 2 yrs	3	3	--
4.	Statistician	1	Drs. Degree / 1 yr	2	2	–
5.	Trans. Planner/Programmer Assistant	2	B.E./Econ/ 0 yrs	3	2	–
6.	Econ. Technician	2	B. Econ / 1 yr	3	3	--
7.	Financial Tech.	2	B. Econ / 1 yr	2	2	–
8.	Statistical Asst.	2	Sr.H.School / 2 yrs	4	3	–

- NOTE : (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
- (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
- (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.10**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**( BINA MARGA ) ACEH BESAR DISTRICT – ACEH PROVINCE**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ (1)	EDUCATION/EXPERIENCE (2) (3)	TO-TAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ
1	Survey & Inventory Engineer	1	B.E / 1 yr	–	–	1
2	Road Design Engr.	1	B.E./ 1 yr	2	1	
3.	Bridge Design Engr.	1	B.E./ 1 yr	1	–	1
4.	Maintenance Engr.	1	B.E./ 1 yr	–	–	1
5.	Surveyor	2	Sr. Tech. Sch/ 1 yr	2	1	1
6.	Survey Technician	4	Jr. Tech. Sch/ 0 yrs	–	–	4
7.	Inventory Tech.	4	Sr. Tech. Sch/ 1 yr	1	1	3
8.	Maintenance Tech.	2	Sr. Tech. Sch/1 yr	–	–	2
9.	Maint. Supervisor	2	Sr. Tech. Sch/ 1 yr	–	–	2
10.	Road Design Tech.	2	Sr. Tech. Sch/ 1 yr	1	1	1
11.	Bridge Design Tech.	2	Sr. Tech. Sch/1 yr	1	1	1
12.	Inventory Tech.	2	Sr. Tech. Sch/ 0 yrs	–	–	2
13.	Constr. Supervision Technician	2	Sr. Tech. Sch/1 yr	4	2	–

NOTE : (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.

(2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.

(3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.11**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY**  
**DIVISION ( BINA MARGA ) ACEH PIDIE DISTRICT – ACEH PROVINCE**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION ( 1 )	NO REQ- (1)	EDUCATION/EXPERIENCE (2) , (3)	TO-TAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD NO REQ.
1.	Survey & Inventory Engineer	1	B.E./ 1 yr	–	–	1
2.	Road Design Engr.	1	B.E./ 1 yr	1	1	–
3.	Bridge Design Engr.	1	B.E./ 1 yr	1	1	–
4.	Maintenance Engr.	1	B.E./ 1 yr	–	–	1
5.	Surveyor	2	Sr. Tech. Sch/ 1 yr	1	1	1
6.	Survey Technician	4	Jr. Tech. Sch/ 0 yrs	–	–	4
7.	Inventory Tech.	4	Sr. Tech. Sch/ 1 yr	1	1	3
8.	Maintenance Tech.	2	Sr. Tech. Sch/ 1 yr	–	–	2
9.	Maint. Supervisor	2	Sr. Tech. Sch/ 1 yr	–	–	2
10.	Road Design Tech.	2	Sr. Tech. Sch/ 1 yr	1	1	1
11.	Bridge Design Tech.	2	Sr. Tech. Sch/ 1 yr	1	1	1
12.	Inventory Tech.	2	Sr. Tech. Sch/ 0 yr	–	–	2
13.	Constr. Supervision Technician	2	Sr. Tech. Sch/ 1 yr	2	2	–

NOTE : (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.

(2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Jr. degree.

(3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.12**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**( BINA MARGA ) NORTH ACEH DISTRICT – ACEH PROVINCE**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ. (1)	EDUCATION/EXPERIENCE (2), (3)	TO-TAL #	# QUALIFIED	ADD. NO. REQ.
1.	Survey & Inventory - Engineer.	1.	Bach. of/1 yr	—	—	1
2.	Road Design Engr.	1	" / 1 yr	1	1	—
3.	Bridge Design Engr.	1	" / 1 yr	1	1	—
4.	Maintenance Engr.	1	" / 1 yr	—	—	1
5.	Surveyor	2	Sr. Tech. Sch/1 yr	2	1	1
6.	Surveyor Technician	4	Jr. Tech. Sch/0 yrs	—	—	4
7.	Inventory Tech.	4	Sr. Tech. Sch/1 yr	2	2	2
8.	Maintenance Tech.	2	" /1 yr	—	—	2
9.	Maint. Supervisor	2	" / 1 yr	—	—	2
10.	Road Design Tech.	2	" / 1 yr	1	1	1
11.	Bridge Design Tech.	2	" / 1 yr	1	1	1
12.	Inventory Tech.	2	" / 0 yr	—	—	2
13.	Constr. Supervision - Technician.	2	" / 1 yr	2	2	—

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2
  - (2) A Bachelor of Engineering Degree with 5 more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech School Diploma.

**TABLE 4.13**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**( BINA MARGA ) EAST ACEH DISTRICT – ACEH PROVINCE**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION ( 1 )	NO REQ. ( 1 )	EDUCATION/EXPERIENCE ( 2 ), ( 3 )	TO-TAL. #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. RFQ.
1.	Survey & Inventory Engineer.	1	Bach. of Engr / 1 yr	—	—	1
2.	Road Design Engr.	1	" / 1 yr	1	1	—
3.	Bridge Design Engr.	1	" / 1 yr	1	1	—
4.	Maintenance Engr.	1	" / 1 yr	—	—	1
5.	Survor	2	Sr. Tech / 1 yr	1	1	1
6.	Survey Technician	4	Jr. Tech. Sch/O yrs	—	—	4
7.	Inventory Tech.	4	Sr. Tech. Sch/1 yr	1	1	3
8.	Maintenance Tech.	2	" / 1 yr	—	—	2
9.	Maint. Supervisor	2	" / 1 yr	—	—	2
10.	Road Design Tech.	2	" / 1 yr	1	1	1
11.	Bridge Design Tech.	2	" / 1 yr	—	—	2
12.	Inventory Tech.	2	" / 0 yr	—	—	2
13.	Constr. Supervision Technician	2	" / 1 yr	2	2	—

- NOTE :**
- (1) The positions & number of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Jr. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in related field to that required will be considered as equivalent to recommended Sr. Tech. School Diploma.

**TABLE 4.14**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**( BINA MARGA ) CENTRAL ACEH DISTRICT – ACEH PROVINCE**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION ( 1 )	NO. REQ. ( 1 )	EDUCATION/EXPERIENCE ( 2 ), ( 3 )	TOTAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Survey & Inventory Engineer.	1	Bach. of Engr /1 yr	—	—	—
2.	Road Design Engr.	1	" /1 yr	1	1	—
3.	Bridge Design Engr.	1	" /1 yr	1	1	—
4.	Maintenance Engr.	1	" /1 yr	—	—	1
5.	Surveyor	2	Sr. Tech. Sch /1 yr	1	1	1
6.	Survey Technician	4	Jr. Tech. Sch / 0 yrs	—	—	4
7.	Inventory Tech.	4	Sr. Tech. Sch / 1 yr	1	1	3
8.	Maintenance Tech.	2	" / 1 yr	—	—	2
9.	Maint. Supervisor	2	" / 1 yr	—	—	2
10.	Road Design Tech.	2	" / 1 yr	—	—	2
11.	Bridge Design Tech	2	" / 1 yr	—	—	2
12.	Inventory Tech.	2	" / 0 yrs	—	—	2
13.	Constr. Supervision Technician.	2	" / 1 yr	1	1	1

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommendation Jr. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related foeld to that required will be considered as .equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.15**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**( BINA MARGA ) SOUTH EAST ACEH DISTRICT – ACEH PROVINCE**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION ( 1 )	NO REQ. ( 1 )	EDUCATION / EXPERIENCE ( 2 ), ( 3 )	TO- TAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Survey & Inventory Engineer.	1	Bach. of Engr / 1 yr	1	1	—
2.	Road Design Engr.	1	" / 1 yr	1	1	—
3.	Bridge Design Engr.	1	" / 1 yr	1	1	—
4.	Maintenance Engr.	1	" / 1 yr	1	—	1
5.	Surveyor	2	Sr. Tech. Sch/ 1 yr	1	1	1
6.	Survey Technician	4	Jr. Tech. Sch/ 0 yrs	—	—	4
7.	Inventory Tech.	4	Sr. Tech. Sch/ 1 yr	1	1	3
8.	Maintenance Tech.	2	" / 1 yr	—	—	2
9.	Maint. Supervisor	2	" / 1 yr	—	—	2
10.	Road Design Tech.	2	" / 1 yr	—	—	2
11.	Bridge Design Tech.	2	" / 1 yr	—	—	2
12.	Inventory Tech.	2	" / 0 yrs	—	—	2
13.	Constr. Supervision	2	" / 1 yr	2	2	—

**NOTE :** (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.

(2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to recommended Ir. degree.

(3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.16**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**( BINA MARGA ) WEST ACEH DISTRICT – ACEH PROVINCE**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION ( 1 )	NO REQ ( 1 )	EDUCATION / EXPERIENCE ( 2 ), ( 3 )	TO-TAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Survey & Inventory Engineer.	1	Bach of Engr / 1 yr	1	1	—
2.	Road Design Engr.	1	" / 1 yr	1	1	—
3.	Bridge Design Engr.	1	" / 1 yr	1	1	—
4.	Maintenance Engr.	1	" / 1 yr	1	—	1
5.	Surveyor	2	Sr. Techf. Sch / 1 yr	1	1	1
6.	Survey Technician	4	Jr. Tech Sch / 0 yrs	—	—	4
7.	Inventory Tech.	4	Sr. Tech. Sch / 1 yr	1	1	3
8.	Maintenance Tech.	2	" / 1 yr	—	—	2
9.	Maint. Supervisor	2	" / 1 yr	—	—	2
10.	Road Design Tech.	2	" / 1 yr	—	—	2
11.	Bridge Design Tech.	2	" / 1 yr	—	—	2
12.	Inventory Tech.	2	" / 0 yrs	—	—	2
13.	Constr. Supervision Technician.	2	" / 1 yr	1	1	1

- NOTE :** ( 1 ) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
- ( 2 ) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended 1r. degree.
- ( 3 ) A Sr. High School Diploma with 2 or more years experience in a related field that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.17**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**( BINA MARGA ) SOUTH ACEH DISTRICT -- ACEH PROVINCE**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION ( 1 )	NO REQ. ( 1 )	EDUCATION / EXPERIENCE ( 2 ), ( 3 )	TO - TAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Survey & Inventory Engineer.	1	Bach. of Engr/1 yr	—	—	1
2.	Road Design Engr.	1	" /1 yr	1	1	—
3.	Bridge Design Engr.	1	" /1 yr	1	1	—
4.	Maintenance Engr.	1	" /1 yr	—	—	1
5.	Surveyor	2	Sr. Tech. Sch/1 yr	1	1	1
6.	Survey Technician	4	Jr. Tech. Sch/0 yrs	—	—	4
7.	Inventory Tech.	4	Sr. Tech. Sch./1 yr	1	1	3
8.	Maintenance Tech.	2	" /1 yr	—	—	2
9.	Maint. Supervisor	2	" /1 yr	—	—	2
10.	Road Design Tech.	2	" /1 yr	—	—	2
11.	Bridge Design Tech.	2	" /1 yr	—	—	2
12.	Inventory Tech.	2	" /0 yrs	—	—	2
13.	Constr. Supervision Technician	2	" /1 yr	1	1	1

- NOTE** : ( 1 ) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
- ( 2 ) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Jr. degree.
- ( 3 ) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.18**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**( BINA MARGA ) JAMBI PROVINCE**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION ( 1 )	NO REQ. ( 1 )	EDUCATION / EXPERIENCE ( 2 ), ( 3 )	TO- TAL. #	# QUALIFIED * BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Inventory & Mapping Engineer.	1	Ir. Degree/0 yrs	1	1	-
2.	Hwy. Design Engr.	1	" /2 yrs	1	1	-
3.	Bridge Design Engr.	1	" /2 yrs	1	1	-
4.	Maintenance Engr.	1	" /1 yr	-	-	1
5.	Cartographer	2	Sr. Tech/ 1 yr	-	-	2
6.	Structural Draftsman	2	" /1 yr	2	1	1
7.	Hwy. Draftsman	2	" /1 yr	3	3	-
8.	Hwy. Design Tech	2	" /1 yr	2	2	-
9.	Bridge Design Tech.	2	" /1 yr	1	1	1
10.	Inventory Tech.	2	" /1 yr	1	1	1
11.	Maintenance Tech.	2	" /1 yr	1	-	2

- NOTE : ( 1 ) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
- ( 2 ) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
- ( 3 ) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.19**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM**  
**BAPPEDA – JAMBI PROVINCE**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ (1)	EDUCATION/EXPERIENCE (2) , (3)	TOTAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Transportation Planner/ Programmer	1	Ir. or Drs. Degree/ 2 yrs.	1	1	—
2.	Trans./Development Economist	1	Drs. Degree / 2 yrs	1	1	—
3.	Financial Analyst	1	Drs. Degree / 2 yrs	1	1	—
4.	Statistician	1	Drs. Degree / 1 yr	1	1	—
5.	Trans. Planner/Programmer Assistant	2	B.E./ Econ/ 0 yr	—	—	2
6.	Econ. Technician	2	B. of Econ / 1 yr	—	—	2
7.	Financial Tech	2	B. of Econ / 1 yr	—	—	2
8.	Statistical Asst.	2	Sr. H. School / 2 yrs	—	—	2

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.20**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**(BINA MARGA) BATANGHARI DISTRICT – JAMBI PROVINCE**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ. (1)	EDUCATION/EXPERIENCE (2), (3)	TO-TAL	QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO REQ.
1.	Survey & Inventory Engineer	1	B.E. /1 yr.	–	–	1
2.	Road Design Eng.	1	B.E / 1 yr.	1	1	–
3.	Bridge Design Eng.	1	B.E/ 1 yr.	–	–	1
4.	Maintenance Eng.	1	B.E/ 1 yr.	–	–	1
5.	Surveyor	2	Sr . Tech. Sch./1 yr	1	–	2
6.	Survey Technician	4	Jr. . Tech. Sch./0 yrs	2	1	3
7.	Inventory Tech	4	Sr . Tech. Sch./1 yr	2	–	4
8.	Maintenance Tech.	2	Sr . Tech. Sch./1 yr	–	–	2
9.	Maint. Supervisor	2	Sr. Tech. Sch./1 yr	–	–	2
10.	Road Design Tech.	2	Sr. Tech. Sch/1 yr	1	–	2
11.	Bridge Design Tech.	2	Sr. Tech. Sch/1 yrs	1	–	2
12.	Inventory Tech.	2	Sr. Tech. Sch./1 yr	1	1	1
13.	Constr. Supervision Technician	2	Sr. Tech.Sch./1 yr	2	2	–

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.21**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**(BINA MARGA) TANJUNG JABUNG DISTRICT – JAMBI PROVINCE**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ (1)	EDUCATION/EXPERIENCE (2) (3)	TOTAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Survey & Inventory Engineer	1	B.E./ 1 yr	—	—	1
2.	Road Design Engr	1	B.E./ 1 yr	1	—	1
3.	Bridge Design Engr.	1	B.E./ 1 yr	1	—	1
4.	Maintenance Engr.	1	B.E./ 1 yr	—	—	1
5.	Surveyor	2	Sr. Tech. Sch./1 yr	1	1	1
6.	Survey Technician	4	Jr. Tech. Sch./0 yrs	1	1	3
7.	Inventory Tech.	4	Sr. Tech. Sch./1 yr	1	1	3
8.	Maintenance Tech.	2	Sr. Tech. Sch./1 yr	—	—	2
9.	Maint. Supervisor	2	Sr. Tech. Sch./1 yr	1	1	1
10.	Road Design Tech.	2	Sr. Tech. Sch./1 yr	—	—	2
11.	Bridge Design Tech.	2	Sr. Tech. Sch./1 yr	—	—	2
12.	Inventory Tech.	2	Sr. Tech.Sch./0 yrs	—	—	2
13.	Constr. Supervisor Technician	2	Sr. Tech. Sch./1 yr	1	1	1

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.22**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**(BINA MARGA) SAROLANGUN BANKO DISTRICT – JAMBI PROVINCE**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ. (1)	EDUCATION/EXPERINCE (2), (3)	TO-TAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO REQ.
1.	Survey & Inventory Engineer	1	B.E./1 yr	–	–	1
2.	Road Design Engr.	1	B.E./1 yr	1	–	1
3.	Bridge Design Engr.	1	B.E./1 yr	1	–	1
4.	Maintenance Engr.	1	B.E./1 yr	–	–	1
5.	Surveyor	2	Sr. Tech. Sch/1 yr	2	2	–
6.	Survey Technician	4	Jr. Tech. Sch/0 yrs	1	1	3
7.	Inventory Tech.	4	Sr. Tech. Sch/1 yr	2	2	2
8.	Maintenance Tech.	2	Sr. Tech. Sch/1 yr	–	–	2
9.	Maint. Supervisor	2	Sr. Tech. Sch/1 yr	–	–	2
10.	Road Design Tech.	2	Sr. Tech. Sch/1 yr	1	1	1
11.	Bridge Design Tech.	2	Sr. Tech. Sch/1 yr	–	–	2
12.	Inventory Tech.	2	Sr. Tech. Sch/0 yrs	2	2	–
13.	Constr. Supervision Technician	2	Sr. Tech. Sch/1 yr	3	1	1

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.23**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**(BINA MARGA) BUNGO – TEBO DISTRICT – JAMBI PROVINCE**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ (1)	EDUCATION/EXPERINCE	TO-TAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD NO REQ.
1.	Survey & Inventory Engineer	1	B.E./1 yr	–	–	1
2.	Road Design Engr.	1	B.E./1 yr	1	–	1
3.	Bridge Design Engr.	1	B.E./1 yr	1	–	1
4.	Maintenance Engr.	1	B.E./1 yr	–	–	1
5.	Surveyor	2	Sr. Tech.Sch/1 yr	1	1	1
6.	Survey Technician	4	Jr. Tech. Sch/0 yrs	2	2	2
7.	Inventory Tech.	4	Sr. Tech. Sch/1 yr	1	1	3
8.	Maintenance Tech.	2	Sr. Tech. Sch/1 yr	1	–	2
9.	Maint. Supervisor	2	Sr. Tech. Sch/1 yr	–	–	2
10.	Road Design Tech.	2	Sr. Tech. Sch/1 yr	–	–	2
11.	Bridge Design Tech.	2	Sr. Tech. Sch/1 yr	–	–	2
12.	Inventory Tech.	2	Sr. Tech. Sch/0 yrs	1	1	1
13.	Constr. Supervision Technician	2	Sr. Tech. Sch/1 yr	2	–	1

- NOTE :** (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
- (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
- (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.24.**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**(BINA MARGA) KERINCI DISTRICT – JAMBI PROVINCE**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ (1)	EDUCATION/EXPERIENCE (2), (3)	TOTAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO REQ
1.	Survey & Inventory Engineer	1	B'E'/1 yr	—	—	1
2.	Road Design Engr.	1	B.E./1 yr	1	—	1
3.	Bridge Design Engr.	1	B.E./1 yr	—	—	1
4.	Maintenance Engr.	1	B.E./1 yr	—	—	1
5.	Surveyor	2	Sr. Tech. Sch/1 yr	1	1	1
6.	Surveyor Technician	4	Jr. Tech. Sch/0 yrs	1	1	3
7.	Inventory Tech.	4	Sr. Tech. Sch/1 yr	1	1	3
8.	Maintenance Tech.	2	Sr. Tech. Sch/1 yr	—	—	2
9.	Maint. Supervisor	2	Sr. Tech. Sch/1 yr	—	—	2
10.	Road Design Tech.	2	Sr. Tech. Sch/1 yr	1	1	1
11.	Bridge Design Tech.	2	Sr. Tech. Sch/1 yr	1	1	1
12.	Inventory Tech.	2	Sr. Tech. Sch/0 yrs	—	—	2
13.	Constr. Supervision Technician	2	Sr. Tech. Sch/1 yr	2	2	—

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Jr. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.25**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**(BINA MARGA) WEST NUSA TENGGARA PROVINCE**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ (1)	EDUCATION/EXPERIENCE (2), (3)	TO-TAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD NO REQ.
1.	Inventory & Mapping Engineer	1	Ir. Degree/0 yrs	—	—	1
2.	Hwy. Design Engr.	1	Ir. Degree/2 yrs	1	1	—
3.	Bridge Design Engr.	1	Ir. Degree/2 yrs	1	1	—
4.	Maintenance Engr.	1	Ir. Degree/1 yr	—	—	1
5.	Cartographer	2	Sr. Tech. Sch/1 yr	—	—	2
6.	Structural Draftsman	2	Sr. Tech. Sch/1 yr	4	3	—
7.	Hwy. Draftsman	2	Sr. Tech. Sch/1 yr	3	2	—
8.	Hwy. Design Tech.	2	Sr. Tech. Sch/1 yr	3	2	—
9.	Bridge Design Tech	2	Sr. Tech. Sch/1 yr	3	2	—
10.	Inventory Tech.	2	Sr. Tech. Sch/1 yr	—	—	2
11.	Maintenance Tech.	2	Sr. Tech. Sch/1 yr	—	—	2

- NOTES :** (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph.
- (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
- (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.26**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM -- BAPPEDA**  
**WEST NUSA TENGGARA PROVINCE**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ. (1)	EDUCATION/EXPERIENCE (2), (3)	TO-TAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Transportation Planner/ Planner/Programmer	1	Ir. Or Drs. Degree/2 yrs	1	1	-
2.	Trans/Development Economist	1	Drs. Degree/2 yrs	1	1	-
3.	Financial Analyst	1	Drs. Degree/2 yrs	1	1	-
4.	Statistician	1	Drs. Degree/2 yr	-	-	1
5.	Trans. Planner/Programmer Assistant	2	Bach. of Engr./Econ/ 0 yrs	-	-	2
6.	Econ. Technician	2	Bach. of Econ/1 yr	-	-	2
7.	Financial Tech.	2	Bach. of Econ/1 yr	-	-	2
8.	Statistical Asst.	2	Sr. H. School/2 yrs	-	-	2

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.27**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**(BINA MARGA) MATARAM CITY DISTRICT – WEST NUSA TENGGARA**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ (1)	EDUCATION/EXPERIENCE (2), (3)	TOTAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Survey & Inventory Engineer	1	Bach. or Engr/1 yr	—	—	1
2.	Road Design Engr.	1	Bach. of Engr/1 yr	1	—	1
3.	Bridge Design Engr.	1	Bach. of Engr/1 yr	1	—	1
4.	Maintenance Engr.	1	Bach. of Engr/1 yr	1	—	1
5.	Surveyor	2	Sr. Tech. Sch/1 yr	—	—	2
6.	Survey Technician	4	Jr. Tech. Sch/0 yrs	—	—	4
7.	Inventory Tech.	4	Sr. Tech. Sch/1 yr	4	—	4
8.	Maintenance Tech.	2	Sr. Tech. Sch/1 yr	2	—	2
9.	Maint. Supervisor	2	Sr. Tech. Sch/1 yr	2	—	2
10.	Road Design Tech.	2	Sr. Tech. Sch/1 yr	2	2	—
11.	Bridge Design Tech.	2	Sr. Tech. Sch/1 yr	2	2	—
12.	Inventory Tech.	2	Sr. Tech. Sch/0 yrs	2	—	2
13.	Constr. Supervision Technician	2	Sr. Tech. Sch/1 yr	2	—	2

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.28**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**(BINA MARGA) WEST LOMBOK DISTRICT – WEST NUSA TENGGARA**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ (1)	EDUCATION/EXPERIENCE (2), (3)	TOTAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Survey & Inventory Engineer	1	Bach. of Eng/1 yr	–	–	1
2.	Road Design Engr.	1	Bach. of Engr/1 yr	1	1	–
3.	Bridge Design Engr.	1	Bach. of Engr/1 yr	–	–	1
4.	Maintenance Engr.	1	Bach. of Engr/1 yr	–	–	1
5.	Surveyor	2	Sr. Tech. Sch/1 yr	–	–	2
6.	Survey Technician	4	Jr. Tech. Sch/0 yrs	–	–	4
7.	Inventory Tech.	4	Sr. Tech. Sch/1 yr	3	3	1
8.	Maintenance Tech	2	Sr. Tech. Sch/1 yr	3	1	1
9.	Maint. Supervisor	2	Sr. Tech. Sch/1 yr	3	1	1
10.	Road Design Tech.	2	Sr. Tech. Sch/1 yr	1	1	1
11.	Bridge Design Tech.	2	Sr. Tech. Sch/1 yr	1	1	1
12.	Inventory Tech	2	Sr. Tech. Sch/0 yrs	3	–	2
13.	Constr. Supervision Technician	2	Sr. Tech. Sch/1 yr	4	3	–

**NOTE :** (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.

(2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.

(3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech School Diploma.

**TABLE 4.29**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAMS HIGHWAY DIVISION**  
**(BINA MARGA) EAST LOMBOK DISTRICT – WEST NUSA TENGGARA PROVINCE**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ. (1)	EDUCATION/EXPERIENCE (2), (3)	TOTAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD NO REQ
1.	Survey & Inventory Engineer	1	Bach. of Engr/1 yr	–	–	1
2.	Road Design Engr.	1	Bach. of Engr/1 yr	1	–	1
3.	Bridge Design Engr	1	Bach. of Engr/1 yr	1	–	1
4.	Maintenance Engr.	1	Bach. of Engr/1 yr	1	–	1
5.	Surveyor	2	Sr. Tech. Sch/1 yr	–	–	2
6.	Survey Technician	4	Jr. Tech. Sch/0 yrs	–	–	4
7.	Inventory Tech.	4	Sr. Tech. Sch/1 yr	–	–	4
8.	Maintenance Tech.	2	Sr. Tech. Sch/1 yr	4	–	2
9.	Maint. Supervisor	2	Sr. Tech. Sch/1 yr	4	–	2
10	Road Design Tech.	2	Sr. Tech. Sch/1 yr	3	–	2
11	Bridge Design Tech.	2	Sr. Tech. Sch/1 yr	3	1	1
12	Inventory Tech.	2	Sr. Tech. Sch/0 yrs	–	–	2
13	Constr. Supervision Technician	2	Sr. Tech. Sch/1 yr	–	–	2

- NOTE :**
- (1) The positions & number of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

TABLES 4.30

**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF  
TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION  
(BINA MARGA) CENTRAL LOMBOK DISTRICT – WEST NUSA TENGGARA PROVINCE**

NO'	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ (1)	EDUCATION/EXPERIENCE (2), (3)	TO-TAL ##	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD NO REQ
1.	Survey & Inventory Engineer	1	Bach. of Engr/1 yr	–	–	1
2.	Road Design Engr.	1	Bach. of Engr/1 yr	1	–	1
3.	Bridge Design Engr	1	Bach. of Engr/1 yr	1	–	1
4.	Maintenance Engr.	1	Bach. of Engr/1 yr	2	–	1
5.	Surveyor	2	Sr. Tech. Sch/1 yr	–	–	2
6.	Survey Technician	4	Jr. Tech. Sch/0 years	–	–	4
7.	Inventory Tech	4	Sr. Tech. Sch/1 yr	–	–	4
8.	Maintenance Tech.	2	Sr. Tech Sch/1 yr	4	–	2
9.	Maint Supervisor	2	Sr. Tech. Sch/1 yr	4	–	2
10	Road Design Tech.	2	Sr. Tech. Sch/1 yr	2	–	2
11	Bridge Design Tech.	2	Sr. Tech. Sch/1 yr	2	–	2
12	Inventory Tech.	2	Sr. Tech. Sch/0 yrs	–	–	2
13	Constr. Supervision Technician	2	Sr. Tech. Sch/1 yr	–	–	2

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended 1r. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.31**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED IDSTRICK ROADS PROGRAM HIGHWAY DIVISION**  
**(BINA MARGA) WEST SUMBAWA DISTRICT – WEST NUSA TENGGARA PROVINCE**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ (1)	EDUCATION/EXPERIENCE (2), (3)	TO-TAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD NO REQ.
1.	Survey & Inventory Engineer	1	Bach. of Engr/1 yr	—	—	1
2.	Road Design Engr.	1	Bach. of Engr/1 yr	1	—	1
3.	Bridge Design Engr	1	Bach. of Engr/1 yr	1	—	1
4.	Maintenance En gr.	1	Bach. of Engr/1 yr	—	—	1
5.	Surveyor	2	Sr. Tech. Sch/1 yr	—	—	2
6.	Survey Technician	4	Jr. Tech. Sch/0 yrs	—	—	4
7.	Inventory Tech.	4	Sr. Tech. Sch/1 yr	—	—	4
8.	Maintenance Tech.	2	Sr. Tech. Sch/1 yr	3	—	2
9.	Maint. Supervisor	2	Sr. Tech. Sch/1 yr	2	—	2
10	Road Design Tech.	2	Sr. Tech. Sch/1 yr	1	—	2
11	Bridge Design Tech.	2	Sr. Tech. Sch/1 yr	—	—	2
12	Inventory Tech.	2	Sr. Tech. Sch/0 yrs	—	—	2
13	Constr. Supervision Technician	2	Sr. Tech. Sch/1 yr	—	—	2

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.32**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAMS HIGHWAY DIVISION**  
**(BINA MARGA) EAST SUMBAWA DISTRICT – WEST NUSA TENGGARA PROVINCE**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ (1)	EDUCATION/EXPERIENCE (2), (3)	TOTAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD NO REQ.
1.	Survey & Inventory Engineer	1	Bach. of Engr/1 yr	–	–	1
2.	Road Design Engr.	1	Bach. of Engr/1 yr	1	–	1
3.	Bridge Design Engr.	1	Bach. of Engr/1 yr	1	–	1
4.	Maintenance Engr.	1	Bach. of Engr/1 yr	–	–	1
5.	Surveyor	2	Sr. Tech. Sch/1 yr	–	–	2
6.	Survey Technician	4	Jr. Tech Sch/0 yrs	–	–	4
7.	Inventory Tech.	4	Sr. Tech. Sch/1 yr	–	–	4
8;	Maintenance Tech.	2	Sr. Tech. Sch/1 yr	3	–	2
9.	Maintenance Supervisor	2	Sr. Tech. Sch/1 yr	2	–	2
10.	Road Design Tech.	2	Sr. Tech. Sch/1 yr	2	2	–
11.	Bridge Design Tech.	2	Sr. Tech. Sch/1 yr	2	2	–
12.	Inventory Tech.	2	Sr. Tech.Sch/0 yrs	2	–	2
13.	Constr. Supervision Technician	2	Sr. Tech Sch/1 yr	2	–	2

**NOTE :** (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.

(2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.

(3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.33**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**(BINA MARGA) DOMPU DISTRICT – WEST NUSA TENGGARA PROVINCE**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO. REQ (1)	EDUCATION/EXPERIENCE (2) , (3)	TO-TAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Survey & Inventory Engineer	1	Bach. of Engr/1 yr	–	–	1
2.	Road Design Engineer	1	" /1 yr	1	–	1
3.	Bridge Design Engineer	1	" /1 yr	1	–	1
4.	Maintenance Engineer	1	" /1 yr	1	–	1
5.	Surveyor	2	Sr. Tech. Sch. /1 yr	–	–	2
6.	Survey Technician	4	Jr. Tech. Sch /0 yr	–	–	4
7.	Inventory Tech.	4	Sr. Tech. Sch /1 yr	–	–	4
8.	Maintenance Tech.	2	" /1 yr	3	–	2
9.	Maint. Supervisor	2	" /1 yr	3	–	2
10.	Road Design Tech.	2	" /1 yr	2	1	1
11.	Bridge Design Tech.	2	" /1 yr	2	1	1
12.	Inventory Tech.	2	" /0 yr	–	–	2
13.	Constr. Supervision Technician	2	" /1 yr	2	1	1

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.34**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**(BINA MARGA) BIMA DISTRICT – WEST NUSA TENGGARA PROVINCE**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO. REQ. (1)	EDUCATION/EXPERIENCE (2) (3)	TOTAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Survey & Inventory Engineer	1	Bach. of Engr / 1 yr	1	—	1
2.	Road Design Engr.	1	" / 1 yr	1	—	1
3.	Bridge Design Engr.	1	" / 1 yr	1	—	1
4.	Maintenance Engr.	1	" / 1 yr	1	—	1
5.	Surveyor	2	Sr. Tech. Sch / 1 yr	—	—	2
6.	Survey Technician	4	Jr. Tech. Sch / 0 yrs	4	—	4
7.	Inventory Tech.	4	Sr. Tech. Sch / 1 yr	—	—	4
8.	Maintenance Tech.	2	" / 1 yr	5	—	2
9.	Maint. Supervisor	2	" / 1 yr	5	—	2
10.	Road Design Tech.	2	" / 1 yr	2	2	—
11.	Bridge Design Tech.	2	" / 1 yr	2	2	—
12.	Inventory Tech.	2	" / 0 yrs	2	—	2
13.	Constr. Supervision Technician	2	" / 1 yr	2	—	2

- NOTE :** (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
- (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
- (3) A. Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.35**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**(BINA MARGA) CENTRAL SULAWESI PROVINCE**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF (4)		
	POSITION (1)	NO. REQ. (1)	EDUCATION/EXPERIENCE (2) , (3)	TOTAL #	# QUALIFIED* BY EDUCATION & EXPERIENCE	ADD. NO REQ.
1.	Inventory & Mapping Engineer	1	Ir. Degree / 0 yr	1	—	1
2.	Hwy. Design Engr.	1	" / 2 yrs	3	1	—
3.	Bridge Design Engr.	1	" / 2 yrs	2	1	—
4.	Maintenance Engr.	1	" / 1 yr	1	1	—
5.	Cartographer	2	Sr. Tech. Sch / 1 yr	—	—	2
6.	Structural Draftsman	2	" / 1 yr	3	3	—
7.	Hwy. Draftsman	2	" / 1 yr	3	3	—
8.	Hwy. Design Tech	2	" / 1 yr	2	2	—
9.	Bridge Design Tech.	2	" / 1 yr	2	2	—
10.	Inventory Tech.	2	" / 1 yr	1	1	1
11.	Maintenance Tech.	2	" / 1 yr	1	1	1

- NOTE :** (1) The positions & number of proposed personnel are based on the recommendations contained in paragraph 10.2.
- (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
- (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.
- (4) Extrapolated from incomplete data but with some detailed knowledge of people comprising staff.

**TABLE 4.36**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM**  
**BAPPEDA – CENTRAL SULAWESI PROVINCE**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF		
	POSITION (1)	NO REQ. (1)	EDUCATION/EXPERIENCE (2), (3)	TOTAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Trans. Planner/Programmer	1	Ir. or Drs. Degree/ 2 yrs	1	1	–
2.	Trans. / Development Economist.	1	Drs. Degree / 2 yrs	4	4	–
3.	Financial Analyst	1	" / 2 yrs	3	3	–
4.	Statistician	1	" / 1 yr	1	1	–
5.	Trans. Planner/Prog. Assistant	2	Bach. of Eng. Econ/ o yrs	1	1	1
6.	Econ. Technician	2	Bach. of Econ/ 1 yr	1	1	1
7.	Financial Tech.	2	" / 1 yr	4	4	–
8.	Statistical Asst.	2	Sr. H. School / 2 yrs	–	–	2

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.

**TABLE 4.37**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**(BINA MARGA) DONGGALA DISTRICT – CENTRAL SULAWESI PROVINCE**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF (4)		
	POSITION (1)	NO. REQ. (1)	EDUCATION/EXPERIENCE (2) , (3)	TOTAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Survey & Inventory Engineer	1	Bach. of Engr/1 yr	–	–	1
2.	Road Design Engr	1	" /1 yr	–	–	1
3.	Bridge Design Engr.	1	" /1 yr	–	–	1
4.	Maintenance Engr.	1	" /1 yr	–	–	1
5.	Surveyor	2	Sr. Tech. Sch /1 yr	2	–	2
6.	Survey Technician	4	Jr. Tech. Sch /0 yrs	2	–	4
7.	Inventory Tech.	4	Sr. Tech. Sch /1 yr	2	–	4
8.	Maintenance Tech.	2	" /1 yr	–	–	2
9.	Maint. Supervisor	2	" /1 yr	2	–	2
10.	Road Design Tech.	2	" /1 yr	1	–	2
11.	Bridge Design Tech.	2	" /1 yr	1	–	2
12.	Inventory Tech.	2	" /0 yrs	2	–	2
13.	Constr. Supervision Technician	2	" /1 yr	2	–	2

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.
  - (4) Extrapolated from incomplete data.

**TABLE 4.38**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**(BINA MARGA) POSO DISTRICT – CENTRAL SULAWESI PROVINCE**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF (4)		
	POSITION (1)	NO. REQ. (1)	EDUCATION/EXPERIENCE (2) , (3)	TOTAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD NO REQ.
1.	Survey & Inventory Engineer	1	Bach of Engr / 1 yr	1	–	1
2.	Road Design Engr.	1	" / 1 yr	1	1	–
3.	Bridge Design Engr.	1	" / 1 yr	1	–	1
4.	Maintenance Engr.	1	" / 1 yr	–	–	1
5.	Surveyor	2	Sr. Tech. Sch/ 1 yr	2	2	–
6.	Survey Technician	4	Jr. Tech. Sch / 0 yrs	3	3	1
7.	Inventory Tech	4	Sr. Tech. Sch / 1 yr	2	2	2
8.	Maintenance Tech.	2	" / 1 yr	–	–	2
9.	Maint. Supervisor	2	" / 1 yr	3	3	–
10.	Road Design Tech	2	" / 1 yr	2	1	1
11.	Bridge Design Tech	2	" / 1 yr	2	1	1
12.	Inventory Tech	2	" / 0 yrs	2	2	–
13.	Constr. Supervision Technician	2	" / 1 yr	4	1	1

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.
  - (4) Extrapolated from incomplete data.

**TABLE 4.39**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**(BINA MARGA) LUWUK – BANGGAI DISTRICT – CENTRAL SULAWESI PROVINCE**

NO	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF (4)		
	POSITION (1)	NO REQ. (1)	EDUCATION/EXPERIENCE (2) , (3)	TO-TAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Survey & Inventory Engineer	1	Bach. of Engr /1 yr	1	—	1
2.	Road Design Engineer	1	" /1 yr	1	1	—
3.	Bridge Design Engineer	1	" /1 yr	—	—	1
4.	Maintenance Engineer	1	" /1 yr	—	—	1
5.	Surveyor	2	Sr. Tech. Sch /1 yr	2	2	—
6.	Survey Technician	4	Jr. Tech. Sch /0 yrs	3	3	1
7.	Inventory Tech.	4	Sr. Tech. Sch /1 yr	2	—	4
8.	Maintenance Tech.	2	" /1 yr	—	—	2
9.	Maint. Supervisor	2	" /1 yr	2	2	—
10.	Road Design Tech.	2	" /1 yr	1	1	1
11.	Bridge Design Tech.	2	" /1 yr	1	1	1
12.	Inventory Tech.	2	" /0 yrs	1	1	1
13.	Constr. Supervision Technician	2	" /1 yr	2	2	—

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.
  - (4) Extrapolated from incomplete data.

