

CHAPTER 19

FUND PREPARATION

19.1 SOURCE OF FUND

1) Applied Acts

Appropriation for highway investment is authorized by the following two acts:

a) Public Works Act (PWA)

Funds appropriated under this Act are capital outlays mainly for medium and large scale projects and effective until completion of the projects. The latest PWA is Executive Order No. 182, dated 3 June, 1987.

b) General Appropriations Act (GAA)

This Act appropriates funds for personnel services, maintenance and other operating expenses and capital outlays for small scale projects.

Since funds appropriated by this Act are effective for a single fiscal year, balances of funds at the end of fiscal year revert back to general fund. Amounts appropriated for the highway subsector are shown in Table 19.1-1.

2) DPWH Infrastructure Program

The DPWH Infrastructure Program is prepared every year with funds appropriated under PWA and GAA. Of appropriations under GAA, the Provincial Development Assistance Project Fund is not included in the Program. Table 19.1-2 summarizes the Program in recent years.

3) Source of Fund

Table 19.1-3 shows sources of funds for projects included in the DPWH Infrastructure Program. About \$42 million are furnished with foreign finance in 1988.

TABLE 19.1-1 APPROPRIATION FOR HIGHWAY SUBSECTOR UNDER
GENERAL APPROPRIATIONS ACT

Unit : Million Pesos

	1982	1983	1984	1985	1986	1987	1988	Notes
A. DPWH								
1. Maintenance and repair of national roads and bridges	447.1	555.1	434.6	541.6	805.2	936.5	866.1	
2. Construction of national roads and bridges in accordance with a program approved by the President	73.0	85.0	-	-	-	-	-	
3. Rehabilitation/improvement of national roads and bridges in accordance with a program approved by the President	65.0	85.0	-	-	-	-	-	
4. Road Development of Various Integrated Rural Development Project, USAID/IDA/IBRD Rural Road Projects	387.4	-	-	-	-	-	-	
B. National Assistance to Local Government Units								
1. Local Road Construction								
a) Assistance in construction of new provincial/city/municipal roads	125.2	126.2	-	-	-	-	-	(Released to and administered by DPWH)
b) Assistance in construction of barangay roads	212.8	213.8	200.0	100.0	157.5	910.0	1,000.0	(Released to and administered by DPWH (Memo Order No.43, 1986). Since 1988, released through DLG to local government units or Engineering District)
2. Provincial Development Assistance Project Fund								
a) Reimbursement to local government units for completed under the USAID-Assisted Rural Roads Project	179.8	-	-	-	-	-	-	(Administered by DLG Since 1988, released through DLG to local government unit or Engineering District)
b) Assistance for development project, including rural roads program to be released on reimbursement scheme	240.0	240.0	240.0	199.8	180.0	270.5	270.5	
c) ADB-TRIP, IBRD Second RRIP (since 1987)	-	-	7.0	135.1	324.5	173.2	305.8	
3. Repair and Maintenance of Local Roads								
a) Assistance in the maintenance and repair of provincial/city roads	182.7	183.9	181.5	182.6	231.7	227.7	265.0	Released to and administered by DPWH (Memo Order No.43, 1986) Since 1988, released through DLG to local government units or Engineering District.
b) Assistance in the maintenance and repair of municipal roads	38.4	40.5	41.3	41.7	55.0	56.7	66.2	
c) Assistance in the maintenance and repair of barangay roads	384.6	386.8	386.8	389.5	512.3	574.6	621.8	DPWH exercises technical supervision.

Source : General Appropriations Act - Fiscal Years 1982 to 1988

TABLE 19.1-2 APPROPRIATION FOR HIGHWAY SUBSECTOR IN
DPWH INFRASTRUCTURE PROGRAM

(Unit: million pesos)

Source of Appropriation	1982	1983	1984	1985	1986	1987	1988
Total	4,146.1	3,587.8	2,867.9	2,200.4	2,276.5	4,814.3	5,577.5
GAA	1,194.4 (28.8%)	202.7 (5.6%)	188.1 (6.6%)	100.0 (4.5%)	157.5 (6.9%)	910.0 (18.9%)	1,000.0 (17.9%)
PWA	2,951.7 (71.2%)	3,385.1 (94.4%)	2,679.8 (93.4%)	2,100.4 (95.5%)	2,119.0 (93.1%)	3,904.3 (81.1%)	4,577.5 (82.1%)
Total	-	3,111.4	2,317.9	1,804.8	1,750.5	2,999.6	3,486.8
GAA	-	-	-	-	-	-	-
PWA	-	3,111.4	2,317.9	1,804.8	1,750.5	2,999.6	3,486.8
Total	-	476.4	550.0	395.6	526.0	1,814.7	2,090.7
GAA	-	202.7	188.1	100.0	157.5	910.0	1,000.0
PWA	-	273.7	361.9	295.6	368.5	904.7	1,090.7

Source: DPWH Infrastructure Program: Fiscal Years 1982 to 1988

Note: GAA: General Appropriations Act

PWA: Public Works Act

TABLE 19.1-3 APPROPRIATION FOR HIGHWAY SUBSECTOR BY SOURCE OF FUND

(Unit: million pesos/dollars)

Source of Fund	1982	1983	1984	1985	1986	1987	1988
Total	4,146.1	3,587.8	2,867.9	2,200.4	2,276.5	4,814.3	5,577.5
Highway							
National Fund	3,573.0	2,680.7	2,092.2	1,410.1	1,569.5	3,727.5	4,486.0
Foreign Fund	573.1 (\$76.4)	907.1 (\$106.72)	775.7 (\$55.40)	790.3 (\$43.91)	707.0 (\$39.28)	1,086.8 (\$50.55)	1,091.5 (\$51.99)
Total	N.A.	3,111.4	2,317.9	1,804.8	1,750.5	2,999.6	3,486.8
Major Roads							
National Fund	N.A.	2,204.3	1,542.2	1,014.5	1,043.5	1,940.1	2,482.3
Foreign Fund	N.A.	907.1 (\$106.72)	775.7 (\$55.40)	790.3 (\$43.91)	707.0 (\$39.28)	1,059.5 (\$49.28)	1,004.5 (\$47.83)
Total	N.A.	476.4	550.0	395.6	526.0	1,814.7	2,090.7
Minor Roads							
National Fund	N.A.	476.4	550.0	395.6	526.0	1,787.4	2,003.7
Foreign Fund	N.A.	0	0	0	0	27.3 (\$1.27)	87.0 (\$4.16)
FOREX Rate Used	US\$1=7.50P	US\$1=8.50P	US\$1=14.00P	US\$1=18.00P	US\$1=18.00P	US\$1=21.50P	US\$1=21.0P

Source: DPWH Infrastructure Program, Fiscal Years 1982 to 1988

19.2 ALLOCATION OF FUNDS

The allocation of infrastructure funds among project categories is done in the following four steps:

- i) The indicators of needs are enumerated for each project category.
- ii) The magnitude of the needs for each project category is estimated based on given development planning standards.
- iii) The capital costs of meeting the estimated needs are calculated.
- iv) The percentage shares of the costs of the needs for each project category are calculated. The shares multiplied by the given overall budgetary ceiling for infrastructure gives the ceilings for the different project categories.

For highway subsectors, the percentage shares of the different regions/provinces/cities in the available funds (ceiling) as calculated above, are computed using the following formulae:

FUND ALLOCATION FORMULAE FOR ROADS

i) CONSTRUCTION (NEW)

$$SC_{in} = \frac{\left[0.30 \cdot \frac{(A/R)_i}{(A/R)_p} + 0.30 \cdot \frac{GVA_{Ai}}{GVA_{Ap}} + 0.25 \cdot \frac{P_i}{P_p} + 0.15 \cdot \frac{PFI_i}{PFI_p} \right] \cdot DFI_i}{\sum \left\{ \left[0.30 \cdot \frac{(A/R)_i}{(A/R)_p} + 0.30 \cdot \frac{GVA_{Ai}}{GVA_{Ap}} + 0.25 \cdot \frac{P_i}{P_p} + 0.15 \cdot \frac{PFI_i}{PFI_p} \right] \cdot DFI_i \right\}}$$

where: SC_{in} = Share of a province/city in the road construction funds of the country

$(A/R)_i$ = Arable land area in hectares/kilometers of existing roads in a province/city

$(A/R)_p$ = Arable land area in hectares/kilometers of existing roads in the Philippines

GVA_{Ai} = Gross value added in agriculture in a province/city

GVA_{Ap} = Gross value added in agriculture in the Philippines

P_i = Total population in a province/city

P_p = Total population in the Philippines

PFI = Poor families in a province/city, i.e., those falling under the poverty line

PFp = Poor families in the Philippines, i.e., those falling under the poverty line

DFI = Implementation difficulty factor of a province/city, based on the accessibility and terrain, reflecting increases in construction costs, as follows:

Rating			Rating		
Accessibility:	Good	1	Terrain:	Flat	1
	Fair	2		Rolling	2
	Poor	3		Mountainous	3

DIFFICULTY FACTOR TABLE

Accessibility Rating	1	1	1	2	2	2	3	3	3
Terrain Rating	1	2	3	1	2	3	1	2	3
Total Rating	2	3	4	3	4	5	4	5	6
Difficulty Factor (DF)	1.00	1.05	1.10	1.05	1.10	1.15	1.10	1.15	1.20

2) IMPROVEMENT AND REHABILITATION

$$SClin = \frac{\left[0.45 \cdot \frac{(0.60 \cdot ERUi + 0.40 \cdot ERPi)}{(ERUp + ERPp)} + 0.25 \cdot \frac{GVA Ai}{GVA Ap} + 0.15 \cdot \frac{Pi}{Pp} + 0.15 \cdot \frac{PFI}{PFp} \right] \cdot DFI}{\sum \left\{ \left[0.45 \cdot \frac{(0.60 \cdot ERUi + 0.40 \cdot ERPi)}{(ERUp + ERPp)} + 0.25 \cdot \frac{GVA Ai}{GVA Ap} + 0.15 \cdot \frac{Pi}{Pp} + 0.15 \cdot \frac{PFI}{PFp} \right] \cdot DFI \right\}}$$

where: SRlin = Share of a province/city in the road improvement and rehabilitation fund of the country

ERUi = Existing unpaved roads in km in a province/city

ERPi = Existing paved roads in km in a province city

ERUp = Total existing unpaved roads in km throughout the country

ERPp = Total existing paved roads in km throughout the country

GVA Ai, GVA Ap, Pi, Pp, PFI, PFp and DFI as previously defined

The computed shares multiplied by the ceiling for the highway subsector gives the ceiling for the different regions/provinces/ cities. The regional/provincial/city budgetary ceilings are first apportioned to the funding requirements of committed projects (foreign-assisted projects with approved loans, DPWH components of inter-agency projects and on-going locally projects) and the balances are allocated to locally funded projects.

Table 15.1-1 is an example of the fund allocation to provinces calculated based on the above criteria.

19.3 SECTOR LOAN SYSTEM

The rural road development project is recognized as the integration of individual rural road improvement/construction projects, some locally funded, others foreign-assisted. For foreign-assisted projects, two types of loan are applicable: project loans and sector loans. A sector loan system is recommended for the rural road development project due to its characteristics of covering numerous roads with a short length. The sector loan system is discussed below.

1) Characteristics of Sector Loans

- A sector loan is a form of assistance for the capital investment needs in a sector in the light of its development perspective, and involves financing of a group of subprojects in a sector which are consistent with the sector development plan.
- Requisites for a sector loan to be possible are as follows:
 - The investment plan of the sector is well designed.
 - Sector institutions have the capability to implement the sector development plan/projects.
- It may be appropriate to reinforce and strengthen the Institutions by technical assistance with a view to facilitating them to discharge responsibilities associated with the sector loan.
- Since a sector loan has a reference to the overall capital investment needs of a sector and must be designed in a way so as to meet these needs effectively, the size of loan is often required to be relatively large.
- There is a need for increased coordination of relevant policies and operations with other external agencies which are also involved in the development of the sector. Such coordination is useful to avoid duplication of effort by the external agencies involved and to ensure consistency.
- The coverage of a sector loan is in terms of meeting primarily the capital investment needs in the concerned sector either over a specified geographical area (area slice) or in respect of funding of such needs over a specified time span (time slice) or both.
- The terms of lending is determined generally with reference to the average life of the subprojects and the average implementation period thereof.
- Procurement under a sector loan proceeds in the same way as under a project loan.

2) Project Execution

- The selection, formulation and appraisal of subprojects are generally the responsibility of the executing agency.

The criteria for the selection and appraisal of subprojects should, however, be specified in advance and mutually agreed upon between the lending institution and the executing agency.

- The degree of involvement of the lending institution in the selection and appraisal of subprojects may depend upon the maturity and capability of the executing agency. Generally, prior approval of the lending institution may be necessary for relatively large subprojects, while for smaller subprojects, the lending agency will review, on a selective basis, the technical and financial/economic viability with a view to ensuring compliance with the mutually-agreed criteria.

3) Application of Sector Loans to the Rural Road Development Project

The rural road development project, comprising many subprojects, is suited for sector loans to be applied.

For sector loans to be possible, well-designed sector investment plans, capable institutions and clearly specified criteria for Subproject selection and appraisal are necessary.

The investment plan of the highway sector is discussed in Chapter 15 and the institutional aspects in Chapter 16. Subproject identification is referred to in Chapter 17. The criteria for the technical evaluation, economic evaluation and prioritization of subprojects are described in Chapter 18.

It is deemed practical that a sector loan will be applied to a group of subprojects in some specified provinces as a component of the overall investment plan for nation-wide rural road development.

Two schemes of loan procedure are applicable as shown in Figure 19.3-1.

Scheme 1 is as follows:

- a) Selection of provinces to be covered by the project
- b) Determination of framework of the project (overall development plan of the sector, criteria for subproject selection and appraisal, total cost of the project, etc)

- c) Formation of subprojects for the first year with technical, financial and economic evaluation thereof
- d) Loan agreement
- e) Formation of subprojects for the following year and concurrence thereon of the lending institution, simultaneously with implementation of subprojects for the current year
- f) Annual repetition of e) above until completion of the project

Scheme 2 is as follows:

- a) Selection of provinces to be covered by the project
- b) Determination of framework of the project (as in Scheme 1)
- c) Formation of subprojects for the first phase of the project
- d) Loan agreement for the first phase of the project presupposing the continuation of the project
- e) Formation of subprojects for the next phase of the project and loan agreement thereon, simultaneously with implementation of subprojects for the current phase
- f) Repetition of e) above until completion of the project

The Subproject Evaluation/Rating Sheet (Figures 18.5-1 and 18.5-2), together with the Subproject Proposal Form (Figure 17.2-1) and the attached location map, may be used as the subproject information to be submitted to the lending institution for concurrence.

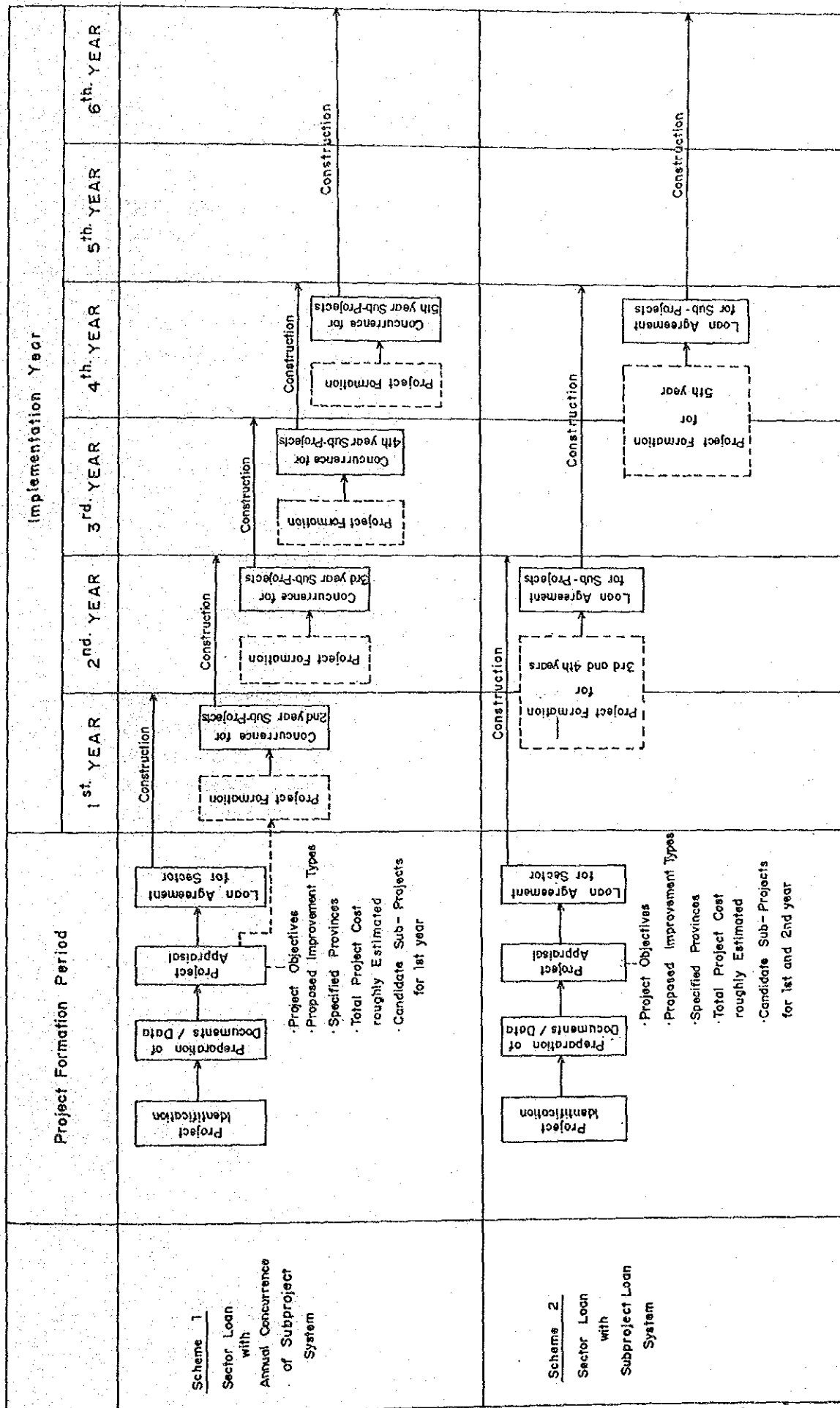


FIGURE 19.3-1 APPLICATION PROCESS OF SUBSECTOR LOAN FOR RURAL ROAD DEVELOPMENT PROJECT

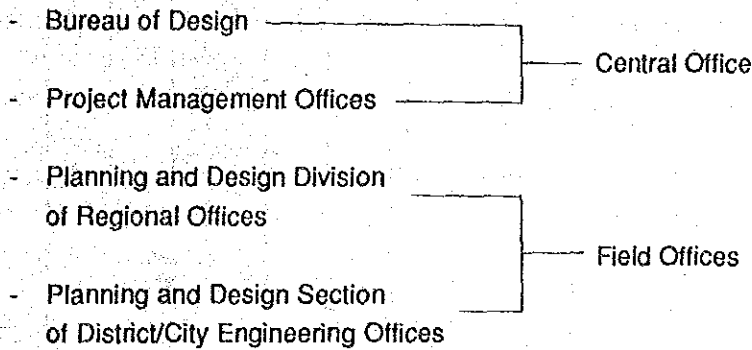
CHAPTER 20

DETAILED ENGINEERING

20.1 PRESENT PROCEDURES AND ORGANIZATION

20.1.1 Procedures

There are four (4) offices in DPWH concerned with preparation and review of detailed engineering design as follows:



Standard procedures for preparation, review and approval of the detailed engineering design are shown in Table 20.1-1. Projects are categorized into foreign assisted projects and locally funded projects. The former are handled by offices in the Central Office of DPWH, while the latter are further classified into two (2): projects initiated at the regional level and projects initiated by the Central Office.

TABLE 20.1-1 STANDARD PROCEDURES FOR APPROVAL OF DESIGN

Type of Project	Offices Concerned and Responsibility			Estimated Cost
	Implementing Office	Review and Recommendation For Approval	Approval	
Foreign Assisted Project	Project Management Office (usually by hiring consultants)	Bureau of Design	Undersecretary Secretary	P5.0 - P10.0 million Above P10.0 million
Projects Initiated by Regional Level	Planning/Design Section of DISTRICT/CITY Office (by Administration)	—	District/City Engineer	Below P1.0 million
	Planning/Design Division of Regional Office (usually by administration)	—	Regional Director	P1.0 - P5.0 million
Locally Funded Projects	Originating Office (by hiring consultants or by administration)	Bureau of Design	Undersecretary	P5.0 - P10.0 million
			Secretary	Above P10.0 million
Projects Initiated by Central Office	Originating Office (by hiring consultants or by administration)	Bureau of Design	Director, Bureau of Design	Below P5.0 million
			Undersecretary	P5.0 - P10.0 million
			Secretary	Above P10 million

Source: Department Order No. 42, Series 1988

Foreign Assisted Projects

Detailed engineering design is carried out by each Project Management Office which usually hires consulting firms to prepare the detailed engineering design.

Designs prepared by consulting firms are reviewed by the Project Management Office, then forwarded to the Bureau of Design for final review which recommends approval. Designs whose estimated construction costs are 5.0 to 10.0 million pesos and above 10.0 million pesos are approved by the Undersecretary and the Secretary, respectively.

Locally Funded Projects Initiated at Regional Level

Detailed engineering design whose construction cost is estimated below 1.0 million pesos is, in general, prepared by the Planning and Design section of the district/city engineering offices by administration and approved by the district/city engineers.

Detailed engineering design of projects costing 1.0 to 5.0 million pesos is undertaken by the Planning and Design divisions of the regional offices by administration and approved by the regional director.

Detailed engineering design of projects costing above 5.0 million pesos is prepared by the Planning and Design division of the Regional Office by administration and forwarded to the Bureau of Design for review. Designs of projects costing 5.0 to 10.0 million pesos are approved by the Undersecretary and those above 10.0 million by the Secretary.

Locally Funded Projects Initiated by Central Office

Projects initiated by the Central Office are designed by the originating office by hiring consulting firms or by administration. Designs are reviewed by the Bureau of Design and approved by the Director of the Bureau of Design when the project is estimated below 5.0 million pesos. Approval of design of projects costing 5.0 to 10.0 million pesos and above 10.0 million pesos is made by the Undersecretary and the Secretary, respectively.

20.1.2 Organization

1) Bureau of Design

The organization chart of the Bureau of Design is shown in Appendix 16-1. Of a total of seven (7) divisions, two (2) are concerned with highway design: Bridges Division and Highways Division.

The major duties and responsibilities of the Bureau of Design are as follows:

- Conduct or initiate, supervise and/or review the results of field surveys for highways and other public works projects.

- Conduct or initiate, supervise and/or review the preparation of schemes, designs, specifications, estimates, tender contract documents for public works projects of DPWH and other Departments upon request or agreement.
- Review and evaluate the designs, specifications, estimates, tender and contract documents of public works projects of all agencies in accordance with current standards and guidelines.

2) Project Management Offices (PMOs)

Foreign assisted projects are, in general, implemented by the Project Management Offices in the Central Office. Since PMOs usually hire consulting firms for preparation of designs, specifications, etc., their major function with respect to the detailed engineering design is review of materials prepared by consulting firms.