**TABLE 4.40**  
**CAPABILITIES AND SUFFICIENCY OF EXISTING STAFF**  
**TO IMPLEMENT PROPOSED DISTRICT ROADS PROGRAM HIGHWAY DIVISION**  
**(BINA MARGA) BUOL – TOLI TOLI DISTRICT – CENTRAL SULAWESI PROVINCE**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF (4)		
	POSITION (1)	NO. REQ. (1)	EDUCATION/EXPERIENCE (2) , (3)	TOTAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO REQ.
1.	Survey & Inventory engineer	1	Bach. of Engr / 1 yr	1	—	1
2.	Road Design Engr.	1	" / 1 yr	—	—	1
3.	Bridge Design Engr.	1	" / 1 yr	—	—	1
4.	Maintenance Engr.	1	" / 1 yr	—	—	1
5.	Surveyor	2	Sr. Tech. Sch / 1 yr	2	—	2
6.	Survey Technician	4	Jr. Tech. Sch / 0 yrs	—	—	4
7.	Inventory Tech	4	Sr. Tech. Sch / 1 yr	1	—	4
8.	Maintenance Tech.	2	" / 1 yr	—	—	2
9.	Maint. Supervisor	2	" / 1 yr	1	—	2
10.	Road Design Tech.	2	" / 1 yr	1	—	2
11.	Bridge Design Tech.	2	" / 1 yr	1	—	2
12.	Inventory Tech.	2	" / 0 yrs	1	—	2
13.	Constr. Supervision Technician	2	" / 1 yr	2	—	2

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.
  - (4) Extrapolated from incomplete data.

**TABLE 4.41**  
**STAFF CAPABILITIES AND SUFFICIENCY**  
**PROVINCIAL WORKSHOP**  
**J A M B I**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF (4)		
	POSITION (1)	NO. REQ. (1)	EDUCATION/EXPERIENCE (2) (3)	TOTAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Workshop Manager	1	Bus. Adm. Grad / 5 yrs	1	1	—
2.	Chief of Warehouse	1	Tech. H. Sch Grad / 3 yrs	1	—	1
3.	Field Inspectors	4	" / 5 yrs	2	2	2
4.	Service Manager	1	Mech. Eng. Grad / 5 yrs	—	—	1
5.	Chief of Heavy Mech	1	Tech. H. Sch / 5 yrs	—	—	1
6.	Chief of Light Mech	1	" / 5 yrs	—	—	1
7.	Chief of Mach. Shop	1	" / 5 yrs	1	—	1
8.	Chief of Lube Sect	1	" / 5 yrs	1	1	—
9.	Chief Electrician	1	" / 5 yrs	1	—	1
10.	Master Mechanics	8	" / 3 yrs	3	2	6
11.	Hyd. Sys. Specialist	1	" / 3 yrs	—	—	1
12.	Fuel Sys. Specialist	1	" / 3 yrs	—	—	1
13.	General Machinist	2	" / 3 yrs	—	—	2
14.	Body & Fender Mech	2	" / 3 yrs	1	1	1
15.	Welder	1	" / 3 yrs	1	1	—
16.	Ignition Sys. Spec.	1	" / 3 yrs	1	—	1
17.	Elec. Sys. Specialist	1	" / 3 yrs	1	—	1
18.	Inj. Sys. Specialist	1	" / 3 yrs	1	—	1

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.
  - (4) The number required does not include semi-skilled and non-skilled shop employees or office personnel.

**TABLE 4.42**  
**STAFF CAPABILITIES AND SUFFICIENCY**  
**PROVINCIAL WORKSHOP**  
**LOMBOK – WEST NUSA TENGGARA**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF (4)		
	POSITION (1)	NO. REQ. (1)	EDUCATION/EXPERIENCE (2) , (3)	TO-TAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Workshop Manager	1	Bus. Adm. Grad / 5 yrs	–	–	1
2.	Chief of Warehouse	1	Tech. H. Sch Grad / 3 yr	1	1	–
3.	Field Inspectors	4	" / 5 yrs	4	4	–
4.	Service Manager	1	Mech. Eng. Grad / 5 yrs	1	–	1
5.	Chief of Heavy Mech	1	Tech. H. Sch / 5 yrs	1	1	–
6.	Chief of Light Mech	1	" / 5 yrs	1	–	1
7.	Chief of Mach. Shop	1	" / 5 yrs	1	–	1
8.	Chief of Lube Sect.	1	" / 5 yrs	1	–	1
9.	Chief Electrician	1	" / 5 yrs	1	–	1
10.	Master Mechanics	8	" / 3 yrs	8	–	8
11.	Hyd. Sys. Specialist	1	" / 3 yrs	1	–	1
12.	Fuel Sys. Specialist	1	" / 3 yrs	1	–	1
13.	General Machinist	2	" / 3 yrs	1	–	2
14.	Body & Fender Mech.	2	" / 3 yrs	1	–	2
15.	Welder	1	" / 3 yrs	1	–	1
16.	Ignition Sys. Spec.	1	" / 3 yrs	–	–	1
17.	Elec. Sys. Specialist	1	" / 3 yrs	–	–	1
18.	Inj. Sys. Specialist	1	" / 3 yrs	–	–	1

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.
  - (4) The number required does not include semi-skilled and non-skilled shop employees or office personnel.

**TABLE 4.43**  
**STAFF CAPABILITIES AND SUFFICIENCY**  
**PROVINCIAL WORKSHOP**  
**SUMBAWA – WEST NUSA TENGGARA**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF (4)		
	POSITION (1)	NO. REQ. (1)	EDUCATION/EXPERIENCE (2) , (3)	TO-TAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD NO. REQ.
1.	Workshop Manager	1	Bus. Adm. Grad./5 yrs	—	—	1
2.	Chief of Warehouse	1	Tech.H.Sch.Grad./3 yrs	—	—	1
3.	Field Inspectors	4	" /5 yrs	1	1	3
4.	Service Manager	1	Mech.Eng.Grad /5 yrs	1	—	1
5.	Chief of Heavy Mech.	1	Tech.H.Sch /5 yrs	—	—	1
6.	Chief of Light Mech	1	" /5 yrs	—	—	1
7.	Chief of Mach. Shop	1	" /5 yrs	—	—	1
8.	Chief of Lube Sect.	1	" /5 yrs	1	—	1
9.	Chief Electrician	1	" /5 yrs	—	—	1
10.	Master Mechanics	8	" /3 yrs	2	1	7
11.	Hyd. Sys. Specualist	1	" /3 yrs	—	—	1
12.	Fuel Sys. Specialist	1	" /3 yrs	—	—	1
13.	General Machinist	2	" /3 yrs	1	—	2
14.	Body & Fender Mech.	2	" /3 yrs	—	—	2
15.	Welder	1	" /3 yrs	—	—	1
16.	Ignition Sys. Spec.	1	" /3 yrs	—	—	1
17.	Elec. Sys. Specialist	1	" /3 yrs	—	—	1
18.	Inj. Sys. Specialist	1	" /3 yrs	—	—	1
19.	Stock Control Spec.	2	" /3 yrs	—	—	2

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.
  - (4) The number required does not include semi-skilled and non-skilled shop employees or office personnel.

**TABLE 4.44**  
**STAFF CAPABILITIES AND SUFFICIENCY**  
**PROVINCIAL WORKSHOP**  
**ACEH**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING (4)		
	POSITION (1)	NO. REQ. (1)	EDUCATION/EXPERIENCE (2) , (3)	TOTAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO REQ.
1.	Workshop Manager	1	Bus. Adm. Grad/5 yrs	1	1	—
2.	Chief of Warehouse	1	Tech.H.Sch. Grad/3 yrs	1	1	—
3.	Field Inspectors	4	" /5 yrs	6	4	—
4.	Service Manager	1	Mech.Eng.Grad./5 yrs	1	1	—
5.	Chief of Heavy Mech	1	Tech.H.Sch. /5 yrs	1	1	—
6.	Chief of Ligh Mech	1	" /5 yrs	1	1	—
7.	Chief of Mech. Shop	1	" /5 yrs	1	1	—
8.	Chief of Lube Sect.	1	" /5 yrs	1	1	—
9.	Chief Electrician	1	" /5 yrs	1	1	—
10.	Master Mechanics	8	" /3 yrs	8	6	2
11.	Hyd. Sys. Specialist	1	" /3 yrs	2	1	—
12.	Fuel Sys. Specialist	1	" /3 yrs	2	1	—
13.	General Machinist	2	" /3 yrs	3	2	—
14.	Body & Fender Mech.	2	" /3 yrs	3	2	—
15.	Welder	1	" /3 yrs	2	1	—
16.	Ignition Sys. Spec.	1	" /3 yrs	2	1	—
17.	Elec. Sys. Specialist	1	" /3 yrs	2	1	—
18.	Inj. Sys. Specialist	1	" /3 yrs	—	—	1

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.
  - (4) The number required does not include semi-skilled and non-skilled shop employees or office personnel.

**TABLE 4.45**  
**STAFF CAPABILITIES AND SUFFICIENCY**  
**PROVINCIAL WORKSHOP**  
**PALU – CENTRAL SULAWESI**

NO.	PROPOSED STAFFING REQUIREMENTS			EXISTING STAFF (4)		
	POSITION (1)	NO. REQ. (1)	EDUCATION/EXPERIENCE (2) (3)	TOTAL #	# QUALIFIED BY EDUCATION & EXPERIENCE	ADD. NO. REQ.
1.	Workshop Manager	1	Bus.Adm. Grad / 5yrs	—	—	1
2.	Chief of Warehouse	1	Tech. H. Sch Grad / 3 yr	1	1	—
3.	Field Inspectors	4	" / 5 yrs	—	—	4
4.	Service Manager	1	Mech. eng. Grad / 5 yrs	1	—	1
5.	Chief of Heavy Mech	1	Tech. H. Sch / 5 yrs	1	—	1
6.	Chief of Light Mech	1	" / 5 yrs	1	—	1
7.	Chief of Mach. Shop	1	" / 5 yrs	—	—	1
8.	Chief of Lube Sect.	1	" / 5 yrs	1	1	—
9.	Chief Electrician	1	" / 5 yrs	1	1	—
10.	Master Mechanics	8	" / 3 yrs	4	4	4
11.	Hyd. Sys. Specialist	1	" / 3 yrs	1	1	—
12.	Fuel Sys. Specialist	1	" / 3 yrs	1	1	—
13.	General Machinist	2	" / 3 yrs	1	—	2
14.	Body & Fender Mech.	2	" / 3 yrs	2	—	2
15.	Welder	1	" / 3 yrs	1	1	—
16.	Ignition Sys. Spec.	1	" / 3 yrs	1	1	—
17.	Elec. Sys. Specialist	1	" / 3 yrs	1	1	—
18.	Inj. Sys. Specialist	1	" / 3 yrs	1	1	—

- NOTE :**
- (1) The positions & numbers of proposed personnel are based on the recommendations contained in paragraph 10.2.
  - (2) A Bachelor of Engineering Degree with 5 or more years experience in a related field to that required will be considered as equivalent to the recommended Ir. degree.
  - (3) A Sr. High School Diploma with 2 or more years experience in a related field to that required will be considered as equivalent to the recommended Sr. Tech. School Diploma.
  - (4) The number required does not include semi-skilled and non-skilled shop employees or office personnel.



**SECTION 5**  
**CENTRAL GOVERNMENT AND OTHER**  
**ORGANIZATIONS, INSTITUTIONS AND**  
**AGENCIES ASSOCIATED WITH FEEDER ROADS**  
**INCLUDING THE PRIVATE SECTOR**

As noted in Section 4, the execution of the feeder roads program is at Provincial, and most particularly, at District level. The Central Government retains the responsibility for overall planning and programming, and the major funding for feeder roads programs. Within the last year there has been a major move to implement a centralization of programming in Jakarta and to institute the development and promulgation of nationwide rural roads physical standards, criteria, priorities and selection of rural roads for development.

The Central Government organizations with principal involvement in the rural roads program are the National Development Planning Board (Bappenas), the Department of Public Works (DPU) and the Department of Home Affairs (DOHA).

An outline of the organization of the Government of Indonesia is shown in Figure 5.1. For an overview of the overall institutional framework for managing and implementing District road programs see Section 6.

In addition to governmental organizations, institutions and agencies, private construction contractors (and to much lesser degree, private consultants) are either involved in or are capable of involvement in District roads programs. The private sector is discussed in the later part of this Section.

**5.1. THE NATIONAL DEVELOPMENT PLANNING BOARD (BAPPENAS)**

The preeminent agency for national planning is Bappenas. The organization of Bappenas is shown in Figure 5.2.

Bappenas is the Central Government agency assigned the responsibility for the development of national planning policy, for the coordination and approval of planning activities of other governmental agencies, and for assuring that Regional and District programs are in concert with national goals.

Although Bappenas is the key national agency concerned with policy, much of the detailed planning has been delegated to other governmental agencies. Of particular relevance to the rural road program are the planning and programming activities carried out by the Directorate

# ADMINISTRATIVE UNITS OF GOVERNMENT

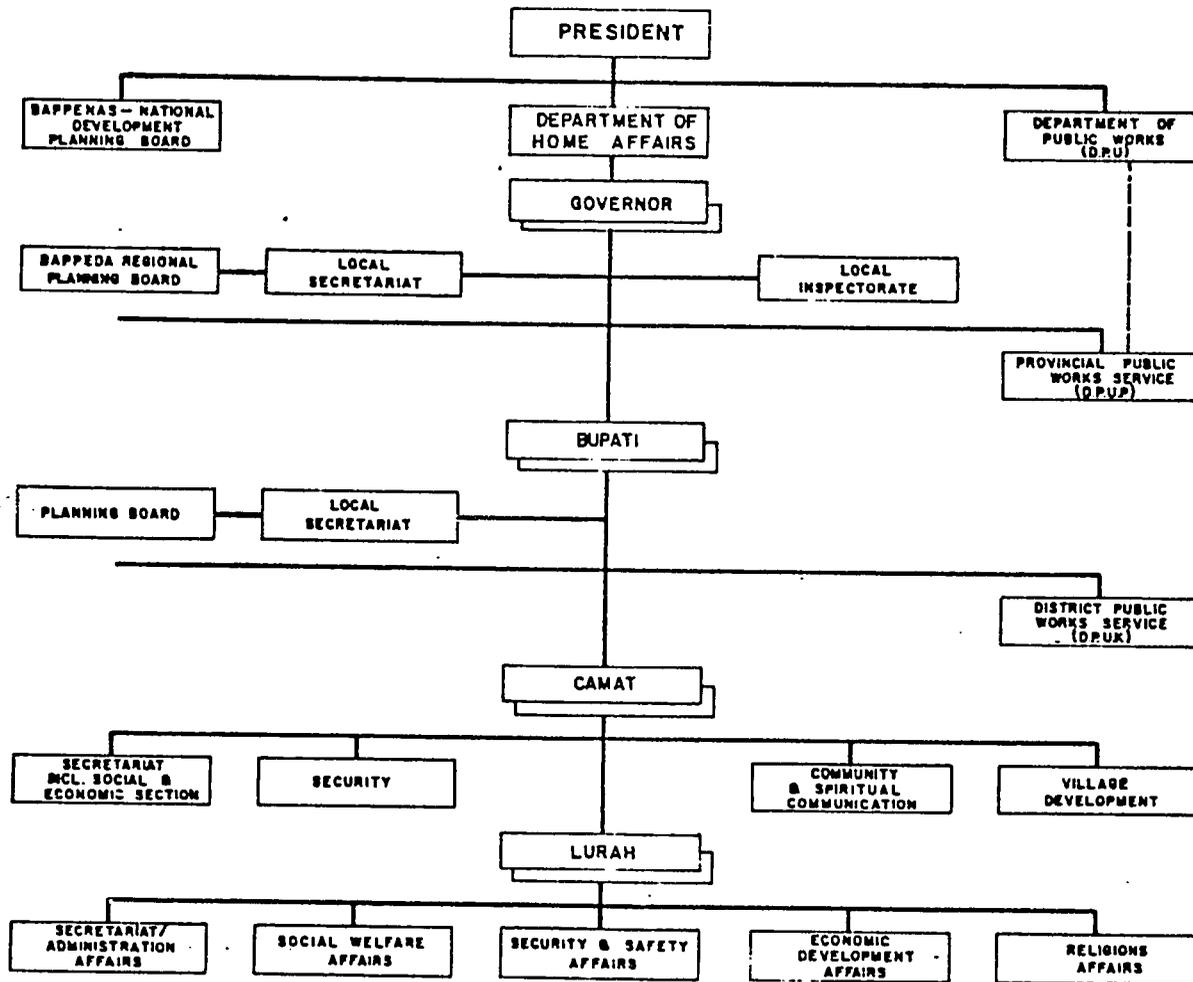
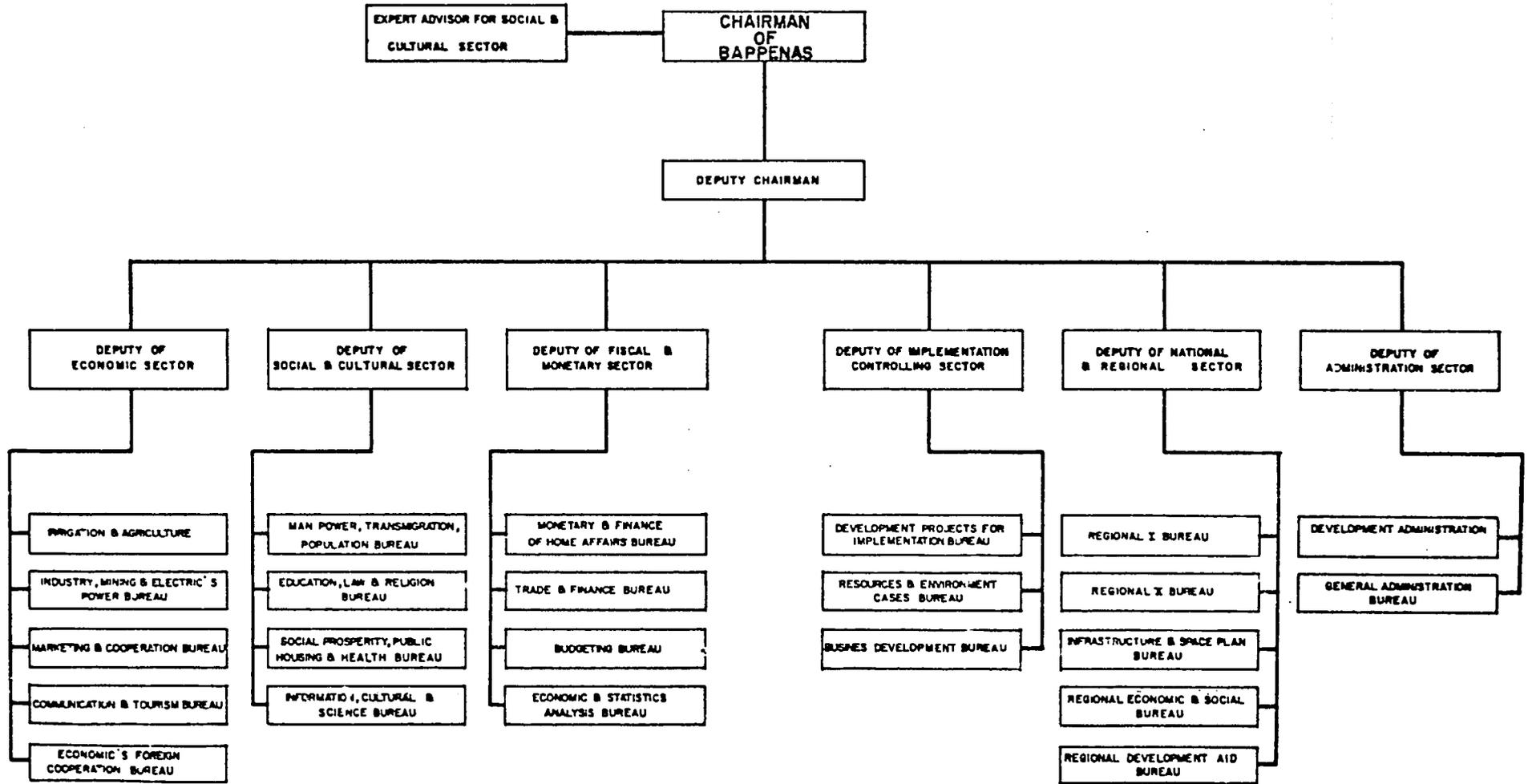


FIGURE NO 3.1

NATIONAL DEVELOPMENT PLANNING BOARD  
ORGANIZATION CHART



5-3

FIGURE NO 8.2

of City & Regional Planning, Directorate General of Housing and Buildings (Cipta Karya), Department of Public Works. These activities are discussed further in this Section (see 5.2). In this instance the Directorate of City & Regional Planning is acting essentially as Bappenas' agent.

Even though having delegated a major portion of the detailed planning and programming for rural development, Bappenas retains overall responsibility/authority for these activities, and remains the preeminent budgeting/funding/review institution of the Government of Indonesia.

Bappenas heads up the governmental team with representatives from the Departments of Public Works, Home Affairs, Finance, Central Bank and Representatives of the Provincial Development Boards which reviews annually and ultimately approves the programs (including feeder roads) originating at Provincial and District levels and forwarded to Bappenas by each Provincial Planning Board (Bappeda). See Sections 6 and 7 for further details of the proposal/review/funding process.

## **5.2. DEPARTMENT OF PUBLIC WORKS (DPU)**

The DPU has the Central Government responsibility for the development and maintenance of the road network throughout the Republic of Indonesia. The DPU organization is shown in Figure 5.3.

The two DPU Directorates with most relevance to District roads are the Directorate General of Highways (Bina Marga) and the Directorate General of Housing and Buildings (Cipta Karya). These two directorates encompass the major activities of engineering, and planning and programming for District roads.

### **5.2.1 DIRECTORATE GENERAL OF HIGHWAYS (DGH)**

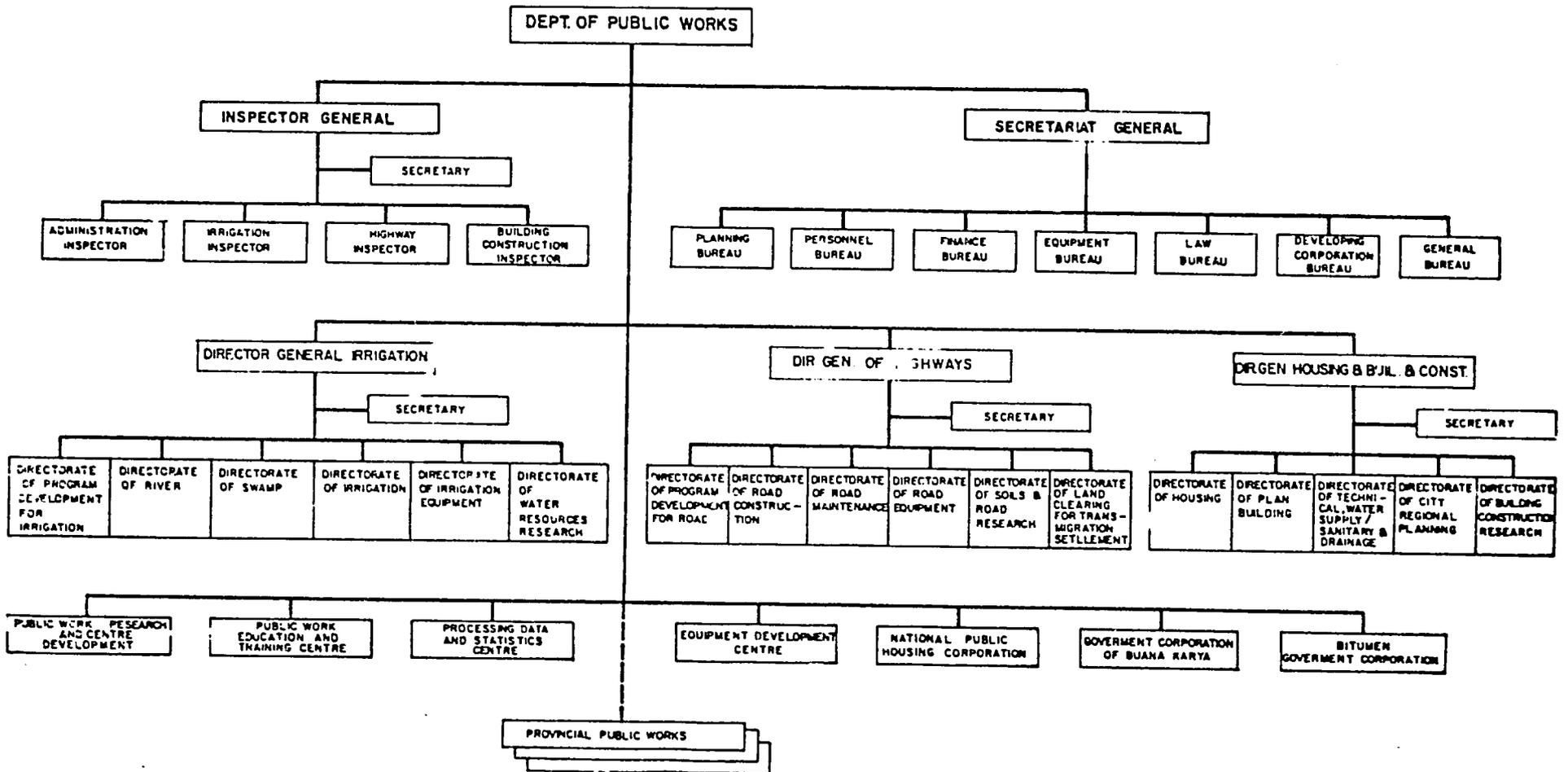
Bina Marga is by definition at the center of the national rural roads programs. The Bina Marga organization is shown in Figure 5.4.

There are two Directorates in the Bina Marga organization which have major influence on the rural roads programs. These are the Directorate of Road Planning (Bipran) and the Directorate of Land Preparation for Transmigration Settlement (PTPT).

#### **A. Directorate of Road Planning (BIPRAN)**

In recognition of the deficiencies in the feeder road development program, the Director General of Bina Marga and the Director of Planning plan to establish a new Sub-Directorate for Rural Roads. The proposed organization of this Sub-Directorate is shown in Figure 5.5.

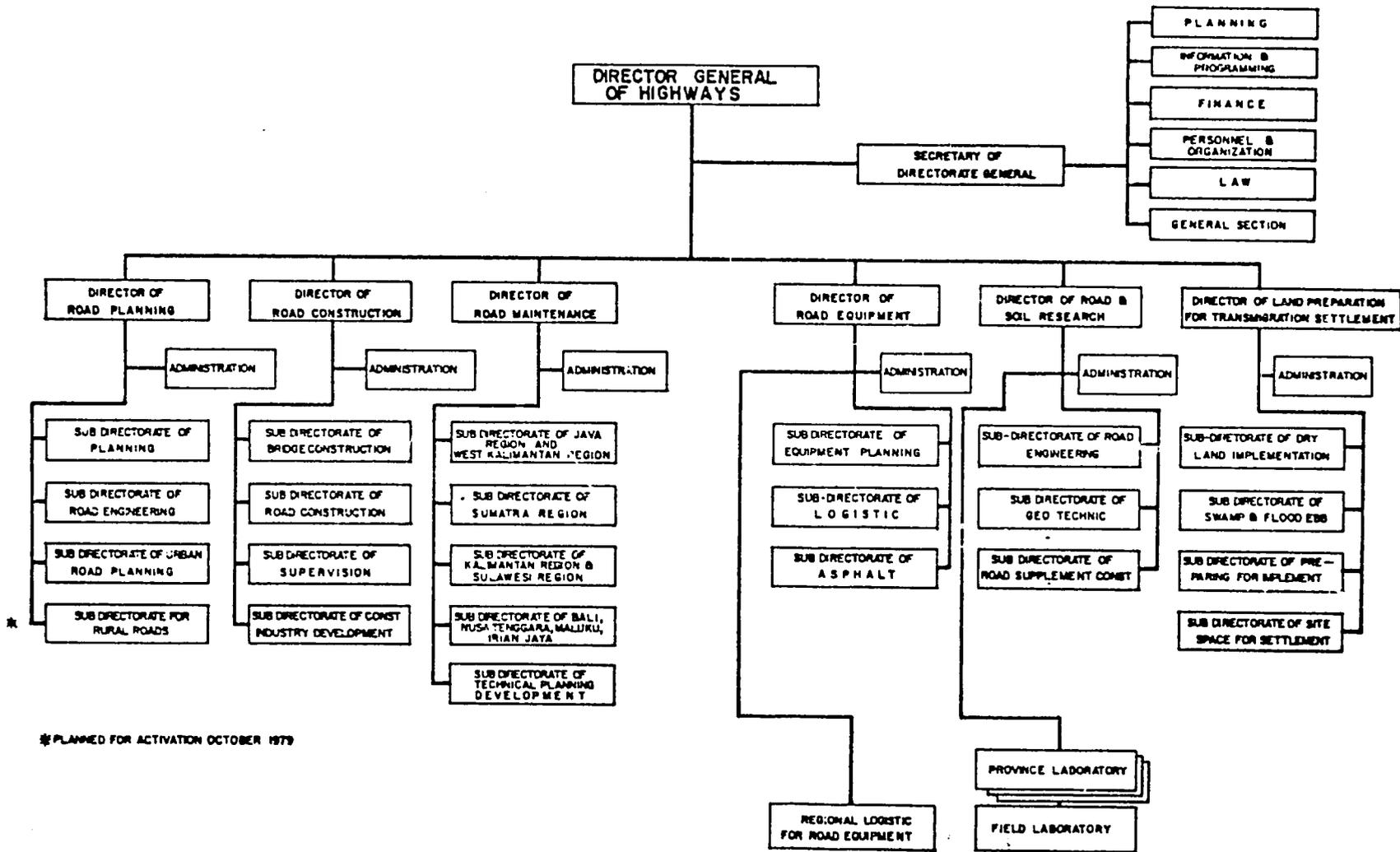
DEPARTMENT OF PUBLIC WORKS  
ORGANIZATION CHART



5-5

FIGURE NO. 5.3

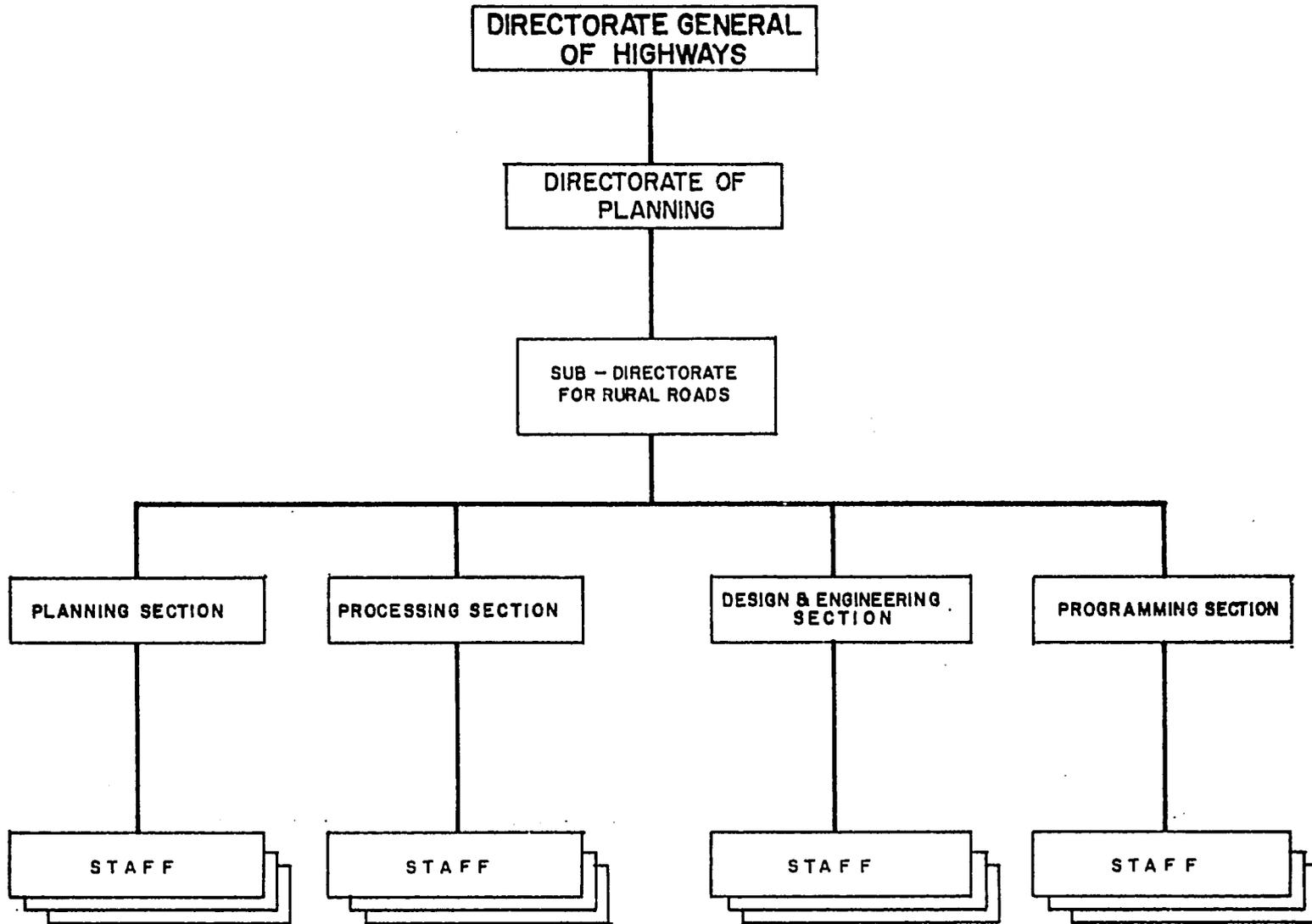
DIRECTORATE GENERAL OF HIGHWAYS  
ORGANIZATION CHART



\* PLANNED FOR ACTIVATION OCTOBER 1979

FIGURE NO 5.4

SUB-DIRECTORATE FOR RURAL ROADS  
ORGANIZATION CHART



5-7

FIGURE NO 5.5

As shown, it is proposed that this new Sub-Directorate will have four sections :

- (1) Planning
- (2) Programming
- (3) Design and Engineering
- (4) Data Preparation and Processing

The main responsibilities of this new organization will be as follows :

- (1) Organize road inventories and other data collection and information needed to support general planning requirements for local roads.
- (2) Organize data collection with reference to National, Regional and District development programs.
- (3) Analyze present and future traffic and transportation needs as they relate to local road development.
- (4) Upgrade and standardize general planning activities for local roads at the Provincial and District levels.
- (5) Develop programs for local road construction and improvement.
- (6) Determine implementation requirements (organization and equipment) for local road development.
- (7) Develop technical procedures and standards for local road projects.
- (8) Develop technical manuals.
- (9) Develop a data base for local road planning and development.
- (10) Compile and publish reports concerning the local road development program.

**B. Directorate of Land Preparation for Transmigration Settlement (PTPT)**

PTPT is responsible for land clearing and site preparation of each site within the selected transmigration settlement areas.

After preparation by PTPT, preliminary documents consisting of an outline plan, site plan and standard specifications are to be transmitted to Cipta Karya.

Cipta Karya after reviewing these preliminary documents, will transmit planning and engineering responsibility for the associated roads to Bipran. Bipran in turn will task its proposed Sub-Directorate for Rural Roads planning with the detailed implementation planning and programming.

The proposed Sub-Directorate for Rural Roads will prepare programming data, road construction drawings, specifications, cost estimates, tender documents, etc. These in turn will be submitted to PTPT which will be responsible for overall project implementation and management for the Bina Marga portion of the transmigration project.

The road constructed as part of a transmigration project may be later assigned to Province (s) or Districts for maintenance responsibility depending upon the classification of the particular roads.

### **C. Regional Betterment Office**

The Central Regional Betterment Office with the Bipran organization, has eight Regional Betterment Offices (in operation or planned) throughout Indonesia. The basic responsibility of these offices is to develop technical plans for the betterment of National and Provincial roads and bridges. These plans are based on anticipated traffic increases in the next fifteen years. Presently these offices do not plan for the betterment of District roads and bridges. However, activities of these offices require coordination with District/feeder road Planning.

### **5.2.2. DIRECTORATE GENERAL OF HOUSING AND BUILDINGS (CIPTA KARYA)**

Within the Cipta Karya is the Directorate of City & Regional Planning which is tasked with managing for the Bappenas and appropriate Departments the development of a long range plan and the formulation and implementation of standard planning and programming procedures for the entire nation.

The Directorate works in liaison with and provides advice and recommendations regarding a wide range of projects to the Bappenas and various government departments. For example, Transmigration Physical Planning starts within the Directorate, and through active involvement of a government coordinating body ultimately involves coordination and participation of 42 Directorate level organizations of the Central Government.

An overall planning sequence has been developed which involves steps leading from a long range general plan to annual plans. Appropriate screenings at National, Sectoral and Provincial levels will be held between each planning step. The descending order of the planning sequence is as follows :

- (1) Long Range Plan (25–30 years)
  - Screening
- (2) 20 Year General Plans
  - (a) Individual
  - (b) Provincial

- (c) Sectoral\*
  - Screening —
- (3) Five Year Programs
  - (a) Provincial
  - (b) Sectoral
    - Screening —
- (4) Annual Plans
  - (a) Provincial
  - (b) Sectoral

At present the Annual Plans and Five Year Programs are being implemented, with planning activities being carried out down to Provincial and District levels. It is anticipated that within the next year the initial 20 Year Plans will be formulated.

One of the tasks of this Directorate is to determine how far the planning and programming can be delegated. This delegation has been made down to two operating levels – the Provincial and District level, and currently under consideration is whether a third level of delegation should be made, e.g. to Sub-District (Kecamatan) or Village (Desa) level.

### 5.3. DEPARTMENT OF HOME AFFAIRS

The Department of Home Affairs has the overall responsibility for Inpres II (District) and Inpres Jalan programs. The department also is responsible for other projects involving District roads through the Directorate of Village Development.

The involvement of the Department of Home Affairs in the annual District roads project review with Bappenas is discussed in Paragraph 5.1.

### 5.4. DEPARTMENT OF MANPOWER AND TRANSMIGRATION

The Department of Manpower and Transmigration develops preliminary documents related to transmigration settlement areas. These documents, in the form of an outline plan, site plan, and standard specifications are transmitted to the Directorate General of Housing and Buildings for further processing. The subsequent activities by this directorate and DGH are as discussed in Paragraph 5.2.

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\* Examples of Sectoral plans are Agriculture, Industry and various regional development plans (such as Transmigration).

## **5.5. TRAINING INSTITUTIONS**

Indonesian training institutions (academic and technical) range from universities through technical training centers and high schools. The universities, their affiliates and other academic institutions have limited impact on the training of personnel involved in feeder roads management and execution. However, although not specifically designed to directly support the country's road programs, academic courses of study such as civil engineering do provide support.

More important in satisfying the training needs of District road programs are the DPU Regional Training Centers and training offered by the DPU Training Center in Jakarta.

### **5.5.1. DPU CENTRAL TRAINING CENTER**

The Central Training Center, located in Jakarta, is administered by the Department of Public Works (DPU). The organizational elements of the Central Training Center are shown on Figure 5.6. The operational training requirements and associated funding are furnished by the various Directorates within the Department of Public Works. For Fiscal Year 1979/1980, the Director General of Highways budget to the center was approximately 1.0 billion rupiah. A maximum of five million rupiahs of these funds are distributed to each of the 26 Provincial DPUP offices to cover travel and living expenses of the training officer who delivers the training material upon request to the Districts for viewing, and travel and living expenses for those trainees attending seminars at the Regional Training Centers.

The subjects and course objectives are recommended and outlined by the Directorate General of Highways Training Section in management, administration, engineering and equipment utilization, operation and maintenance. Tables 8.30 through 8.32 list those courses that are presently available. The texts to satisfy these course objectives are left to the discretion of each Regional Training Center and the part time instructors.

Table 8.30 lists courses and the number of personnel that have completed these courses and those scheduled to take these courses during fiscal year 1979/1980. This list also indicates the participants' educational and experience background. The course material consists of audio/visual slide presentations and workbook study plans. These courses are given at the DPU Central Training Center and the five established Regional Training Centers. The Regional Training Centers are discussed in paragraph 5.5.2.