3) Planning and Design Division of Regional Offices

Detailed engineering designs of locally funded projects costing above 1.0 million pesos are undertaken by the Planning and Design Division of Regional Offices. In general, the Planning and Design Division is composed of the following sections and staff:

Planning and Design Division

1 - Division Chief

a) Planning & Programming Section

12 - Technical Staff

2 - Economist

2 - Draftsman

b) Survey & Investigation Section

8 - Technical Staff

8 - Draftsman

c) Highway Design Section

8 - Technical Staff

6 - Draftsman

d) Structural Design Section

8 - Technical Staff

2 - Draftsman

- e) Hydraulic Section
 - 8 - Technical Staff
- f) Architectural Design Section
 - 4 - Technical Staff
 - 2 - Draftsman
- g) Mechanical & Electrical Section
 - 8 - Technical Staff

4) Planning and Design Section of District/City Offices

Projects costing below 1.0 million pesos are designed by these sections. Most current locally funded projects, particularly barangay road projects, fall under this category. Since most of these projects are improvement of surface types and conditions and rehabilitation, and follow the existing alignment, both horizontal and vertical alignments, they do not require earth works. Thus, the Design Section prepares a standard cross section, based on which it prepares quantities, cost estimates and specifications which usually follow DPWH Standard Specifications.

In general, the Planning and Design Section of District/City Offices composes of four (4) engineering staff and one (1) draftsman as follows:

- 1 - Supervising Civil Engineer
- 1 - Senior Civil Engineer
- 1 - Architect
- 1 - Civil Engineer
- 1 - Draftsman

5) Local Government Units

a) Provincial Engineer's Office

The Programming Division of each Provincial Engineer's Office is in charge of detailed engineering design and in general is composed of the following four (4) sections and staff headed by one (1) Division Chief (Supervising Civil Engineer):

Public Works Section (4 - Engineering Staff)

- 1 - Civil Engineer
- 1 - Civil Engineer Aide
- 1 - Draftsman
- 1 - Illustrator

Roads and Bridges Section (3 - Engineering Staff)

- 1 - Assistant Civil Engineer
- 1 - Senior Draftsman
- 1 - Clerk
- 1 - Utility Worker

Reports and Statistics Section (2 - Engineering Staff)

- 1 - Civil Engineer
- 1 - Civil Engineer Aide
- 1 - Senior Clerk
- 1 - Utility Worker

Survey and Right-of-way Section (6 - Engineering Staff)

- 1 - Supervising Civil Engineer
- 1 - Geodetic Engineer
- 1 - Geodetic Engineer Aide
- 1 - Civil Engineer
- 1 - Utility Worker
- 1 - Row Agent

6) **Office of Municipal Planning and Development Coordinator (MPDC) and Municipal Engineer**

The Office of MPDC is in charge of planning and design of infrastructure projects with the technical assistance of the Municipal Engineer. However, most municipalities do not assign the Municipal Engineer; instead, MPDC concurrently undertakes the roles and functions of the Municipal Engineer.

The present organization of the Office of MPDC appears to be weak and is composed of the following sections and staff:

Relatively Large Municipality Relatively Small Municipality

- | | |
|---|---|
| 1 - MPDC | 1 - MPDC |
| 1 or 2 - Draftsman in Plans
and Program Section | 1 - Draftsman in Plans
and Program Section |
| 2 - Statistician in Research,
Evaluation and Statistics
Section | 2 - Clerk in Civil
Registration Section |
| 2 - Clerk in Civil Registration
Section | |

20.2 PROPOSED PROCEDURE FOR RURAL ROADS PROJECTS

20.2.1 Administration Type Subprojects

The detailed engineering design of this type of project is recommended to be carried out by the Regional and the District/City Offices. Maximum involvement of these field offices for rural roads projects will be essential in view of the following:

- Rural roads projects are composed of numerous small size projects. Current investment level for rural roads projects is expected to be more than double by the year 1991.
To implement numerous small size projects scattered nationwide, efficient utilization of work forces in these field offices will be most effective.
- Department Order No. 42, Series of 1988, authorizes the Regional Directors to approve designs of projects costing up to 5.0 million pesos and the District/City Engineers of those up to 1.0 million pesos. Thus, most small size projects can be designed at the Regional and the District/City Office level.

Since alignments of the administration type subprojects, as defined in Chapter 15, will follow more or less the existing horizontal and vertical alignments, the expected volume of earth work will be minimal. The detailed engineering design may be simply done by preparing standard cross sections and a straight road diagram indicating work activities. Accuracy of quantities estimated based on this method will still be within the allowable range of error.

In proportion to increases in work loads, organization of the Regional and the District/City Offices will have to be strengthened by employing regular staff and/or project-hired contractual staff.

20.2.2 Contract Type Subprojects

The detailed engineering design of this type of project is recommended to be undertaken by the Project Management Office for rural road projects. The present procedure will be followed. PMO will hire consulting firms for detailed engineering services. Reviews of designs prepared by the consulting firms will be made by the PMO and the Bureau of Design.

In line with the schedule of construction, hiring consulting firms, detailed engineering periods and review periods should be properly scheduled. As many consulting firms will be expected to involve, standardization of design criteria for various classes of roads should be established. To expedite review works, proper coordination should be maintained between PMO and the Bureau of Design.

CHAPTER 21

TENDERING

21.1 PRESENT PROCEDURE

21.1.1 Committees In Charge of Tendering

All public tendering is conducted by two (2) committees, one the Prequalification, Bids and Awards Committee (PBAC), which is responsible for selecting contractors for construction works and suppliers of materials/equipment, and the other the Prequalification, Evaluation and Award Committee (PEVAC), which is responsible for selecting consulting firms.

PBACs are created in the Central Office, regional offices and district/city offices in DPWH. Powers delegated to each level of office are presented in Table 21.1-1.

Executive Order No. 164, issued in May 1987, specifies that PBAC members in the Central Office are composed of the following:

- a) A chairman (regular), who should be at least the third ranking official of the Department
- b) An executive officer and secretary (regular), who is the Legal Officer of the Department
- c) A technical member (regular) to be designated by the head of the Department
- d) Two (2) members (provisional) with experience in the type of project to be bid and in project management, duly designated by the head of Department on a project-to-project basis
- e) A representative from at least one of the following organizations, who is a non-voting member:
 - Philippine Institute of Civil Engineers
 - Philippine Constructors Association
 - National Confederation of Contractors Associations of the Philippines, Inc.
 - Philippine Institute of Certified Public Accountants

TABLE 21.1-1 LIMITS OF AUTHORITY FOR BIDS/AWARDS/CONTRACTS

	D P W H				President
	District/ City Engineers	Regional Directors	Under- Secretaries	Secretary	
Bidding/Awarding/ Entering into Contract	Below P1.0M	P1.0 - P5.0M	P5.0 - P100.0M	Above P100.0M	---
Approval of Awards/ Contracts	Below P0.5M	P0.5 - P3.0M	P3.0 - P10.0M	P10.0 - P100.0M (below P10.0M ¹)	Above P100.0M (above P10.0M ¹)

Source: Department Order No. 42, Series of 1988
Executive Order No. 164

- Note :
- 1) Awarded through negotiation
 - 2) All purely consultancy contracts relating to infrastructure projects, regardless of amount, are approved by the Secretary.

In line with Government policy to expedite project implementation through decentralization and administrative delegation, local government units were ordered by Memorandum Order No. 175 in May, 1988 to create PBACs in each unit to undertake public bidding for the projects funded from National Government funds. PBAC members are specified to be composed of the following:

For each province

Chairman : Governor

Members : Three (3) provincial board members duly designated by the Governor

Members : Three (3) representatives from non-government civic organizations

Members : One (1) representative from the Philippine Institute of Certified Public Accountants (PICPA) or any practicing Certified Public Accountant from the private sector duly recommended by PICPA

For each city/municipality

Chairman : Mayor

Members : Three (3) city/municipal board members duly designated by the Mayor.

Members : Three (3) representatives from non-government civic organizations

Members : One (1) representative from the Philippine Institute of Certified Public Accountants or any practicing Certified Public Accountant from the private sector residing within the city/municipality and duly recommended by PICPA

21.1.2 Procedures

All public tendering or selection of contractors is conducted in accordance with PD1594, as amended, which is entitled "Implementing Rules and Regulations". Figure 21.1-1 shows the tendering procedure prepared based on PD1594.

The selection of consultants is undertaken in accordance with the "Guidelines on the Hiring Consultants" prepared by NEDA. The procedure for selecting consultants is presented in Figure 21.1-2.

FIGURE 21.1-1 PROCEDURE FOR BIDDING

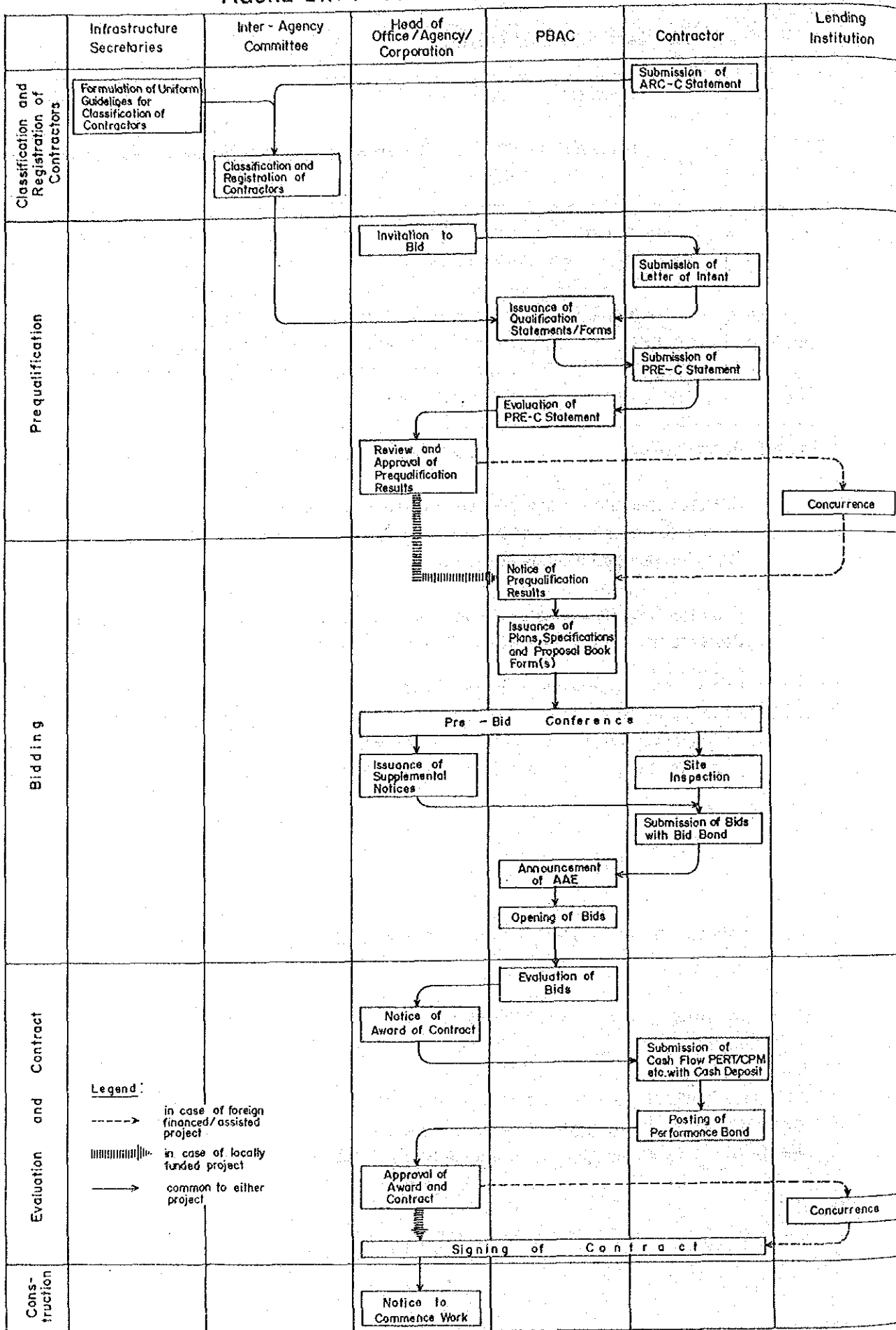
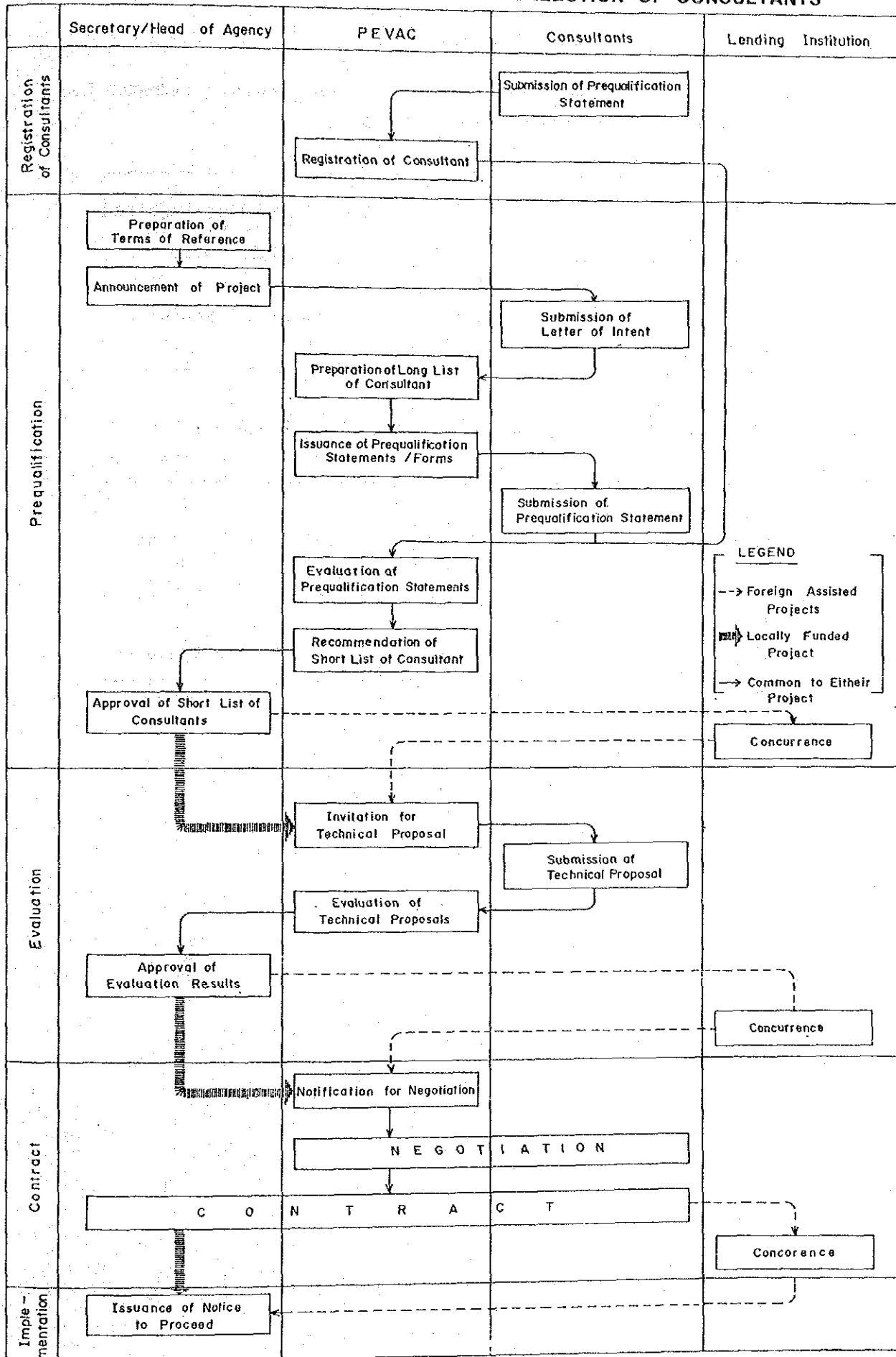


FIGURE 21.1-2 PROCEDURE FOR THE SELECTION OF CONSULTANTS



21.1.3 Time Required for Selecting Contractors

Table 21.1-2 shows the generally required approximate time for selecting contractors from invitation to bid (or advertisement) to approval of contract:

Type & Size of Project	Responsible Agency	Approximate Time Required
Local Bidding P1 million or below	PBAC, District/ City Office	About 1.5 months
Local Bidding P1.0 - 5.0 million	PBAC, Regional Office	About 2.5-3.0 months
Local Bidding Above P5.0 million	PBAC, Central Office	About 4.5-7.0 months
International Bidding	PBAC, Central Office	About 7.0-10.5 months

TABLE 21.1-2 TIME REQUIRED FOR SELECTING CONTRACTOR

Bidding Procedure	PBAC: DISTRICT/CITY OFFICE	PBAC: REGIONAL OFFICE	PBAC: CENTRAL OFFICE
	Below 1 million P	1.0-5.0 million P	Above 5.0 million P
1. Invitation to Bid (advertisement)	(At least once within a week) 1 day	(3 times within 2-3 weeks) 15 days	(3 times within 2-3 weeks) 15 days
2. Submission of Letter of Intent by Contractor	2-3 days	2-3 days	2-3 days (10-15 days)
3. Issuance of P.Q. Forms	1 day	1 day	1 day
4. Preparation/Submission of P.Q. Forms	2-3 days	2-3 days	3-6 days (20-30 days)
5. Evaluation of P.Q. Forms	3-6 days	6-10 days	10-20 days (20-30 days)
Approval of Prequalified Contractors/Issuance of Tender Documents	2-3 days	4-6 days	6-10 days (20-30 days)
7. Preparation of Bids by Contractor	15 days	30 days	45 days 60 days 90 days (P5-10M) (P10-100M) (Above P100M)
8. Bidding/Evaluation of Bids	3-4 days	6-10 days	20-30 days (30-45 days)
9. Approval of Award and Notice of Award	3-4 days	4-6 days	10-20 days (20-30 days)
10. Contract and Approval of Contract	5-6 days	5-6 days	20-30 days (30-40 days)
Total	50-45 days	75-90 days	130-210 days (210-320 days)

Note: () shows no. of days in the case of international bidding
 Source: PD 1594, as amended, and PBAC Secretariat

21.2 PROPOSED PROCEDURE FOR RURAL ROADS PROJECTS

21.2.1 Administrative Type Subprojects

Since this type of project is proposed to be undertaken by administration at the regional or district/city offices, no tendering is required, except in the case of contracting a supply of laborers (Pakyaw contract).

21.2.2 Contract Type Subprojects

For this type of project, it is recommended that the present tendering procedure be followed. Tendering is to be undertaken at different levels of agencies depending on the size of the project and the sources of funds and summarized below:

Type of Bidding	Source of Funds	Size of Project	Responsible Agency
Local Bidding	National	Below ₱1.0M	PBAC, District /City Office
Local Bidding	National	₱1.0-₱5.0M	PBAC, Regional Office
Local Bidding	National	Above ₱5.0M	PBAC, Central Office
International Bidding	Foreign + National	All	PBAC, Central Office
Local Bidding	National Aid Fund to Local Government Units	Below ₱0.2M	PBAC, Respective LGU

Shortening the time required for tendering is one of the key factors to expedite implementation of the projects. It is recommended that the Government make all possible efforts to shorten the time for evaluation of prequalification documents and bids submitted by contractors as well as the time for approval.

CHAPTER 22

CONSTRUCTION

22.1 PRESENT PROCEDURES

22.2.2 Agencies Concerned

There are five (5) agencies concerned with the construction or implementation of projects as follows:

- Bureau of Construction
 - Project Management Offices
 - Construction Division of Regional Offices
 - Construction Section of District/ City Offices
 - Local Government Units
- } Central Office of DPWH
- } Field Office of DPWH

Bureau of Construction

The organization chart of the Bureau of Construction is shown in Appendix 16-1. The major roles and functions of the Bureau are as shown below:

- a) Formulate policies relating to construction management and contract administration;
- b) Review and evaluate construction programs, estimates, and tender and contract documents;
- c) Inspect, check and monitor construction and works supervision activities of field implementing offices for the purpose of ensuring that such activities are being conducted in accordance with the current standards and guidelines of the Department;
- d) Provide specialist support to implementing field offices on construction management and contract administration;
- e) Perform such other related duties and responsibilities as may be assigned or delegated by the Secretary or as may be required by law.

Thus, the Bureau is not directly involved in actual construction, unless specifically required to do so by the Secretary.

Project Management Offices

Foreign assisted projects are implemented by project management offices, usually by contract. Construction supervision is, in general, done by consultants hired by project management offices.

Construction Division of Regional Offices

Locally funded projects costing above 1.0 million pesos are implemented by regional offices, usually by contract. Construction supervision is done by administration.

Construction Section of District/City Offices

Locally funded projects costing up to 1.0 million pesos are implemented by district/city offices and done by contract or by administration.

Local Government Units

In accordance with the Government policy of decentralization, local government units (LGUs) are given greater participation in the implementation of infrastructure programs funded by the National Government. The construction of local road projects funded under the National Assistance to Local Government Units (NALGU) in the General Appropriations Act and costing not more than P200,000 each are implemented by the local government unit.

LGUs implement projects by contract or by administration under the technical guidance and supervision of DPWH and the general supervision of DLG.

22.1.2 Construction by Administration

Under the present laws and regulations, construction can be done by administration when the following conditions are met:

- a) Any project with a cost of 1.0 million pesos or less
- b) A project costing over 1.0 million pesos
 - Failure to award a contract after open competitive public bidding for valid cause or causes
 - Approval of the Secretary of DPWH must be obtained when the project cost is 10 million pesos or less

- Approval of the President of the Philippines must be obtained when the project cost is more than 10 million pesos.

22.1.3 Construction Methods

There are two (2) kinds of construction methods: equipment-based construction and labor-based construction. During the previous administration, the former was the governing method. However, under the present administration, extensive application of the latter is being pursued to create as many job opportunities as possible, so that economy in the area will be stimulated and economic recovery of the country will be accelerated.

1) Equipment-based construction method

When a project is implemented by contract, contractors usually apply the equipment-based construction method which allows contractors to utilize their own equipment to the maximum possible extent.

When this method is applied, cost shares of materials, equipment and labor to total construction cost are as shown below. Cost shares vary depending upon the nature of works involved. In general, when earth work is a major component, the equipment cost share becomes high, while the materials cost share increases when structural work is a major component.

Cost component	Cost share (%)
Materials	30 - 60
Equipment	40 - 60
Labor	5 - 15

Contractors are broadly classified into three (3): small, medium and large, based on their past experience, financial capabilities, equipment owned and engineering manpower resources.

TABLE 22.1-1 CATEGORIZATION OF CONTRACTORS

Class of Contractor	Allowable Range of Contract Cost	No. of Contractors	
		Roads	Bridges
Small	Less than or equal to P3.0M	436	526
Medium :			
Subclass A	Above P3.0M up to P15.0M	79	68
Subclass B	Above P3.0M up to P30.0M	88	52
Large :			
Subclass A	Above P3.0M up to P50.0M	25	10
Subclass B	Above P3.0M	27	15
Total		655	671

Source : Department Order No. 41, Series of 1987

2) Labor-based construction method

This method is being adopted in as many projects as possible. Executive Order No. 182 expresses the Government policy on this method as follows:

"Whenever technically and economically feasible, labor-based and labor-based/equipment-supported methods shall be used in the implementation of the projects authorized in this Executive Order : provided that

- i) The estimated financial cost of each project done by the labor-based method does not exceed the cost of the best alternative construction method defined by the agency concerned by more than ten per centum (10%).
- ii) The estimated duration of the project done by the labor-based method does not exceed the duration of the best alternative method defined by the agency concerned by more than fifty per centum (50%).
- iii) The employment of workers in the projects will not unduly impair the labor requirements of agricultural production.