Table 8.31 lists the "self-instructional" courses that have been developed. These courses are predominately audio/visual (i.e. slides in conjunction with a cassette tape recording) and are available on request to the Provinces through the DPUP Training Centers. These courses are delivered to the requesting Districts and shown by the Provincial Training Officer who for Bina Marga presentations is generally selected from the Bina Marga section of DPUP.

Table 8.32 lists those courses that are engineering oriented. They cover drafting, surveying,

# DPU CENTRAL TRAINING CENTER ORGANIZATION

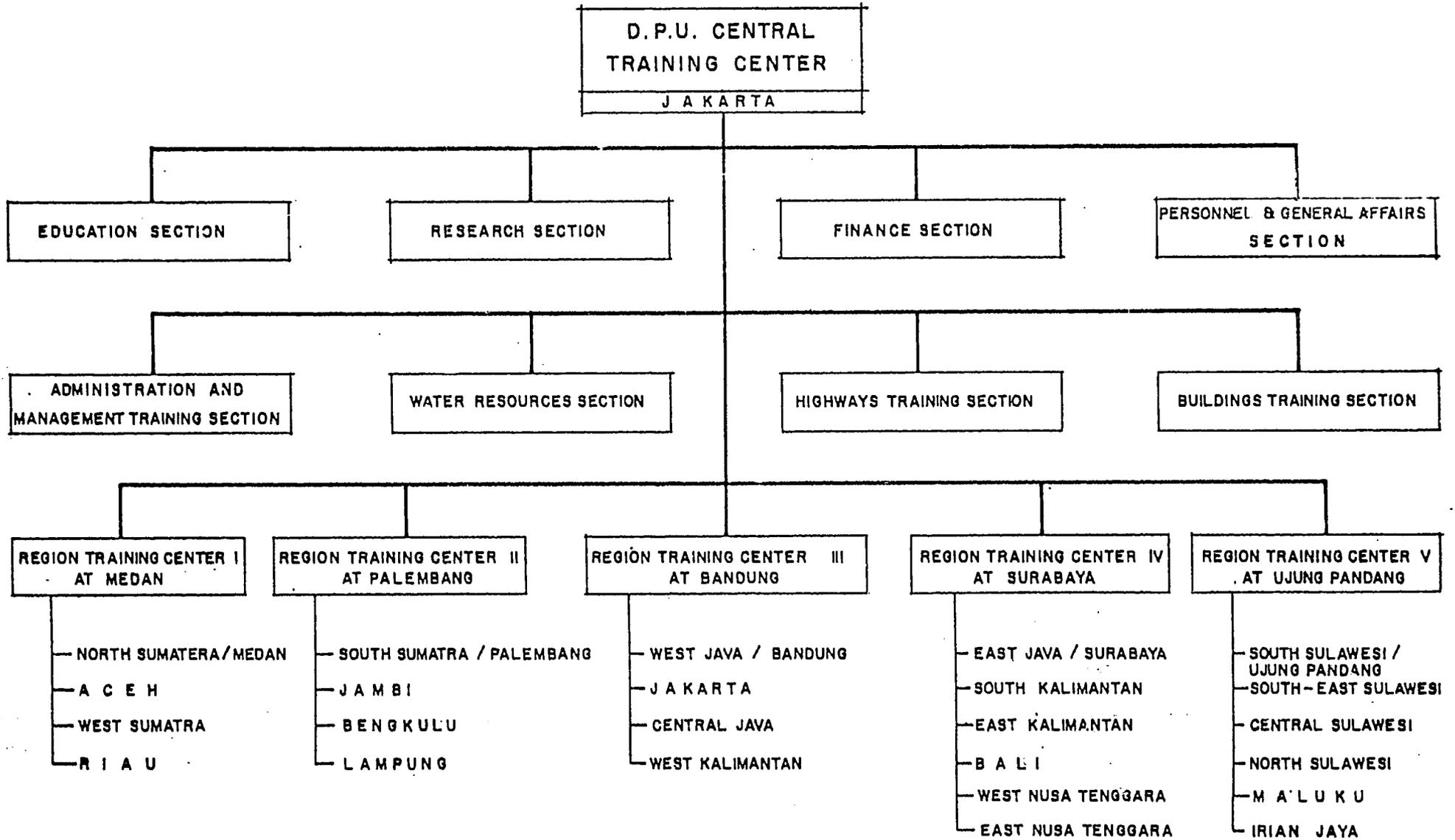


FIGURE NO. 5.6

5-12

mathematics, design and maintenance fundamentals. These courses are offered by the DPU Training Centers on a forty hour a week basis for approximately one month.

### 5.5.2. DPU REGIONAL TRAINING CENTERS

Presently there are five established DPU Regional Training Centers. They are located in Medan, Surabaya, Jogjakarta, Ujung Pandang and Bandung. A typical functional organization (prescribed by the Central DPU Training Center) for these centers is from the Medan organization (See Figure 5.7) and varies slightly with each Regional Training Center.

There are no permanent instructors within the organizational structure. Instructors are obtained, as required, from the DPUP organizations and from Bina Marga within the DPUP to lecture on engineering subjects relative to roadworks. These instructors develop or modify previously developed course material to satisfy the Bina Marga objective of the courses outlined in Tables 8.30 and 8.32. Most of these instructors are graduate engineers with five to ten years experience.

A "Training Schedule" of those courses offered is published for review by the Centers. Each DPUP has the prerogative, as funds permit, to send selected personnel to these courses.

The Regional Training Center in Medan has three classrooms which can accommodate a maximum of 120 students without provisions for room and board. With these provisions, this center can accommodate 80 students. An expansion of this facility is planned in 1980 to add two more classrooms and in 1981 to build an additional boarding house. This will increase the Center's capacity to 200 students without room and board and 160 students with room and board. The cost per student is Rp 75,000 per month if room and board are provided.

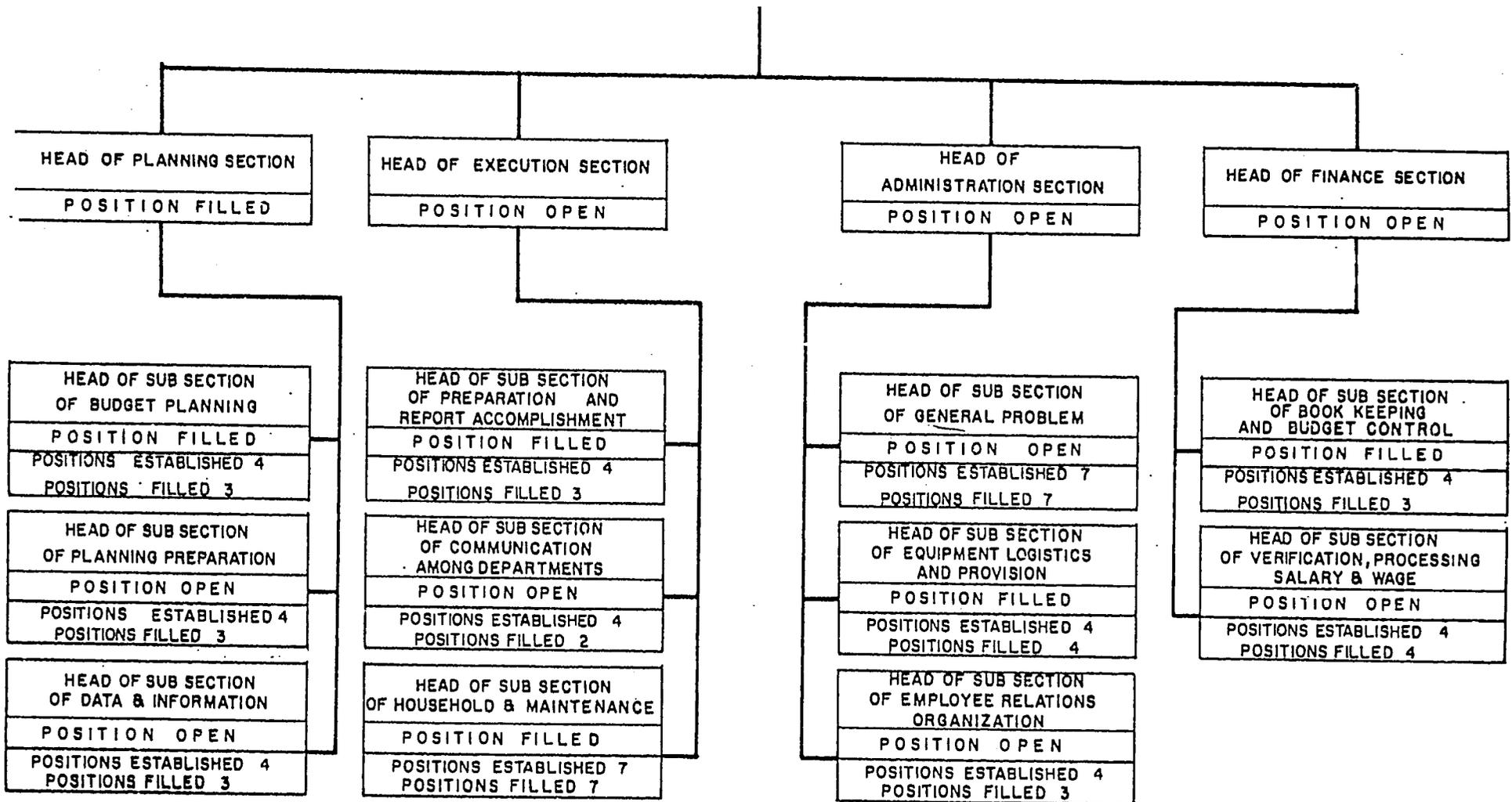
The available training equipment and aids include survey equipment and one overhead sound slide projector. No laboratory equipment is available.

The Regional Training Center in Surabaya has two classrooms which can accommodate 40 students each. It also has a dormitory which can provide room and board for 80 students. An expansion of this facility is in the planning stage. The increase in accommodations as a result of this expansion was not available nor was the anticipated completion schedule.

The Regional Training Center in Jogjakarta has twelve classrooms which can accommodate 30 students each. It also has dormitories which can provide room and board for 100 students. Any expansion planned for this facility was not determined but it was observed that extensive improvements should be made.

The equipment and training aids available include surveying equipment, twelve bridge design models, overhead sound projector, 8 mm film projector and a slide projector.

# REGIONAL TRAINING CENTER ORGANIZATION



5 - 14

FIGURE NO. 5.7

The Regional Training Center in Ujung Pandang has three classrooms which can accommodate 40 students each and a dormitory which can provide room and board to 40 students. Another facility (including boarding), located approximately 17 Km from Ujung Pandang has been built which can accommodate 30 students. The available training equipment and aids are limited to a slide projector and a tape recorder.

The Regional Training Center in Bandung has two classrooms which can accommodate a total of 65 students and a dormitory which can provide room and board for 30 students. Expansion of this training center is currently under construction and is scheduled to be completed in 1980. The expansion includes ten additional classrooms and a dormitory which will increase the classroom capacity to 300 students and room and board accommodations to 94 students.

The training equipment consists of two slide projectors, one overhead projector, one 8 mm movie projector, one 35 mm camera and one opaque projector. All of the equipment is in good operating condition.

### 5.5.3. DPUP TRAINING ACTIVITIES

Each DPUP has a training sub-section and a "Provincial Training Officer". This training officer also works in the personnel department and as such assumes dual responsibilities. His primary responsibility is to coordinate the Provincial and District training needs and perform the necessary administrative functions for implementation. The Training Officer delivers the requested training material for viewing to the Districts. This officer does not "train", he operates the viewing equipment and makes the necessary arrangements for those selected candidates to attend seminars at the Central and Regional Training Centers. In addition, he performs the administrative functions to support those personnel who have been selected as instructors at the Regional Training Centers.

Five DPUP's have been selected to give equipment operation training. They are located in Medan, Bandung, Palembang, Surabaya and Ujung Pandang. Their respective regional responsibilities are shown on Figure 5.6. Each of these five DPUP's (Bina Marga section) has five equipment instructors; one each for dump trucks, loader, motor grader, crawler tractors and road roller. The initial training is given at the requesting Provincial workshops. This training is limited to equipment operations. Following this, on-the-job training is given at on-going projects.

Equipment training is scheduled twice a year for each Province. However, this schedule is not met due to lack of funds for this type of training within the 1.0 billion rupiah allocated by Bina Marga to the DPUP Central Training Center.

## **5.6. INTERAGENCY COORDINATION IN THE FUNDING PROCESS FOR RURAL ROADS**

Interagency coordination in the funding follows the pattern previously described in this Section and in Sections 4,6 and 7.

The major element in coordination for District road programs, indeed all Regional, Provincial and District development programs is Bappedas (Badan Perencanaan Daerah). Each Bappeda has primary responsibility for coordination of District and Provincial plans. The Bupati's office (Sub-Bureau of Development) review all funding requests which are then passed to the Provincial authorities for review. DPUP's perform a technical evaluation and Bappedas evaluate from a social and economic point of view.

Thus the regional administration in the form of the regional planning board, Bappeda, has primary responsibility for the coordination of planning, funding and implementation of rural road projects.

Annual regional consultations are held in July in each of the four major regions for all member Bappedas with officials of Bappenas and Central Government departments. This signals the initiation of the annual budget cycle. The Bappedas then return to the Provinces to coordinate with local agencies in preparing preliminary project proposals. These proposals are sent to Jakarta in October for a national review by Bappenas and Central Government departments.

To date a fundamental weakness in this process is the shortage of skilled manpower and the absence of a means to develop trained planning/analysis manpower.

The mechanism exists for effective coordination. Indeed, within individual programs such as Inpres II, coordination appears to be better than among programs. Better coordination is needed among the Inpres II, Inpres Jalan, and Padat Karya programs plus the integration of Desa programs where appropriate. Further, agriculture, transmigration and other national development programs are growing and will require ever-increasing coordination if the available funding is to be maximized.

Bappedas are in place. However, they are inadequately staffed at times. In each of the four Provinces, Bappedas manpower requires upgrading in both quantitative and qualitative terms in order to effectively coordinate present and projected program requirements. Specific weaknesses in manpower are discussed in Section 8.

## **5.7. ORGANIZATIONS INVOLVED IN PLANTATION, SAWMILL AND MINING OPERATIONS**

Various organizations are involved in plantation, sawmill, mining, and similar operations which require construction of roads linking their local activities to the National, Provincial

and/or District road systems. No data was readily available concerning the numbers and lengths of these roads, nor their effect on rural road development programs. In theory, these road construction activities are to be coordinated with Provincial and District road programs. Of particular relevance to District road programs is the impact of such operations on traffic volumes and types generated onto public roads, and secondly the follow-on government responsibility for these "specialty roads" if and when they are absorbed into the public road system.

## **5.8. PRIVATE SECTOR**

Evaluation of the private sector capabilities relative to supporting District Roads development programs has been limited to construction companies and consulting engineering firms. The equipment and materials industries were not specifically surveyed; however, it is to be noted that major equipment manufacturers' dealership and service organizations are represented in each of the study provinces with Komatsu and Caterpillar dealerships offering fairly good service capability. Basic building material-aggregates, cements, reinforcing steel are in good supply and readily available (except for transportation limitation in some locales) to support planned projects. Projects requiring fabricated steel could present a transportation problem as local capability does not exist in the study provinces.

### **5.8.1. PRELIMINARY EVALUATION OF CONSTRUCTION COMPANIES**

The four study provinces use uniform prequalification standards for three areas of civil works- Irrigation, Cipta Karya (building) and Bina Marga (roads and bridges). These standards are well suited to the needs of evaluating, prequalifying, and ranking general contractors for road and bridge construction.

The ranking of contractors during prequalification utilizes the weighting of capability factors (personnel, construction plant and equipment, financial capacity, and prior experience) by a jury system of representatives (which may vary between Provinces) appointed from various agencies engaged in the Province's development programs. Prequalification is performed by the DPUP and the data on qualified bidders is distributed to the Provincial Governor, Bappeda, the Bupatis (Head of District Governments), and all functional groups of DPUP and the Ministry of Public Works in Jakarta.

The major elements of contractor prequalification reflecting specific capabilities are shown in Table 5.1 with the example given defining that of Central Sulawesi. There are minor variations between Provinces, but the general rationale is similar.

#### **A. Qualified Contractors by Province/District**

The prequalified contractors listed in the four provinces of study are extensive. In lieu of reproducing these lists, they have been condensed into summaries of each Province which

**TABLE 5.1**  
**CONTRACTOR PREQUALIFICATION**

SPECIFIC CAPABILITIES	CONTRACTOR CLASSIFICATION*			
	A	B	C	D
<b>I. PERSONNEL</b>				
University Grad – Civil	1	–	–	–
Academic – Civil	1	1	–	–
Academic – Electrical / Mechn.	1	1	–	–
Other Staff :				
Craftsman – Civil Work / Irrigation	4	3	2	1
Supervision & L. borers	5	3	2	1
Surveyors	1	–	–	–
Administration ( al. other staff )	4	3	2	1
<b>II. EQUIPMENT</b>				
Truck	5	3	1	–
Bulldozer	2	1	–	–
Powered roller / roller vibrator	3	2	–	–
Grader	1	1	–	–
Loader	2	1	–	–
Asphalt Mixing Plant	1	–	–	–
Asphalt Finisher	1	–	–	–
Excavator	–	–	–	–
Backhoe	1	–	–	–
Hand – Operator Compactor	2	–	–	–
Hand – Operator Vibrator	3	2	1	–
Motorized Lift ( Materials )	1	–	–	–
Pile Driver	1	–	–	–
Concrete Mixer	2	1	–	–
Surveyor Instruments	2	1	–	–
Water Pump	3	2	1	–
Welding Machine	2	–	–	–
Mobile Crane / Water Truck	2	–	–	–
Jeep / Pick – Up	1	–	–	–
Motor Bicycle	4	3	2	1
<p><b>NOTE</b> : Numbers in each ranking category represents the minimum requirement in each specific capability.</p> <p>* Classification discriminate as to which contractors ( subjects to capability ) will be permitted to bid given projects.</p> <p style="text-align: right;">( Sheet 1 of 2 )</p>				

III. OFFICE FACILITIES – detail omitted for brevity

IV. FINANCIAL CAPABILITY

With respect to financial capacity, Class A contractors must be capable of financing 30 percent of a given project ; Class B, 10 percent. No capacity is specified for classes C and D. Other financial information includes rupiah volume by quarters of proceeding year.

V. EXPERIENCE

As to experience, the standard does not specify any minimum and maximum number of years, nor value and number of prior contracts. This factor would be relevant primarily to difficult projects with tight schedules where prior experience and performance would be a major concern in contract award. Generally, this should not represent a major area of concern on the majority of District road projects observed.

In the area of special construction and/or erection such as steel trusses and prestress concrete bridge components, it is acknowledged that prequalification should include successful performance on prior projects of similar scope.

The consultant believes this prequalification standard represents a satisfactory means of contractor evaluation with the exception that equipment maintenance personnel need to be added. Further, the prequalified contractors established hereby reflects the capability of the Private Sector as well as any alternative means of evaluation within the scope of this study.

( Sheet 2 of 2 )

TABLE 5.2  
CONTRACTOR CLASSIFICATION

CENTRAL SULAWESI	CONTRACTOR CLASSIFICATION			
	A	B	C	D
Donggala	11	12	51	34
Poso	0	9	14	22
Banggai	1	7	11	14
Buol Toli Toli	0	1	3	9
Totals	12	29	79	79

( Sheet 1 of 2 )

TABLE 5.2 ( Continued )

J A M B I	CONTRACTOR CLASSIFICATION				
	B 3	B 2	B 1	BO*	Total
Batang Hari	—	—	—		—
Sarolangun — Bangko	—	—	1		1
Bungo — Tebo	—	—	—		—
Kerinci	—	—	4		4
Tanjung Jabung	—	—	1		1
Jambi City	17	20	38		75
Totals	17	20	44	—	81

\* Jambi Province uses only 3 classifications to rank the prequalified contractors as to relative capability.

W. NUSA TENGGARA	CONTRACTOR CLASSIFICATION				
	B. III	B. II	B. I	B.O	Total
West Lombok	6	6	14	11	37
Central Lombok	—	—	—	4	4
East Lombok	—	—	—	3	3
Sumbawa	—	1	3	1	5
Bima	—	—	7	1	8
Dompu	—	—	2	5	7
Totals	6	7	26	25	64

A C E H	CONTRACTOR CLASSIFICATION					
	A 1	A 2	B 1	B 2	C	Total
Aceh Besar	3	—	13	6	12	34
Aceh Pidie	—	—	2	1	5	8
North Aceh	1	—	6	—	8	15
East Aceh	—	—	4	—	8	12
South East Aceh	—	—	—	—	2	2
Central Aceh	—	—	1	—	2	3
South Aceh	—	—	—	—	2	2
West Aceh	—	—	1	—	7	8
Totals	4	—	27	7	46	84

( Sheet 2 of 2 )

identify by District the number of contractors in each classification (See Table 5.2).

#### **B. Capabilities to carry out future District road construction programs**

Within the limited scope of this study, a truly quantitative evaluation of the private sector capability to support the execution of expanded District road programs is not feasible. Proposals in both the DPUP and DPUK areas of responsibility have not been completed for FY 1979/1980. In view of this fact, it is recommended the follow-on program attempt to obtain more quantitative definition of future programs, roads and bridges, in order that a more accurate assessment can be made of local contractor capability to support these programs. This is believed to be essential to assure that the other elements of the follow-on implementation can be tailored in light of these contractor capabilities.

However, it is to be noted that in the recent past, the private sector has been able to execute all the contracted rural road and bridge projects. It is the consultant's judgement that construction contractors have been performing adequately at the levels of construction and to the standards of construction imposed to date. With proper guidance/supervision from the DPUK/DPUP organizations, (and with follow-on consultant assistance) the consultant believes the contractors are capable of expanding their work forces and upgrading their quality of work to support a program several times that of recent years.

As to special projects, where other capabilities than those noted by the preceding prequalification summary are desired, tenders for these projects would have to be issued which specified the contractor experience and capability factors exceeding the standard in use. Representative projects in these study provinces would include steel truss bridges and precast/prestressed concrete. In both instances however, qualified contractors can be found within Indonesia for these types of projects. In addition, local contractor capability could be developed in these areas through training, consultant support and additional equipment.

#### **5.8.2. PRELIMINARY EVALUATION ON CONSULTING FIRMS**

The participation of private sector consulting firms on feeder roads projects is essentially nil. Consulting firms do however, participate in both the National and Provincial road programs. These firms are for the most part Java-based organizations which are engaged by DGH. These firms would be capable of planning, mapping, location surveys, designs, and construction management for District road projects.

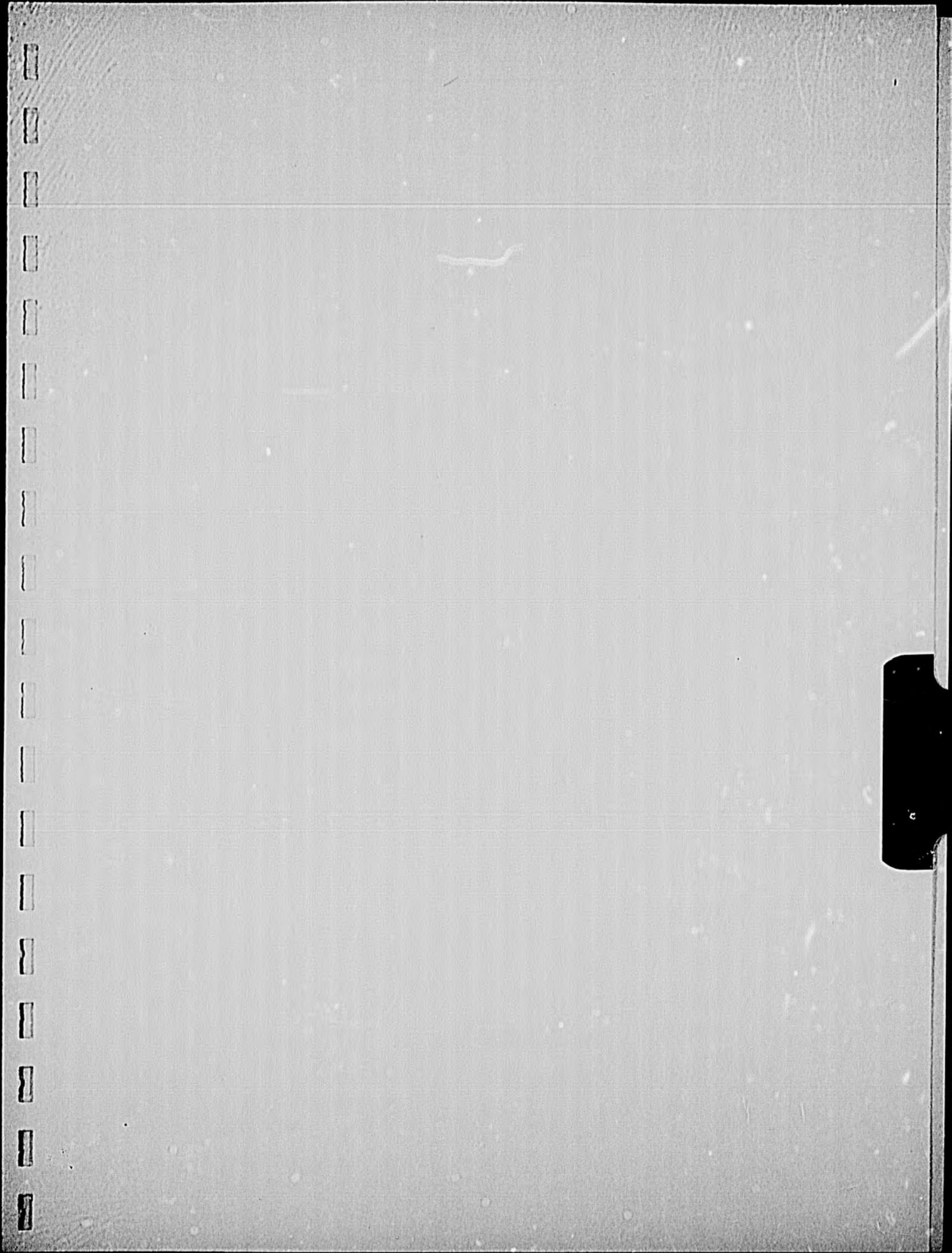
Qualification of Province-based firms are very limited in the educational attainments of their staffs. Also the executive directors of many of these consultants do not have engineering background. A representative survey of the qualifications of Province-based consulting firms is shown in Table 5.3, with the example being 12 Central Sulawesi based firms.

Of the 12 firms, listed in Table 5.3, only 4 firms (see  $\Delta$  design in Table 5.3) represent a desirable level of engineering qualifications at the staff and/or executive director levels to perform any substantial engineering for road and bridge projects.

**TABLE 5.3 – QUALIFICATIONS OF PROVINCE – BASED CONSULTING FIRMS  
( CENTRAL SULAWESI )**

NO OF FIRMS	EMPLOYEE EDUCATION STATISTICS		EXECUTIVE DIRECTOR		ITS* OR ITB* GRADUATES ON STAFF
	ENGR. GRAD.	OTHER UNIV. DEGREE	ENGR.	NON ENGR.	
6	0	2 firms, 1 each	0	1	No
2	1	0	1 ( $\Delta$ ) of 2	1 of 2	No
2	2 ( $\Delta$ )	0	0	1	Yes, 1 each
1	3	0	0	1	Yes, 1 ( $\Delta$ )
1	6	1	0	1	No

\* On the basis of qualifications summaries received, these institutions ( Institute of Technical Surabaya and Bandung ) appeared to be the only ones represented whose civil engineering programs would afford the desired level of training.



## SECTION 6

### OVERALL INSTITUTIONAL RELATIONSHIPS

Section 4 and 5 address the various institutional, organizational and procedural relationships involved in feeder roads programs. This section summarizes the institutional relationships among these various governmental organizations. The following discussions and referenced figures depict information flows, funding flows, review and approval cycles, and the implementation cycle. The last digits of the following paragraphs are keyed to the numbers shown on the figures.

Recommendations as to how these relationships and procedures can be improved are addressed in Section 10 of this report.

#### **6.1. INPRES II ( AND INPRES JALAN )\*, (FIGURE NO. 6.1 & 6.2.)**

- 6.1.1. Presidential Instructions are issued to the Department of Home Affairs who has the overall responsibility for Inpres programs.
- 6.1.2. The Department of Home Affairs issues a "Joint Decree" with the Department of Finance and the Chairman of Bappenas. Inputs, based on long term planning, will be provided by the Sub Directorate of Rural Roads (when activated) and Cipta Karya. The main principles of the Inpres programs are stated as well as the amount of funding available to each District.
- 6.1.3. Instructions from the Department of Home Affairs to the Governor give details concerning project selection, preparation and checking of implementation, and transfer of funds
- 6.1.4. The Governor assigns the Bupati as project leader and requests a proposal of recommended projects listed according to priority.
- 6.1.5. This proposal is submitted to the Bappeda which conducts a budgetary review and lists those projects that are eligible for funding.
- 6.1.6. This approved list is returned to the Bupati who is responsible for the preparation of a project form called a "DURP". The Bupati assigns the planning input to the

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\* Details of Inpres Jalan process have not been firmed up nor available in English at this time. However, it is assumed that events will be similar to those for Inpres II.

INPRES II \*  
FUNDING, APPROVAL & IMPLEMENTATION FLOW CHART

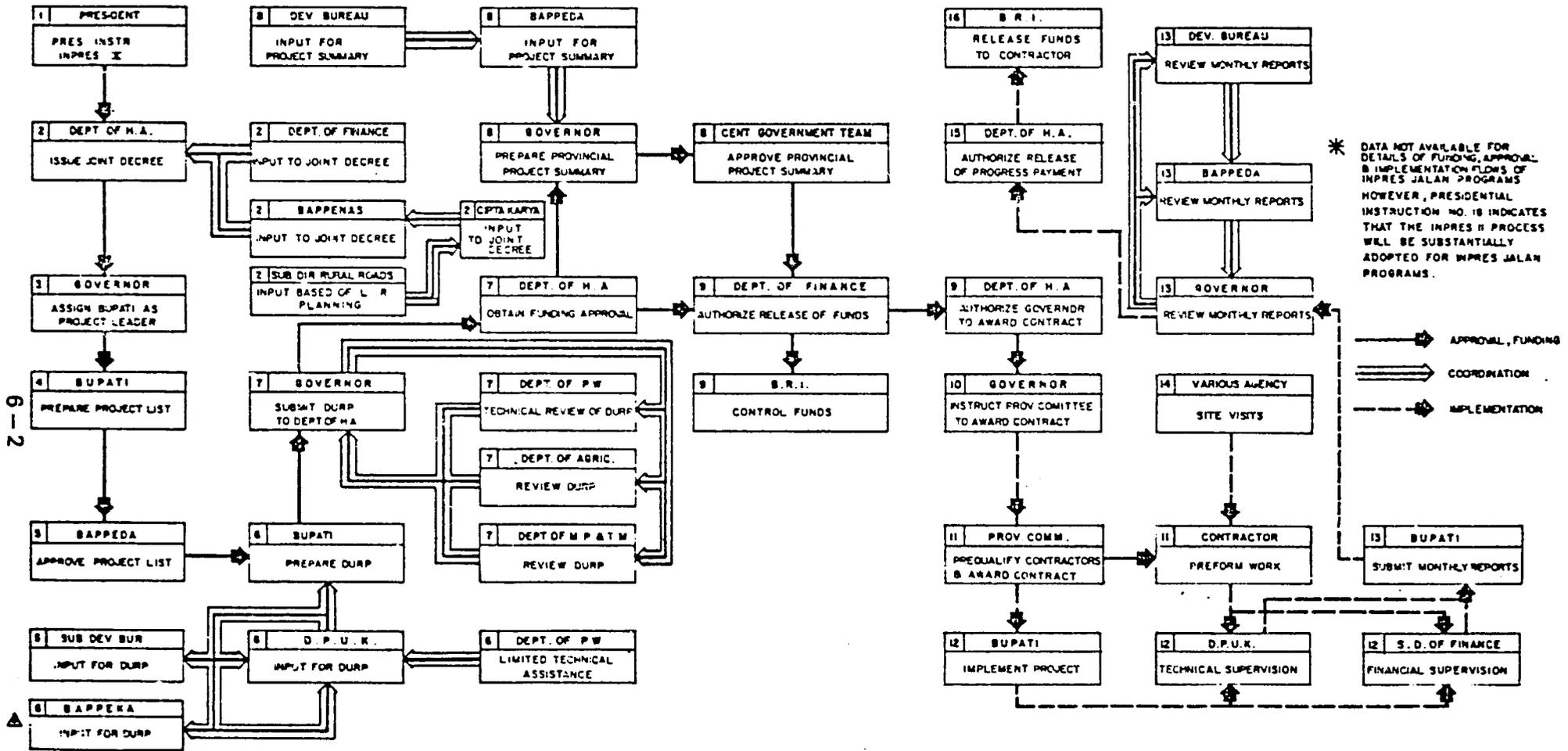


FIGURE NO. 6.1

INPRES II - INSTITUTIONAL RELATIONSHIPS

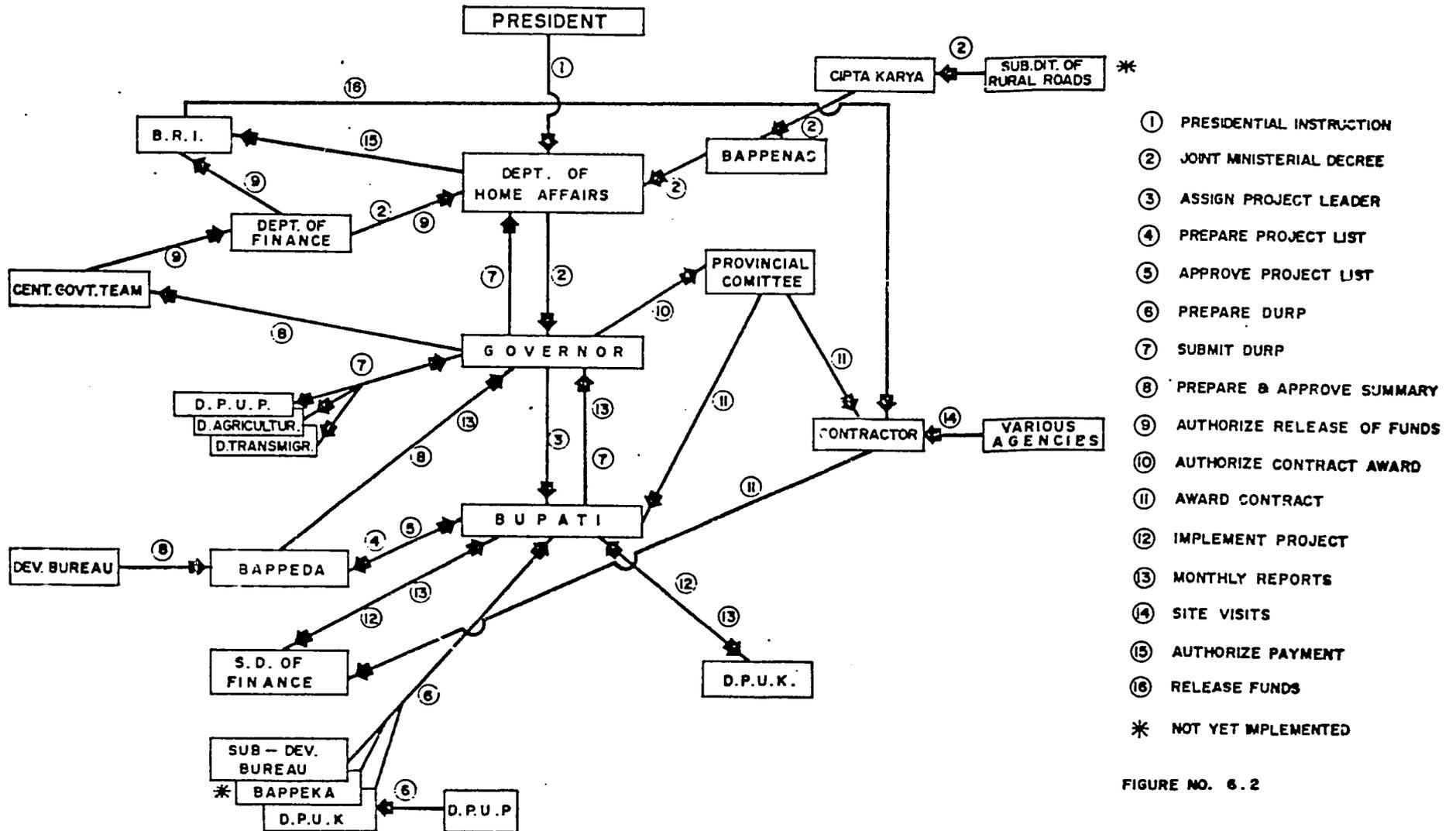


FIGURE NO. 6.2

DURP to the Sub-Development Bureau and Bappeka\*\* and the technical inputs to DPUK who in turn may require and occasionally receive limited technical assistance from the Department of Public Works.

- 6.1.7. The DURP is submitted to the Governor for approval. The DURP is reviewed by the provincial Departments of Public Works, Agriculture, and Transmigration and manpower for the technical and employment aspects of the project. The Governor then submits the approved DURP to the Department of Home Affairs for funding approval.
- 6.1.8. Upon funding approval by the Department of Home Affairs, the Governor, with inputs from the Development Bureau and Bappeda, prepares a Provincial project summary and forwards it to the Central Government INPRES team for approval. This team consists of members from the Departments of Public Works, Agriculture, Transmigration and Manpower.
- 6.1.9. This summary is issued to the Department of Finance who issues a letter to the Bank Rakyat Indonesia authorizing the release of project funds. This letter is also forwarded to the Department of Home Affairs who authorizes the Governor to award the necessary contracts for implementation.
- 6.1.10. The Governor issues instructions to the Provincial Committee, composed of representatives from DPUP, Bappeda and the Provincial Development Bureau, to award the contract.
- 6.1.11. The Provincial Committee awards the contract and forwards appropriate documentation to the Bupati for implementation as Project Leader.
- 6.1.12. The Bupati assigns technical supervision to the DPUK and financial control to the Sub-Directorate of Finance in the District.
- 6.1.13. The Bupati submits monthly progress and financial reports to the Department of Home Affairs, through the Governor.
- 6.1.14. Site visits are made by the INPRES team, Provincial Directorate of Finance and Inspection.
- 6.1.15. The Department of Home Affairs reviews the Bupati's monthly progress report and authorizes release of funds.
- 6.1.16. Bank Rakyat Indonesia releases funds for progress payment to the contractors.

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\*\* Bappekas have not yet been implemented in the four study Provinces.

## **6.2. PADAT KARYA (FIGURE NO. 6.3 & 6.4.)**

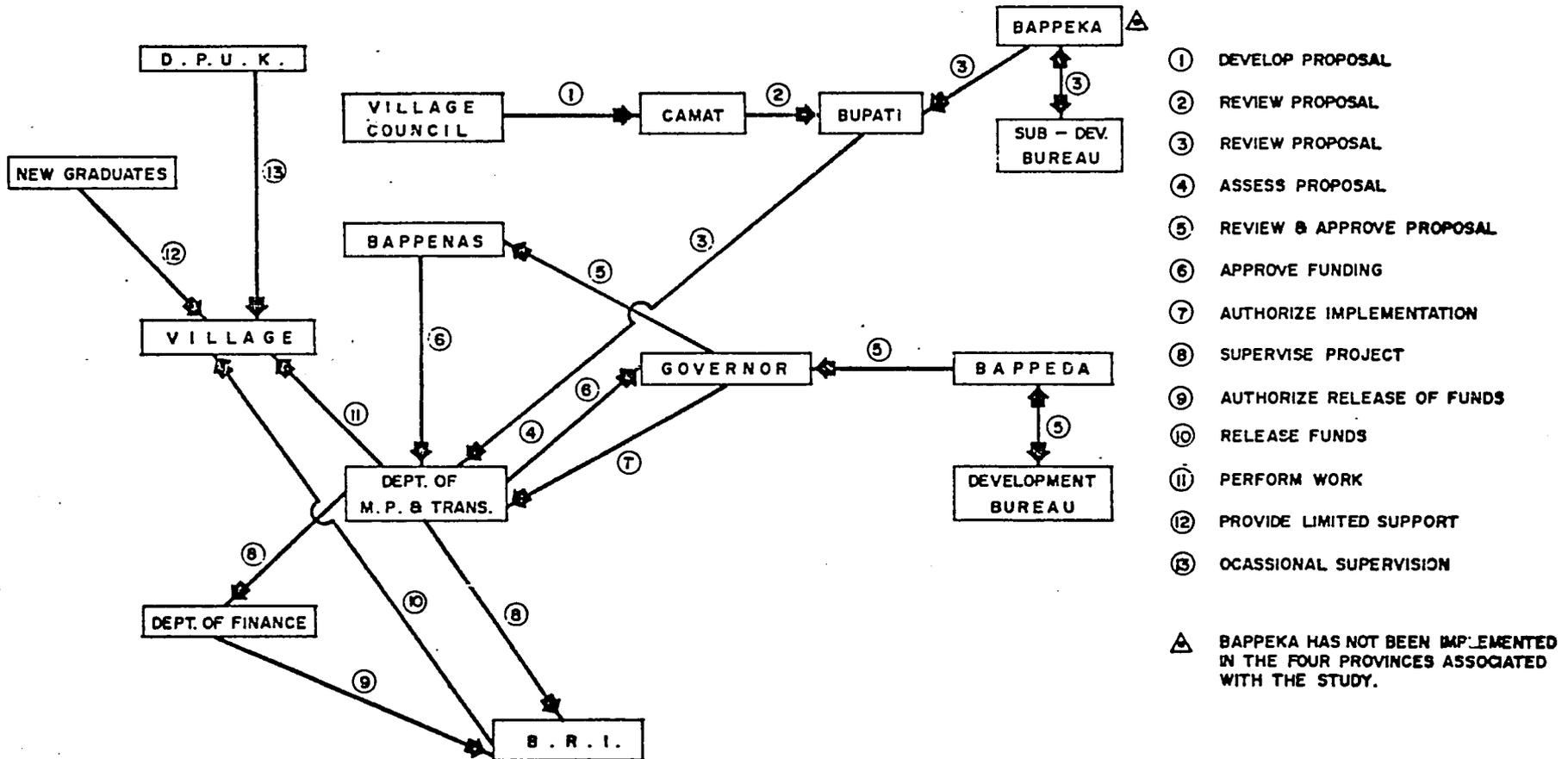
- 6.2.1. The Village Council develops a project proposal (outlining proposed projects on a priority basis) and submits it to the Camat (Sub District Chief) for review.
- 6.2.2. The Camat reviews the proposal and forwards it to the Bupati for further review.
- 6.2.3. The Bupati reviews the proposal and submits it to the Provincial office of the Department of Manpower and Transmigration.
- 6.2.4. The Provincial office assesses the proposal and recommends priorities to the Governor.
- 6.2.5. The Governor in conjunction with Bappeda and the Development Bureau reviews and approves the prioritized proposals and forwards them to Bappenas, and Central Government Department of Manpower and Transmigration for funding approval.
- 6.2.6. Bappenas and the Department of Manpower and Transmigration approve funding and authorize the Governor to implement the project.
- 6.2.7. The Governor authorizes implementation and assigns the construction management responsibility to the Provincial office of the Department of Manpower and Transmigration.
- 6.2.8. The Provincial office of the Department of Manpower performs construction management services and also requests the Department of Finance to release funds to the village to perform the work.
- 6.2.9. The Department of Finance issues a letter to Bank Rakyat Indonesia authorizing release of funds.
- 6.2.10. The Bank Rakyat Indonesia issues funds to village offices.
- 6.2.11. Village performs construction work.
- 6.2.12. Projects are occasionally supervised by recent technical school graduates working voluntarily in the village.
- 6.2.13. The District Public Works may provide limited technical services and the loan of perhaps a road roller, however, this varies widely among the various Districts.

## **6.3. INPRES DESA (FIGURE NO. 6.5 & 6.6.)**

- 6.3.1. The Village Council develops a proposal and submits it to the Camat (Sub District Chief) for review.
- 6.3.2. The Camat reviews the proposal and forwards it to the Bupati for further review.



PADAT KARYA DISTRICT ROADS PROJECTS—INSTITUTIONAL RELATIONSHIPS



- ① DEVELOP PROPOSAL
  - ② REVIEW PROPOSAL
  - ③ REVIEW PROPOSAL
  - ④ ASSESS PROPOSAL
  - ⑤ REVIEW & APPROVE PROPOSAL
  - ⑥ APPROVE FUNDING
  - ⑦ AUTHORIZE IMPLEMENTATION
  - ⑧ SUPERVISE PROJECT
  - ⑨ AUTHORIZE RELEASE OF FUNDS
  - ⑩ RELEASE FUNDS
  - ⑪ PERFORM WORK
  - ⑫ PROVIDE LIMITED SUPPORT
  - ⑬ OCCASIONAL SUPERVISION
- △ BAPPEKA HAS NOT BEEN IMPLEMENTED IN THE FOUR PROVINCES ASSOCIATED WITH THE STUDY.

6-7

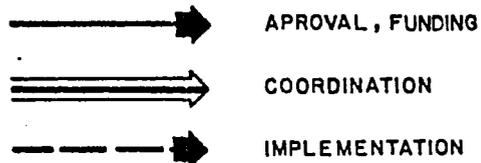
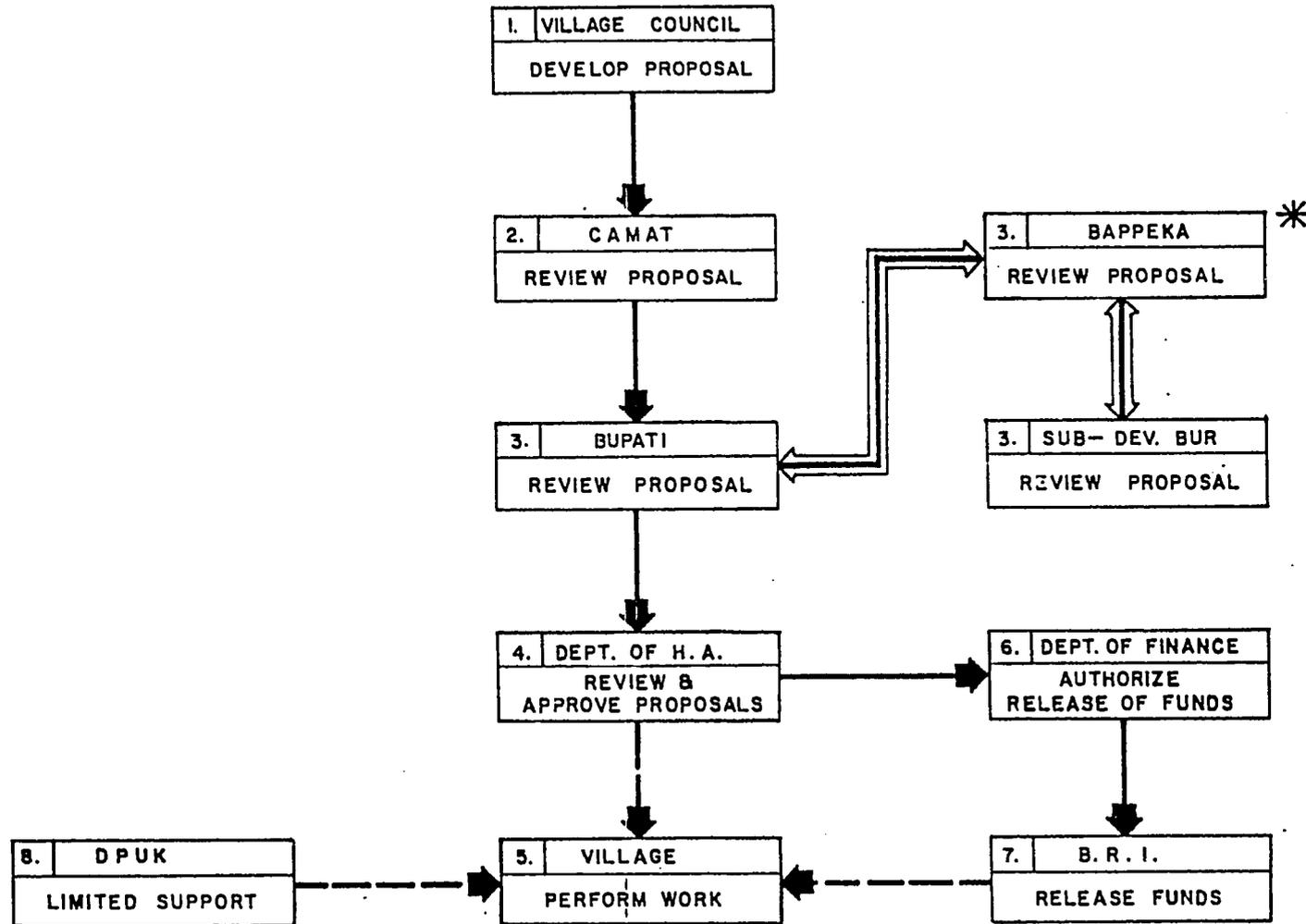
FIGURE NO. 6.4

- 6.3.3. The Bupati reviews the proposal and submits it to the Provincial Office of the Department of Home Affairs.
- 6.3.4. The Provincial office of the Department of Home Affairs assesses the proposal and approves implementation of the project and concurrently requests the Department of Finance to release funds.
- 6.3.5. Village performs construction work.
- 6.3.6. The Department of Finance issues a letter to Bank Rakyat Indonesia authorizing release of funds.
- 6.3.7. The Bank Rakyat Indonesia issues funds to village offices.
- 6.3.8. The District Public Works Service may provide limited technical support and the loan of a road roller.

**6.4. TRANSMIGRATION ROADS (FIGURE NO. 6.7. & 6.8.)**

- 6.4.1. The Department of Home Affairs, the Department of Manpower and Transmigration and the Bappenas identify transmigration road projects for which funding is available.
- 6.4.2. The Department of Manpower and Transmigration, in conjunction with the Department of Home Affairs, transmits preliminary documents in the form of an outline plan, site plan and standard specifications through the Department of Public Works to the Directorate General of Housing and Buildings (CIPTA KARYA).
- 6.4.3. Cipta Karya assigns overall project development responsibility to the Directorate of Regional and City Planning.
- 6.4.4. The Directorate of Regional and City Planning develops the appropriate documents and submits them to the Directorate General of Highways, which tasks the Directorate of Land Preparation for Transmigration Settlement (PTPT) with the development of each site within the selected area.
- 6.4.5. The PTPT forwards pertinent information to the Directorate of Planning. When the Sub-Directorate of Rural Roads is activated it is planned that this information will be passed on to the Sub-Directorate which will be charged with the preparation of detailed documents such as, planning and programming data, complete road construction drawings, specifications, cost estimates, and tender documents.
- 6.4.6. The Sub-Directorate for Rural Roads will then return the completed construction documentation to the PTPT, which is responsible for project implementation and management. PTPT incorporates this data into a comprehensive construction pack-

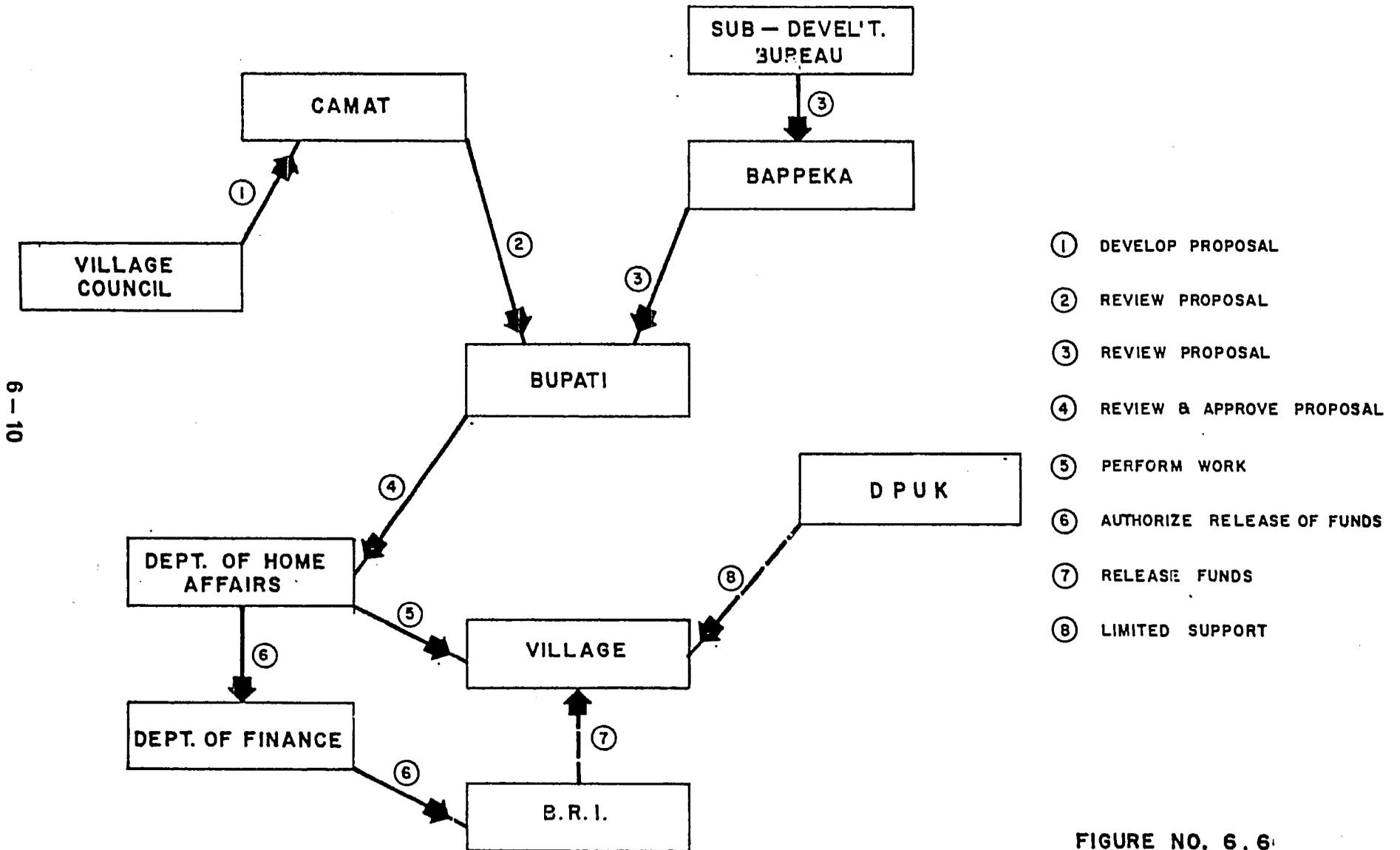
# INPRES DESA – ORGANIZATION, FUNDING, APPROVAL & IMPLEMENTATION



\* BAPPEKA HAS NOT BEEN IMPLEMENTED IN THE FOUR PROVINCES ASSOCIATED WITH THIS STUDY.

FIGURE NO. 6.5

# INPRES DESA— INSTITUTIONAL RELATIONSHIPS



6-10

FIGURE NO. 6.6

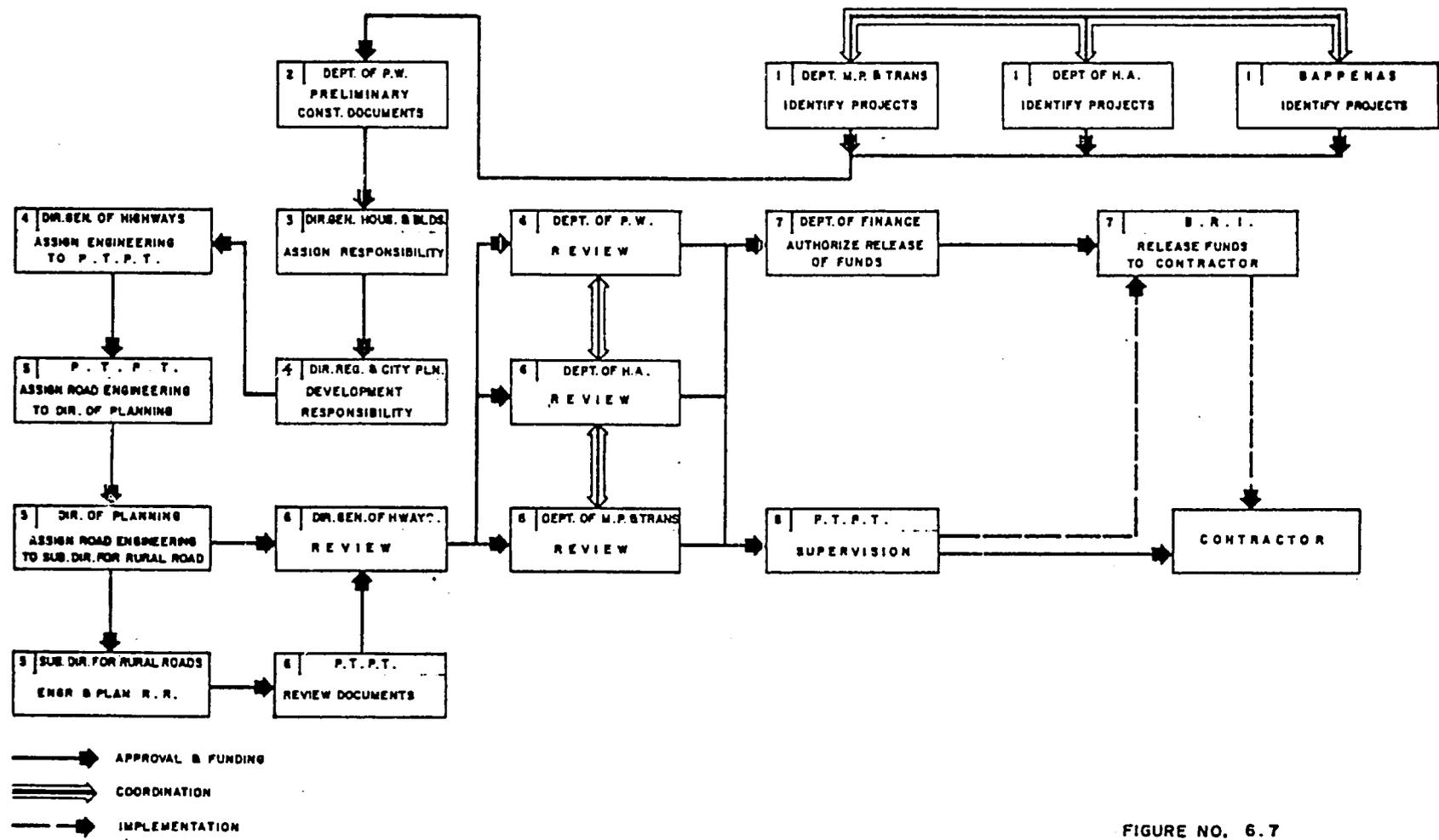
age which encompasses land clearing, site preparation, agricultural sectors, etc. This composite package is then submitted, through the appropriate channels, for technical review and release of funds.

- 6.4.7. The Department of Finance issues a letter to the Bank Rakyat Indonesia authorizing the release of funds. Concurrently, the PTPT is authorized to award the contract.
- 6.4.8. PTPT awards the contract, performs construction management functions and approves contractors monthly progress for payments.

#### **6.5. INPRES II PROGRAM SCHEDULE**

Figure 6.9. shows the approximate time for each event for the management of Inpres II funds. It takes approximately sixteen months from the time the Presidential Instructions are Issued until a contract is awarded. Inpres Jalan application and allocation procedures were not available in English as of this writing. However, it is assumed that the events will be similar to those shown for Inpres II and the time cycle for each event would be the same.

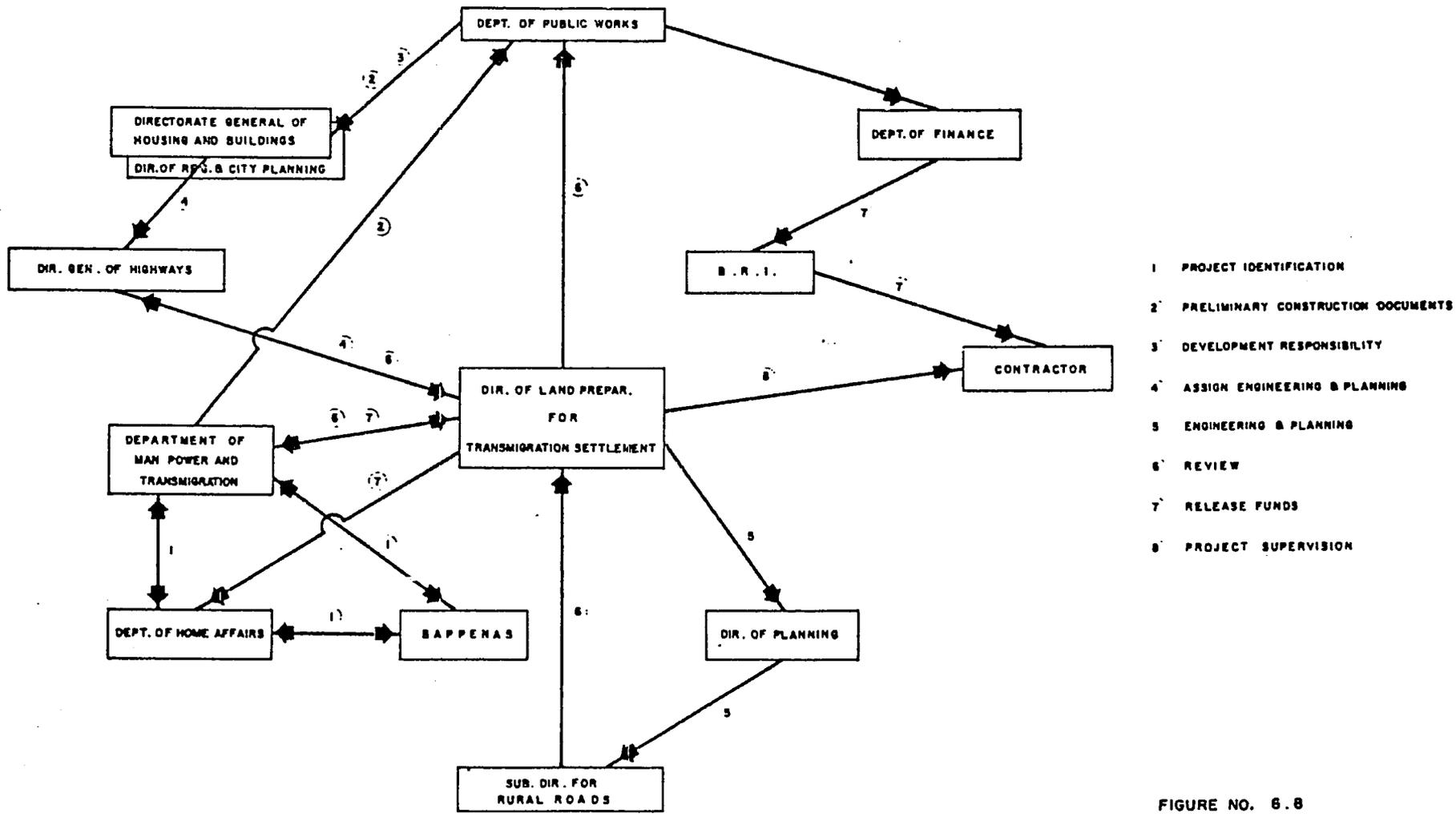
### DISTRICT ROADS IN TRANSMIGRATION PROJECTS ORGANIZATION APPROVAL & FUNDING



6-12

FIGURE NO. 6.7

# DISTRICT ROADS IN TRANSMIGRATION PROJECTS - INSTITUTIONAL RELATIONSHIPS



6-13

FIGURE NO. 6.8





## SECTION 7

### FUNDING

This Section presents a review and comments on the sources and extent of funds available to authorities in Aceh, Jambi, Central Sulawesi and West Nusa Tenggara Provinces for feeder road construction and maintenance, including the role of Inpres funding - current and future.

#### 7.1. INTRODUCTION

The Central Government through the Directorate General of Highways, Bina Marga, finances construction of National highways, Provincial roads of national or inter-provincial importance, and maintenance of National highways. Provincial funds (APBD I) for the construction and maintenance of Provincial roads are supplemented by allocations from Bina Marga and by Inpres I funds. Development and maintenance of District roads are financed through District funds (APBD II) with some (usually minor) assistance from Provincial funds with the major sources being the Inpres II program and the newly implemented Inpres Jalan program. Tables 7.1 through 7.3 present a summary of sources and uses, execution responsibilities of the various authorities and funding needs. Figure 7.1 illustrates the overall funds flow which applies to the four Provinces.

Further sources of funds for feeder roads are the Padat Karya and Inpres Desa Programs.

Padat Karya is administered at the Sub-District (Kecamatan) level while Inpres Desa is managed at the Village (Desa) level. These programs will also be discussed in the following paragraphs.

The following is a review of the sources and uses of funds for feeder roads in the four Provinces. Also included is an assessment of the relationship between identified needs and fund allocations. Although the discussion emphasizes roadworks, the funding rules and procedures apply to bridges as well. Paragraph 7.3.3, funding allocation vs. needs-bridges, presents bridge funding data and requirements.

The order of discussion is as follows :

- (1) Sources and Uses of Funds
- (2) Funding vs. Needs
- (3) Findings and Conclusions

**TABLE 7.1 – GOI PUBLIC HIGHWAY SYSTEM  
( SOURCES / USES OF FUNDS / EXECUTION RESPONSIBILITIES )**

ROAD STATUS AND FUND USES	SOURCES				USERS		
	CENTRAL GOVT. THRU :		PROVINCE	DISTRICT	D G H	D P U P (2)	D P U K (3)
	BINA MARGA.	GOVERNOR (1)					
National Roads :							
New Construction	x				x		
Betterment	x				x	x	
Support Works	x					x	
Maintenance	x					x	
Provincial Roads :							
New Construction	x		x		x	x	
Betterment	x		x		x	x	
Support Works	x	x	x			x	
Maintenance		x	x			x	
District Roads :							
New Construction	x	x	x	x	x	x	x
Betterment	x	x	x	x	x	x	x
Support Works	x	x	x	x		x	x
Maintenance			x	x			x
<p>NOTES : (1) Received from Central Government for Inpres Provincial, Inpres District and Inpres Jalan.  (2) Provincial Public Works  (3) District Public Works</p> <p>SOURCE : Feeder Roads Management I DGH RFP July 1978</p>							

**TABLE 7.2 – SUMMARY OF ALLOCATIONS BY AMOUNTS, SOURCES AND USES  
OF FUNDS DISTRICT ROADS – 1979 / 1980 RP x 106**

PROVINCE AND USES	SOURCE					TOTAL
	INPRES II (1)	INPRES Jalan (2)	APBD II (3) **	PADAT KARYA	OTHER (4)	
<b>A C E H</b>						
Development *	769	1039	–	95	–	1903
Maintenance	40	–	252	–	112	404
Total	809	1039	252	95	112	2307
<b>CENTRAL SULAWESI</b>						
Development	343	806	78	42	–	1269
Maintenance	10	–	31	–	–	41
Total	353	806	109	42	–	1310
<b>J A M B I</b>						
Development	425	347	–	42	2	816
Maintenance	12	–	2	–	–	14
Total	437	347	2	42	2	830
<b>W. NUSA TENGGARA</b>						
Development	832	655	43	95	–	1582
Maintenance	47	–	28	–	9	84
Total	879	655	71	95	9	1666
<p><b>NOTES :</b> (1) Kotamadya (City Areas) subsidies deducted            (2) Does not include bridge funding            (3) APBD II Expenditures – only complete data available is for 1978/1979 which is shown.            (4) Provincial (APBD I) contribution</p> <p><b>SOURCES :</b> Ministry of Home Affairs            BAPPENAS            APBD I Budgets            APBD II Budgets            USAID</p> <p>* Development : New construction, rehabilitation, support works.            ** Percentage of total APBD II appropriation allotted to District Roads :</p>						
		<u>Development</u>		<u>Maintenance</u>		<u>T o t a l</u>
A c e h		–		21.3		21.3
Central Sulawesi		14.7		5.8		20.5
J a m b i		–		.3		.3
West Nusa Tenggara		14.9		10.0		24.9

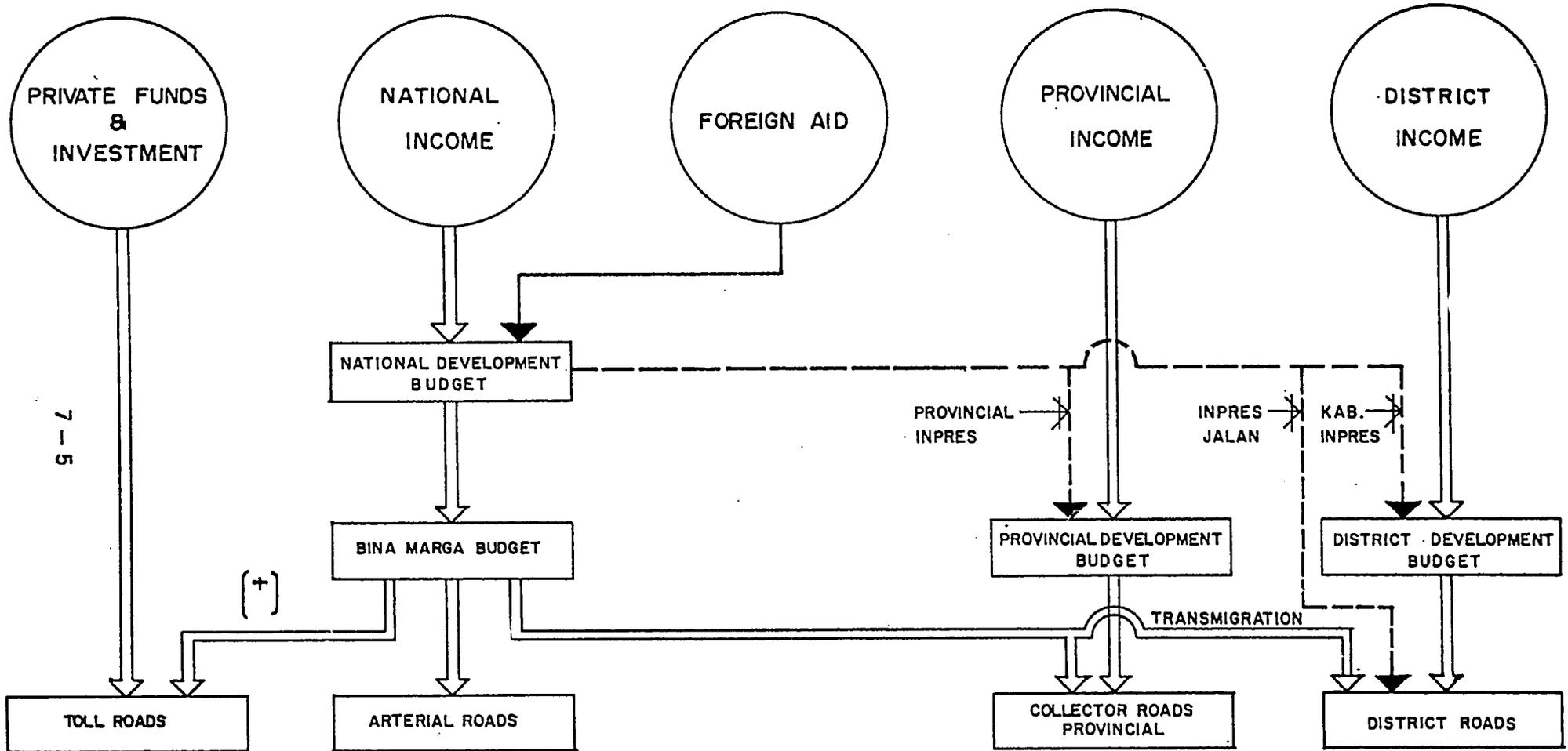
TABLE 7.3 – FUNDING VS. NEEDS DISTRICT ROADS ( TOTAL ALL SOURCES )

P R O V I N C E	R E H A B I L I T A T I O N ( Rp x 10 <sup>6</sup> )				M A I N T E N A N C E ( 1 ) ( Rp x 10 <sup>6</sup> )		
	REQ'D TO COMPLETE	1979 / 1980 FUNDING	YEARS TO COMPLETE AT 1979 / 1980 FUNDING LEVEL	ANNUAL FUNDS REQUIRED TO COMPLETE IN 4 YRS BY END OF 1983 / 84 FISCAL YEAR	ANNUAL REQUIRE – MENT ( 3 )	1979 / 1980 FUNDING LEVEL	SHORT – FALL ( 3 )
A c e h	13650	1903	7.2	3413	1039	404	635
Central Sulawesi	3350	1269	2.7	–	261	41	220
J a m b i	4325	816	5.3	1082	373	14	359
W. Nusa Tenggara	3825	1582	2.5	–	270	84	186

**NOTES :**

- (1) For Sources of Funds, See Tables 7.11 and 7.12
- (2) APBD II figure included herein from 1978 / 1979 budget, 1979 / 1980 figures not available
- (3) "Annual Requirement" and "Shortfall" are based on current levels of maintenance ( e.g. Rp. 250,000 / km per year for unpaved roads ), data provided by Bappenas.  
This level of maintenance is not considered adequate. For the consultants' recommendation for and adequate maintenance program, see paragraph 10.6.4. and for estimate of cost, see Section 12.

# FUNDING FLOW



- CENTRAL GOVERNMENT SUBSIDY
- ==== THE MAIN SOURCE OF FUNDS
- \_\_\_\_\_ THE AID SOURCE OF FUNDS
- [ + ] ORIGINATE FROM PROJECT AID

SOURCE = DGH

FIGURE 7.1

## **7.2. SOURCES AND USES OF FUNDS**

As illustrated in Table 7.1, funds for roadworks at the District level may originate from a number of sources. For purposes of this discussion, these funds sources will be divided into two major categories :

- (1) Central Government Sources
- (2) Local Sources

As defined in Section 1, "feeder roads" is synonymous with "District roads". However, certain District roads are located within cities (Kotainadyas) and are thus not "rural" or "feeder" roads. Where data sources permit, the city roads will be excluded from the analysis. It is believed that any distortion arising from the inadvertent inclusion of city road data would not be significant.

### **7.2.1. CENTRAL GOVERNMENT SOURCES AND USES OF FUNDS**

Central Government funding for District roads consists essentially of the following Inpres programs :

- (1) Inpres II (Kabupaten)
- (2) Inpres Jalan

In some cases, Provincial funds from APBD I and Inpres I sources are allocated to District roads. The amounts are small and do not have a significant impact on District road funding.

In addition, funds from the Padat Karya and Inpres Desa programs do find their way into District road improvements. Also, funds from Transmigration, Agricultural, Irrigation and other development programs are allocated to roadworks on a project by project as needed basis. However, as this report is focused on shaping an ongoing roadworks program, such peripheral programs will be considered only to the extent of the coordination required and any major impacts resulting from their implementation. As the initial capital investment from such perhipheral roadworks is absorbed by sources outside the usual roadwork funding channels, the major financial impact is on future maintenance requirements.

#### **A. Inpres II (Kabupaten)**

In 1970, the Central Government initiated a nationwide employment program known as the "Kabupaten" (i.e., "District") program. Under this program, funds are made available to rural and urban autonomous areas, on a per-capita basis, for the development of economic infrastructure. A major objective of the program is employment creation. Funds are channelled directly to the District government via the following formal procedures :

- (1) In early January, after the presentation of the National Budget to Parliament, a Presidential Instruction is issued. This restates the main principles of the program, sets forth the intended per-capita allocation for the next budget year and instructs the appropriate ministers to provide further directives for program implementation.
- (2) A "Joint Decree" by the Ministers of Home Affairs and Finance and the Chairman of Bappenas follows the Presidential Instruction. The main principles are further elaborated and the amount available for each District is stated.
- (3) Instructions from the Ministers of Home Affairs give detailed directives concerning project selection, preparation, checking, implementation and transfer of funds.
- (4) The District administrations select and prepare prospective projects. A prioritized project list is prepared.
- (5) The project list is then submitted to the Regional Development Planning Agency (Bappeda), which determines the project's consistency with development activities funded by other parties. Corrections are requested as required. The result is a list of projects declared as eligible for financing.
- (6) On approval by Bappedas, the District administration commences preparation of the preparatory work for each project including surveys, site analysis, design and cost analysis. A project form called a "DURP" is drawn up for each project. The DURP and its attachments provide technical drawings, locations, type and purpose of project, physical volume of work, direct employment provided in man-days, a breakdown of costs, start and finish dates and projected expenditures by month. To fund the DURP preparation, survey and investigation funds will have been made available amounting to about two percent of the total funds received for the ongoing year.
- (7) The DURP is signed by the Bupati and forwarded to the Provincial offices of Public Works, Agriculture and Transmigration and Manpower for examination of the technical, agricultural and employment aspects of the project. If a project is rejected, the Provincial office sends the proposal back to the District with reasons for rejection and suggestions for improvements. The District then makes a new or corrected proposal. In practice, the Provincial authorities attempt to avoid formal rejection by proposing and discussing adjustments directly with the District officials.
- (8) Provincial authorities draw up Provincial summaries on the prescribed forms.
- (9) A "National Review" takes place in Jakarta where proposals are reviewed with the

Central Government team. Individual projects are not approved or rejected, as project appraisal is considered to be the responsibility of the Provincial government and Bappeda. The main objective of this review is to verify that all DURPS are submitted and correctly summarized.

- (10) A letter of authorization is issued by the Department of Finance which is the legal basis for release of the funds to the Bank Rakyat Indonesia (BRI).
- (11) The BRI then sends a letter to all branches with detailed instruction on payment of funds against certified bills.

Inpres II is based on a fixed per-capita grant to each District. For 1979/1980 it is Rp 550 capita with a minimum of Rp 65,000,000 per District. Past experience indicates that about 55 percent of Inpres II funds are used on roadworks, 15 percent on bridges, 15 percent on irrigation and the remaining 15 percent on "other" projects (market, drainage, flood protection, reforestation, river ports, bus stations, culverts, etc). Table 7.4 illustrates the 1979/1980 Inpres II allocations for each of the subject Provinces for roadworks. The amounts shown include Ipeda "incentives". Project maintenance costs are expected to be covered from Ipeda income of the District. Twenty percent of Ipeda income is expected to be devoted to maintenance. If this amount is not sufficient, then five percent of Inpres II funds may be allocated for maintenance.

Until fiscal year 1979/1980 Inpres II was the major source of funds for District roads. In fiscal year 1979/1980, the Inpres Jalan program was introduced, adding a significant new source of funds.

#### B. Inpres Jalan

Inpres Jalan is a new program first implemented for the 1979/1980 fiscal year. It is targeted for roadworks and bridgeworks at the District level on the outer islands (i.e., not Java). It is intended to redress the inequities inherent in the per-capita based Inpres II program, where the bulk of the funding goes to Java. The 1979/1980 allocation for Inpres Jalan is approximately Rupiah 13 billion, with Rupiah 300 million earmarked for training. Seventeen Provinces have been declared eligible for the program, including all four of the study Provinces. All funds will be earmarked for specific projects. Specific application and allocation procedures were not available in English as of this writing. Table 7.5 presents a summary of the 1979/1980 Inpres Jalan application and uses for roads and bridges for the subject Provinces.

Tables 7.6 through 7.9 illustrate the Inpres Jalan subsidies and their uses by District for 1979/1980. A comparison between the magnitude of Inpres II and Inpres Jalan subsidies for 1979/1980 is presented in Table 7.10. It is clear that Inpres Jalan is a significant source of funds for District roadwork.