For the labor-based method, the purchase of hand tools and other work implements, in an amount not exceeding five per centum (5%) of the estimated project cost, may be charged against the project funds."

The Government intends to increase the labor cost share to total construction cost from 5 - 15% of the equipment-based method to 20 - 30% by adopting the labor-based method.

In the implementation of the labor-based method, the Government recognized the following problems:

- Most engineers have been accustomed to the equipment-based method, not to the labor-based method. There is an urgent need to train engineers who can supervise and manage projects to be done by the labor-based method.
- Technical specifications, construction scheduling and other technical and planning procedures suitable for the labor-based method should be established.
- For the implementation of projects by the labor-based method, the involvement of the community in which the projects are located is essential. For this purpose, the traditional Pakyaw contract system should be improved and proper procedures for this system should be established.

In order to cope with above problems, the Central Labor-based Advisory and Training Team (CLATT) was organized. CLATT prepared the "Training Manual" which covers:

- Planning
- Work Organization
- Reporting and Control
- Tools and Equipment
- Technology for Labor-based Method
- Technical Specification
- Maintenance
- Project Implementation Handbook

a) Training Program of CLATT

This program was implemented between October 1987 and May 1988 and consisted of six (6) training courses. Each course lasted three (3) weeks and was attended by about 40 trainees with a supplemental one (1) week for trainers.

Training strategy set by CLATT was as follows:

- To cope with the 1988 labor-based construction program, since more than 2,000 site supervisors were identified to be immediately required, training was focused on providing site supervisors.

- Among the engineers who attended site supervisor training, capable engineers were selected. They were further trained for another one (1) week to receive the supplemental program.
- Selected engineers who were trained as trainers, undertook seminars with the assistance of CLATT staff in their respective regions to train engineers aimed at providing enough site supervisors in their region.

b) **Pakyaw Contract System**

The Pakyaw contract system is traditional in the Philippines. It is widely used in the construction industry by both the Government and the private sector to undertake jobs in which manual labor is a major component. In line with the Government policy to create more job opportunities through the implementation of infrastructure projects in rural areas, this system is planned to be extensively used for rural roads projects.

In order to apply this system efficiently and effectively to rural projects, a guideline was prepared by CLATT and issued as Department Order No. 57, Series of 1987.

i) **Coverage of the Pakyaw Contract**

The contract covers the provision of labor services only. Construction materials, equipment, and tools are provided by the implementing agency.

ii) **Labor Groups**

The contract is awarded only to local labor groups, such as Parent-Teacher Associations, and barangay groups, and not to regular/licensed contractors nor to any Government officials/employees.

The workforce is normally formed of about 20 workers from whom a group leader (a Pakyaw leader) is elected. The elected Pakyaw leader is the signatory to the contract and other documents pertaining to the work on behalf of the Pakyaw group.

Unskilled workers should come from the barangay where the project is located, semi-skilled workers from the municipality and skilled workers from the province.

The project facilitator (PF), who is normally an existing DPWH employee detailed to the project, assists in organizing Pakyaw groups and in the preparation of Pakyaw contracts.

iii) **Award**

Pakyaw contracts are awarded only after competitive selection, either through open public bidding or through the sealed canvass of at least three (3) Pakyaw groups.

Bidding is made for unit prices of certain construction work items such as bush clearing, grubbing, topsoil removal, etc.

Awards are made by the district/city engineer only up to a cost of ₱100,000.00 per Pakyaw contract, and by the regional director up to ₱200,000.00 per Pakyaw contract.

iv) **Supervision**

The resident engineer (RE) is responsible for overall construction and ensuring compliance with design standards and specifications. The RE directs the site supervisors (SS) and is a party to the calculations of payments and a joint signatory to all documents relating to the accomplishment and payment for the work.

Site supervisors (SS) closely supervise the construction work to ensure that it is in accordance with instructions. They also verify daily attendance.

v) **Payment**

Since Pakyaw contracts are, in general designed to be completed within one calendar month, the workers are paid at least once a month.

In some cases more frequent payments may be requested. Provided that it is agreed with the district/city engineer, a payment halfway through and on completion of the contract may be made. However, with mid contract payments, some retention (normally 10%) is withheld to ensure completion of the work.

22.2 PROPOSED CONSTRUCTION SYSTEM

22.2.1 Administration Type Subprojects

This type of project is recommended to be undertaken by administration and implemented by regional and district/city offices. A project costing less than 200,000 pesos and funded by National aid to local government units will be implemented by the respective local government units.

One of the most important objectives of the rural roads projects is to create as many job opportunities for rural people as possible. To achieve this objective, the labor-based construction method is best fitted; however, some construction activities will require the support of equipment to assure quality of work as well as to construct the road economically and quickly. CLATT classified construction activities into three (3) categories as shown below, and the construction activities list classified into categories is shown in Table 22.2-1.

Classification

- A : Work that can be done by hand rather than by machine
- B : Work that can be effectively done by hand or alternatively by machine
- C : Work that can be satisfactorily done only by machine

As shown in Table 22.2-1, some essential construction activities for road construction, such as compaction and rolling, need support of equipment, therefore, this type of project is recommended to be carried out by a labor-based/equipment-supported construction method.

TABLE 22.2-1 CONSTRUCTION ACTIVITIES CLASSIFIED BY HAND OR BY MACHINE

Nature of Work	Operations	Classification		
1. Clearing Operation	Preparation of ground	B		
2. Earthwork	Excavation	B		
	Transportation : small leads	B		
	" : long leads	C		
3. Soil Stabilization	Compaction	C		
	Borrowing of soil	B		
	Adding stabiliser to the soil	B		
	Dry mixing	B		
	Wet mixing	B		
4. Granular Base/Surface Course	Laying of aggregate	B		
	Adding filler material	B		
	Watering	B		
	Rolling	C		
5. Bituminous Pavement	(a) Surface dressing	Spraying of bitumen	B	
		Spreading of stone chips	B	
		Rolling	C	
	(b) Open graded pre-mix surfacing	Mixing	C	
		Laying	B	
		Rolling	C	
	(c) Grouted macadam	Laying of aggregate	B	
		Spraying of bitumen	B	
		Rolling	C	
	6. Quarrying and Crushing	(a) Large quarrying	Quarrying & crushing	C
			Quarrying & crushing	B
		(c) Small-scale crushing of graded crushing	C	
(d) Breaking into single size stones		B		
(b) Small quarrying		Quarrying & crushing	B	
7. Maintenance	(a) Gravel or earth roads	Routine surface maintenance	B	
		Regrading	C	
		Regraveling	B	
	(b) Surfaced roads	Patching	A	
		Resurfacing	B	
	(c) All roads	Routine maintenance of verges	B	
		Grass verges	B	
		Side drains and ditches	B	
		Culverts	A	

Source : Training Manual For Labor-based Road Construction and Maintenance, CLATT

Recommended System/Organization

Regional and/or district/city offices are responsible for project management and supply of materials, tools and equipment. Each community where a project is located is responsible for the supply of laborers.

In regional and/or district/city offices, the following will be organized:

Project Engineer (PE) : Responsible for overall project management of 4 to 5 subprojects. Also responsible for mobile equipment (crew and scheduling and assigning equipment to each subproject and procurement and delivery of materials.

Resident Engineer (RE) : Responsible for construction supervision of 2 to 3 subprojects. Scheduling and assigning equipment and material procurement schedule should be coordinated with the PE.

Site Supervisor (SS) : Responsible for day-to-day inspection, supervision and management of 2 to 3 community construction teams. Also responsible for management of tools rented to CCTs.

Mobile Equipment Crew (MEC) :
Managed by PE and dispatched to subprojects in accordance with needs of equipment of each subproject. Typical equipment will be:

- Dump trucks
- Road rollers
- Bull dozers
- Concrete mixers
- Graders

In municipalities and/or barangays, "Community Construction Teams (CCTs)" should be organized. One (1) CCT will be composed of about 20 laborers. Municipal mayors and barangay captains should take the initiative to organize CCTs in their respective areas. One (1) leader, who will sign the contract and manage the team, should be elected among the laborers. The leader enters into the Pakyaw contract (labor supply contract) with the regional or district/city office. Several CCTs should be organized for a subproject depending on labor requirements.

One example of organization for the construction of administrative type subprojects is shown in Figure 22.2-1.

22.2-2 Contract Type Subprojects

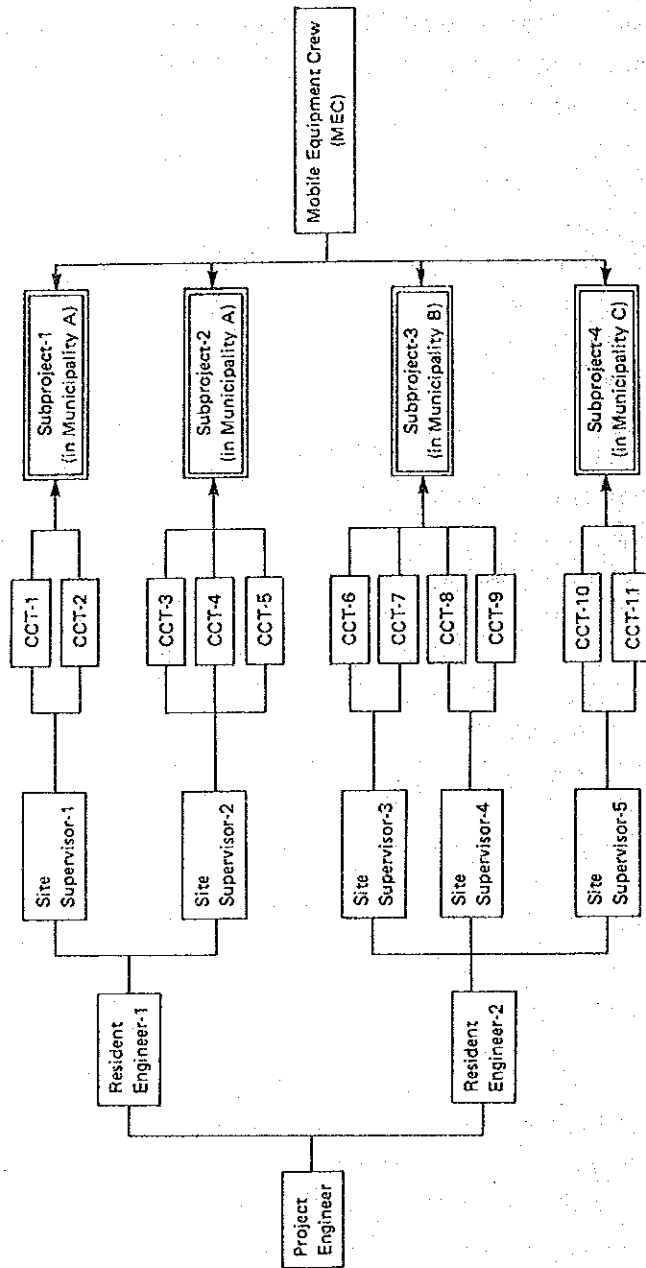
This type of project is recommended to be undertaken by the Project Management Office for the rural Road Project. These subprojects should be constructed by contractors and supervised by consulting firms under the management of PMO.

Several subprojects should be packaged in one (1) contract in order to facilitate project implementation and to reduce administrative overhead. In the case of foreign assisted projects, since international bidding will be required, which will take a long time for tendering, proper scheduling should be made.

Management/Procurement of Materials/tools

Supply of Labor

Supply of Equipment



Notes:

Regional and/or District/City Offices

- Project Engineer (P.E.) responsible for overall management of 4 to 5 subprojects.
- Resident Engineer (R.E.) responsible for construction supervision of 2 to 3 subprojects.
- Site supervisor (S.S.) responsible for Management of 2-3 CCTs.
- Mobile Equipment Crew (MEC) under control of Project Engineer will mobilize equipment in accordance with needs of subproject.

Community Construction Team (CCT)

- Composed of about 20 laborers

FIGURE 22.2-1 EXAMPLE OF ORGANIZATION FOR CONSTRUCTION OF ADMINISTRATIVE TYPE SUBPROJECTS

CHAPTER 23

MAINTENANCE

23.1 PRESENT MAINTENANCE SYSTEM

23.1.1 Maintenance Funds

1) National Roads

Maintenance funds for national roads are appropriated by the General Appropriations Act. Total maintenance funds and allocation of funds to regional and district/city offices are determined by the Equivalent Maintenance Kilometer System (EMK system). The EMK system is expressed as follows:

$$\text{Maintenance Funds} = \text{Basic Cost} \times \text{EMK}$$

Basic Cost : Cost to maintain one equivalent-maintenance-kilometer for one year
(current basic cost is ₱17,104.00)

EMK : Equivalent-maintenance-kilometer to be determined by type of pavement, width of roadway and traffic volume. EMK factors are shown in Table 23.1-1.

For example, the Bohol First Engineering District Office is in charge of maintenance of 309.149 km of national roads which are equivalent to 581.694 EMKs.

2) Local Roads

Maintenance funds for local roads are appropriated by the General Appropriations Act under National Assistance to Local Government Units (NALGU) and local governments' general fund.

Table 23.1-2 shows the share of maintenance funds by the national government and local government units.

TABLE 23.1-1 EMK FACTORS

Unpaved Roads

	Traffic Volume (AADT)								
	1	25	50	75	100	150	200	300	400
Low - Granular Surface (G.S.)	0.35	0.40	0.50	-	-	-	-	-	-
Medium - 10 cm - 20 cm G.S.	0.40	0.60	0.90	1.40	1.90	2.20	2.40	2.50	2.60
High - 20 cm > G.S.	-	-	0.85	1.00	1.45	1.90	2.10	2.30	2.50

Bituminous and Concrete Roads

	Traffic Volume (AADT)								
	200	400	600	1000	1500	2000	3000	5000	10000
Low - Bituminous Road (1 cm - 3 cm)	1.10	1.55	2.10	2.50	2.60	-	-	-	-
Medium (3.1 cm - 6 cm)	1.00	1.25	1.55	2.00	2.20	2.30	2.40	2.50	-
High (6.1 cm - 10 cm)	0.70	0.85	0.95	1.20	1.65	1.85	1.95	2.10	2.20
Extra Strength (10 cm > f)	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.15	1.20
Concrete	0.50	0.60	0.80	0.85	0.90	0.95	1.00	1.05	1.10

FW (Factor for Road Width)

Paved (Asphalt or Concrete)

7.50 m ≥ W = 1.00

7.50 < W < 10.0 m = 1.15

10.0 m ≤ W = 1.30

Unpaved (Gravel or Earth)

5.00 m ≥ W = 0.80

5.00 m < W = 1.00

Factor for Bridges

Concrete = 0.01

Steel = 0.035

Temporary = 0.10

(Bailey & Timber)

TABLE 23.1-2 MAINTENANCE FUNDS FOR LOCAL ROADS

Roads	National Assistance to Local Government Units (National Fund)	Counterpart Fund of LGUs (LGUs' General Fund)	Total (P/year/physical km)
Provincial Roads	2/3 of Maintenance Cost (P8,552.00)	1/3 of Maintenance Cost (P4,276.00)	75% of Basic Cost (P12,828.00)
City Roads	1/3 of Maintenance Cost (P5,701.00)	2/3 of Maintenance Cost (P11,104.00)	100% of Basic Cost (P17,104.00)
Municipal Roads	3/5 of Maintenance Cost (P5,131.20)	2/5 of Maintenance Cost (P3,420.80)	50% of Basic Cost (P8,552.00)
Barangay Roads	40% of Basic Cost (P6,841.60)	No counterpart fund required	50% of Basic Cost (P6,841.60)

Source: DPWH Memorandum Circular No. 39, Series of 1988

23.1.2 Organization

1) National Roads

Maintenance of national roads is under the responsibility of DPWH. Agencies concerned with roads and bridge maintenance in DPWH are as follows:

- Bureau of Maintenance ————— Central Office
- Maintenance Division of Regional Offices ———— Field Offices
- Maintenance Section of District/City Offices ———— Field Offices
- Bureau of Equipment ————— Central Office
- Regional Equipment Service ————— Field Offices
- Area Equipment Service ————— Field Offices

Bureau of Maintenance (BOM)

The major duties and responsibilities of BOM are as follows:

- Formulate policies relating to infrastructure projects and facilities
- Review and evaluate maintenance programs, estimates, and tender and contract documents
- Inspect, check and monitor maintenance activities of implementing field offices
- Provide specialist support to implementing field offices
- Perform such other related duties and responsibilities as may be assigned or delegated by the Secretary or as may be required by law

Maintenance Division of Regional Offices

There are three (3) units in the Maintenance Division of Regional Offices: Planning and Control, Operation, and Special Projects.

The Operation Unit undertakes actual supervision of maintenance operations which are done by district/city offices.

Maintenance Section of District/City Offices

This is the implementing arm of actual maintenance work. The Maintenance Section is, in general, composed of several sections/ units as follows:

- Planning Section
- Operation Section
 - School Buildings
 - Flood Control, Ports, Water Supply, etc.
 - Highways and Bridges

The Highways and Bridges Unit is further subdivided into several areas such as Areas I, II and III, and an Area Engineer is assigned to each Area. Under the Area Engineer, four (4) to five (5) fixed crews are organized. A fixed crew is headed by a maintenance foreman and has about four (4) to six (6) maintenance men (laborers). In addition to fixed crews, several mobile crews are organized under a Field Operation Engineer as follows:

- Repair of paved roads crew(s)
- Bridge repair crew
- Hauling crew
- Grader crew

Bureau of Equipment (BOE)

The major duties and responsibilities of BOE are as follows:

- Formulate policies relating to the management of infrastructure equipment and ancillary facilities
- Review and evaluate programs, estimates, and tender and contract documents for equipment
- Inspect, check and monitor the management of equipment by regional equipment services and area shops
- Provide specialist support to implementing field offices on equipment management
- Perform such other related duties and responsibilities as may be assigned or delegated by the Secretary or as may be required by law.

Regional and Area Equipment Services

Regional Equipment Services operate Regional Base Overhaul Shops where major repairs of equipment are done. It is supported by an average of five (5) Satellite Area Equipment Services which handle minor repairs and maintenance and serve as an extension of the regional equipment service.

Regional and Area Equipment Services are directly supervised by the Regional Director; however, equipment management responsibilities of BOE extend to these services.

2) Local Roads

Local roads are maintained by each local government unit under the technical supervision of DPWH and the administrative supervision of DLG.

Provincial Roads

Provincial Engineer's Offices (PEOs) are responsible for the maintenance of provincial roads. Each PEO has a Roads/Bridges Maintenance Division and an Equipment Pool Division. Two (2) examples of organization of maintenance divisions are shown below:

	Bohol	Masbate
Provincial Road Length (km)	922.2	117.8
Maintenance Division Staff		
	1 - Division Chief	1 - Division Chief
	2 - Area Eng.	2 - Division Staff
	2 - Assist. Area Eng.	2 - Area Eng.
	18 - Maint. Foreman	6 - Assist. Area Eng.
	54 - Capataz	2 - Maint. Foreman
	256 - Maintenance Man	16 - Capataz
	2 - Bridge Foreman	100 - Maintenance Man
	22 - Carpenters	1 - Bridge Foreman
		3 - Carpenters
No. of Crews		
	54 - Fixed Crew	16 - Fixed Crew
	2 - Bridge Crew	1 - Bridge Crew
Maintenance Men per Fixed Crew		
	about 5	about 6
Km per Fixed Crew		
	about 17 km	about 7 km

In general, one (1) fixed crew is organized for every 10 to 20 km of provincial roads and is composed of 5 to 6 maintenance men under a Capataz.

City Roads

The maintenance of city roads is under the responsibility of City Engineer's Offices (CED).

Municipal Roads

The maintenance of municipal roads is supposed to be under the responsibility of Municipal Engineer's Office; however, many municipalities do not assign a Municipal Engineer. In these cases, maintenance is managed directly by a municipal mayor or a Municipal Planning and Development Coordinator (MPDC).

Barangay Roads

The maintenance of barangay roads was under the responsibility of district/city offices of DPWH up to 1987. However, since 1988, responsibility has been shifted to each local government unit. city and municipal governments are responsible for the maintenance of barangay roads. Examples of the maintenance division of municipal governments are shown below:

	Silang, Cavite	Carmen, Bohol	Antequeva, Bohol	Cabadbaran, Agusan del Norte
Municipal Roads (km)	-	14.0	6.5	25.6
Barangay Roads (km)	-	178.5	83.2	54.6
Responsible Person	Municipal Eng.	Mayor	MPDC	Municipal Eng.
Maintenance Staff	1-C & E Aide 2-Foreman 9-Laborer	1-Foreman 6-Laborer	1-Foreman 6-Laborer	1-Foreman 6-Laborer 2-Carpenter 1-Mason

As shown above, since maintenance organization in municipal governments is not yet well organized, barangay captains are currently involved in maintenance of barangay roads by adopting the Pakyaw contract system.

23.1.3 Maintenance Planning and Programing

District/city offices prepare "Annual Maintenance Work Program and Performance Budget (AMWP/PB)". AMWP/PBs are prepared based on feature inventory data for each work activity. Planned work quantities are computed by multiplying feature inventory by standard work quantity which is determined for each inventory unit. Planned work quantities are converted to number of crew days, equipment days and quantities of materials based on each work activity standard. These are then estimated in costs.

AMWP/PBs are prepared for both routine maintenance and periodic maintenance. About 60% are planned for the former and the rest for the latter.

AMWP/PBs prepared by district/city offices are summarized by regional offices for a Regional AMWP/PB. these are then summarized in the Central Office to develop the National Highway Maintenance budget request. These are adjusted to meet maintenance fund allocation.

An annual maintenance program for routine maintenance is prepared by spreading annual amounts over the 12 months of the year, expressed in crew-days for each work activity.

An annual maintenance program for periodic maintenance is prepared by specifying months for a section to be implemented and expressed in percentage to be accomplished.

23.1.4 General Procedure

1) Inspection and Identification of Maintenance Needs

An Area Engineer, who is responsible for the maintenance of 80 to 150 km of roads, is required to make routine inspections at least once in two (2) weeks. According to answers to a questionnaire prepared by the Study Team, routine inspections are conducted three (3) times a week on average. In addition to the area engineer's inspections, a maintenance foreman, who is assigned to 20 to 30 km of roads, makes inspections almost daily.

Based on inspections, the area engineer prepares a "Maintenance Needed Report".

2) Preparation of Semimonthly Schedule

A schedule meeting is held usually three (3) to four (4) days prior to the beginning of the scheduling period. A schedule meeting is conducted by the district/city Maintenance Engineer and attended by area engineers. A semimonthly schedule is prepared at the district/city office level every half-month, and actual work to be done is scheduled based on the "Maintenance Needed Reports". A semimonthly schedule consists of the following:

- Available man-days

- Activities and locations scheduled
- Workdays, crew sizes and man-days
- Dates scheduled
- Equipment and materials scheduled
- Supervisor
- Remarks about the work
- Alternate work in the case of inclement weather or the lack of some resources

Although each schedule is based on current needs, the annual program does act as a guide in all cases.

3) Work Assignment

Based on the semimonthly schedule, the work assignment is made by an area engineer to the maintenance foremen. Both written and verbal instructions are used. Written instructions are placed on an activity card which authorizes the maintenance foremen to perform one workday of an activity at a location.