### C. Padat Karya (PK)

The Padat Karya program is implemented by the GOI Department of Transmigration and Manpower. Its primary purpose is to provide short-term employment during the dry season in rural areas. There are three basic types of projects :

- (1) Roadworks
- (2) Irrigation
- (3) Terracing and Reforestation

Roadworks comprise the majority of projects and the emphasis is on projects which are agriculture-related. For purposes of this report, it is assumed that 70% of the funding is devoted to roadworks.\*

The program is implemented at the Sub-District (Kecamatan) level. The Sub-Districts eligible to participate are selected each year by the Jakarta office of the Department of Manpower.

One project per selected Sub-District is permitted, with a funding ceiling of Rp 15 million. Project proposals are regularly submitted at or near the Rp 15 million ceiling. A key criterion is that 70% of total cost is for labor. Projects are most often very simple and done almost entirely by manual labor. Ongoing maintenance is a problem. There is no specific allocation in Padat Karya funding for maintenance. After the project is completed, it is expected that maintenance will be by volunteer labor. No formal mechanism exists for coordination with District or Inpres Desa projects.

For the four subject Provinces, the number of Padat Karya projects and the Rupiah amounts for fiscal year 1979/1980 are shown below. The last column illustrates funding dedicated to feeder roadworks assuming that 70% of total funds are used for roadworks.

	1979/1980 Projects	1979/1980 Total Rp X 106	Estimates for Roadworks Rp X 106
A c e h	9	135	95
Central Sulawesi	4	60	42
J a m b i	4	60	42
West Nusa Tenggara	9	135	95

Source : USAID, Jakarta

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\* This is a rough order of magnitude estimate based on general information received in discussions with various GOI representatives.

Although not significant in comparison with Inpres II and Inpres Jalan funding, Padat Karya funds are significant when compared with individual District budgets for roadworks as presented in Section 7.2.2.

#### D. Inpres Desa

Inpres Desa is designed specifically for village (Desa) development. A fixed grant of Rp 450,000 for 1979/1980 is provided to each village. The amount may be greater for a special project or a very poor village. About 40% – 45% of the project funds are spent on roads. The projects are proposed by the village community and are submitted to Sub-District and District administrations who forward them to the Provincial agency of the Department of Home Affairs (DOHA).

After approval by the DOHA, the village supplies labor and local materials to implement the projects. Projects include roadworks, small bridges, markets, small dams, irrigation canals and buildings for social purposes. There are no specific standards for roadworks and the DPUK's are seldom involved except for occasional advice and equipment loans. What maintenance there is, is carried out by Gotong Royong\* using local materials.

There are limited records available on Desa roads and on Inpres Desa funds spent on roads. However, as Inpres Desa funds are not available to District administrations for District roads, they do not actually represent a source of funds for the Districts. Inpres Desa roadworks are important in the sense that they could and should be coordinated with Padat Karya and District projects where appropriate. Desa roadworks are normally quite basic, even primitive. However, if coordinated within a District-wide planning framework, the Desa program could aid in maximizing the impact of available funds over the long term. A case-in-point may be where a Desa path is eventually upgraded to a District road as result of agricultural development or new transmigration settlement.

#### 7.2.2. LOCAL SOURCES AND USES OF FUNDS

APBD II (the District budget) is the major source of local funds for District roadworks. APBD II funds are raised via Ipeda (land) taxes and various other taxes and fees. These funds are subsidized by funds from the Central Government, Department of Home Affairs, which pays all wages and salaries in the routine budget. This subsidy usually amounts to more than 90% of the DPUK routine budgets. The remainder of routine budget expenditure is financed by District (locally raised) taxes.

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\* Gotong Royong is where members of a village contribute their time, labor and available materials for projects to benefit the entire community.

The Ipeda tax is the major source of funds for District road maintenance. Maintenance is normally the only roadwork financed by local funds. Inpres II regulations stipulate that 20% of Ipeda income must be devoted to maintenance. If this amount is not sufficient, then five percent of Inpres II funds may be allocated for maintenance projects. Note that these percentages apply to all Inpres II projects. These are the only significant and regular District contributions identified in District development budgets. There are occasional contributions from Provincial authorities to District authorities for emergency relief and in the case of Aceh Province there is an annual Rp 20,000,000 contribution to each District to be used for maintenance or development projects (all projects - not just roads; it is assumed that 70% of the Rp 20,000,000 is used for road maintenance)\*.

West Nusa Tenggara Province also supplies APBD I funds for District road maintenance as illustrated in Table 7.11. Central Sulawesi and Jambi District rely exclusively on District sources for maintenance funds, as there are no Provincial contribution. Thus the existing local sources and uses of funds for roadworks are limited; funds availability is usually inadequate for the needs, and the use of these funds limited to maintenance of existing roads.

### 7.2.3. SUMMARY

There are two basic sources of funds for District roadworks, Central Government and local (almost exclusively District "raised") funds. The Central government sources consist of the Inpres II program, the Inpres Jalan program and the Padat Karya program. Local funds come mainly from the Ipeda (local land taxes) via District (APBD II) budgets with occasional small contributions from the Provincial budget (APBD I).

### 7.3. FUNDING ALLOCATIONS VS. NEEDS

The following analysis of funding available to the authorities responsible for District road construction will focus on determining the adequacy or inadequacy of current and projected funding levels for projected needs for road construction, rehabilitation and maintenance. In order to simplify the discussion, funds availability will be presented in two categories :

- (1) Development
- (2) Maintenance

All discussion will center on Province-wide summaries of funding and needs for District roads. Given the scope and time constraints of the study, it is impractical in this discussion to examine individually each District in the four Provinces.

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\* Assumption based on discussions with Provincial and District representatives.

### 7.3.1. ESTABLISHING NEEDS

Table 7.12 illustrates District road kilometrage by road type and condition for each of the subject Province. The percentage of District road kilometrage observed to be in poor to damaged condition is 70% or greater in each Province. Table 7.12 presents a breakdown between asphalt and non-asphalt surfaces and the conditions of each from the 1978 DPUP survey of District roads. Thus the basic need for road improvement is clearly established and has been confirmed by the sample observations made by consultant representatives in the field.

### 7.3.2. ESTABLISHING FUNDS REQUIREMENTS.

An examination of the needs as established in Table 7.12 coupled with an estimate of per-unit rehabilitation and maintenance costs, enable an order-of-magnitude funds requirements estimate to be calculated. Comparing projected funds requirements against funds availability at current levels will provide a measure of the adequacy of current funding levels to meet observed needs. In order to make such an estimate, it is necessary to set ground rules and make certain assumptions. The following assumptions were made :

- (1) All roads classified as poor-to-damaged required rehabilitation.
- (2) For this assessment, new construction will be assumed to be zero (for discussion purposes only).
- (3) Average annual maintenance costs are estimated to be Rp 250,000/Km for non-asphalt roads and Rp 167,000/Km for asphalt roads\*.
- (4) Rehabilitation for asphalt roads at Rp 10 million per kilometer, for non-asphalt at Rp 5 million per kilometer. Both are "average" estimates\*.

Table 7.3 illustrates the number of years which would be required to rehabilitate all District roads in poor to damaged condition assuming optimization of all funds for District road development as presented in Table 7.2. As target funding levels for District road development have not been officially established beyond 1979/1980, it is not possible to evaluate the adequacy of projected funding. However, an estimate is shown of the annual funding level required beginning in 1980/1981 if all District roads in poor to damaged condition are to be rehabilitated by the end of Repelita III (fiscal year 1983/1984). This estimate does not include funds for new construction nor funds for bridgework or maintenance. Thus at best, total needs are understated. An estimate of the annual maintenance shortfall for roads based on 1979/1980 funding levels is shown in the last column of Table 7.3.\*

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\* Source of estimates : Data furnished by Bappenas. The estimates for maintenance are for a level of maintenance not considered adequate by the consultant. For consultant's recommended maintenance program, see paragraph 10.6.4, and for an estimate of cost of the recommended program, see Section 12.

It is recognized that the above approach involves a certain amount of oversimplification. However, it does serve to highlight the relative adequacy or inadequacy of the present funding level in meeting the observed needs. It should be noted that due to limited time, limited data availability and with only an average confidence level for the data that is available, extreme precision in such an estimate is neither feasible nor credible in this study.

#### A. Development

"Development" is defined as rehabilitation/support and new construction roadworks. Table 7.3 illustrates that District road programs in both Aceh and Jambi Provinces are seriously underfunded. At the 1979/1980 funding level, approximately five years for Jambi and seven years for Aceh will be required to rehabilitate the roads observed to be in poor to damaged condition, assuming that all District road development funds will be channelled into rehabilitation. Funding levels for Inpres II, Inpres Jalan and Padat Karya are included. This assumption is probably not realistic but it serves to dramatize the extent of fund shortages. If any error is built into the assumption, it will serve to understate shortages, not overstate. Again assuming that all District road development funds will be channelled into rehabilitation, the following increase in annual funding for District road development would be required to rehabilitate all District roads in poor to damaged condition by the end of fiscal year 1983/1984 :

	1979/1980 <u>LEVEL</u> RP X 10 <sup>6</sup>	<u>REQUIRED</u> RP X 10 <sup>6</sup>	<u>PERCENT</u> <u>INCREASE</u>
A C E H	1903	3413	180%
C E N T R A L S U L A W E S I	1269	—	—
J A M B I	816	1082	133%
W E S T N U S A T E N G G A R A	1502	—	—

From Table 7.3 and the above tabulation, it appears that the District road programs in Aceh and Jambi Provinces are the most seriously underfunded and that current funding levels in Central Sulawesi and West Nusa Tenggara Provinces appear adequate to complete rehabilitation by the end of Repalita III, fiscal 1983/1984.

Central Sulawesi and West Nusa Tenggara Provinces appear to have a marginally adequate level of funding for District road development. However, their needs for new construction should be examined carefully to determine the impact on funds requirements.

## B. Maintenance

In all four Provinces, District road routine maintenance programs are seriously underfunded, as illustrated by the "shortfall" estimate in Table 7.3. Shortfall estimates range from Rp 186 million per year for West Nusa Tenggara to Rp 635 million per year for Aceh.

## C. Summary

Funding levels for rehabilitation, new construction and support works (i.e. development) for District roads are marginal in Central Sulawesi and West Nusa Tenggara Provinces. Both Aceh and Jambi rural road programs are seriously underfunded.

Maintenance programs are virtually non-existent in all Districts within the four Provinces. It would be erroneous to say maintenance is "underfunded". It is virtually "unfunded"

### 7.3.3. FUNDING VS. NEEDS – BRIDGES

#### A. Funding Sources

Funding Sources for District bridgework follow the same pattern as those for roadworks discussed earlier. Tables 7.13, 7.14 and 7.15 present Inpres II, Jalan and Padat Karya bridge funding and a Summary of Sources and Uses.

#### B. Allocation vs. Needs – Bridges

Bridge conditions on District roads as discussed in Section 8 are as follows : (expressed in meters)

	FAIR TO GOOD	POOR	BAD	TOTAL
ACEH	4,024	13,771	2,840	20,635
JAMBI	1,929	4,157	1,595	7,681
CENTRAL SULAWESI	777	76	4,715	5,568
WEST NUSA TENGGARA	1,907	499	318	2,724

If it is assumed that 100% of bridges in bad condition and 80% of those in poor condition requires replacement or major rehabilitation, funding requirements are as follows :

	RP X 10 <sup>6</sup>
ACEH	41,570
JAMBI	14,330
CENTRAL SULAWESI	14,760
WEST NUSA TENGGARA	2,160

The preceding estimates assume replacement by steel/concrete bridges at an average of Rp 3 million/meter\*. In order to provide a conservative estimate, it is further assumed that 75% of replacement bridges would be of timber construction with the remaining 25% of steel/concrete construction. Timber construction is assumed to cost one sixth (or Rp 500,000/meter) that of steel/concrete. Thus, the "funds required" appearing in Table 7.16, have been estimated.

At 1979/1980 funding levels District bridge replacement in Aceh Province would require a total of 24 years and 76 years in Jambi Province, while requiring ten years and six years in Central Sulawesi and West Nusa Tenggara Provinces respectively. It should be emphasized that the foregoing is based on a conservative estimate and reflects what is most likely a "best case".

Consistent and reliable data were not available for maintenance funding and costs and these are not quantified here. However, field investigations by Consultant personnel revealed that there is an almost total lack of bridge maintenance in all four Provinces.

### C. Summary

It is evident from Table 7.16 that Aceh and Jambi bridgeworks follow the same pattern as roadworks—serious underfunding. The increase in funding levels required to complete needed bridgeworks range from 153% in West Nusa Tenggara to 1,897% in Jambi. It is unlikely under present circumstances that West Nusa Tenggara and Central Sulawesi could effectively absorb such an increase and a certainty that Aceh and Jambi could not without a major improvement in staffing, training and technical assistance. The estimates presented here are not intended to be exact, but rather to identify order of magnitude needs and to present the relative needs of the four Provinces in question.

## 7.4. FINDING AND CONCLUSIONS

### 7.4.1. FINDINGS

- (1) Table 7.2 summarizes the amounts and significant sources and uses of funds for District roads in the four Provinces.

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\* Source of estimate : Consultant Bridge Specialist's order-of-magnitude estimate utilizing data provided by Provincial and District Public works offices.

(2) Sources of funds for District roadworks are as follows :

- (a) Inpres II
- (b) Inpres Jalan
- (c) Padat Karya
- (d) APBD II

There is a further contribution from APBD I budgets in the case of Aceh; each District is provided Rp 20 million per year for maintenance of all infrastructure - not just roads.

- (3) Funds are allocated for rehabilitation, support and new construction works. Some Inpres II and APBD II funds are allocated for maintenance as shown in Table 7.2.
- (4) At current funding levels, approximately five and seven years would be required in Jambi and Aceh Province respectively to rehabilitate District roads in poor to damaged condition. Central Sulawesi and West Nusa Tenggara would require less than four years.
- (5) Inpres funds are usually not received until three to five months into the fiscal year which begins 1 April. This tends to delay start dates of projects until just prior to the rainy season, thereby making it difficult and in some cases, impossible to finish projects within the fiscal year as required by funding directives.
- (6) Allocation formulas and application procedures for Inpres Jalan have not yet been firmly established.
- (7) There are no organized routine maintenance programs for feeder roads or bridges in any of the Districts.
- (8) The coordinating mechanism for the various rural road programs is Bappedas with some support from DPUP.
- (9) Bappekas are not yet functioning.
- (10) Funding agencies do not have approved standards for establishing maintenance needs of roads or bridges.
- (11) Annual funding shortfall for feeder road maintenance vary from Rp 180 + million in West Nusa Tenggara to Rp 600 + million in Aceh Province\*.
- (12) Bridge replacement of all bridges in "bad" condition and an assumed 80% of those in "poor" condition could require 24 years, 10 years, 76 years and 6 years respectively for Aceh, Central Sulawesi, Jambi and West Nusa Tenggara District road bridges at current funding levels.

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\* Based on a level of maintenance not considered adequate by the consultant. See paragraph 10.6.4 and Section 12 for consultant's recommendation and cost estimates.

#### 7.4.2. CONCLUSIONS

- (1) Inpres II concept is well conceived in theory. Improvement is needed in execution for roadworks.
  - (a) Coordination within the program is good, but coordination with other programs can be improved.
  - (b) Delay in funds disbursement until July or August hampers effective program execution as regulations call for project completion within the fiscal year.
  - (c) The per capita allocation procedure results in under-funding for large, relatively sparsely populated Provinces such as Aceh.
- (2) Aceh and Jambi rural roadworks are seriously underfunded for both development and maintenance works. Increases of more than 100% and 150% respectively in rural roadworks funding levels would be required to rehabilitate the current system. West Nusa Tenggara and Central Sulawesi funding levels appear to be marginal relative to development needs (ie. adequate for rehabilitation within 3–4 years).
- (3) Maintenance funding in all Districts is grossly inadequate, as illustrated by Table 7.3. Shortfalls (annual) range from Rp 180+ million per year to Rp 600+ million per year for maintenance needs alone\*.
- (4) Inpres Jalan will play a significant role in channelling funds to District roads. However, it makes no provision for maintenance.
- (5) APBD II allocations for maintenance of District roads are inadequate in all cases.
- (6) Coordination by Bappedas among funding programs should be improved. More emphasis on priorities is required. Coordination within a single program is usually adequate. However, coordination among Inpres II, Padat Karya and new Inpres Jalan Programs could be upgraded.
- (7) The most serious funding problem is a lack of maintenance funds in all Provinces, followed by serious underfunding of rural road development projects in Aceh and Jambi Provinces.

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\* Based on a level of maintenance not considered adequate by the consultant. See paragraph 10.6.4 and Section 12 for consultant's recommendation and cost estimates.

- (8) Neither Aceh nor Jambi DPUKs are in position to effectively manage a significant increase in roadwork development funding, without major improvement in staffing, training, procedures and technical assistance.**
- (9) DPUKs in all four Provinces are not in a position to effectively manage an increase in maintenance funds to the level required, without major improvement in staffing, training, procedures and technical assistance.**
- (10) Emergency assistance may be required immediately for District road rehabilitation on both Aceh and Jambi Provinces since they are seriously underfunded concurrent with a phased upgrading of their ongoing capabilities for road development maintenance.**
- (11) District bridge replacement/repair and maintenance funding is inadequate for all four Provinces.**

TABLE 7.4. — INPRES II — 1979/1980 RP X 10<sup>3</sup>

	R O A D S								TOTAL ROADS
	ASPHALTED				NON — ASPHALTED				
	REHAB	NEW	MAINTENANCE		REHAB	NEW	MAINTENANCE		
			ROUTINE	SPECIAL			ROUTINE	SPECIAL	
<b>A C E H</b>									
Rp x 10 <sup>3</sup>	71,091	262,423	5,500	—	370,020	142,174	4,845	29,412	885,765
* KM	5.3	25.2	3.5	—	109.0	26.6	2.2	20.2	192
NO. PROJECT	3	2	2	1**	21	14	1	5	62
<b>CENTRAL SULAWESI</b>									
Rp x 10 <sup>3</sup>	65,073	134,744	6,141	1,928	29,127	114,722	—	1,517	353,252
KM	14.7	19.4	10	5.0	7.3	50.0	—	8	114.4
NO PROJECTS	3	6	1	1	3	9	0	—**	23
<b>J A M B I</b>									
Rp x 10 <sup>3</sup>	80,432	133,322	6,798	—	219,854	56,320	5,243	—	501,969
KM	2.8	10.0	10.0	—	56.6	10.0	10.0	—	99.9
NO PROJECTS	5	8	1	—	14	2	1	—	31
<b>WEST NUSA TENGGARA</b>									
Rp x 10 <sup>3</sup>	20,000	619,055	14,100	32,380	—	193,106	—	—	878,641
KM	3.0	73.9	6.5	24.0	—	25.7	—	—	133.1
NO. PROJECTS	1	21	1	5	—	9	—	—	37

\* KM length in Kilometers.

NOTES : \*\* Data inconsistent

SOURCES : Bantuan Pembangunan Daerah Tingkat II Rencana Pelaksanaan Tahun 1979/1980 BAPPENAS 21 April 1979.

**TABLE 7.5**  
**SUMMARY OF INPRES JALAN SUBSIDIES BY PROVINCE**  
**FOR 1979/1980**

NO.	PROVINCE	SUPPORT/ ROADS (KM)	BRIDGES (M)	WOODEN BRIDGES (M)	CULVERTS (M)	TOTAL SUBSIDIES RP X 10 <sup>3</sup>
1	A C E H	226	435	370	353	1,483,821
2	CENTRAL SULAWESI	180	—	1,179.5	—	1,151,176
3	J A M B I	44.5	—	—	—	346,828
4	WEST NUSA TENGGARA	99	—	—	—	655,079
	<b>T O T A L S</b>	<b>549.5</b>	<b>435</b>	<b>1,549.5</b>	<b>353</b>	<b>3,633,904</b>
<p><b>NOTES</b> : Source : Presidential Instruction No.18 Tahun 1979/1980 Jalan Kabupaten</p>						

**TABLE 7.6**  
**SUMMARY OF INPRES JALAN SUBSIDIES – BY DISTRICT**  
**FOR 1979/1980**

**PROVINCE : A C E H**

NO	DISTRICT	R O A D L I N K	SUPPORT/ROADS (KM)	BRIDGES (M)	WOODEN BRIDGES (M)	CULVERTS (M)	TOTAL SUBSIDIES RP X 10 <sup>3</sup>
1	ACEH BESAR	a. Lampeuneurut – Sibreh	10.8	32	–	70	63,548
		b. Krueng Glumpang – Indrapuri	17.2	86	–	102	84,051
		c. Lamateuk–Cot Peuraeu–Lamblang	8	12	100	36	73,943
			<u>36</u>	<u>130</u>	<u>100</u>	<u>208</u>	<u>221,542</u>
2	SOUTH EAST ACEH	a. Kelapa gading–T.Sembilan	8	102	–	12	35,182
		b. Blangke jeren–Remabaru	15	10	10	36	93,753
		c. Blangke jeren–Ketukah–Terangon	23	72	30	24	129,498
			<u>46</u>	<u>184</u>	<u>40</u>	<u>72</u>	<u>258,433</u>
3	SOUTH ACEH	Gn. Kapur–Kedai Pasir Trumon	12	–	6	16	107,134
4	WEST ACEH	a. Lambo – Sango	5	–	18	21	43,551
		b. Lhokruet – Aluegro	5	–	31	21	45,621
		c. Patek – Karangtuo	12	–	60	–	105,588
		d. Ujungblang – Kaie Jeneuh	7	–	13	15	58,279
			<u>29</u>	<u>–</u>	<u>122</u>	<u>57</u>	<u>253,041</u>

(Sheet 1 of 2)

TABLE 7.6 - CONTINUED

NO	DISTRICT	ROAD LINK	SUPPORT/ROAD (KM)	BRIDGES (M)	WOODEN BRIDGES (M)	CULVERTS (M)	TOTAL SUBSIDIES RP X 10 <sup>3</sup>
5	NORTH ACEH	a. Put. at Abang	18	—	30	—	137,925
		b. Jungka Gajan—Kitce	8	—	36	—	47,141
		c. Geudong—Kreung Pase	14	—	—	—	106,207
		d. Seunuedon—Ulue Rubek	8	22	—	—	59,719
			48	22	66	—	350,992
6	EAST ACEH	a. Sp.III Kp. Busa—Pendarun	30	87	—	—	161,311
		b. Indirayek—Alu le Mirah—Kota Binjai	22	12	36	—	117,218
		c. Sungai Pauh—Blang Patek	3	—	—	—	14,150
			55	99	36	—	292,679
		T O T A L S	226	435	370	353	1,483,821

SOURCE : Instruksi Presiden Republik Indonesia Nomer 18 Tahun 1979 Tentang Bantuan Penunjang Jalan Kabupaten Tahun 1979/1980

(Sheet 2 of 2)

**TABLE 7.7**  
**SUMMARY OF INPRES JALAN SUBSIDIES – BY DISTRICT**  
**FOR 1979/1980**

**PROVINCE : CENTRAL SULAWESI**

NO	DISTRICT	R O A D L I N K	SUPORT/ROADS (KM)	BRIDGES (M)	WOODEN BRIDGES (M)	CULVERTS (M)	TOTAL SUBSIDIES RP X 10 <sup>3</sup>
1	DONGGALA	a. Donggala–Surumana	16	–	170	–	92,822
		b. Palu – Binangga	<u>27</u>	<u>–</u>	<u>–</u>	<u>–</u>	<u>132,291</u>
			43	–	170	–	225,113
2	BUOI–TOLI– TOLI	a. Toli Toli–Santigi	10	–	15	–	56,792
		b. Santigi–Buol	<u>42</u>	<u>–</u>	<u>376.5</u>	<u>–</u>	<u>295,198</u>
			52	–	391.5	–	351,990
3	P O S O	Tompira – Bungku	43	–	618	–	375,118
4	BANGGAI	a. Biak–Balantak	30	–	–	–	126,633
		b. Salodik – Siuna	<u>12</u>	<u>–</u>	<u>–</u>	<u>–</u>	<u>72,322</u>
			42	–	–	–	198,955
		<b>T O T A L S</b>	<u>180</u>	<u>–</u>	<u>1,179.5</u>	<u>–</u>	<u>1,151,176</u>

Source : Instruksi Presiden Republik Indonesia Nomer 18 Tahun 1979 Tentang Bantuan Penunjang Jalan Kabupaten Tahun 1979/1980

**TABLE 7.8**  
**SUMMARY OF INPRES JALAN SUBSIDIES – BY DISTRICT**  
**FOR 1979 / 1980**

PROVINCE : JAMBI

DISTRICT	ROAD LINK	SUPPORT/ROADS ( KM )	BRIDGES (M)	WOODEN BRIDGES (M)	CULVERTS (M)	TOTAL SUBSIDIES RP X 10 <sup>3</sup>
BATANGHARI	Muara Bulian – Kunroh	34.5	–	–	–	276,074
SAROLANGUN BANGKO	Ma. Siau – Dasuntuo	10	–	–	–	70,754
	T O T A L S	<u>44.5</u>	<u>–</u>	<u>–</u>	<u>–</u>	<u>346,828</u>
<p><b>SOURCE :</b> Instruksi Presiden Republik Indonesia Nomor 18 Tahun 1979  Tentang Bantuan Penunjang Jalan Kabupaten Tahun 1979/1980</p>						

**TABLE 7.9**  
**SUMMARY OF INPRES JALAN SUBSIDIES – BY DISTRICT**  
**FOR 1979 / 1980**

**PROVINCE : WEST NUSA TENGGARA**

DISTRICT	ROAD LINK	SUPPORT/ROADS (KM)	BRIDGES (M)	WOODEN BRIDGES (M)	CULVERTS (M)	TOTAL SUBSIDIES RP X 10 <sup>3</sup>
DOMPU	Sango Patante – Kilo – Kiwu	52	–	–	–	363,871
EAST LOMBOK	Sambelia – Belanting – Obelobel – Sayang – Sembalun	47	–	–	–	291,208
	TOTALS	<u>99</u>	<u>–</u>	<u>–</u>	<u>–</u>	<u>655,079</u>

**SOURCE :** Instruksi Presiden Republik Indonesia Nomer 18 Tahun 1979  
Tentang Bantuan Penunjang Jalan Kabupaten Tahun 1979/1980

**TABLE 7.10**  
**INPRES II VS. INPRES JALAN SUBSIDIES**  
**FOR DISTRICT ROADWORKS**  
**1979 / 1980**  
**RP X 10<sup>6</sup>**

SOURCE	ACEH	CENTRAL SULAWESI	JAMBI	W. NUSA TENGGARA
INPRES II	809	353	437	879
INPRES Jalan	1039	806	347	655
<p><b>NOTE :</b> It is assumed that 70% of the total Inpres Jalan subsidy is dedicated to roadworks with the remaining 30% dedicated to bridges and culverts applicable to Aceh and Central Sulawesi Provinces which had bridgework included in Inpres Jalan funding. Thus only 70% of the total Inpres Jalan subsidies is included in this chart for Aceh and Central Sulawesi Provinces.</p>				

**TABLE 7.11**  
**DISTRICT MAINTENANCE EXPENDITURES – BY SOURCE**  
**1978 / 1979**

PROVINCE	TOTAL KM PROVINCE	RP X 10 <sup>6</sup>			TOTAL RP X 10 <sup>6</sup>	RP/KM (2) RP X 10 <sup>6</sup> (AVG)
		INPRES II	KABUPATEN ( APBD II )	OTHER ( 1 )		
ACEH	4198	40	252	112	404	.096 / KM
CENTRAL SULAWESI	1119	10	31	—	41	.036 / KM
JAMB I	1517	12	2	—	14	.009 / KM
WEST NUSA TENGGARA	1178	47	28	9	84	.071 / KM

NOTES : (1) Other :  
APBD I contribution from the Province

(2) Includes bridge maintenance

SOURCES : - Bantuan Pembangunan Daerah Tingkat II Tahun 1979/1980  
April 1979 Bis 21

- BAPPENAS
- Consultants Feeder Road Study Repts Data Research

**TABLE 7.12**  
**DISTRICT ROAD KILOMETRAGE BY TYPE SURFACE AND CONDITION<sup>(1)</sup>**

PROVINCE	ASPHALT		NON - ASPHALT		OVERALL TOTAL	POOR TO DAMAGED TOTAL	OBSERVED ESTIMATE POOR TO DAMAGED (2)
	FAIR TO GOOD	POOR TO DAMAGED	FAIR TO GOOD	POOR TO DAMAGED			
ACEH	107	15	1374	2700	4196	2565	3357
Present of total	2%	1%	33%	64%	100%	65%	80%
CENTRAL SULAWESI	220	2.5	234	662	1119	665	783
Percent of total	20%	0.2%	21%	59%	100%	59.4%	70%
JAMBI (3)	79	0.5	587	851	1517	852	1292
Percent of total	5%	—	39%	56%	100%	56%	70%
W. NUSA TENGGARA	262	96	279	561	1178	657	825
Percent of total	22%	8%	23%	47%	100%	55.8%	70%

**NOTES :**

- (1) Source : Provincial (DPUP) Bina Marga Inventories of District Roads ( 1978 )
- (2) Observed estimates based on Consultant's Province Representatives sampling and inventories provided by local authorities August, September 1979.
- (3) Updated by District records from 1978 DPUP inventory.

**TABLE 7.13**  
**INPRES II 1979 / 1980**  
**B R I D G E S**

	B R I D G E S		TOTAL BRIDGES
	REHAB	NEW	
ACEH Rp x 10 <sup>3</sup>	14,549	191,303	223,602
CENTRAL SULAWESI Rp x 10 <sup>3</sup>	15,000	109,999	124,999
JAMBI Rp x 10 <sup>3</sup>	10,712	58,012	68,724
W NUSA TENGGARA Rp x 10 <sup>3</sup>	67,500	54,500	122,900
<p><b>NOTE :</b> Source : Bantuan Pembangunan Daerah Tingkat II Rencana Pelaksanaan Tahun 1979 / 1980  BAPPENAS 21 April 1979.</p>			

**TABLE 7.14 – INPRES JALAN AND PADAT KARYA  
1979 / 1980 BRIDGE FUNDING**

	<u>Bridges</u> Meters	<u>Wooden Bridges</u> Meters	<u>Culverts</u> Meters	<sup>(1)</sup> <u>Est. Subsidy</u> RP X 10 <sup>6</sup>
A C E H	435	370	353	445
CENTRAL SULAWESI	—	1180	—	345
J A M B I	—	—	—	—
W. NUSA TENGGARA	—	—	—	—
<p><u>NOTE</u> : (1) Assumes 30% of total Inpres Jalan subsidy for bridges and culverts for Provinces in which bridge and culvert projects are planned for FY 79/80.</p>				
<p><u>PADAT KARYA *</u> RP X 10<sup>6</sup></p>				
A C E H			9.5	
CENTRAL SULAWESI			4.2	
J A M B I			4.2	
WEST NUSA TENGGARA			9.5	
<p>* Assumes that bridge and culverts account for 10% of Padat Karya funding.</p>				

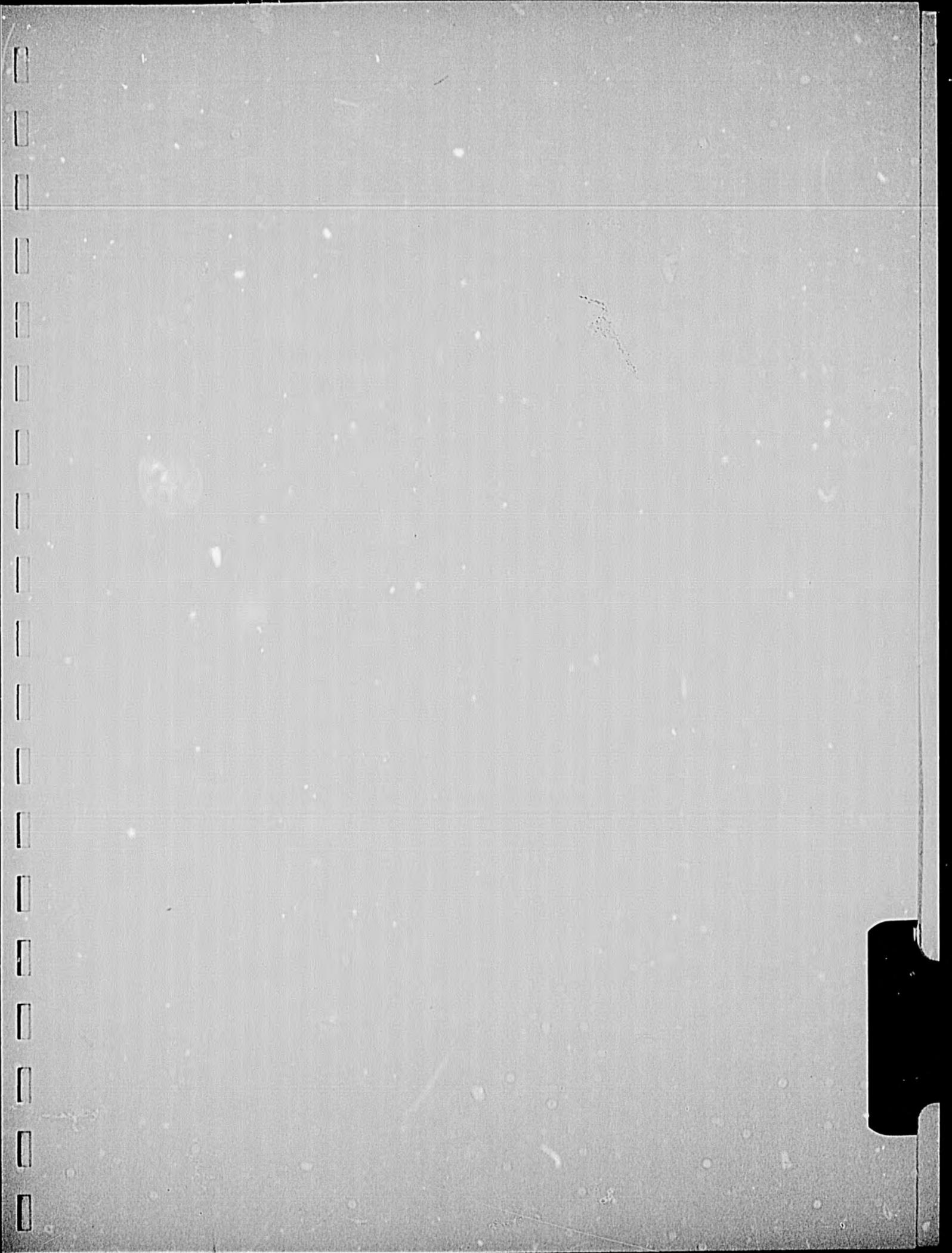
**TABLE 7.15 – SUMMARY OF SOURCES AND USES OF  
FUNDS – BRIDGES : 1979 / 1980  
RP X 10<sup>6</sup>**

	INPRES II	INPRES JALAN	APBD II	PADAT KARYA	TOTAL
<b>A C E H</b> Development	206	445	(1)	9.5	660.5
<b>J A M B I</b> Development	69	–	(1)	4.2	73.2
<b>CENTRAL SULAWESI</b> Development	153	345	34.7	4.2	536.7
<b>W. NUSA TENGGARA</b> Development	122	–	(1)	9.5	131.5
<b>NOTE :</b> (1) No significant funding.					

**TABLE 7.16 - FUNDING VS. NEEDS - BRIDGES**

	FUNDING LEVEL RP X 10 <sup>6</sup>	FUNDS * REQUIRED RP X 10 <sup>6</sup>	YEARS TO COMPLETE	AS A PERCENT OF CURRENT ANNUAL FUND- ING LEVEL REQ'D TO COMPLETE IN FY 83/84
A C E H	661	15,589	24	590%
J A M B I	73	5,537	76	1897%
CENTRAL SULAWESI	537	5,375	10	250%
W. NUSA TENGGARA	132	808	6	153%

\* Assumes replacement with 75% timber and 25% concrete or steel.



**SECTION 8**

**STRENGTHS AND WEAKNESSES**

**OF**

**EXISTING ORGANIZATIONS, PROCEDURES, SYSTEMS AND**

**CONDITIONS**

This Section addresses the strengths and weaknesses of the organizations, procedures and systems as discussed in Section 4 through 7 of the report. Also included are preliminary analyses and discussion of existing conditions of roads, bridges, laboratories, equipment, and training facilities/programs since the conditions or status of these elements are reflections of the overall strengths and weaknesses of the feeder road management system.

**8.1. PLANNING**

The organizations active in planning and programming for District roads have been examined in Sections 4, 5 and 6 of this report. The following discussion will assess the strengths and weaknesses of the procedures being employed by these organizations.

**8.1.1. CENTRAL GOVERNMENT**

The move toward centralization of long range planning and programming, and standardization of technical criteria and standards is a definite strength.

The participation of the Directorate for Regional & City Planning, Cipta Karya, DPU in the development of a comprehensive National Long Range Plan will be of value in providing guidelines in consonance with National Development Policy Objectives, to the Provincial Planning Board (Bappeda) as well as to other agencies concerned with planning/coordination. The coordinating role of the Directorate in transmigration and other programs with impact on District roads is also a definite strength.

A significant weakness has been the lack of a central agency or organization to provide national technical standards, criteria and programming for feeder roads. Activation of the Sub Directorate for Rural Roads, Directorate of Planning, Bina Marga (See Section 5.2.1) should correct this deficiency.

**8.1.2. PROVINCIAL PLANNING**

Bappeda, although limited at the present time in quantity and quality of staff, exist in each Province and should be the key agency at the Provincial level responsible for planning

for attainment of National and Regional objectives. Bappedas are working well in the budgeting/funding area but not as well in coordinated planning, to include District roads.

One area of concern is the difficulty in recruiting and retaining qualified planning staff. For example, in the four Provinces there are a total of seven persons actively engaged in planning. Since they have many areas of involvement, such as irrigation, housing, etc., it is difficult to determine the amount of time available to devote to District roads planning. It is unlikely that anything more than a cursory review is possible under the circumstances. Although all seven of these individuals have technical degrees, interviews revealed that all have a minimal exposure to professional planning procedures.

A clear definition of authority, responsibility and functional/institutional relationships between Bappeda and Bappenas, and between Bappeda and the Provincial Development Bureau is lacking. These interfaces and duties need further definition.

### 8.1.3. DISTRICT PLANNING

Planning capability at the District level is woefully inadequate. None of the Districts within the four study Provinces have implemented the District Planning Board (Bappeka).

Planning is further hindered by the limited funding available to implementing agencies. As District personnel lack skills in project screening and priority setting, there are severe constraints on the ability to assess needs, and to plan accordingly for necessary improvements or new construction.

District (as well as Provincial) level planning should proceed along rational lines. For example, traffic on District roads generally is very low, often less than 25 motorized vehicles a day. Minimum low-cost road geometric and structural design standards would apply. Upon the establishment of such standards (preferably by Bina Marga DPU with possible local adaptation) it would then be necessary to assess the needs of each existing road and bridge in accordance with these standards. New road and bridge construction would have to be evaluated in accordance with its priority when compared to necessary improvements to existing road sections and bridges. The end result of this analysis should be a master list of improvements and new construction in each District with the estimated costs for each project. The projects could then be grouped, by priority, in annual programs covering a five year period. The total costs for all new construction or improvement projects in a given year would indicate the amount of funding that should be requested for that work.

To the construction/improvement budget would have to be added sufficient funds to maintain existing roads and bridges in good condition. Such maintenance is particularly important after an existing road or bridge has been rehabilitated or upgraded, or new construction has been completed. On yet-to-be improved roads and bridges, maintenance could

be restricted to that necessary to keep the road open due to the uneconomical aspects of trying to apply normal routine maintenance techniques to road and bridge sections which could not properly benefit from such maintenance.