4) Directing

Directing, which consists of the actions necessary to produce acceptable work results, is made by a maintenance foreman to maintenance men. "Activity Standards" are prepared in the "Highway Maintenance Management Manual", which are important guides for determining the acceptable work results for a job.

5) Reporting

A reporting system is established based on "Activity Cards". An activity card given to a maintenance foreman is returned to an area engineer filled in with data about equipment, materials and laborers used as well as accomplishments.

All activity cards are collected and compiled at the district/city office and an "Activity Card Summary Worksheet" is prepared, which is then broken down into an "Activity Data Summary" and an "Activity Performance Summary." These reports are forwarded to the regional office and a Regional Summary is prepared, which is then submitted to the Central Office where a National Summary is prepared.

23.1.5 Maintenance Crews

All types of work performed by maintenance field forces are described by activities. Activities are used throughout the management system: work is planned, scheduled, directed, reported and controlled by activity. Therefore, maintenance crews are organized depending on the activities to be done. However, district/city offices organize fixed crews and mobile crews. The former is by nature a laborer crew and is assigned to certain roads (normally 20 to 30 km of roads). Activities are performed by a fixed crew or a mobile crew or a combination of both crews depending on the nature of work.

The following crews are organized in district/city offices:

Fixed Crew	1-Foreman 1-Driver 4 to 6-Maintenance Man
Paved Road Repair Crew	1-Foreman 1-Operator 1-Driver 2 to 6-Maintenance Man
Hauling Crew	1-Foreman 1-Payload Operator 1-Driver
Grader Crew	1-Foreman 1-Grader Operator 1-Road Roller Operator 1-Driver
Bridge Repair Crew	1-Foreman 1-Operator 1-Driver 1-Artisan 5-Laborer

23.1.6 Frequency of Maintenance

The Study Team prepared a questionnaire on road/bridge maintenance and requested district/city offices, provincial engineer's offices and municipal mayor's or engineer's offices in the four (4) pilot provinces to answer the questionnaire.

The frequency of major maintenance activities is summarized based on their answers as shown in Tables 23.1-3 & 4 for routine maintenance activities and in Tables 23.1-5 & 6 for periodic maintenance activities.

TABLE 23.1-3 FREQUENCY OF ROUTINE MAINTENANCE ACTIVITIES: DISTRICT OFFICES

Activities	Cavite		Bohol		Agusan del Norte	
	Actual	Ideal	Actual	Ideal	Actual	Ideal
A. Shoulder Maintenance						
A.1 Shoulder repair	1	2	2	4	(selective)	4
A.2 Replacement of shoulder surface	0.5	1	1	1	(selective)	2
A.3 Reshaping of shoulder surface	1	2	1	2	(selective)	4
A.4 Erosion repair and control	0.5	1	1	2	(selective)	As the need arises
B. Drainage Maintenance						
B.1 Cleaning of sideditches	2	2	3	6		12
B.2 Cleaning of culverts	2	2	2	4		12
C. Roadside Maintenance						
C.1 Vegetation control	2	2	4	4		2
D. Gravel Surface Maintenance						
D.1 Minor repair	1	2	4	As necessary	As the need arises	
D.2 Spot replacement of gravel surface	1	2	4	4		12
D.3 Reshaping of gravel surface	1	2	1.5	3		4
D.4 Regrading of gravel surface	1	2	1.5	3		4
D.5 Hauling and stockpiling of aggregate at site	seldom	As necessary	1	4	As the need arises	
E. Bituminous Surface Maintenance						
E.1 Pothole patching	2	4	1	2	no bituminous pavement	
E.2 Filling cracks	1	1	1	1	do	
E.3 Spot surface sealing	1	1	1	1	do	
F. PCC Pavement Surface Maintenance						
F.1 Filling cracks and joints	1	1	1	1		4
F.2 Pothole patching	1	1	N.A	-		4
F.3 Spot surface treatment with asphalt	1	1	N.A	-		4

Note: Actual: Actual frequency the office is practicing
 Ideal: Ideal frequency the office suggests
 Frequency: Frequency per year

Source: Answers on questionnaire prepared by the Study Team

TABLE 23.1-4 FREQUENCY OF ROUTINE MAINTENANCE ACTIVITIES: PROVINCIAL ENGINEER'S OFFICES

Activities	Cavite		Masbate		Bohol		First		Agusan del Norte	
	Actual	Ideal	Actual	Ideal	Actual	Ideal	Actual	Ideal	Actual	Ideal
A. Shoulder Maintenance										
A.1 Shoulder Repair	-	No answer	2	2	1	1	1	1	1	2
A.2 Replacement of shoulder surface	When needed	1 in 3 yrs	1	1 in 3 yrs	1 in 6 yrs	1	1	1	-	-
A.3 Reshaping of shoulder surface	1	3	6	3	1 in 2 yrs	1	1	1	2	2
A.4 Erosion repair and control	When needed	2	4	2	When needed	5 man-days per km	2	2	2	3
B. Drainage Maintenance										
B.1 Cleaning of sideditches	When needed	4	4	3	1	2	2	2	2	2
B.2 Cleaning of culverts	- do -	2	1	2	1	1	1	1	1	1
C. Roadside Maintenance										
C.1 Vegetation control	Year-round	2	2	2	2	1	2	2	2	2
D. Gravel Surface Maintenance										
D.1 Minor repair	-	Daily	-	-	12	12	12	12	-	-
D.2 Spot replacement of gravel surface	-	do	1	1	1	1	1	1	1-2	1-2
D.3 Reshaping of gravel surface	1	1	1	1	1 in 2 yrs	1	1	1	1	1
D.4 Regrading of gravel surface	1	3	1	3	1 in 2 yrs	1	1	1	1	1
D.5 Hauling and stockpiling of aggregate at site	When needed	1	1	1	1	1	1	1	3	3
E. Bituminous Surface Maintenance										
E.1 Pothole patching	-	1 in 7 yrs	1 in 7 yrs	1 in 5 yrs	Subject to availability	1 in 5 yrs	1 in 5 yrs	1 in 5 yrs	-	-
E.2 Filling cracks	-	1 in 7 yrs	1 in 7 yrs	1 in 5 yrs	Bituminous	1 in 5 yrs	1 in 5 yrs	1 in 5 yrs	-	-
E.3 Spot surface sealing	-	1 in 7 yrs	1 in 7 yrs	1 in 5 yrs	Bituminous	1 in 5 yrs	1 in 5 yrs	1 in 5 yrs	-	-
F. PCC Pavement Surface Maintenance										
F.1 Filling cracks and joints	-	1 in 7 yrs	1 in 7 yrs	1 in 6 yrs	When needed	When needed	When needed	When needed	1	1
F.2 Pothole patching	1	-	-	1 in 3 yrs	1 in 3 yrs	1 in 3 yrs	1 in 3 yrs	1 in 3 yrs	3	3
F.3 Spot surface treatment with asphalt	-	1 in 5 yrs	1 in 5 yrs	1 in 5 yrs	1 in 5 yrs	1 in 5 yrs	1 in 5 yrs	1 in 5 yrs	-	-

Note: Actual: Actual frequency the office is practicing
 Ideal: Ideal frequency the office suggests
 Frequency: Frequency per year

Source: Answers on questionnaire prepared by the Study Team

TABLE 23.1-5 FREQUENCY OF PERIODIC MAINTENANCE ACTIVITIES: DISTRICT OFFICES

Activities	Cavite		Bohol First		Agusan del Norte	
	Actual	Ideal	Actual	Ideal	Actual	Ideal
A. Regraveling of Gravel Road						
ADT < 100	1	2			1	
100 < ADT < 200				4		
200 < ADT < 300			8	2		
300 < ADT			5	1		
B. Resealing of Bituminous Road						
ADT < 200				7		No bitumi- nous road
200 < ADT < 400				6		
400 < ADT				5		
C. AC Overlay on Bituminous Road						
ADT < 400						
ADT > 400						
D. AC Overlay on PCC Road						
ADT < 400						(Not yet done)
ADT > 400						When needed - do -
E. Reconstruction of PCC Road						
ADT < 400						
ADT > 400						
F. Redecking of Temporary Bridge						
Timber bridge				3	2	
Bailey bridge				3	2	

Note: Actual: Actual frequency the office is practicing
Ideal: Ideal frequency the office suggests
Frequency: 8 means one time in 8 years
Source: Answers on questionnaire prepared by the Study Team

TABLE 23-1-6 FREQUENCY OF PERIODIC MAINTENANCE ACTIVITIES: PROVINCIAL ENGINEER'S OFFICES

Activities	Cavite		Masbate		Bohol First		Agusan del Norte	
	Actual	Ideal	Actual	Ideal	Actual	Ideal	Actual	Ideal
A. Regraveling of Gravel Road								78 m ³ /km per year
ADT < 100	5		3	4	8	6	5	per year
100 < ADT < 200	4		3	3	6	5		
200 < ADT < 300	3		2	2	6	5		
300 < ADT	2		2	1.5	6	5		
B. Resealing of Bituminous Road								
ADT < 200			7	5	10	5		
200 < ADT < 400			7	5	10	5		
400 < ADT			6	4	10	5		
C. AC Overlay on Bituminous Road								
ADT < 400			8	5	When needed			
ADT > 400			7	4	- do -			
D. AC Overlay on PCC Road								
ADT < 400					When needed			
ADT > 400					- do -			
E. Reconstruction of PCC Road								
ADT < 400					When needed			
ADT > 400					- do -			
F. Redecking of Temporary Bridge								
Timber bridge	2		2	2	6	3	3	
Bailey bridge	2		2	2	6	3	3	

Note: Actual: Actual frequency the office is practicing
 Ideal: Ideal frequency the office suggests
 Frequency: 2 means one time in 2 years
 Source: Answers on questionnaire prepared by the Study Team

23.1.7 Maintenance Equipment

District/city offices rent maintenance equipment from Regional Equipment Services which are under the control of the Bureau of Equipment. Regional equipment services are responsible for the repair and maintenance of equipment.

Provincial engineer's offices own equipment. The Motor Pool Division in the provincial engineer's office is responsible for the repair and maintenance of equipment.

Most municipality governments do not have equipment. Maintenance activities mostly rely on manual work. Whenever they need equipment, they borrow equipment from district/city offices or provincial engineer's offices, usually on Saturdays or Sundays.

Table 23.1-7 shows the maintenance equipment district/city offices are renting from the Bureau of Equipment and equipment they wish to rent additionally.

Table 23.1-8 shows the maintenance equipment provincial engineer's offices own and equipment they wish to have additionally.

TABLE 23.1-7 MAINTENANCE EQUIPMENT: DISTRICT OFFICES

	District Office							
	Cavite		Masbate		Bohol First		Agusan del Norte	
National Roads	207.3 km		359.7 km		309.1 km		156.2 km	
PCC	30.4		6.2		17.6		89.0	
Bituminous	172.6		72.0		110.9		-	
Gravel/Earth	4.3		281.5		180.6		67.2	
Equipment	Rented from BOE	Additionally Needed	Rented from BOE	Additionally Needed	Rented from BOE	Additionally Needed	Rented from BOE	Additionally Needed
Grader	1(1)		NA	3	3		1	2
Dump Truck	2		NA	4	8(7)		2	3
Payloader	1		NA		1		-	1
Road Roller	-		NA	5	3	3	1	
Excavator	-		-		-		1	
Service Vehicle	12		NA		14(3)		6	
Mighty Mile	-		-		2		-	
Vibromax	1		-		-		-	
Plate Compactor	-		-	7	2(2)	8	-	
Air Compressor	-		-		1(1)		-	
Asphalt Kettle	-		-		1(1)		-	
Water Truck	-		-		-	2	-	

Source: Answers on questionnaire prepared by the Study Team.