The above indicates a comparison of present conditions with a set of standards. However, this would require adjustment or take into account the different growth and development aspects of various areas. For example, a transmigration area could be expected to develop faster than other areas. Development needs within such an area might thus be given a higher priority than those in other areas.

A less rigorous planning process (as found in the study Provinces and Districts) could result in necessary work being continually deferred (or even overlooked) until the program becomes meaningless.

Areas in which planning for routine maintenance must be addressed are Transmigration, Agriculture and Irrigation Programs. The planning for the future maintenance and responsibility for roads constructed through such programs needs to be undertaken by the appropriate Districts (and Provinces as well). It was not evident that such planning and coordination was taking place.

A fundamental weakness noted in other sections of this report is the lack of coordination of technical planning and operations between the Provincial and District Public Works Department, particularly with regard to District roads and bridges. A notable exception is in the Province of West Nusa Tenggara where Provincial Public Works Sectors have been combined with District Public Works Departments, with each combined department under a single chief reporting to both the District Bupati and the Chief of the Provincial Public Works Department. The technical coordination between the Province and District in West Nusa Tenggara was judged to be superior to that found in the other three study Provinces.

Another weakness in the planning process is the lack of coordination of village and Sub District projects with District roads programs. The lack of District Planning Boards contributes to this problem. It should be noted that there are some exceptions. For example, in West Nusa Tenggara Province, it was observed that numerous villages and Sub Districts were constructing culverts on District roads which were scheduled for upgrading by the District. These were well coordinated projects.

## **8.2. FUNDING PROCEDURES**

Existing funding programs are discussed and evaluated in Section 7. This discussion will serve to highlight significant strengths and weaknesses in the overall funding program.

### **8.2.1. INPRES II**

The Inpres II (District) program's major strength lies in the comprehensive, almost elaborate, system of checks and reviews built into the process. Technical reviews, financial reviews, socio-economic reviews and ongoing implementation reviews for the funding process are all spelled out in detail. However in practice, although the procedures are generally followed in form, there is an insufficient number of trained personnel at both District and Provincial levels to carry out the reviews in an effective manner.

A significant weakness in this program is the allocation formula. For 1979/1980 a fixed allocation of rupiah 550 per capita is applied. This allocation does not directly address the needs of a given District or Province and it tends to favour heavily populated areas even though a minimum award is established for sparsely populated areas.

Maintenance funding is neglected in Inpres II. The program does permit up to five percent of Inpres II funds to be used for maintenance if Ipeda set-asides are insufficient. However, the amounts are inadequate.

The application/approval/funding cycle often results in delay of funds disbursement until July or August of the fiscal year, which begins April 1 - a significant blockage to effective completion of projects, especially when the delay extends up to the onset of the rainy season.

### **8.2.2. INPRES JALAN**

Inpres Jalan should redress the significant weakness inherent in the per/capita allocation formula of Inpres II. Although specific allocation formulas have not yet been established, Presidential Instruction No.18 does state that Inpres Jalan is implemented "in the context of equal distribution of development". It goes on to state that the amount and type of subsidies for roads support is based on priorities that support economic activities. Thus the broad scope of this program should allow for the flexibility needed to assist Districts with differing needs and differing social and physical infrastructures.

A potential weakness of the program is the lack of any specific measures for funding routine maintenance. However, in discussion with the Ministry of Home Affairs officials, it was stated that proposals for routine maintenance funding would be considered.

### **8.2.3. PADAT KARYA**

Padat Karya funds for rural roadworks are relatively small compared to Inpres II and Inpres Jalan. However, when viewed alongside APBD II funding (See Section 7), they appear much more significant. Padat Karya programs are implemented at the Sub-District level and are intended to provide short-term employment during the dry season. Properly coordinated

with Inpres II, Inpres Jalan and the Inpres Desa program, they could provide a significant contribution to an integrated District roadworks program. At present, the coordination of Padat Karya with the other roadwork programs appears to be weak. West Nusa Tenggara is an exception, where it was found that coordination has occurred in a manner which produced maximum impact from available funds.

As with the other programs, funding for maintenance is lacking in Padat Karya - a significant weakness.

#### **8.2.4. APBD II**

District budgets are the main source of funds for routine maintenance. As presented in Section 7, the level of funding is, without exception, inadequate. Although Districts are required to set aside 20% of their Ipeda income for routine maintenance, there appears to be little or no control over the application of the set-aside - a significant weakness. As there are no matching funds from Central Government for maintenance work and there are few or no provisions for funding maintenance from Central Government funds, the local governments have no financial incentive to expend funds on routine maintenance.

Districts are not eligible for significant funding for routine maintenance. As physical infrastructure deteriorates, subsidies are available for replacement or rehabilitation. Thus there appears to be a lack of incentives for local funding of maintenance work.

In the best of situations, APBD II resources appear to be inadequate to meet the needs of routine maintenance and should be supplemented.

### **8.3. DESIGN**

This section reviews the general geometric road and bridge design standards, and specifications, as formulated by the Directorate General of Bina Marga, together with assessments of existing construction plans and the related design procedures and methodology which relate to District roads and bridges.

Standards and specifications specifically for District roads do not exist. However, standards and specifications available which could be modified for adaptation to District roads would likely include the following :

#### **8.3.1. STANDARDS/SPECIFICATIONS**

- (1) Standard Specification for Geometric Design of Rural Highway No.13/1970.
- (2) Specifications and Standards for Composite Beam for Highway Bridges No.01/1969 and No.003, 004/PTJ/ST/BM/1977

- (3) Specifications and Standards for Reinforced Concrete Slab Highway Bridges No. 02/1969.
- (4) Specifications and Standards for Reinforced Concrete T—Beam Highway Bridges No.001, 002, 003/PTJ/ST/BM/1977.
- (5) Loading Specification for Bridge Design No.12/1970.
- (6) Drawing Standards consists of :
  - (a) Typical Bridge details
  - (b) Pipe and Box Culvert details
  - (c) Headwall details
  - (d) Traffic signs
  - (e) Intersection details
  - (f) Road Marking details
  - (g) Guard Rail and Guide Post details.

**Observation :**

The above documents were found to be available at DPUP Bina Marga Offices, however, they were not found at the DPUK offices visited.

Design guidelines in general use which could be modified for adaptation to District roads include :

- (1) The pavement design methods adopted by the Directorate General of Bina Marga are outlined in the publication "A Guide for Pavement Design (Flexible)" No.04/PO/BM/1974, April 1, 1974. The method is based on use of the CBR value of the subgrade and pavement structural layers. This guide appears to be well suited to the District roads new construction, the surfacing of unsealed roads, and for widening schemes.
- (2) General guidelines for road construction have also been prepared by the Directorate General of Bina Marga in the publication "Standard Specifications for Highway Construction" No.01/ST/BM/1972. The general specifications introduce a modern approach to road construction and also incorporate a standardized contracting procedure.

### **8.3.2. EXISTING DESIGN PROCEDURES**

This Section is subdivided into roads and bridges and includes discussion of the consultant's

assessment of the design methods employed.

#### **A. Roads**

Design work carried out in a District for new District roads has been quite limited. A construction fund is usually allocated from the Inpres budget with some small amount allocated for design. New District roads are primarily small scale contracts, less than ten Km in length, most of which are located in District towns. The new roads are designed by the DPUK technical staff.

Review of design drawings, related documents and the existing procedures employed reveal that the design drawings and documents for construction of new District roads are prepared in a rather simple format. They are not up to an acceptable professional standard.

This may be attributed to lack of design experience of the technical staff, shortage of manpower, limited funds, lack of survey equipment, and/or limited technical assistance from the DPUP (in the case of DPUK's) or Bina Marga, DPU.

District engineering documents consist of the following : a few small size drawings showing a general location of the new road, typical cross section, quantity estimates and rudimentary specifications. Apparently, no guidelines or design criteria are followed. The design standards are more or less fixed as dictated by policy and the available allocated funds rather than engineering judgement. Engineering surveys are not conducted and location sketches do not show the existing topography or other elevation information. Horizontal and vertical alignments for the proposed road are not computed. Lacking survey instruments, the final location and profile grade will be verified and set by eye in the field by the DPUK representative. Design of the pavement structural section is based on traditional and locally accepted construction practice\*.

The drainage design, in most cases, is found to be deficient. Side drains and ditches provided do not have adequate capacities to carry surface run-off during floods or heavy rains.

The design drawings along with engineer's estimates are initially prepared for the purpose of seeking approvals of the available funds from higher levels of government. The procedures for submitting the designs with cost estimates to higher levels is administrative. Theoretically, all technical matters are to be reviewed by the Bina Marga, DPUP, but in practice this is rarely accomplished. The Bappenas may have some comments on the numbers, lengths and locations of the road projects as they may be related to the development goals set forth in the regional development plan. After final approval is received from the Central and Provincial government agencies, these documents together with specifications will serve as the final contract documents for the new road construction.

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\* Basically consisting of pavement structures which can be constructed by labor intensive methods with simple hand tools and a minimum of heavy equipment.

## **B. Bridges**

District road bridges under 20 meters in length are usually designed by DPUK personnel. DPU Bina Marga's contribution is strictly minor and is through the DPUP when assistance is requested. The DPUK have few experienced personnel (in many instances, none) in bridge design. These designs are rarely reviewed by qualified staff. DPUP assistance is seldom provided and this is understandable as they are heavily committed to the Provincial and National road programs and have little time available to support the DPUK.

A review of the new bridges designed by District personnel, both timber and concrete slab bridges, revealed lack of data in the following design analysis areas :

- (1) Bridge siting investigations, site data collection, hydrological information, soil (foundation) analyses, etc.
- (2) Economic analysis for bridge-type selection.
- (3) Material source investigations.
- (4) Wheel loading or stress analysis.
- (5) Adequate detail and drafting.

The only existing procedure found in use at District level was for material take-off using the "Standard Drawings" of a 4 M wide single lane bridge as the basis for quantity analysis.

## **8.4 CONSTRUCTION**

This section discusses the construction details of District roads including bridges in the four study Provinces including existing construction, road and bridge inventories, quality control and laboratories/materials testing.

### **8.4.1. EXISTING CONSTRUCTION**

Most of the existing District roads and drainage or crossing structures were built during the pre-World War II period. This construction was primarily done by a system of forced labor for which purpose large numbers of laborers were mobilized from various villages. The roads built at that time were basically to serve the purpose of hauling agricultural produce from plantation areas to markets or District towns. The majority of the road construction was probably supervised by Dutch engineers, most were built with a Telford foundation. Stone and gravel was transported from the nearby rivers and mountains. These roads represent a legacy from the days of the Dutch colonization and some of them can still be found today in their near-original form. However, during the period within which the Republic attained Independence, the engineering "know how" of road construction was unfortunately not passed on to the local engineers who took over the road building responsibilities. As a result, the District roads, since

that time have been badly neglected with almost no regular maintenance whatsoever. Both District records and visible inspection by team members have indicated that the majority of District road bridges are in poor structural and physical condition.

#### A. Roadworks

Very few District roads have been constructed recently; most have been built in District towns. The DPUK has responsibility for implementation of new District road construction including engineering supervision. Specifications for construction which have been prepared by the DPUK are found to be very general and inadequate. There is no quality control in the selection, use and placement of fills, bases and wearing surface materials. The supervision is conducted by visual inspection and the inspector rarely visits the job site. All construction work is done on the basis of locally conventional practice, i.e., basically consisting of labor intensive methods with simple hand tools and a minimum of heavy equipment.

#### B. Bridges

As in the case of roadwork, no rigorous quality control is exercised on bridge construction. Quality control is limited to visual inspection, which becomes judgemental and is effective only in relation to the experience of the inspector or supervisor. Inspection is generally performed by the DPUP. DPUP inspection where performed, is preferred over DPUK since the latter has few, if any, qualified personnel to perform this work.

More than 50% of the existing bridges are rated as damaged and in very bad condition. These damaged conditions apply to either superstructure or substructure or both. Most bridges vary between 10 and 100 years old, especially bridges from over 20 to 200 meters in length. Approximately eighty five percent of bridge superstructures and timber bridges receive no basic routine maintenance.

### 8.4.2. ROAD AND BRIDGE INVENTORIES

#### A. Road Inventory

District road inventories by length in kms and type of surface and condition for all Districts in the four Provinces are presented in Tables 8.1 through 8.3. The data shown represents the latest information and was gathered from local District offices. These inventories were conducted recently, some were completed early this year such as in the case of Central Sulawesi. The administrative regulation by the Provincial Government requires that an inventory for roads in the District be updated every year for planning purposes.

The tabulated data covers roads with asphalt, gravel, and earth surfaces. For each type the condition is rated as good, fair, poor and damaged. It is to be noted, the road condition survey is based entirely on the subjective observations of the District road personnel who conducted the inventory.

The road condition in these Provinces can be summarized as follows :

Road Condition*	A C E H		J A M B I		CENTRAL SULAWESI		WEST NUSA TENGGARA	
	KM	%	KM	%	KM	%	KM	%
Good	252.8	5.7	361.7	23.8	209.7	18.7	187.2	15.9
Fair	1455.2	32.9	304.6	20.1	244.5	21.9	333.0	28.3
Poor	1320.7	29.9	579.3	28.2	79.7	7.1	453.3	38.5
Damaged	1393.1	31.5	271.7	17.9	584.7	53.3	204.2	17.5

It appears from the above figures that the District roads in the Jambi area may be in a better condition than those in other Provinces. In general, about 50 to 60 percent of all District roads are in poor to very poor condition, and a very high percentage of this condition exists on the earth surfaced roads. Our local representatives and technical team members have inspected District roads in a number of locations and estimated that the "poor to very poor" condition of District roads to be 70% or greater. In most cases the roads were observed during the dry season. During the rainy season the number of roads in very poor or impassable condition would be higher.

The status of existing District roads, based on our physical inspection and observation, could be summarized as follows :

- (1) Average daily traffic on most of the District roads is less than 50 vehicles per day, predominantly comprised of trucks.
- (2) There are few restricted horizontal and vertical alignments. Future improvements can be accomplished within the existing right of way.
- (3) Most District roads are passable in the dry season and about 20–30 percent become impassable in the wet season. The road sections in low lying areas may become flooded for 3–4 days after heavy rains and this situation will generally persist for 5–6 months throughout the rainy season.
- (4) Major problems existing, at present, for District roads are landslides in mountainous areas due to lack of sub-surface drainage and drainage problems in plains areas.
- (5) There are two principal types of road failures. These are pavement surface failure for gravel roads, and structural failure for dirt roads. The deterioration is principally attributed to the lack of maintenance as discussed in Section 8.5.
- (6) Several locations of stream crossings in Central Sulawesi and West Nusa Tenggara are without bridges and become impassable in most stream flow conditions.

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\* Condition classifications are as used by District road personnel. These classifications are not formally defined.

## B. Bridge Inventory

Bridge inventories on District roads for the study Provinces by type of construction, condition, and aggregated lengths in meters are summarized in Tables 8.4 through 8.7. As in the case of roads, these inventories were recently taken and are subjective evaluation reflecting the judgement of the District road agency observer.

The referenced bridge inventories are summarized as follows :

Bridge Condition	A C E H		J A M B I		CENTRAL SULAWESI		WEST NUSA TENGGARA	
	M	%	M	%	M	%	M	%
Good and Fair	4,024	19.5	1,929	25.2	777	13.9	1,917	70.1
Poor	13,771	66.7	4,157	54.0	76	1.4	499	18.3
B a d	2,840	13.8	1,595	20.8	4,715	84.7	318	11.6

Other observations which relate to these inventories are summarized by Province as follows :

- (1) Aceh — The major portion of new construction is being developed for 4 M widths and lengths of 5 M to 7 M. There are a number of existing bridges over 20 M long with temporary superstructure or with inadequate superstructure. Generally these bridges are 40--80 years old.
- (2) Jambi — The majority of these bridges (timber structures) are seriously deteriorated and constitute a hazard for users. The longer span bridges are mostly under 20 years old.
- (3) Central Sulawesi — Bridges are mostly 30--40 years old. Many stream crossings are limited to ford-type crossings, and a few ferry type crossings.
- (4) West Nusa Tenggara — Bridges in the 30--40 year age group are built of structural steel girders and timber decks. New bridges are concrete slab construction. The 2 long span bridges superstructure design was by Bina Marga, DPU, and sub-structure by DPUP.

The basis for condition classifications used in the inventories are as follows :

- (1) Good — A bridge which is still in service without any sign of deterioration, regardless of material and type of structure.
- (2) Poor — A damaged bridge which shows rupture, deterioration or missing components on the secondary structure such as railing, wind bracing, parapets, etc., but is still serviceable since the main structure is still in a sound and durable condition.

This classification also includes bridges which show damaged timber planks/decks, if the replacement will restore the bridge to service for at least another 10 years.

- (3) Bad — This classification includes all temporary bridges, Bailey bridges, and permanent bridges which show signs of a deteriorated member of the main structure or excessive rocking when heavy vehicles pass.

Excessive settlement of the substructure may endanger the use of the bridge for the traffic and is also classified as bad. Broken bridges and unusable bridges (due to condition) will fall under this classification.

#### **8.4.3. QUALITY CONTROL PROCEDURES**

As previously noted, quality control has been largely judgemental as executed by the inspector or regional representative assigned to a given project. However, emphasis is to be placed in the future on utilization of the developing DPUP soils and materials testing capability to perform foundation analyses and concrete testing in support of bridge construction

#### **8.4.4. LABORATORIES/MATERIAL TESTING**

This section deals with materials testing laboratories for roadworks and concrete works in the four study Provinces. The details include types and condition of testing equipment, activities and manpower. All laboratories have one thing in common, they follow some standards and specifications by AASHTO and ASTM. Based on our inspection and observations, the tests meet the above standards and specifications.

##### **A. Aceh**

In this Province, there are two material testing laboratories, one located in the compound of the Roadworks Division under jurisdiction of the Provincial Public Works Department, and another belongs to the Technical Faculty of Syah Kuala University.

The DPUP laboratory is well equipped with complete roadworks and bridgeworks testing apparatus (See Lab Inventory Table 8.8). Our physical inspection of the laboratory indicated that most of the testing equipment is fairly new and in good condition. The major task of the laboratory at present is to undertake field testing for ongoing Betterment projects. It appears to have adequate capacity for the present task. The present staff consists of one graduate engineer with five years of related experience, five laboratory technicians and four field technicians with two to three years of experience and four laborers. In addition, there are 2 to 3 field technicians in each section of the District office who can give assistance to the Provincial laboratory when dictated by the workload. They have been well trained either in the central laboratory in Jakarta or in Bandung. Based on our assessment and interview with the Chief of Roadworks Division, the laboratory can undoubtedly handle the testing work

for the Feeder Roads Management Program in addition to the current assignments, possibly requiring a slight increase in manpower.

The university laboratory is more academic and research oriented, with limited experience in actual field testing. It has a wide range of testing equipment, the list of which is shown in sheet 2 of Table 8.8. The potential capacity of lab testing is high. Although the present staff is limited, additional manpower can easily be mobilized from research associates, instructor assistants, and students. Various standards and specifications are followed including AASHTO and ASTM. Outside projects are accepted by the university. This laboratory can serve as a supporting facility in case the DPUP laboratory is overloaded.

#### B. Jambi

The DPUP laboratory in this Province is also located in the compound of the Workshop and Roadwork Division. The laboratory is adequately equipped with basic materials testing apparatus for roadworks and bridges. Laboratory testing equipment sets are shown in Table 8.9. Present activities are concrete testing for bridgeworks on government-financed projects. No roadworks testing activities being performed at the present time. However, based on our interview, the staff appear to have enough potential and capabilities to undertake materials testing for a roadwork project. All of the laboratory technicians have been academically trained in the research laboratory center at Bandung. The testing equipment is relatively new and still in good condition. If necessary, the laboratory has recourse to Bandung for increased manpower and testing equipment as well.

The laboratory is staffed with one chief and four laboratory and field technicians. The chief has approximately 15 years of experience and technicians have four related experience.

#### C. Central Sulawesi

Unlike the first two Provinces, the DPUP material testing laboratory in this Province is not located in the Roadwork Division compound, but a few kilometers away. It is a section of DPUP's Bina Marga Department. This laboratory has recently been set up (about a year ago) to undertake the material testings for Toboli – Ampibabo Project and Parigi –Sausu Project, both of which are Provincial roads and GOI financed. These projects involve the construction of about 30 kilometers of road and 8 bridges, and will commence late this year. Several essential tests such as concrete compressive strength, flexural strength, and aggregate abraisson cannot be performed due to lack of equipment. Most of the testing equipment on hand is in reasonably good condition. The laboratory inventory is shown on Table 8.10. At present time, activity is limited to some materials testing for road construction for the above projects. It is obvious that the testing equipment on hand is inadequate for the upcoming projects, assuming conventional specifications (no copies of these specifications were obtainable) for materials testing and quality control are a part of the contract documents.

Laboratory staff includes the laboratory chief, assistance chief, two technicians and three laborers. The entire staff have limited practical experience. However, the chief and assistant chief have completed academic training at I.T.B. Their capabilities and manpower should certainly be upgraded for their imminent assignment, if materials testing and quality control are required on the contracts noted.

#### D. West Nusa Tenggara

The laboratory facility is located in the Roadworks Division, DPUP Office Building. It is an independent division, at the same administrative level as Roadworks, Irrigation, and Building Divisions under the Chief of the DPUP. The laboratory has the capability to satisfy the need for basic material testings for roadworks and bridgeworks. Testing equipment inventory is presented in Table 8.11. Physical inspection of the laboratory indicates that most of the testing equipment is in good condition, and test reports are properly maintained. The principal tests being performed at present are concrete testing, mix design, soundings and borings for bridge projects in West Nusa Tenggara, including some field CBR tests for roads in Sumbawa.

This laboratory division has four sub-divisions, namely soils, concrete, asphalt and administration. The chief is a graduate engineer with three years experience. His assistants are heads of the four sub-divisions who occasionally serve as laboratory or field technicians.

### 8.5. MAINTENANCE

Maintenance for roads and bridges is separately discussed in the following paragraphs.

#### 8.5.1. ROADS

This paragraph reviews the maintenance activities presently being performed on District roads.

It should be noted that the term "maintenance" as used in this paragraph encompasses the concepts of "Programmed Maintenance" as well as "Repair". It is noted that the adopted terminology used by the Directorate General of Bina Marga, is defined as "routine efforts to maintain road conditions where the roads still have adequate servicability or are maintainable".

The texts prepared for "Training Support Services Project", have been accepted by the Directorate General of Bina Marga as "Standard Road Maintenance and Repair Manuals". These documents are made available to all DPUP Bina Marga offices, but they are not found in the DPUK offices.

In general, the DPUK has full responsibility for looking after and repairing all roads in Districts which have been officially designated as District roads. However, this is not always the

case; there are some exceptions in Provinces of Central Sulawesi and West Nusa Tenggara where this administrative organizational rule does not apply.

In Central Sulawesi, the maintenance responsibility for about 320 kilometers of District roads has been assigned to the DPUP on the instruction of the Governor. For the economic development of the region, these District roads, as listed below, are urgently needed to be rehabilitated to support the on-going transmigration project in the area where the traffic volume will soon become heavy. The subject road sections are as follows :

- |                 |   |            |
|-----------------|---|------------|
| (1) Pape        | — | Kolonodale |
| (2) Palu        | — | Palolo     |
| (3) Batni       | — | Toili      |
| (4) Toli - Toli | — | Buol       |

The Provincial Government is now in the process of changing the status of the above roads to the "Provincial" classification.

In West Nusa Tenggara, the DPU Section, which at the same time functions as the DPUK, is responsible for maintenance works for all District roads under direct supervision of the DPUP.

Interviews and discussions with Bupatis and the DPUK technical personnel in the study Provinces indicate that there are three types of maintenance activities presently being performed for the District roads, namely, annual maintenance; rehabilitation and upgrading (or major maintenance) and emergency maintenance. Each type of activity is discussed in the following subsections.

#### A. Annual Maintenance

The annual maintenance could conceivably be regarded as a routine activity for the District road maintenance and repair work. The major source of maintenance funds come principally from Inpres II through the Central Government budget and a minor part is allocated from the local District fund or District budget so called "APBD II". The maintenance budget at the District level is programmed by the Bupati. The funds provided for maintenance are so limited that they are sufficient to repair less than 5% of "very poor" condition roads in the District. In the District of Sumbawa, West Nusa Tenggara, only 2 kilometers of roads could be repaired each year against the total length of approximately 250 kilometers. For a more complete discussion of maintenance funding, see Section 7 of their report. Typical annual maintenance activities for District roads comprise the following : grubbing the edge of roadway, grass and weed cutting, cleaning drainage ditches and patching potholes. These operations are performed irrespective of road surface types. For asphalt sealed roads, the main activities include filling potholes with gravel and sealing the surface with bitumen. Surface maintenance

of the asphalt roads is seldom performed. For gravel roads, the main activities consist of regravelling surfaces and reshaping shoulders. On the earth roads, it includes levelling, re-surfacing of carriageway, and restoring crown slopes. These operations, except for the asphalt roads, are carried out once a year on different locations depending upon demand dictated by deterioration of road conditions and approval of a proposed budget.

The selection of road sections to be repaired is conducted within the District level. The DPUK in conjunction with the Bureau of Development, prepares a proposal for maintenance of specific road section together with cost estimates and scopes of works which are submitted to their Bupati for official approval. Since the works are of relatively small scale, generally less than 5 million rupiahs\*, the DPUK will employ a labor only contractor who has no machinery or equipment except hand tools to undertake the works. The type of work is normally let out through a work order with a so called "S.P.K." procedure without bidding.

All operations are carried out by hand-labor including crushing large size stone, surface leveling, spreading and placing aggregates. If necessary, trucks for hauling material and rollers with operators could be leased from the DPUK. The maintenance works would be performed in the dry season during June through September.

The engineering works are supervised by Chief of Construction, DPUK, and the administration is handled by the Bupati staff. We have reviewed in the field some of the maintenance works and discovered that the work standards are low and most of the laborers are unskilled. Quality control is non-existent. Supervision is done by visual inspection.

#### B. Major Maintenance (Upgrading)

Major maintenance herein is considered to be upgrading road surface quality; i.e., from earth to gravel surface or from gravel to bituminous treated surface. It is a larger scale work project than a routine maintenance job and usually costs more than five million rupiahs per kilometer. The work of this nature, in accordance with the administrative regulation, is required to be let to contractors by tender. All local contractors intending to undertake this work must register with the Bureau of Development, the Provincial Public Works, and meet pre-qualification requirements.

The source of funds for upgrading is allocated principally from the Inpres II and APBD budgets. However, in case of an urgent need for major maintenance and a shortage of District budget, the Inpres I fund could be allocated to upgrade a District road with the approval of the Governor. The funds for major maintenance or upgrading works are not regularly made available every year, and the amount which is available (very limited) varies between one

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\* Commencing this year, the maximum cost of work through the "S.P.K." process has been revised to rupiah 10 million.

District and another. For example, one District in West Nusa Tenggara has implemented the upgrading work for only 10 kilometers of road in this funding category.

The DPUK is responsible for the preparation of design documents for upgrading work. The related documents are similar to those for the design of new District roads as discussed in paragraph 8.3. and consist of a sketch of the location map, typical cross section of the new road surface, quantity estimates, cost estimates and the scope of work. These are submitted to the Bupati who subsequently submits them to the Development Bureau and DPUP for review and approval. In case the budget comes from the Inpres II and the Provincial income, the DPUP takes care of all technical matters, however, the planning must be closely coordinated with the Bupati. Following the approval by the Provincial Governor, the DPUK is charged with the responsibility for implementation including contracting and supervision of construction.

We have inspected some of the ongoing projects for upgrading works, such as roads in Mujur, Central Lombok District, Province of West Nusa Tenggara. The existing gravel surface road was being upgraded to an asphalt treated surface. The observed operations were labor intensive and consisted of the following : crushing large size stone, patching potholes, over laying crushed stone on existing surface, spreading river gravel, rolling and levelling, spraying bitumen, spreading fine aggregate and compaction. Although the works were carried out in a locally conventional practice and with visual inspection only, the final outcome was found to be quite acceptable.

### C. Emergency Maintenance

There have been in most cases no funds nor manpower reserved in the District offices for emergency repair works which normally are in great demand during the rainy season. In the case of road failures due to landslides, embankment slides, drainage problems, including collapse of bridge structures, the immediate remedial action would be carried out as a "Gotong Royong" activity consisting of voluntary actions by people from the nearest village who contribute their time, labor and available material to rectify the situation within their capability. If the problem is quite serious and too big for them to handle, they provide a "make-shift" solution until a more permanent project can be implemented in the following year's budget.

## 8.5.2. BRIDGES

### A. Routine Maintenance

There is no adequate maintenance manual in use for District road bridges. Further, as funds for Districts in the four Provinces are very limited, routine maintenance for bridges in the

District road systems is not performed.

**B. Major Maintenance**

The periodic maintenance of timber bridges to be carried out every 5 years comprises full replacement of the timber deck, railing if any, and surface course. A temporary bridge is provided during replacement as required.

DPUK uses local contractors to perform these maintenance jobs. A special fund from the Provincial Governor for flood damage or special requirements (when available) is used to supplement funding needs exceeding the regular budget.

**C. Emergency Repair**

Emergency repair is accomplished usually as a Gotong Royong project . When funds are necessary to perform repairs or replacement, local authorities have the latitude to appropriate funds.

**8.6. EQUIPMENT**

**8.6.1. INTRODUCTION**

This section summarizes the results of the preliminary investigations that were made on the equipment and the maintenance/repair facilities in each of the four Provinces, included within the scope of this study. This section includes discussions of the strengths and weaknesses found in the overall equipment/maintenance systems.

The equipment listed in 8.12 through 8.19 includes those available at each of the four Provinces from Bina Marga (DPUP) and the Governors (DPUK). Due to the limited time available and the extensive area to be covered, verification was accomplished by spot checks. However, this procedure was adequate to obtain sufficient information to substantiate the discussions and conclusions that follow.

The following is based on the premises that (1) a high priority has been placed to developing the capabilities of the Provincial Public Works (DPUP) to include District (feeder) road projects, (2) DGH is redefining the Provincial organizational responsibilities so that additional direct assistance can be provided to the District Public Works (DPUK), and (3) early implementation of these projects are program objectives.

**8.6.2. AVAILABLE EQUIPMENT AND ALLOCATIONS**

Tables 8.12 through 8.15 provide summaries of the DPUP equipment located in each of the

four Provinces under study. This equipment is assigned to National and Provincial road projects and is not normally utilized for the construction, rehabilitation, or maintenance of District roads. The equipment that is used for District road maintenance is assigned by the Governors and is listed in Tables 8.16 through 8.19. Discussion with DPUK personnel verify that the equipment assigned is inadequate in both types and numbers to properly maintain the existing road networks. Two examples are : in the Province of Jambi the District of Tanjung Jagung has no equipment to maintain approximately 183 Km of District roads. The District of Aceh Besar in the Province of Aceh has two rear dump trucks and a tandem roller in poor condition, to maintain approximately 615 Km of District roads.

The existing concept of dividing the equipment resources which exist in the various Indonesian Governmental organizations by administrative road classifications of "National", "Provincial", and "District" and by the various funding sources available for each, instills constraints which are seriously detrimental to the efficient management of equipment. Approximately sixty percent of the total road network in Indonesia is classified as "District" yet the percentage of Central and Provincial Government equipment assigned to these road projects is negligible.

Other Governmental organizations observed to be doing road construction such as the Army and Pertamina requiring government funded equipment, maintenance capabilities, spare parts, etc. are not within the scope of this study and therefore are not listed herein.

### 8.6.3. EQUIPMENT REQUIREMENTS

A precise quantitative analysis to determine the numbers, types and size of the equipment required in the four study Provinces to maintain over 8,000 Km of existing District roads will not be performed during this study phase\*. However, the following paragraph addresses the typical equipment complement that would be required for various road projects and that could be used for estimating purposes. Regardless of how simple it may seem to construct or maintain the lower class District roads, all of the fundamental principles of engineering, analysis of the site conditions, program planning, etc., would apply in order to ascertain the best equipment for a particular project. The fundamental principles of heavy equipment and material handling are covered in numerous engineering texts and references, and for this reason there will be no attempt in this limited study to present a complete text on equipment applications. When these principles are carefully applied to the conditions of a job it then becomes possible to arrive at reasonably accurate figures for the types and quantity of equipment required for that job. Another job with different conditions may well require a different complement of equipment. The Department of Public Works

\* In Section 12, an order of magnitude estimate is provided for a five year maintenance program.

publication "Basic Guide For Work Performance Using Equipment (P.5)" contains most of these principles. A suitable detailed analysis utilizing these principles and guidelines for any road project, could not be located for review.

Taken together Tables 8.20 through 8.23 show typical operations, crews and equipment required to perform new construction, rehabilitation and maintenance projects, under normal site conditions, using equipment intensive methods. Tables 8.24 and 8.25 show the operations, equipment and personnel required for labor intensive road maintenance.

#### **8.6.4. EQUIPMENT CONDITION**

By most standards, the numbers of equipment shown on the summary Tables 8.12 through 8.19 as being fair (F), poor (P), and scrap (S) conditions are excessively high. This situation stems from the following reasons :

- (1) The remoteness of the job site to a maintenance facility.
- (2) Lack of accessibility by road to transport.
- (3) Lack of daily routine maintenance.
- (4) Limited management responsibility at the job site to accomplish the required maintenance.
- (5) Uncontrolled cannibalization of parts.
- (6) Insufficient funds and governmental policies to hire private companies to perform maintenance and supply spare parts.
- (7) Limited capabilities of the Provincial and District workshops to (1) make major repairs and (2) perform lesser repairs at the job site.
- (8) Lack of enforcement of established government maintenance procedures/policies upon equipment users and enforcement of any associated penalties.
- (9) Lack of proper spares and the excessive time required to obtain them.
- (10) Misuse of the equipment.
- (11) Limited skilled mechanics.

Figures 8.1 and 8.2 depict the condition of equipment on several typical ongoing National and Provincial road projects and how they have progressively deteriorated. These are statistics

compiled by the regional workshop in Medan of the Central Bina Marga equipment.

To cite a few examples, Road Project F-2 in North Sumatera, a project being done by Bina Marga, had thirty-eight dump trucks during the period of April – June 1978, seventeen of which were in good condition and twenty-one were considered to be in fair condition. During the period of January – March 1979, this project had twenty-nine dump trucks of which eight were in good condition, seven were in fair condition and fourteen were in poor (Unusable) condition.

On another project, (the Bireuen project), being done by a private contractor, P.T. Marjaya with lease/purchase equipment from Central Bina Marga, had forty-two dump trucks during the period of April – June 1978 of which seventeen were good, twelve were in fair and thirteen were considered in poor condition. In the July - September period thirty-five were in poor condition and for the period of January – March 1979 forty-one were considered in poor condition, leaving only one available for work.

Even though the Provincial and Regional workshops are responsible for the maintenance of Bina Marga equipment being used by Bina Marga crews, there does not appear to be any significant difference between the maintenance of that equipment and the lease/purchase Bina Marga equipment being used by a private contractor. Theoretically, the private contractors are to be self-sufficient from an equipment standpoint to meet the contractor pre-qualification requirements, however, this is not case. Although the private contractor is responsible for the maintenance of the leased Bina Marga equipment, it is evident that this is not being accomplished.

#### 8.6.5. MAINTENANCE AND REPAIR

##### A. Policies and Procedures

The Central Government Department of Public Works has issued publications which, in great detail, provide the necessary procedures for proper equipment maintenance, daily record keeping and workshop administration. The records kept by the workshop personnel define the repairs that have to be made to correct a particular problem. The cause of the failure cannot be determined. However, based on their experience the workshop personnel indicated that most equipment failures can be attributed to the lack of proper field maintenance, neglect and misuse by the equipment operators. The daily preventive maintenance records and usage records which would show hourmeter operating time, engine oil changes, lubrication, filter changes, etc. are not being kept, or if they are, do not accompany the equipment back to the workshop. Hence, a historical record necessary to determine the equipment's efficiency and economical life is not available.

The statistics discussed in paragraph 8.6.4 (Equipment Condition) confirm the fact that proper care of equipment is not being accomplished. This and the following findings relative

to maintenance and spare parts management are the foremost weaknesses, in being able to construct and maintain roads of any classification assuming adequate funds are made available. It is noted here that the prequalification requirements for contractors to bid on road projects under the requirement of "personnel" does not include equipment maintenance personnel.

The existing fundings and support policies are shown in Figure 8.3. Basically there are two sources of funding. One is from the Central Government DPU (Bina Marga) and the second is "multiple source" from the Governor through DPUP for National and Provincial road projects along with irrigation and other needed projects. The DPUK equipment, with few exceptions is furnished and maintained by funds provided by the Governors through the Bupatis. Normally, when the DPUK equipment needs maintenance, other than minor services and possibly engine tune-ups, DPUK, when funds are available, hire private capability. In the Province of Nusa Tenggara, for example, where the DPUK is integrated with DPUS (same chief), the Provincial workshop performs maintenance on the DPUK equipment. This is attributed to good working relationships between the two organizations, rather than established policies. In the Provinces of Central Sulawesi, Aceh and Jambi, the Provincial workshop does not perform maintenance on DPUK equipment even if the funding is available.

The policy and organizational structure of the Central Government (DPU Bina Marga) dictates that if the Provincial workshops do not have the required spare parts, or capability to perform the necessary maintenance, they must go to the regional workshop for support. If the regional workshop cannot satisfy the requirement, it in turn must go to the central Bina Marga road and equipment department in Jakarta. Observations indicate that this concept of equipment management is weak in that equipment costing Rp 93,000,000 may be inoperative for as long as eight months to a year.

In addition, the Provincial workshop in Sumbawa is subordinate to the Provincial workshop in Mataram (same Province) which creates greater delays in maintenance.

#### **B. Facilities and Capabilities**

1. **District Workshops.** As stated in paragraph A above, the DPU has very limited maintenance funding and capabilities. The maintenance areas are only capable of servicing and performing minor engine tune-ups, and that is limited to transportation vehicles such as jeeps, motorcycles and other similar equipment rather than road or bridge construction equipment.
2. **Provincial Workshops.** Each Province has only one Provincial workshop with the exception of Nusa Tenggara which has two. This is one of the contributing factors for inadequate maintenance. The area to be covered by each Provincial workshop is too large

and the poor road conditions and limited bridge width and load limitations make it difficult and sometimes impossible get the equipment requiring major repairs to the workshop.

The Provincial workshops also have limited maintenance capabilities, limited funds, and are too few in number. The Provincial workshop in Bireuen for example is responsible for maintaining the DPUP equipment in the Province of Aceh. Table 8.12 lists the major DPUP furnished construction equipment for Aceh Province which totals 219 items. Jeeps, land rovers, motorcycles, etc., have been excluded. This complement of equipment was made by twenty-seven different major equipment manufacturers. This inhibits adequate spare parts inventory and training, and induces uncontrolled cannibalization.

The workshop at Bireuen has 79 personnel with an annual operating budget of only 11 million rupiahs. This budget includes funds for salaries, allowances, gasoline, oil and expendable spare parts. Major spare parts are ordered from the regional workshop in Medan requiring up to 3 months lead time.

Workshop equipment which exists in each Provincial workshop is listed on Tables 8.26 through 8.29.

A cursory review of the spare parts inventory and control system at the Bireuen workshop revealed that only two air filters had been issued in the past twelve months and that no oil filters were issued during a seven month period. The reason given was that if the users do not request parts, they are not issued. It can be concluded that field preventative maintenance is ineffective and that the Provincial workshops and equipment users rely on the regional workshops and private industry for support when funding permits.

3. Regional Workshops. Figure 8.4 shows the regional workshops, their locations and the number of Provincial workshops that each supports. It becomes apparent that there are not enough regional workshops to provide the necessary maintenance support and that the geographical locations relative to the Provincial workshops necessitates shipment of major spare parts and/or equipment for maintenance over long land distances and some by sea. This is considered a weakness in the present distribution of maintenance capabilities. The regional workshops have greater maintenance capabilities but are still limited. Vehicle engine overhaul appears to be possible but similar work on bulldozer diesel engines and transmissions is questionable. The regional workshops do not have sufficient equipment such as dynamometers, torque wrenches, hydraulic shop, fuel injector testing and repair capability, to name a few deficiencies in repair/diagnostic tooling and equipment.

The Medan workshop has 87 personnel with an operating budget of 120 million rupiahs per year and spare parts budget of 30 million rupiahs per year. Figure 8.5 shows their spare parts inventory, quality received from Jakarta, and the amount used. An increase of over 9000 parts has been realized in the past year. Some of this has been attributed to the fact that Jakarta may send parts that have not been ordered. Special orders take up to eight months to receive.

Workshops in Bireuren, Medan, Jambi, Ujung Pandang, Palu, Mataram and Sumbawa were visited. The aforementioned conditions are typical for all of the workshops. The following additional points however merit mentioning.

- (a) Budgets may allow for spare parts but not for repair by private firms and vice versa. An example of this situation was observed during a visit to the Caterpillar Corporation shop in Medan. This shop was in the process of repairing a tractor belonging to the DPU Irrigation Department. Caterpillar identified the spares needed, had them in stock, but the DPU ordered the parts from Jakarta in accordance with the prescribed policy. The tractor has been disassembled for over 3 months awaiting the parts.
- (b) Scrap equipment has not been collected in 7 years and remains on the inventory list.
- (c) The computerized tabulation of the spare parts available in Jakarta being used in Medan was issued in 1975. Palu has revised sheets dated June 1978.
- (d) The workshop in Mataram has a large lathe that cannot be used due to insufficient electrical power. If power became available, they would have no operator.

Recommendations to correct these weaknesses are outlined in Section 10 of this report. The estimated costs for additional maintenance facilities, up-grading the existing facilities and additional tooling is in Section 12 of this report.

## **8.7. TRAINING**

An assessment of the current training capabilities and how they may be applied to the Feeder Road Management Program has been accomplished. The following addresses the apparent strengths and weaknesses of these capabilities.

### **8.7.1. TRAINING INSTITUTIONS (Academic and Technical)**

The formal training institutions throughout Indonesia provide Academic and Technical Courses from the High School level through the University level of instruction. Although not

specifically designed to directly support Road Programs, the technical courses of study in Civil and Mechanical engineering, as well as management and economic curricula, provide a potential resource which, if used, would be considered a definite strength in satisfying some of the overall Feeder Road Program Training Objectives.

#### 8.7.2. DPU TRAINING CENTERS

The Central and five Regional Training Centers established by the Department of Public Works provides the basis from which a comprehensive training program could be initiated, at least in part, to directly support the Government's needs in all aspects of Road Programs. This is considered a strength in the overall training scheme.

The operational training requirements and associated implementation funds being provided by the Directorate General of Bina Marga, Irrigation and Manpower and Transmigration to the Central DPU Training Center is also considered a strength in the existing system. The results of such programs and efforts may vary widely on management performance. No assessment of training program results is made.

There is no existing method to objectively evaluate nor measure the impact of training as it relates to increased units of output and quality of work at the job site.

The Training Sections that make-up the DPU Central Training Center are shown on Figure 5.6. The highway Training Section has only two staff members who coordinate Bina Marga training requirements throughout Indonesia. This limited staff is not capable of developing new course material to keep abreast of expanding needs.

The Regional Training Center Organization is shown on Figure 5.7. This organization performs only administrative functions. There are no instructors shown and no section is responsible for course and lesson plan development. As stated in Section 5, the course material and lesson plans to satisfy the objectives are left to the discretion of the DPUP personnel selected to give the courses. This is considered to be one of the major weaknesses in the current training programs.

Although some of the Training Centers are constructing or planning to construct new facilities to accommodate more students, the projected increase in capacity does not appear to be adequate. Approximately 1100 personnel are recommended to take those courses outlined in Section 11 pertaining to District Roads Work in the four study provinces. Once the course material is developed and the training program implemented, other provinces, in addition to the four study provinces, will in all probability send employees to take these courses. There is a lack of training equipment and aids to effectively support instructors. Laboratory equipment and models are virtually non-existent. Basic equipment such as projectors, measuring devices, and so on, are too few, or in some Centers, not available.

### **8.7.3. COURSE MATERIAL AND INSTRUCTORS**

The courses listed on Table 8.31 can at best be classified as orientation or familiarization. They may be used to introduce the subject to new trainees. However, they are not adequate for teaching the subjects. They are audio-visual aids which address the elements for a given subject in their proper sequence. Qualified instructors are not available to accompany these presentations, nor to answer questions that might be posed by the trainees. The results which could be gained from this method of familiarization does not, in the consultant's judgement, justify the cost.

The courses listed on Tables 8.30 and 8.31 are normally conducted at the Central DPU Training Center, and those listed on Table 8.32 at the Regional Training Centers. Lesson plans for these courses have not been generated, leaving the content and sequence of instruction up to the discretion of the individual instructors. Additionally, the regular training schedules are not implemented due to lack of adequate funding or may be slipped or modified downward (less offerings) for the same reason.

The short duration of courses and the lack of course material and of qualified instructors are considered to be the primary weaknesses of the existing training programs.

### **8.7.4. PERFORMANCE EVALUATION**

There are no existing methods to objectively evaluate or measure the students' performance or knowledge gained through these courses. The Training Centers conduct an opinion poll which is designed to solicit subjective responses from the students about the training facility, adequacy of furnishings, relevance of lectures, the manner in which the lecture was presented, and so on. This is considered to be a weakness.

# PROVINCIAL/NATIONAL ROAD PROJECTS:

## CONDITION OF EQUIPMENT BY QUARTERLY PERIODS:

CONTRACTOR RESPONSIBLE  
FOR EQUIPMENT MAINTENANCE

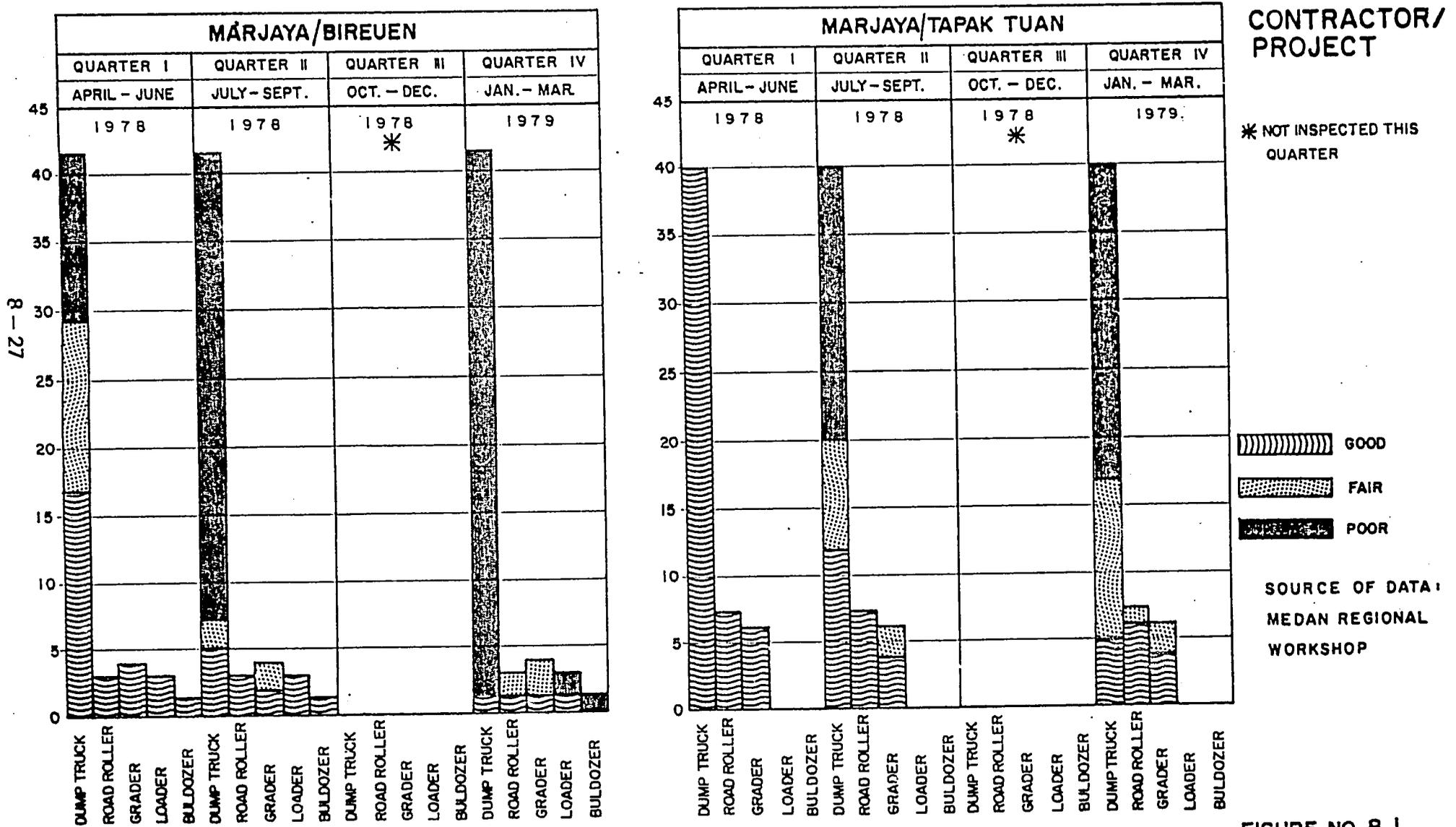
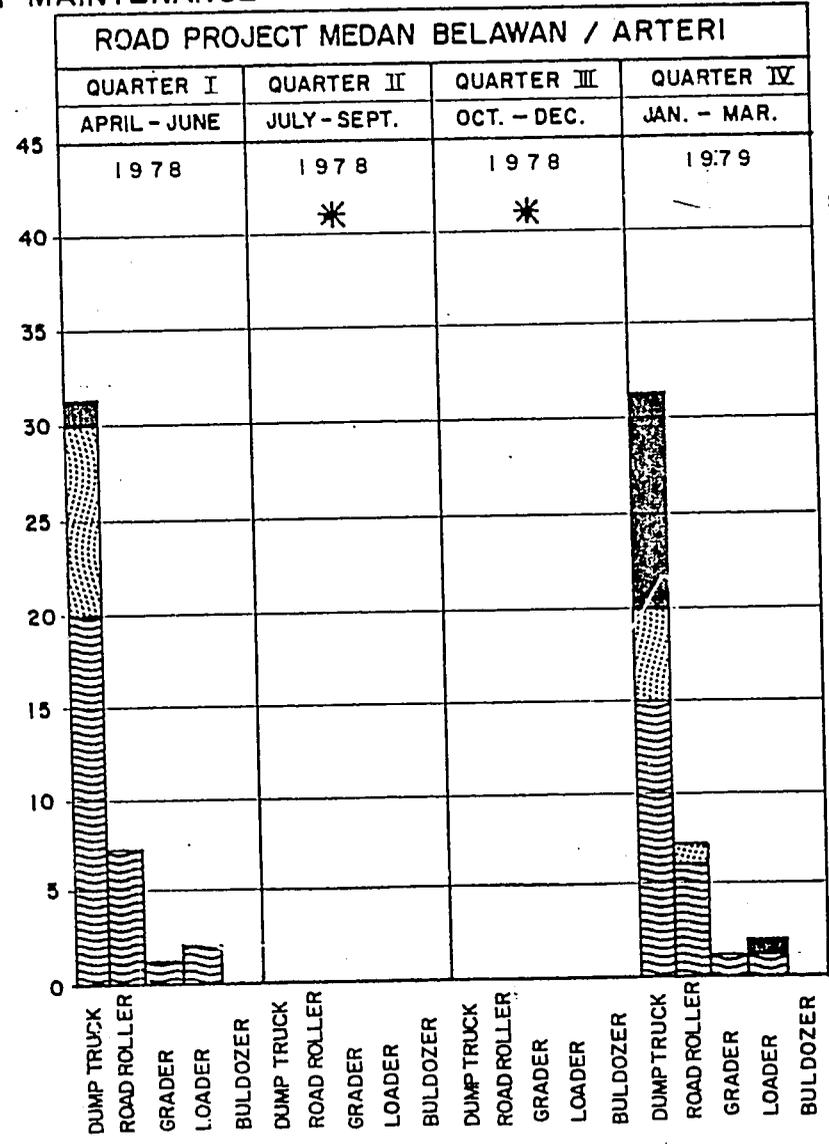
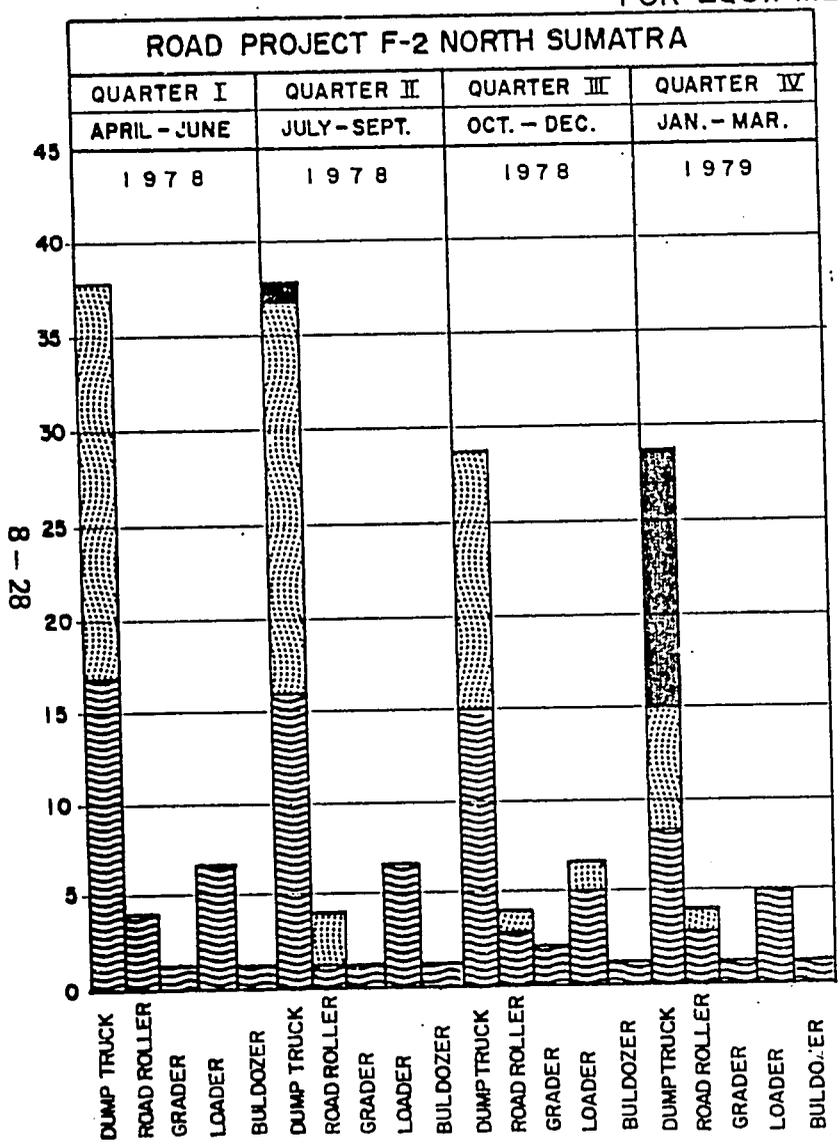


FIGURE NO. 8.1

PROVINCIAL/NATIONAL ROAD PROJECTS:  
 CONDITION OF EQUIPMENT  
 BY QUARTERLY PERIODS:  
 PROVINCIAL AND REGIONAL  
 WORKSHOPS RESPONSIBLE  
 FOR EQUIPMENT MAINTENANCE.



BINA MARGA  
 CREW

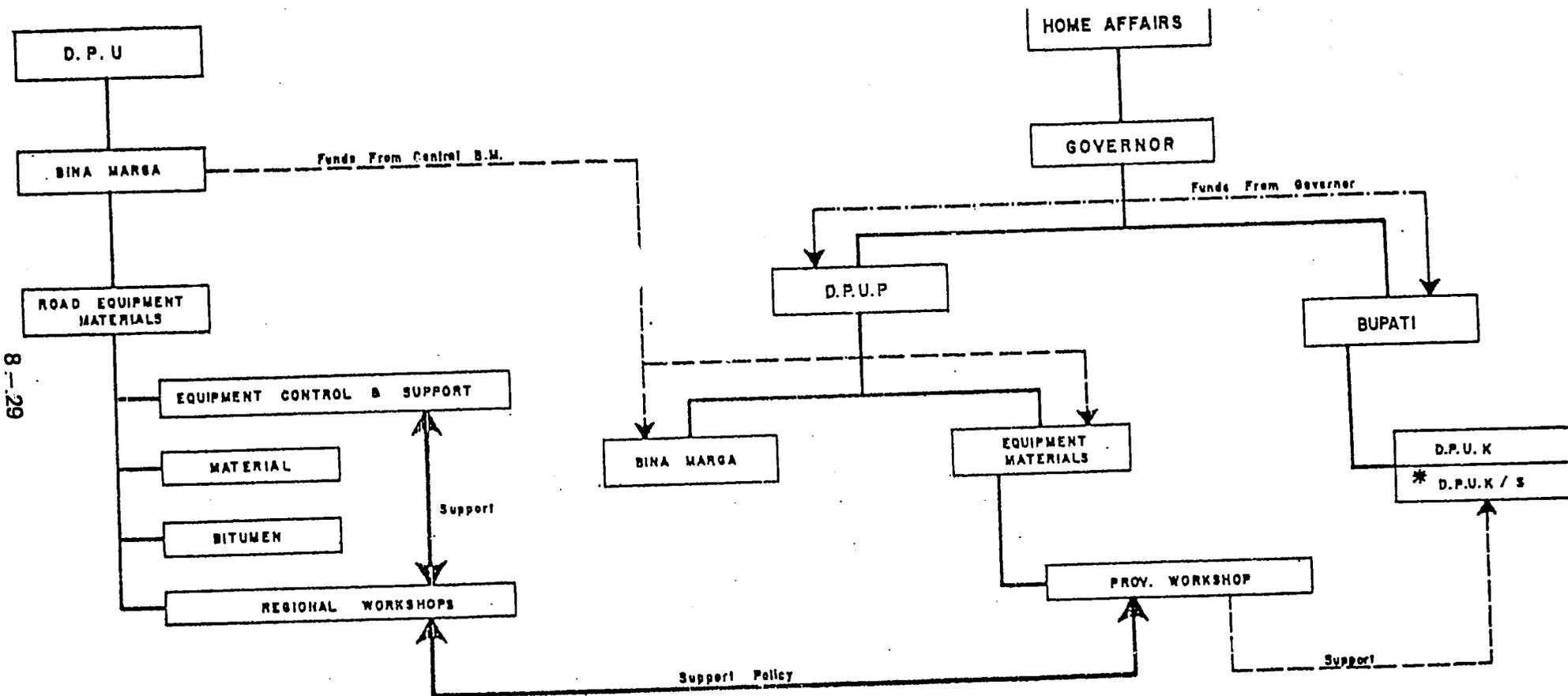
\*NOT INSPECTED THIS  
 QUARTER

GOOD  
 FAIR  
 POOR

SOURCE OF DATA:  
 MEDAN REGIONAL  
 WORKSHOP

FIGURE NO. 8. 2

# EQUIPMENT & MATERIALS EXISTING FUNDING & SUPPORT POLICIES



8-29

\* NUSA TENGGARA PROVINCE ONLY

FIGURE NO. 8.3

REGIONAL WORKSHOPS &  
DEPENDENT PROVINCES

8-30

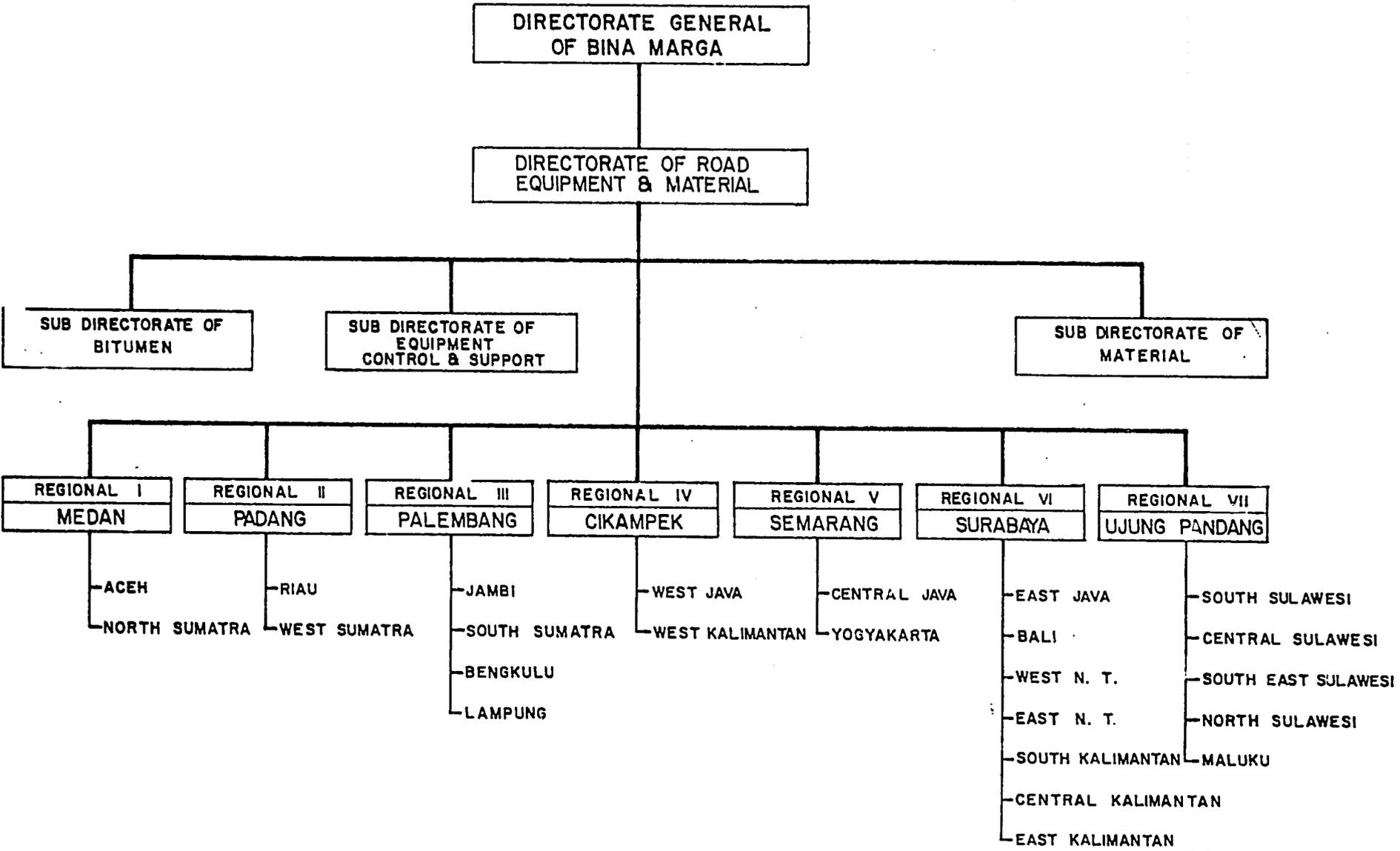
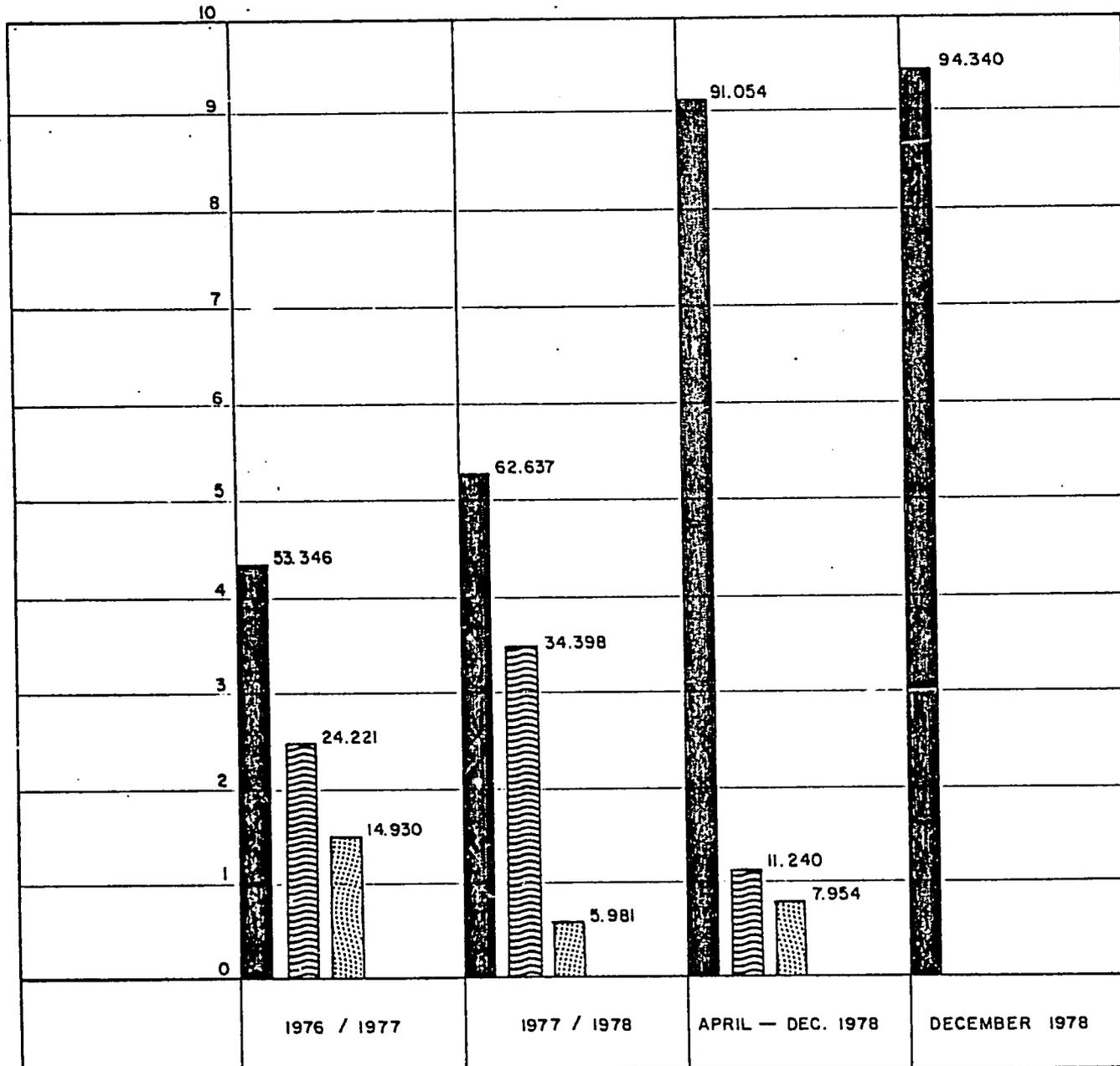


FIGURE NO. 8.4

# MEDAN WORKSHOP SPARE PARTS INVENTORIES



**NOTE**

SCALE : 1 : 10.000 PCS

 IN STOCK  
 RECEIVED  
 USE

FIGURE NO. 8.5

**TABLE 8.1**  
**ROAD INVENTORY BY TYPE OF SURFACE AND CONDITION**  
**DISTRICT ROADS – ACEH PROVINCE**

DISTRICT	LENGTH IN KM BY TYPE OF SURFACE AND CONDITION*												TOTAL LENGTH KM
	ASPHALT				GRAVEL				EARTH				
	GOOD	FAIR	POOR	DAMA- GED	GOOD	FAIR	POOR	DAMA- GED	GOOD	FAIR	POOR	DAMA- GED	
Aceh Besar	1.5	7.0	—	—	14.4	107.3	22.0	—	40.5	25.1	217.6	179.6	614.9
Pidie	1.2	—	4.2	—	40.8	18.0	82.0	17.0	—	—	28.1	461.2	652.5
North Aceh	25.8	—	—	—	—	75.0	92.7	12.0	—	—	37.1	278.8	521.4
Repr. North Aceh	—	11.9	—	—	—	350.9	—	—	—	—	166.5	—	529.3
East Aceh	31.1	—	—	—	—	194.7	—	—	—	205.0	280.5	—	711.3
Central Aceh	—	—	—	0.9	—	60.3	—	—	—	—	92.5	78.1	231.8
West Aceh	19.9	—	—	—	—	308.3	—	—	—	—	94.7	89.4	512.3
South Aceh	13.1	—	—	—	—	54.5	9.5	—	—	—	66.0	202.9	346.0
South East Aceh	5.5	—	—	—	6.0	10.8	—	—	—	2.5	97.0	57.0	178.8
Banda Aceh City	21.8	3.6	5.6	3.8	2.0	5.5	2.6	1.5	15.2	8.8	10.9	6.0	87.3
Sabang City	11.2	6.0	—	—	2.8	—	7.2	—	—	—	4.0	5.0	36.2
<b>Total</b>	<b>131.1</b>	<b>28.5</b>	<b>9.8</b>	<b>4.7</b>	<b>66.0</b>	<b>1185.3</b>	<b>216.0</b>	<b>30.5</b>	<b>55.7</b>	<b>241.4</b>	<b>1094.9</b>	<b>1357.9</b>	<b>4421.8</b>
Source : District Offices													

\* Condition classifications are used by District road personnel  
 These classifications are not formally defined.

**TABLE 8.2**  
**ROAD INVENTORY BY TYPE OF SURFACE AND CONDITION\***  
**DISTRICT ROADS – JAMBI AND CENTRAL SULAWESI PROVINCES**

DISTRICT	LENGTH IN KM BY TYPE OF SURFACE AND CONDITION*												TOTAL LENGTH KM
	ASPHALT				GRAVEL				EARTH				
	GOOD	FAIR	POOR	DAMA- GED	GOOD	FAIR	POOR	DAMA- GED	GOOD	FAIR	POOR	DAMA- GED	
<b><u>J A M B I</u></b>													
Batanghari	—	—	—	—	99.5	23.0	21.5	6.0	164.5	68.0	49.5	46.0	478.0
Bungo Tebo	5.8	3.9	—	—	17.2	4.0	—	—	12.0	96.0	147.5	39.0	325.0
Kerinci	34.7	4.0	0.5	—	2.0	14.0	14.0	—	26.0	50.0	60.0	60.0	265.2
Sarko	—	10.0	—	—	—	11.0	55.0	—	—	—	189.0	—	265.0
Tanjung Jabung	—	20.7	—	—	—	—	—	—	—	—	42.0	120.7	183.4
<b>Total</b>	<b>40.5</b>	<b>38.6</b>	<b>0.5</b>	<b>—</b>	<b>118.7</b>	<b>52.0</b>	<b>90.5</b>	<b>6.0</b>	<b>202.5</b>	<b>214.0</b>	<b>488.0</b>	<b>265.7</b>	<b>1.517.0</b>
<b><u>CENTRAL SULAWESI</u></b>													
Donggala	146.7	7.5	0.5	—	1.0	117.0	24.5	—	—	19.0	40.7	6.7	363.6
Poso	—	19.0	—	2.0	—	20.0	—	20.0	—	—	—	432.0	496.0
Luwuk	35.0	—	—	—	5.0	49.0	—	—	—	—	—	34.0	123.0
Toli Toli	10.0	—	2.0	—	12.0	10.0	5.0	2.0	—	—	7.0	88.0	136.0
<b>Total</b>	<b>191.7</b>	<b>26.5</b>	<b>2.5</b>	<b>2.0</b>	<b>18.0</b>	<b>199.0</b>	<b>29.5</b>	<b>22.0</b>	<b>—</b>	<b>19.0</b>	<b>47.7</b>	<b>560.7</b>	<b>1.118.6</b>
Source : District Office													

\* Condition classifications are used by District road personnel  
 These classifications are not formally defined.

TABLE 8.3

ROAD INVENTORY BY TYPE OF SURFACE AND CONDITION  
DISTRICT ROADS – WEST NUSA TENGGARA PROVINCE

DISTRICT	LENGTH IN KM BY TYPE OF SURFACE AND CONDITION*												TOTAL LENGTH KM
	ASPHALT				GRAVEL				EARTH				
	GOOD	FAIR	POOR	DAMA- GED	GOOD	FAIR	POOR	DAMA- GED	GOOD	FAIR	POOR	DAMA- GED	
West Lombok	46.0	31.0	9.4	3.2	—	10.0	13.0	—	13.5	0.9	80.7	3.8	211.5
Central Lombok	43.0	18.8	18.8	4.0	4.3	0.5	3.8	1.8	22.8	37.2	63.1	31.7	249.6
East Lombok	13.1	9.7	42.9	—	7.0	—	37.1	—	—	—	41.5	27.0	178.3
Sumbawa	—	29.1	4.7	—	—	1.5	—	—	—	151.2	64.0	—	250.5
D o m p u	5.5	8.5	2.0	2.0	6.0	8.0	2.0	—	8.5	2.0	19.0	81.5	145.0
B i m a	15.7	21.0	8.9	—	2.0	3.6	29.0	12.0	—	—	13.4	37.2	142.8
<b>Total</b>	<b>123.3</b>	<b>118.1</b>	<b>86.7</b>	<b>9.2</b>	<b>19.3</b>	<b>23.6</b>	<b>84.9</b>	<b>13.8</b>	<b>44.6</b>	<b>191.3</b>	<b>281.7</b>	<b>181.2</b>	<b>1177.7</b>
Source : District Offices													

\* Condition classifications are used by District road personnel  
These classifications are not formally defined.

**TABLE 8.4**  
**EXISTING BRIDGE INVENTORY SUMMARY**  
**DISTRICT ROADS – ACEH PROVINCE**

DISTRICT	TYPE	CONDITION ( LENGTH M )			SUB TOTAL ( LENGTH M )	TOTAL		REMARKS
		GOOD	POOR	B A D		NO	LENGTH M	
East Aceh	Concrete	89	342	37	468	8	2940	
	Steel	38	146	16	200	40		
	Timber	121	2125	26	2272	216		
Aceh Besar	Concrete	30	41	7	78	12	2639	
	Steel	276	368	63	707	23		
	Timber	723	964	167	1854	181		
Pidie	Concrete	13	252	70	335	27	4781	
	Steel	—	—	—	—	—		
	Timber	167	3351	928	4446	371		
North Aceh	Concrete	32	24	4	60	3	2551	
	Steel	—	—	—	—	—		
	Timber	734	1704	53	2491	219		
South East Aceh	Concrete	89	65	42	196	13	978	
	Steel	—	—	—	—	—		
	Timber	355	259	168	782	53		

\* For condition classification descriptions.

See paragraph 8.4.2B.

Sheet 1 of 2

**TABLE 8.4**  
**EXISTING BRIDGE INVENTORY SUMMARY**  
**DISTRICT ROADS – ACEH PROVINCE**

DISTRICT	TYPE	CONDITION (LENGTH M)			SUB TOTAL (LENGTH M)	TOTAL		REMARKS
		GOOD	POOR	BAD		NO	LENGTH M	
Central Aceh	Concrete	10	—	—	10	2	514	
	Steel	—	—	—	—	—		
	Timber	307	36	161	504	66		
West Aceh	Concrete	225	239	239	703	36	2621	
	Steel	—	—	—	—	—		
	Timber	614	652	652	1918	167		
South Aceh	Concrete	26	416	26	468	32	3611	
	Steel	—	—	—	—	—		
	Timber	175	2787	181	3143	218		

**TABLE 8.5**  
**EXISTING BRIDGE INVENTORY SUMMARY**  
**DISTRICT ROADS – JAMBI PROVINCE**

DISTRICT	TYPE	* CONDITIOIN (LENGTH M)			SUB TOTAL (LENGTH M)	TOTAL		REMARKS
		GOOD	POOR	B A D		NO	LENGTH M	
Batanghari	Concrete	—	—	—	—	111	1325	
	Steel	—	—	—	—			
	Timber	842	297	186	1325			
Kerinci	Concrete	34	8	—	42	65	796	
	Steel	11	—	35	46			
	Timber	124	274	310	708			
Muara Bungo – Tebo	Concrete	7	68	76	151	184	3324	
	Steel	—	144	—	144			
	Timber	352	2150	527	3029			
Sorolangun	Concrete	11	21	21	53	88	1320	Extrapolated ** Data;
	Steel	3	40	10	53			
	Timber	316	656	243	1214			
Tanjung Jabung	Concrete	8	15	15	38	61	915	Extrapolated ** Data;
	Steel	2	29	7	38			
	Timber	219	455	165	839			

\* For condition classification descriptions, see paragraph 8.4.2B

\*\* Complete data for Sorolangun and Tanjung Jabung not available. Values extrapolated on the basis of averages of lengths of bridges to road lengths, and conditions from available data.

TABLE 8.6  
EXISTING BRIDGE INVENTORY SUMMARY  
DISTRICT ROADS – CENTRAL SULAWESI PROVINCE

DISTRICT	TYPE	*CONDITION (LENGTH M)			SUB TOTAL (LENGTH M)	TOTAL		REMARKS
		GOOD	POOR	B A D		NO	LENGTH M	
Donggala	Concrete	273	–	–	273	45	382	
	Steel	6	–	–	6			
	Timber	22	–	81	103			
P o s o	Concrete	–	16	–	16	397	4460	
	Steel	–	–	–	–			
	Timber	–	60	4384	4444			
L u w u k	Concrete	–	–	–	–	123	628	
	Steel	–	–	–	–			
	Timber	413	–	215	628			
Toli Toli	Concrete	36	–	–	36	16	98	
	Steel	24	–	–	24			
	Timber	3	–	35	38			

\* For condition classification descriptions, see paragraph 8.4.2B

TABLE 8.7

EXISTING BRIDGE INVENTORY SUMMARY  
DISTRICT ROADS WEST NUSA TENGGARA PROVINCE

DISTRICT	TYPE	* CONDITION (LENGTH M)			SUB TOTAL (LENGTH M)	TOTAL		REMARKS
		GOOD	POOR	BAD		NO	LENGTH M	
West Lombok	Concrete	782	16	—	798	70	955	
	Steel	56	70	9	135	16		
	Timber	9	9	4	22	4		
Central Lombok	Concrete	322	63	12	397	40	624	
	Steel	22	83	78	183	11		
	Timber	8	—	36	44	3		
East Lombok	Concrete	246	84	—	330	24	525	
	Steel	124	38	—	162	12		
	Timber	—	—	33	33	4		
Sumbawa	Concrete	65	19	—	84	12	163	
	Steel	—	36	—	36	11		
	Timber	—	22	21	43	9		
Dompu	Concrete	—	15	4	19	4	40	1 Bamboo (35 m) bridge— poor.
	Steel	—	5	5	10	2		
	Timber	—	5	6	11	3		
Bima	Concrete	268	6	16	290	60	417	2 Suspension bridge—dam — age
	Steel	—	28	—	28	6		
	Timber	5	—	94	99	5		

\* For condition classification descriptions, see paragraph 8.4.2B.