- Note:
- Rented from BOE : Number District Office rents from BOE
 - Additionally Needed : Number District Office additionally needs
 - NA : No answer
 - 8(7) : 7 units out of 8 are non-operational

TABLE 23.1-8 MAINTENANCE EQUIPMENT: PROVINCIAL ENGINEER'S OFFICE

Provincial Engineer's Office						
	Cavite	Masbate	Bohol First	Agusan del Norte		
National Roads	429.5 km	117.8 km	922.2 km	232.9 km		
PCC	45.3	2.3	7.1	3.3		
Bituminous	91.5	4.6	11.3	0.2		
Gravel/Earth	292.7	110.9	903.8	229.4		
Equipment	Owned	Addi- tionally Owned	Addi- tionally Owned	Addi- tionally Owned	Addi- tionally Owned	Addi- tionally Owned
		Needed	Needed	Needed	Needed	Needed
Grader	6	3(2)		7(2)	2	2
Dump Truck	10	1	5	14(2)	3	8
Loader	1	1		3	2	
Roller	4	1		8(1)		4
Tractor	2	2		7(3)		1
Service Vehicle				11(2)		2
Mighty Mite	2	2		1		
Asphalt Kettle		2			1	
As. Distributor	2					
Water Truck						1
Back hoe						2
Prime Mover					1	1
Stake Truck					1	
Concrete Mixer					3	
Portable Rock Crusher					1	

Source: Answers on questionnaire prepared by the Study Team

Note : - Owned : Number owned by Office

- Additionally Needed : Number additionally needed by Office

- 3(2) : 2 units out of 3 are non-operational

Table 23.1-9 shows the results of the nationwide equipment status survey conducted by the Bureau of Equipment in May 1988. The condition of the equipment is classified into seven (7) as follows:

- A : Idle "Ready to run"
- B : Rented
- CN : Under minor repair
- Cj : Under major repair
- DN : Awaiting minor repair
- Dj : Awaiting major repair
- E : Unserviceable

In the Table, CN and DN are combined, as are Cj and Dj.

TABLE 23.1-9 NATIONWIDE MAJOR EQUIPMENT STATUS SURVEY RESULTS

(as of MAY 1988)

Equipment/ Plant	Equipment Status						Total
	Idle	Rented	Under/Awaiting Minor Repair	Under/Awaiting Major Repair	Un- serviceable		
Grader	86	201	105	214	275	881	
Dump Truck	112	313	169	493	786	1,873	
Loader	35	94	97	184	194	604	
Roller	163	87	109	311	309	979	
Service Vehicle (Jeep, pickup)	155	1,509	251	542	751	3,208	
Tractor	38	25	58	146	252	519	
Mighty Mite	29	51	41	116	96	333	
Asphalt Kettle	41	17	16	19	62	155	
Asphalt Distributor	33	2	2	7	2	48	
Water Truck	12	11	9	43	28	103	
Plate Compactor	76	8	30	56	64	234	
Air Compressor	139	27	73	69	103	411	
Truck Mtd. Crane	55	32	12	53	58	210	
Stake Truck	12	42	8	13	29	104	
Asphalt Plant	12	2	4	7	4	29	
Potable Crushing Plant	33	4	3	3	2	46	
Washing/Crushing Plant	10	1	7	12	20	50	
Rock Crusher	7	6	7	19	17	56	

Source: Bureau of Equipment

23.1.8 Maintenance Problems

Maintenance problems raised by officials of implementing agencies are summarized in Table 23.1-10. Common problems the implementing agencies face are:

- Insufficient maintenance funds
- Delays in release of funds
- Poor equipment condition, frequent breakdown of equipment, delay in repair of equipment and insufficient number of equipment
- Some materials are not available

TABLE 23.1-10 MAINTENANCE PROBLEMS RAISED BY MAINTENANCE IMPLEMENTING AGENCIES

	District/City Offices, DPWH (National Roads)	Provincial Engineer's Offices (Provincial Roads)	Municipal Mayor/Engineer's Office (Barangay Roads)
Maintenance Fund	<ul style="list-style-type: none"> Not enough. Present basic cost of ₱17,104.00 should be increased to ₱22,481.00 (Cavite), or ₱25,000.00 (Masbate) or ₱20,000.00 (Bohol). Release of funds is scheduled to be the beginning of every quarter, but usually delayed. Funds should be released in the first week of every quarter. 	<ul style="list-style-type: none"> Not enough. Present fund of ₱12,828/km should be increased to ₱17,000/km (Cavite), ₱20,000.00/km (Masbate) and ₱15,000.00/km (Agusan del Norte). Release of national aid funds is always delayed. 	<ul style="list-style-type: none"> Not enough. Present national aid funds of ₱6,841.00/km should be increased to ₱10,000.00 - ₱15,000.00/km. Release of national aid funds is always delayed.
Equipment	<ul style="list-style-type: none"> Frequent breakdown of most equipment is always experienced. Area equipment service cannot repair equipment immediately due to lack of spare parts. Number of equipment is not sufficient. Most equipment is not in good condition. 	<ul style="list-style-type: none"> Most equipment is in poor condition due to old age. Spare parts are difficult to procure due to lack of funds. 	<ul style="list-style-type: none"> No equipment. Borrowing equipment from district office or provincial engineer's office. Even maintenance tools are not sufficient.
Maintenance Engineers and Laborers	<ul style="list-style-type: none"> No problem 	<ul style="list-style-type: none"> No problem 	<ul style="list-style-type: none"> Due to insufficient budget, regular maintenance engineers and equipment operators cannot be employed. No organization yet.
Materials	<ul style="list-style-type: none"> Some materials, especially asphalt, aggregate and bridge materials, are not always available. 	<ul style="list-style-type: none"> Some materials, particularly base course materials, are not always available. 	<ul style="list-style-type: none"> Some materials, particularly gravel, are not always available or cannot be procured due to lack of funds.
Others	<ul style="list-style-type: none"> Some bituminous surface roads are beyond economically maintainable condition. Service vehicles for inspection are not always available due to breakdown. 		

Source: Answers on questionnaire prepared by the Study Team

23.2 OBSERVATION ON MAINTENANCE

The Study Team inspected various class of roads with different type of pavement in the four (4) pilot provinces, mainly focusing on maintenance condition.

TABLE 23.2-1 NUMBER OF SECTIONS INSPECTED

Pavement Type	Road Class		
	National Road	Provincial Road	Barangay Road
PCC	2	6	-
Bituminous	4	5	-
Gravel	15	20	8

Deficiencies in maintenance as well as design and quality of work observed during the inspections are summarized in Table 23.2-2. Figures in the Table show % of section observed deficiencies. For example, 15 sections of gravel surfaced national roads were inspected, then 60% of section (or 9 sections) have deficiency of uneven surface with a lot of potholes.

TABLE 23.2-2 OBSERVED DEFICIENCIES

Deficiencies Observed	% of Section Observed Deficiency		
	National Road	Provincial Road	Barangay Road
A. PCC Pavement			
1. Lack of joint and crack sealing	50	67	-
2. Eroded shoulders	50	50	-
3. Improper or inverted cross slope of shoulder	50	50	-
4. Loose base/subbase, particularly	50	50	-
5. Low quality of slab concrete	50	83	-

TABLE 23.2-2 (Continued)

TABLE 23.2-2 (Continued)

Deficiencies Observed	% of Section Observed Deficiency		
	National Road	Provincial Road	Barangay Road
B. Bituminous Pavement			
1. A lot of potholes without repaired	75	80	-
2. Deterioration progressed and condition is similar to gravel road	25	60	-
3. Loose base/subbase, particularly shoulder side	50	60	-
4. No sideditches provided. Shoulder side pavement damaged	25	80	-
5. DBST with structural problem	20	-	-
6. Localized alligator cracks	75	80	-
C. Graved Roads			
1. Uneven surface with a lot of potholes	60	70	75
2. Lack of proper cross slope, thus surface water drain inadequate	80	80	88
3. Poor surface coarse material, become muddy and impassable after rain	40	65	75
4. Boulders used, but fine materials not used to fill and cover boulders, thus rideability is very poor.	27	50	50
5. Surface course materials scoured at steep gradient section	20	60	63
6. Insufficient drainage at sag section	20	35	38
7. Insufficient drainage facilities	40	65	75
8. Grass Growing shoulders, hindering surface drain and narrowing lane width	40	60	75
9. Became almost earth road and impassable after rain	20	45	75
10. Insufficient rolling of surface course	40	45	63
11. Cut section or depressed section with no sideditches thus raw water runs on the road surface	7	25	25

Source : Study Team

23.3 RECOMMENDATION ON MAINTENANCE SYSTEM

The on-going Philippine Highway Maintenance System was adopted on a national basis in 1984. The system is in its fourth year of operation. The system can be described as a "maintenance-activity oriented system", whereas the previous system was a "maintenance-crew oriented system". Since the present system can cope with current maintenance needs flexibly, limited maintenance funds can be utilized most efficiently and effectively. It is recommended that the present system be maintained with occasional modifications and revisions to make it more efficient and effective.

1) Maintenance Funds

All agencies concerned with road/bridge maintenance pointed out the problem of insufficient maintenance funds. From the viewpoint of the national budget, maintenance funds will not be easily increased. However, the basic cost per EMK should be reviewed at least annually, and a reasonable amount for basic costs should be determined based on maintenance needs and the budget.

The Medium-term Philippine Development Plan 1987-1992 expresses the Government's one of the policies and strategies on highway maintenance as follows: "Road user charges will also be reviewed and a better system of levying appropriate levels of motor vehicle taxation will be instituted to reflect real road maintenance costs."

Revival of the "Highway Special Fund", which was abolished in 1975, should be considered as one way to increase maintenance funds.

Another problem raised by agencies concerned is the delayed release of maintenance funds. The Government should make every effort to release funds as scheduled. It is also recommended that the present system to release an equal amount of funds for each quarter be restudied. Release of a bigger amount of funds just before and during the rainy season may more suitably meet maintenance needs.

2) Assessment of Road Surface Condition

In order to estimate national level maintenance needs as well as to evaluate effects of maintenance efforts, a nationwide assessment of road surface conditions should be carried out regularly. These data will be useful not only for maintenance purposes but also for planning and identification of rehabilitation and improvement projects. Road sections which are beyond economically maintainable conditions should be recommended for rehabilitation and/or improvement.

3) Prioritization Criteria for Maintenance Activities

It is quite often observed that vegetation control work is being done along a road section. However, minor repair of the road surface and/or side ditch clearing of the same section, which can be done manually, is not being carried out. Clear prioritization

criteria for maintenance activities should be established. It is quite important to decide what should be done first in order to utilize the limited maintenance funds effectively. Routine inspection should be done focusing on priority maintenance activities. The semimonthly schedule should be also prepared in accordance with the prioritization criteria.

4) Maintenance Equipment

Lack of equipment and frequent breakdown of equipment are common problems of the agencies concerned. On the other hand, there is much equipment available which is just idle in regional/area equipment services as revealed by the equipment status report prepared by the Bureau of Equipment (refer to Table 23.1-9). Closer coordination is needed between regional/area equipment services and district/city offices should be made, so that available equipment is more efficiently utilized.

There is also much equipment under or awaiting minor repair. Repairs of this equipment are reported delayed due to lack of spare parts. A system to supply spare parts constantly, and management of these should be established.

A thorough study will be needed to determine the optimum solution for improvement of equipment status on the following:

- Necessity of improvement/rehabilitation of base and area shops including procurement of spare parts, tools and machines for repair
- Equipment required for major repair which can be economically repaired
- What should be done with non-operational equipment
- Necessity of procurement of additional equipment

5) Community Level Participation in Maintenance

Residents along a road are more concerned about the condition of the road. They can actively participate in maintenance in the following aspects:

Monitoring -- A system should be established for monitoring road conditions by residents, and a representative selected from residents should report any deficiency or defects of road conditions to the respective agency.

Maintenance of barangay roads -- A system should be established for maintenance of barangay roads aimed at the active participation of barangay people, thus creating continuous jobs for them.

JICA