**TABLE 8.8**  
**EQUIPMENT SETS FOR LABORATORY TESTING**  
**UNDER DPUP JURISDICTION**  
**ACEH PROVINCE**

LABORATORY TESTING	FIELD TESTING
Moisture Content	Sounding ( Dutch Cone Penetrometer )
Grainsize Distribution	Cone Penetrometer
Specific Gravity	Hand Auger Boring
Unit Weight	Machine Drilling
Atterberg Limit	A.C. Drilling
Standard Compaction	Field CBR
Modified Compaction	Field Density ( Sand Cone )
Laboratory CBR	Plate Bearing Test
Los Angeles Abrasion	Benkelman
Concrete Slump	Concrete Slump
Cylin. Conc. Compression	Concrete Hammer
Marshall Test for A.C.	

( Sheet 1 of 2 )

**TABLE 8.8**  
**EQUIPMENT SETS FOR LABORATORY TESTING**  
**UNDER JURISDICTION OF SYAH KUALA UNIVERSITY**  
**ACEH PROVINCE**

LABORATORY TESTING	FIELD TESTING
Moisture Content	Sounding ( Dutch Cone Penetrometer )
Grainsize Distribution	Cone Penetrometer
Specific Gravity	Hand Auger Boring
Unit Weight	Machine Drilling
Atterberg Limit	Field CBR
Standard Compaction	Field Density ( Sand Cone )
Modified Compaction	
Laboratory CBR	
Unconfined Compression	
Los Angeles Abrasion	
Organic Impurities	
Concrete Slump	
Cylin. Conc. Compression	
Unconfined	
Triaxial	
Kneading Compactor ( Asphalt )	
Asphalt Compression	
Concrete Permeability	
Direct Shear	

( Sheet 2 of 2 )

**TABLE 8.9**  
**EQUIPMENT SETS FOR LABORATORY TESTING**  
**UNDER DPUP JURISDICTION**  
**JAMBI PROVINCE**

LABORATORY TESTING	FIELD TESTING
Moisture Content Grainsize Distribution Specific Gravity Unit Weight Atterberg Limit Standard Compaction Modified Compaction Laboratory CBR Organic Impurities Concrete Slump Cylin. Conc. Compression	Sounding ( Dutch Cone Penetrometer ) Cone Penetrometer Hand Auger Boring Field CBR Field Density (Sand Cone )

**TABLE 8.10**  
**EQUIPMENT SETS FOR LABORATORY TESTING**  
**UNDER DPUP JURISDICTION**  
**CENTRAL SULAWESI PROVINCE**

LABORATORY TESTING	FIELD TESTING
Moisture Content Grainsize Distribution Specific Gravity Atterberg Limit Standard Compaction Modified Compaction Laboratory CBR Organic Impurities Concrete Slump Marshall (Asphalt)	Hand Auger Boring Field CBR Field Density ( Sand Cone ) Benkelman

**TABLE 8.11**  
**EQUIPMENT SETS FOR LABORATORY TESTING**  
**UNDER DPUP JURISDICTION**  
**WEST NUSA TENGGARA PROVINCE**

LABORATORY TESTING	FIELD TESTING
Moisture Content Grainsize Distribution Specific Gravity Unit Weight Standard Compaction Modified Compaction Laboratory CBR Unconfined Compression Slump Cylin. Conc. Compression	Sounding ( Dutch Cone Penetrometer ) Cone Penetrometer Hand Auger Boring Field CBR Field Density ( Sand Cone ) Benkelman

**TABLE 8.12**  
**DPUP EQUIPMENT SUMMARY**

**ASSIGNED TO NATIONAL AND PROVINCIAL ROAD PROJECTS : ACEH PROVINCE**

I T E M	DESCRIPTION	K M DISTRICT ROADS	QUAN TITY	CONDITION *				USE - ABLE
				G	F	P	S	
1	Bulldozer	4,421.8	18	11	—	7	—	11
2	Motor Grader		14	7	4	3	—	11
3	Wheel Loader		24	11	11	2	—	22
4	Roller Tandem		10	3	5	2	—	8
5	Roller 3 Wheel		42	21	13	8	—	34
6	Tire Roller		1	—	1	—	—	1
7	Rear Dump Truck		63	42	12	9	—	54
8	Flat & General Truck		12	10	1	—	1	11
9	Fuel Tank Truck		1	1	—	—	—	1
10	Water Tank Truck		2	2	—	—	—	2
11	Chip Spreader		2	1	1	—	—	2
12	Asphalt Distributor/Sprayer		4	4	—	—	—	4
13	Asphalt Finisher		1	1	—	—	—	1
14	Asphalt Mixing Plant		1	1	—	—	—	1
15	Crushing Plant		8	3	2	3	—	5
16	Compressor		3	2	1	—	—	3
17	Vibrator / Tamper		4	4	3	1	—	4
18	Concrete Mixer		4	4	2	—	2	2
19	Concrete Vibrator		5	5	4	—	1	4

\* G = good, F = fair, P = poor (inoperable, but repairable), S = scrap (uneconomical to repair)

**TABLE 8.13**  
**DPUP EQUIPMENT SUMMARY**

**ASSIGNED TO NATIONAL AND PROVINCIAL ROAD PROJECTS : JAMBI PROVINCE**

I T E M	DESCRIPTION	K M DISTRICT ROADS	QUAN- TITY	CONDITION *				USE-- ABLE
				G	F	P	S	
1	Bulldozer	1,517.0	3	3	—	—	—	3
2	Motor Grader		7	1	3	3	—	4
3	Wheel Loader		12	4	3	5	—	7
4	Roller Tandem		3	3	—	—	—	3
5	Roller 3 Wheel		21	6	10	5	—	16
6	Tire Roller		3	3	—	—	—	3
7	Rear Dump Truck		53	25	13	15	—	38
8	Flat & General Truck		7	4	1	2	—	5
9	Fuel Truck		4	4	—	—	—	4
10	Water Truck		5	2	—	2	1	2
11	Chip Spreader		2	2	—	—	—	2
12	Asphalt Distributor / Sprayer		2	2	—	—	—	2
13	Asphalt Mixing Plant		1	—	—	1	—	—
14	Sweeper Broom		1	1	—	—	—	1
15	Crushing Plant		1	1	—	—	—	1
16	Air Compressor		4	4	—	—	—	4
17	Concrete Mixer		9	9	—	—	—	9
18	Concrete Vibrator		5	5	—	—	—	5
19	Concrete Batcher		1	1	—	—	—	1

\* G = good, F = fair, P = poor (inoperable, but repairable), S = scrap (uneconomical to repair)

**TABLE 8.14**  
**DPUP EQUIPMENT SUMMARY**

**ASSIGNED TO NATIONAL AND PROVINCIAL ROAD PROJECTS : CENTRAL SULAWESI**

I T E M	DESCRIPTION	K M DISTRICT ROADS	QUAN- TITY	CONDITION *				USE -- ABLE
				G	F	P	S	
1	Bolldozer	1,118,6	15	8	3	3	1	11
2	Motor Grader		8	6	—	1	1	6
3	Wheel Loader		8	5	2	1	—	7
4	Track Loader		7	3	2	2	—	5
5	Excavator		1	1	—	—	—	1
6	Roller Tandem		3	1	2	—	—	3
7	Roller 3 Wheel		87	55	7	15	10	62
8	Tire Roller		3	3	—	—	—	3
9	Vibrator / Tamper		2	—	—	2	—	—
10	Rear Dump Truck		60	38	5	15	2	43
11	Flat & General Truck		7	4	2	1	—	6
12	Fuel Truck		3	2	—	1	—	2
13	Water Truck		3	3	—	—	—	3
14	Chip Spreader		2	2	—	—	—	2
15	Asphalt Distributor / Sprayer		3	1	1	1	—	2
18	Crushing Plant		13	6	3	4	—	9
17	Sweeper Broom		1	1	—	—	—	1
18	Concrete Mixer		8	8	—	—	—	8
19	Concrete Batcher		1	1	—	—	—	1

\* G = good, F = fair, P = poor (inoperable, but repairable), S = scrap (uneconomical to repair)

**TABLE 8.15**  
**DPUP EQUIPMENT SUMMARY**

**ASSIGNED TO NATIONAL AND PROVINCIAL ROAD PROJECTS**  
**PROVINCE : WEST NUSA TENGGARA ( LOMBOK )**

ITEM	DESCRIPTION	K M DISTRICT ROADS	QUAN- TITY	CONDITION*				USE- ABLE
				G	F	P	S	
1	Motor Grader	1,177.7	2	1	1	-	-	2
2	Wheel Loader		5	4	-	1	-	4
3	Roller Tandem		1	1	-	-	-	1
4	Roller 3 Wheel		29	6	3	-	20	9
5	Roller Vibrator		1	1	-	-	-	1
6	Tire Roller		1	1	-	-	-	1
7	Rear Dump Truck		17	7	6	4	-	13
8	Flat & General Truck		15	13	-	2	-	13
9	Fuel Truck		1	1	-	-	-	1
10	Water Truck		2	2	-	-	-	2
11	Chip Spreader		3	3	-	-	-	3
12	Asphalt Distributor / Sprayer		5	5	-	-	-	5
13	Sweeper Broom		1	1	-	-	-	1
14	Crushing Plant		2	1	1	-	-	2
15	Air Compressor		5	3	2	-	-	5
16	Concrete Mixer		4	4	-	-	-	4
17	Concrete Vibrator		5	5	-	-	-	5

( Sheet 1 of 2 )

\* G = good, F = fair, P = poor ( inoperable, but repairable ), S = scrap ( uneconomical to repair )

**TABLE 8.15**  
**DPUP EQUIPMENT SUMMARY**

**ASSIGNED TO NATIONAL AND PROVINCIAL ROAD PROJECTS**  
**PROVINCE : WEST NUSA TENGGARA ( SUMBAWA )**

ITEM	DESCRIPTION	KM DISTRICT ROADS	QUAN-TITY	CONDITION*				USE-ABLE
				G	F	P	S	
1	Motor Grader		1	1	-	-	-	1
2	Wheel Loader		1	1	-	-	-	1
3	Roller 3 Wheel		8	-	7	-	1	7
4	Rear Dump Truck		2	2	-	-	-	2
5	Flat & General Truck		5	5	-	-	-	5

( Sheet 2 of 2 )

\* G = good, F = fair, P = poor ( inoperable, but repairable ), S = scrap ( uneconomical to repair )

**TABLE 8.16**  
**DPUK EQUIPMENT SUMMARY**  
**USED FOR DISTRICT ROAD MAINTENANCE**  
**PROVINCE : ACEH**

ITEM	DESCRIPTION	K M DISTRICT ROADS	QUAN- TITY	CONDITION*				USE- ABLE
				G	F	P	S	
I. Municipality Banda Aceh & Sabang	Rear Dump Truck	123.5	5	1	2	2	-	3
	Roller 3 Wheel		1	-	-	1	-	-
	Roller Tandem		2	-	1	1	-	1
II. Aceh Besar	Rear Dump Truck	614.9	2	-	1	1	-	1
	Roller Tandem		1	-	-	1	-	-
III. Aceh Pidie	Bulldozer	652.5	1	1	-	-	-	1
	Dozer - Shovel		1	1	-	-	-	1
	Rear Dump Truck		6	-	3	3	-	3
	Roller Tandem		1	-	1	-	-	1
IV. North Aceh	Rear Dump Truck	521.4	1	-	1	-	-	1
V. Central Aceh	Rear Dump Truck	231.8	2	-	1	1	-	1
VI. East Aceh	Dozer Shovel	711.3	1	1	-	-	-	1

( Sheet 1 of 2 )

\* G = good, F = fair, P = poor (inoperable, but repairable), S = scrap (uneconomical to repair)

**TABLE 8.16**  
**DPUK EQUIPMENT SUMMARY**  
**USED FOR DISTRICT ROAD MAINTENANCE**  
**PROVINCE : ACEH**

I T E M	DESCRIPTION	K M DISTRICT ROADS	QUAN- TITY	CONDITION*				USE - ABLE
				G	F	P	S	
VII.. West Aceh ( including Sub - district Calang )	Motor Grader	512.3	1	1	-	-	-	1
	Rear Dump Truck		8	5	6	7	-	11
	Roller 3 Wheel		5	2	2	1	-	4
VIII. South East Aceh	Rear Dump Truck	178.8	5	1	2	2	-	3
	Roller Tandem		3	-	2	1	-	2
IX. South Aceh	Rear Dump Truck	346.0	7	2	3	2	-	5
	Roller 3 Wheel		2	1	1	-	-	2

( Sheet 2 of 2 )

\* G = good, F = fair, P = poor ( inoperable, but repairable ), S = scrap ( uneconomical to repair )

**TABLE 8.17**  
**DPUK EQUIPMENT SUMMARY**  
**USED FOR DISTRICT ROAD MAINTENANCE**  
**PROVINCE : J A M B I**

I T E M	DESCRIPTION	K M DISTRICT ROADS	QUAN- TITY	CONDITION *				USE- ABLE
				G	F	P	S	
I. Kerinci								
1.	Bulldozer	265.2	3	-	1	2	-	1
2.	Motor Grader		1	-	-	1	-	-
3.	Shovel		1	-	-	1	-	1
4.	Rear Dump Truck		4	-	2	2	-	2
II. Sarko								
1.	Roller 3 Wheel	265.0	4	-	2	2	-	2
2.	Rear Dump Truck		4	-	1	3	-	1
3.								
III. Bungo - Tebo								
1.	Bulldozer	325.7	4	-	4	-	-	4
2.	Tractor		4	-	4	-	-	4
3.	Roller 3 Wheel		5	1	-	4	-	1
4.	Rear Dump Truck		7	2	5	-	-	7
IV. Batanghari								
1.	Roller 3 Wheel	478.0	2	-	1	1	-	1
2.	Rear Dump Truck		4	-	3	1	-	3
V. Tanjung Jabung								
	Zero	183.4						

\* G = good, F = fair, P = poor (inoperable, but repairable), S = scrap (uneconomical to repair)

**TABLE 8.18**  
**DPUK EQUIPMENT SUMMARY**  
**USED FOR DISTRICT ROAD MAINTENANCE**  
**PROVINCE : CENTRAL SULAWESI**

I T E M	DESCRIPTION	K M DISTRICT ROADS	QUAN- TITY	CONDITION *				USE - ABLE
				G	F	P	S	
I. Donggala	Bulldozer	363.6	1	-	-	1	-	-
	Roller 3 Wheel		4	-	4	-	-	4
	Stone Crusher		1	1	-	-	-	1
II. P o s o	Roller 3 Wheel	496.0	3	3	-	-	-	3
	Flat & General Truck		2	2	-	-	-	2
	Stone Crusher		1	1	-	-	-	1
III. Banggai	J e e p	123.0	1	1	-	-	-	1
	Light Truck		1	-	-	-	1	-
	Roller 3 Wheel		4	1	-	-	3	1
	Stone Crusher		1	1	-	-	-	1
IV. Buol - Toli Toli	Roller 3 Wheel	136.0	5	-	2	-	3	2
	Dozer		1	-	-	-	1	-
	Stone Crusher		1	1	-	-	-	1

\* G = good, F = fair, P = poor ( inoperable, but repairable ), S = scrap ( uneconomical to repair )

**TABLE 8.19**  
**DPUK EQUIPMENT SUMMARY**  
**USED FOR DISTRICT ROAD MAINTENANCE**  
**PROVINCE : WEST NUSA TENGGARA**

I T E M	DESCRIPTION	K M DISTRICT ROADS	QUAN- TITY	CONDITION *				USE- ABLE
				G	F	P	S	
I. West Lombok	Roller 3 Wheel	211.5	6	5	1	-	-	6
	Flat & General Truck		1	-	-	1	-	-
	Crushing Plant		2	1	1	-	-	2
II. Central Lombok	Roller 3 Wheel	249.6	7	7	-	-	-	7
	Crushing Plant		2	2	-	-	-	2
III. East Lombok	Roller 3 Wheel	178.3	7	6	-	1	-	6
	Flat & General Truck		1	1	-	-	-	1
	Crushing Plant		2	-	1	1	-	1
IV. Sumbawa	Roller 3 Wheel	250.5	2	2	-	-	-	2
V. D o m p u	Roller 3 Wheel	145.0	1	1	-	-	-	1
VI. B i m a	Roller 3 Wheel	142.8	1	1	-	-	-	1

\* G = good, F = fair, P = poor (inoperable, but repairable), S = scrap (uneconomical to repair)

**TABLE 8.20**  
**TYPICAL OPERATION, EQUIPMENT AND CREW FOR NEW AND**  
**REHABILITATION DISTRICT ROAD PROJECTS**  
**EQUIPMENT INTENSIVE**

OPERATION	EQUIPMENT	CREW		
		S	SS	U
Survey	Pick - up, transit, level, rod	1	1	1
Borrow Pit ( s )	Wheel dozer, wheel loader, portable Crushing Plant	3	1	1
Clear & Grub	Wheel dozer with tipper attachment	1		3
Ripping	Wheel dozer with Tipper attachment	1		2
Sub - Grade	Motor grader, compactor ( VIB ), water truck	3		2
Sub - Base	Motor grader, compactor ( VIB ), water truck	3		2
Base	Motor Grader, compactor ( VIB ), water truck	3		2
Wearing Course	Motor grader, compactor ( VIB ), water truck	3		2
Ditches / Slopes	Wheel Dozer with backhoe attachment	1		3
Culverts	Wheel Dozer with backhoe attachment	1		3
Load, Haul, Dump	Dump trucks ( eight ) depending on travel time	8		
Paving ( if req'd )	Dump truck with chip spreader, bitumen distributor, road roller ( 10 ton )	3		6

( Sheet 1 of 2 )

**TABLE 8.20**  
**TYPICAL CREW FOR NEW AND**  
**REHABILITATION DISTRICT ROAD PROJECT**  
**EQUIPMENT INTENSIVE**

OPERATION	EQUIPMENT	C R E W		
		S	SS	U
Support Equipment	Pick - up, pick - up w/lube unit, compressor, water pump, generator, flat bed truck ( 2.5 tons )	3		2
Equipment Maintenance personnel		2		1

S = Skilled, SS = Semi - skilled, U = Unskilled

**TABLE 8.21**  
**EQUIPMENT SUMMARY**  
**NEW & REHABILITATION DISTRICT ROAD PROJECTS**  
**PER CREW**  
**EQUIPMENT INTENSIVE**

EQUIPMENT	QUANTITY
Wheel Dozer with Angle Blade (Cat 814 or equiv.)	2
Wheel Loader ( Cat 950 or equiv.)	1
Motor Grader with Scarifier ( Cat 120 B or equiv.)	1
Compactor (VIB) ( Case W 55 ) or equiv	2
Water Truck ( 4000 Lt )	1
Portable Crushing / Screening Plant	1
Dump Truck ( 2.5 ton )	8
Flat - bed Truck ( 2.5 ton ) with Hyd. Boom	1
Pick - up	4
Ripper Attachment ( Cat D 60 / 6 )	1
Back Hoe Attachment ( 1/8 cu meter )	1
Concrete Mixer ( one sack )	1
Chip Spreader	1
Bitumen Distributor	1
Compressor ( 150 psi @ 20 cfm )	1
Generator ( 10 Kw )	1
Water Pump	1
Lube Unit	1
Transit	1
Level	1
Rod, Chains, Range Pole, etc.	1 ea.

**TABLE 8.22**  
**TYPICAL OPERATION, EQUIPMENT AND CREW FOR**  
**MAINTENANCE OF DISTRICT ROADS**  
**( 200 Km / Year )**  
**EQUIPMENT INTENSIVE**

OPERATION	EQUIPMENT	CREW*	
		S	U
1) Management	Pick up	1	
2) Supervision	Pick up	2	
3) Clean Ditches, Culverts, & Back- slopes	A) Farm Tractor W/Backhoe & Loader Attachment:	2	2
	B) Dump Truck	2	2
4) Grass Control	Farm Tractor W/Mower & Loader Attachment	2	2
5) Reprofile	A) Motor Grader W/Scarifier	2	2
	B) Dump Truck	4	4
	C) Vibratory Compactor		2
	D) Road Roller	2	
6) Pothole Patching & Crack Sealing	A) Bitumen Sprayer ( Trailer Mounted )	1	6
	B) Mechanical Tamper		2
<b>TOTAL</b>		<b>18</b>	<b>22</b>
* S = Skilled U = Unskilled			

**TABLE 8.23**  
**EQUIPMENT SUMMARY ( PER CREW )**  
**DISTRICT ROAD MAINTENANCE PROJECTS**  
**( EQUIPMENT INTENSIVE )**

EQUIPMENT DESCRIPTION	QUANTITY
Pick up	2 ea
Farm Tractor w /backhoe and loader attachments	2 ea
Farm Tractor w /mower and loader attachments	2 ea
Dump Truck ( 4 m <sup>3</sup> )	6 ea
Motor Grader e /scarifier ( Cat. 120 B or equiv. )	2 ea
Road Roller ( 8.5 ton )	2 ea
Vibratory Roller ( Case W 55 or equiv. )	2 ea
Bitumen Sprayer ( Trailer mounted )	1 ea
Mechanical Tamper	2 ea

**TABLE 8.24**  
**TYPICAL OPERATION, EQUIPMENT AND CREW FOR**  
**MAINTENANCE OF DISTRICT ROADS**  
**( 200 Km / Year )**  
**LABOR INTENSIVE**

OPERATION	EQUIPMENT	CREW*	
		S	U
1) Management	Pick up	1	
2) Supervision	Pick up	2	
3) Clean Ditches Culverts, & Back-slopes	Dump Truck	2	30
4) Grass Control	Hand Tools only		20
5) Reprofile	A) Vibratory Compactor	2	30
	B) Road Roller	2	
6) Pothole Patching & Crack Sealing	A) Bitumen Sprayer ( Trailer Mounted )	1	6
	B) Mechanical Tamper		2
<b>TOTAL</b>		<b>10</b>	<b>88</b>
* S = Skilled U = Unskilled			

**TABLE 8.25**  
**EQUIPMENT SUMMARY ( PER CREW )**  
**DISTRICT ROAD MAINTENANCE PROJECTS**  
**( LABOR INTENSIVE )**

EQUIPMENT DESCRIPTION	QUANTITY
Pick up	2 ea
Dump Truck ( 4 m <sup>3</sup> )	2 ea
Road Roller ( 8.5 ton )	2 ea
Vibratory Roller ( Case W55 or equivalent )	2 ea
Bitumen Sprayer ( Trailer mounted )	1 ea
Mechanical Tamper	2 ea

**TABLE 8.26**  
**WORKSHOP EQUIPMENT SUMMARY**  
**PROVINCE : ACEH ( Bireuen )**

I T E M	DESCRIPTION	QUAN- TITY	CONDITION*				USE- ABLE
			G	F	P	S	
1	Forklift	4	1	-	-	-	1
2	Generator	5	3	-	2	-	3
3	Welding machine/gas	5	3	1	1	-	4
4	Mobile Workshop	1	1	-	-	-	1
5	Lubrication eq.	3	2	-	1	-	2
6	Water pump	10	2	2	6	-	4
7	Overhead crane	3	3	-	-	-	3
8	Lathe	1	-	1	-	-	1
9	Brake lathe	1	1	-	-	-	1
10	Milling machine	1	1	-	-	-	1
11	Grinding machine	1	-	1	-	-	1
12	Drilling machine	2	2	-	-	-	2
13	Hydraulic press	2	2	-	-	-	2
14	Battery charger	1	1	-	-	-	1
15	Power hack saw	1	1	-	-	-	1
16	Steam cleaner	1	1	-	-	-	1
17	Hydraulic jack	2	2	-	-	-	2
18	Brake shoe grinder	1	-	1	-	-	1
19	Balancer	1	1	-	-	-	1
20	Brake smith force	1	-	1	-	-	1
21	Arbor press	2	-	2	-	-	2
22	Air power sand Blast	2	-	2	-	-	2

\* G = good, F = fair, P = poor ( inoperable, but repairable ), S = scrap ( uneconomical to repair )

TABLE 8.27  
WORKSHOP EQUIPMENT SUMMARY  
 PROVINCE : J A M B I

I T E M	DESCRIPTION	QUAN- TITY	CONDITION *				USE- ABLE
			G	F	P	S	
1	Forklift	3	3	-	-	-	3
2	Generator	4	4	-	-	-	4
3	Water pump	2	-	2	-	-	2
4	Chain saw	4	-	4	-	-	4
5	Welding machine	2	2	-	-	-	2
6	Mobile crane	1	-	-	1	-	-
7	Power Drill	4	4	-	-	-	4
8	Winch manual	2	-	2	-	-	2
9	Lubrication equipment	2	2	-	-	-	2

\* G = good, F = fair, P = poor (inoperable, but repairable), S = scrap (uneconomical to repair)

**TABLE 8.28**  
**WORKSHOP EQUIPMENT SUMMARY**  
**PROVINCE : CENTRAL SULAWESI**

I T E M	DESCRIPTION	QUAN- TITY	CONDITION*				USE- ABLE
			G	F	P	S	
1	Mobile crane	1	-	-	1	-	-
2	Forklift	2	2	-	-	-	2
3	Compressor	3	2	-	1	-	2
4	Water pump	2	-	-	2	-	-
5	Generator	4	1	1	2	-	2
6	Chain saw	4	2	-	2	-	2
7	Lubrication Truck	3	3	-	-	-	3
8	Workshop Truck	1	1	-	-	-	1
9	Trailer Towed	2	2	-	-	-	2
10	Welding machine	2	2	-	-	-	2
11	Drilling machine	1	1	-	-	-	1
12	Battery charger	1	1	-	-	-	1

\* G = good, F = fair, P = poor ( inoperable, but repairable ), S = scrap ( uneconomical to repair )

**TABLE 8.29**  
**WORKSHOP EQUIPMENT SUMMARY**  
**PROVINCE : WEST NUSA TENGGARA**

I T E M	DESCRIPTION	QUAN- TITY	CONDITION*				USE- ABLE
			G	F	P	S	
1	Mobile crane / truck	5	3	1	1	-	4
2	Forklift	3	1	2	-	-	3
3	Winch manual	4	4	-	-	-	4
4	Water pump	2	-	2	-	-	2
5	Brake drum lathe	2	2	-	-	-	2
6	Brake shoe grinder	1	1	-	-	-	1
7	Drill stand	2	2	-	-	-	2
8	Welding machine / gas	4	2	2	-	-	4
9	Generator	2	2	-	-	-	2
10	Air compressor	3	3	-	-	-	3
11	Hydraulic press	7	7	-	-	-	7
12	Battery tester	1	1	-	-	-	1
13	Battery charger	1	1	-	-	-	1
14	Tire wheel aligner	1	1	-	-	-	1
15	Caster / camber gauge	2	2	-	-	-	2
16	Steam cleaner	2	1	1	-	-	2
17	Hydraulic jack	2	2	-	-	-	2
18	Spark plug tester	2	2	-	-	-	2
19	Dual wheel dolly:	4	4	-	-	-	4
20	Blower	1	1	-	-	-	1

\* G = good, F = fair, P = poor ( inoperable, but repairable ), S = scrap ( uneconomical to repair )

**TABLE 8.30**  
**DIRECTORATE GENERAL OF HIGHWAYS**  
**TRAINING — DIVISION**  
**LIST OF TRAINING PROGRAMS TO BE**  
**IMPLEMENTED DURING THE FISCAL**  
**YEAR OF 1979 / 1980**

NO	PROGRAM	TOTAL — MAN									
		TO BE TRAINED					ALREADY TRAINED				
		A*	B	C	D	E	A*	B	C	D	E
1.	Audio Visual Course	—	—	—	—	25604	—	—	—	—	5000
2.	Supervision Course	—	—	—	943	—	—	—	400	—	
3.	Equipment Operator Course	—	—	—	—	4000	—	—	—	1400	
4.	Laboratory Course	—	—	1663	943	—	—	240	240	—	
5.	Quality Control Course	—	542	1663	943	—	—	180	500	240	
6.	Project Key - Post - Holder Course	172	542	—	—	—	72	108	—	—	
7.	Workshop Administration Course	—	200	123	—	—	—	180	—	—	
8.	Office Administration Course	—	—	400	—	—	—	—	80	—	
9.	Secretary / IBM Course	—	—	200	—	—	—	—	80	—	
10.	Equipment Mechanic Course	—	—	721	—	—	—	—	341	—	
1 .	Radio Operator Course	—	—	100	—	—	—	—	37	—	

TABLE 8.30  
 DIRECTORATE GENERAL OF HIGHWAYS  
 TRAINING - DIVISION  
 LIST OF TRAINING PROGRAMS TO BE  
 IMPLEMENTED DURING THE  
 FISCAL YEAR 1979 / 1980

NO	PROGRAM	TOTAL - MAN									
		TO BE TRAINED					ALREADY TRAINED				
		A*	B	C	D	E	A*	B	C	D	D
12.	Technical Terminology Course	172	524	-	-	-	72	108	-	-	-
13	Finance Administration Course	-	-	750	-	-	-	-	379	-	-
14	Study at The Polytechnic Institution	-	-	500	-	-	-	-	230	-	-
15	Planning Road Construction Course	172	200	-	-	-	20	20	-	-	-
16	Management III Course	172	-	-	-	-	40	-	-	-	-
17.	Management IV Course	-	542	-	-	-	-	120	-	-	-
18.	Surveyor / Designer Course	-	-	350	-	-	-	-	-	-	-
19	Operator Instructor Course	-	-	50	-	-	-	-	25	-	-
20	Land - Laws Course	52	-	-	-	-	-	-	-	-	-
21	Section Engineering Course	-	240	-	-	-	-	-	-	-	-

TABLE 8.30  
 DIRECTORATE GENERAL OF HIGHWAYS  
 TRAINING - DIVISION.  
 LIST OF TRAINING PROGRAMS TO BE  
 IMPLEMENTED DURING THE  
 FISCAL YEAR 1979 / 1980

NO	PROGRAM	TOTAL - MAN									
		TO BE TRAINED					ALREADY TRAINED				
		A*	B	C	D	E	A*	B	C	D	E
22.	Study at The University	-	542	-	-	-	-	-	30	-	-
23.	Accountant Course	56	-	-	-	-	17	-	-	-	
24.	Post - Graduate Study	260	-	-	-	-	-	-	-	-	
25.	Land - Clearing Course	-	50	150	-	-	-	-	-	-	
26.	Traffic Survey Course	-	50	150	-	-	-	-	-	-	
27.	Programmer Course	26	80	-	-	-	-	-	-	-	
28.	Highway Economic Course	50	150	-	-	-	-	-	-	-	
29.	Photogrammetric Course	-	30	90	-	-	-	-	-	-	
30.	Basic Technical Course	-	-	250	500	-	-	-	-	-	
31.	Statistic Course	-	26	52	-	-	-	-	-	-	

**TABLE 8.30**  
**DIRECTORATE GENERAL OF HIGHWAYS**  
**TRAINING – DIVISION**  
**LIST OF TRAINING PROGRAMS TO BE**  
**IMPLEMENTED DURING THE**  
**FISCAL YEAR 1979 / 1980**

NO	P R O G R A M	TOTAL – MAN									
		TO BE TRAINED					ALREADY TRAINED				
		A*	B	C	D	E	A*	B	C	D	E
32.	Library Course	26	52	52	–	–	–	–	–	–	–
33.	Computer Course	26	52	–	–	–	–	–	–	–	–
34.	Manpower Planning Course	26	52	–	–	–	–	–	–	–	–
35.	Construction Industry Course	400	400	1000	1000	3000	–	–	–	–	–

( Sheet 4 of 4 )

\* Participant Qualification / Level of Participant's Education & Experience Background

- A = Engineer ( University Graduate )
- B = Bachelor of Engineer ( Academy Graduate )
- C = Technical / Senior High School
- D = Staff at Supervision Position
- E = Staff at Foreman Position

**TABLE 8.31**  
**DIRECTORATE GENERAL OF HIGHWAYS TRAINING DIVISION**  
**LIST OF "SELF - INSTRUCTIONAL" COURSES**

NO	COURSE TITLE	FORMAT	NO	- COURSE TITLE	FORMAT
1.	Base Repair	Slide - Tape	21	Cubieal Mold	Slide - Tape
2	Butas Patching	"	22	Field Gradation Analysis	"
3.	Shoulder Maintenance	"	23	Concrete Slump Test	"
4	Ditch Maintenance	"	24	Why run Slump Test ?	"
5	Culvert Maintenance	"	25	Asphalt - Sprayer	"
6	Sampling form a Stockpile	"	26	Asphalt - Sprayer : Ermont	"
7	Slitting and Quartering	"	27	Stockpiling	Work - Book
8	Servicing Vehicles	"	28	Vehicle Oil Change	Slide - Tape
9	Servicing Equipment	"	29	Equipment Oil Change	"
10	Servicing Filters	"	30	Greasing	"
11	Erosion Control	"	31	Tyre Repairing	"
12	Measuring Slopes	Work - Book	32	Batter Maintenance	"
13	What is Sampling ?	Slide - Tape	33	Measurements	"
14	Why Tests are run ?	"	34	Basic Soldering	"
15	Sampling from a Truck	"	35	Bridge Inspection	"
16	Sampling from a Conveyor belt	"	36	Bridge Maintenance	"
17	Sampling Asphalt from barrels	"	37	Quarrying	"
18	Sampling Water for Concrete	"	38	Aggregate Preparation	Work - Book
19	Sampling Concrete	"	39	Pipe Placement	Slide - Tape
20	Cylinder Mold	"	40	Base Construction	Work - Book

**TABLE 8.31**  
**DIRECTORATE GENERAL OF HIGHWAYS TRAINING DIVISION**  
**LIST OF "SELF - INSTRUCTIONAL" COURSES**

NO	COURSE TITLE	FORMAT	NO	COURSE TITLE	FORMAT
41	Gravel Roads	Work Book	56	Welding Steel	Work - Book
42	Asphalt Surfacing w/Sprayer	"	57	Penetration Patching	Slide - Tape
43	Priming	"	58	Field Moisture Content	"
44	Asphalt Single Surface Treatments	"	59	Field Density by sand - cone	"
45	Asphalt Multiple Surface Treatments	"	60	Completing Sampling Forms & Tags	Work - Book
46	Macadam Penetration	"	61	Calibrating Scales	Slide - Tape
47	Soil Understanding	"	62	Preparation of Cold - mix Butas	"
48	Asphalt - Sprayer "Linnhoff	Booklet	63	Excavation and Embankment	Work - Book
49	Steel - Wheeled Rollers	Slide - Tape	64	Shoulder Construction	"
50	Pneumatic - Tired Rollers	"	65	Asphalt - Plant Control	"
51	Asphalt - Sprayer : Hand - Lance	"	66	Asphalt Surfacing w / Butas mix	"
52	Reading Drawings	Work - Book	67	Asphalt Surfacing w / hot mix	"
53	Use of Battery Charger	Wall Diagram Booklet	68	Introduction to Soils	"
54	Basic Bench Skills	Slide - Tape	69	Air - Filter Usage	Slide - Tape
55	Basic Machines	"	70	Jack - hammer Usage	Wall - Diagram
			71	Compaction : Sheepsfoot	Slide - Tape

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**TABLE 8.31**  
**DIRECTORATE GENERAL OF HIGHWAYS TRAINING DIVISION**  
**LIST OF "SELF – INSTRUCTIONAL" COURSES**

NO	COURSE TITLE	FORMAT	NO	COURSE TITLE	FORMAT
72	Loader Operation ( Basic )	Slide Tape	86	Stone – Crushing	Work Book
73	Dozer Operation (1)	Slide Tape Wall Diagram	87	Measuring w / Rod & Chain	Slide Tape B.1
74	Dozer Operation (2)	Slide Tape Work Book	88	Theodolit Measuring	Slide Tape B.1
75	Introduction to Motor Grader	Slide Tape W.D	89	Asphalt – Sprayer : Hanta	Slide Tape
76	Earth Levelling : Motor Grader	Slide Tape	90	Water Tank Operation	"
77	Cutting Ditches & Slopes :	Slide Tape	91	Loader Operation ( continued )	"
78	Asphalt Heating & Hand Appl.	"	92	Aggregates Levelling : Motor Grader	"
79	Reading Site – Plan & Contract of Road & Bridges	Work Book	93	Asphalt Hot–mix Levelling : Motor Grader	"
80	Writing RAB & Contract Doc	Booklet	94	Servicing Stone – Crusher	Booklet
81	Sampling Asphalt from Tanks	Slide Tape	95	Intro to Components Replacemnt	Slid.Tape B.1
82	Field C.B.R.	"	96	Components Replacement : Cooling Svstem	"
83	Asphalt Behaviour	Work Book	97	Basic Knowledge of Electricity : Vehicle	"
84	Basic Knowledge of Road Const	"	98	Braking Components Replacement	Slide Tape
85	Basic Concrete Construction	"	99	Lamps & Cables installation : Vehicle	Booklet

**TABLE 8.31**  
**DIRECTORATE GENERAL OF HIGHWAYS TRAINING DIVISION**  
**LIST OF "SELF - INSTRUCTIONAL" COURSES**

NO	COURSE TITLE	FORMAT	NO	COURSE TITLE	FORMAT
100	Checking up, adjusting & testing engine : Vehicle engine	Booklet			
101	Trouble Shooting :: Vehicle engine	"			
102	Safety Procedures	Slide - Tape			
103	Traffic Regulation on Worksite	"			

**TABLE 8.32**  
**REGIONAL TRAINING CENTER COURSES**

**A. Drafting**

1. Normalization of Technical Signs and Standard Books
2. Use of Drawing Equipment
3. Perspective Drawing
4. Hand Drawing/Technical Sketching
5. Stereoscopic Projections
6. Sign of Electricity Installation, Gas, Water
7. Identification of Production
8. Nomographs – Constructing Template Drawing and Writing
9. Technical Terminology
10. Construction Drawing
11. Understanding Growth and Character Development
12. Indonesian Language (grammar, memo writing, spelling system, report writing).

**B. Surveying**

1. Land Survey Theory
2. Measurement
3. Location/Plant
4. Distance
5. Use of proper survey equipment
6. Level instruments
7. Equipment to measure angle distance
8. Gradient measurement
9. Enlargement/Reduction of Drawings/Maps
10. Measuring Distance by optical method
11. Curve Staking
12. Land Survey Practice
13. Use and Maintenance of equipment
14. Computing and Plotting survey data/notes
15. Algebra
16. Geometry
17. Law

( Sheet 1 of 3 )

**TABLE 8.32**  
**REGIONAL TRAINING CENTER COURSES**

**C. Civil Engineer**

1. Performance Measurement
2. Cost Analysis
3. Administration/Personnel/Organization
4. Engineering Control
5. Finance Administration
6. Equipment
7. Maintenance Management
8. Geometric Design
9. Road Design
10. Drainage Design
11. Pavement Design
12. Construction Survey
13. Road Construction
14. Road Quality Control
15. Pavement Material Preparation
16. Construction Quality Control
17. Bridge Construction
18. Road Maintenance
19. Bridge Maintenance
20. River Control

**D. Maintenance**

1. Review and Refresher
2. Road Construction
3. Field CBR and Erosion Control
4. Sand Cone Density Test
5. Field Water Content Test
6. Embankment Preparation
7. Foundation Improvement/Road Shoulder Maintenance
8. Bituminous and Penetration Patch
9. Side Ditch and Culvert Maintenance
10. Culvert Installation and Traffic Control
11. Aggregate Spreading/Asphalt Mixture by Motor Grader

( Sheet 2 of 3 )

**TABLE 8.32**  
**REGIONAL TRAINING CENTER COURSES**

12. Bridge Inspection and Maintenance
13. Compaction with Steel Roller
14. Compaction with Tire Roller
15. Compaction with Sheepfoot Roller
16. Installation to Road Construction Equipment
17. Upgrading
18. Applied Engineering Management
19. Soil Mechanics
20. Excavation and Embankment
21. Planning for Survey
22. Road Geometric Design
23. Performing Survey
24. Road Pavement Design
25. Road Paving
26. Bituminous Application
27. Complimentary Construction and Traffic Sign

( Sheet 3 of 3 )