

## 22.2 PROJECT COST ESTIMATE

### 22.2.1 Unit Cost

As mentioned in Chapter 21.2, the unit cost of each construction item was established by unit cost analysis based on the market price survey findings. Informations from contractors and latest unit costs similar projects were referred. Unit costs of major construction items are presented in Table 21.2-4. The unit cost analysis of some major construction items are reported in Appendix 21-1.

### 22.2.2 Construction Cost

Table 22.2-1 summarizes the construction costs for pavement rehabilitation and drainage improvement works under the short/medium terms. Table 22.2-2 shows the costs break-down by types of works.

The detailed calculation of the quantities of major items and construction costs are reported in Appendix 22-2 and 22-3, respectively.

Total construction cost in the short term was estimated to be 817.68 million pesos, of which 541.69 million pesos or 66.2% are for the north study section and 275.99 million pesos or 33.8% for the south.

Total construction cost in the medium term was roughly estimated to be 764.80 million pesos, of which 318.37 million pesos or 41.6% for the north study section and 446.43 million pesos or 58.4% for the south study section.

As for types of rehabilitation works under the short term, two-lane PCC reconstruction requires 366.04 million pesos, followed by one-lane PCC reconstruction of 254.61 million pesos, and AC overlay of 95.72 million. The requirement of drainage improvement costs 101.31 million pesos.

### 22.2.3 Consultancy Cost

The consultancy cost consists of detailed engineering cost and construction supervision cost. The former usually amounts from 3% to 5% of construction cost. The average of 4% was adopted in the study.

The construction supervision cost which amounts to 5% to 9% of construction cost was estimated at 6%, taking into consideration the nature of works.

### 22.2.4 Project Cost

Project cost includes construction cost and consultancy cost. Since the pavement rehabilitation and improvement of drainage works were planned to be constructed within the existing right-of-way, no land acquisition were required.

As shown in Table 22.2-3, total project cost estimated is 899.45 million pesos for the short term works, of which 595.86 million pesos for the north study section and 303.59 million pesos for the south.

TABLE 22.2-1 SUMMARY OF CONSTRUCTION COST FOR PAVEMENT  
REHABILITATION DRAINAGE IMPROVEMENT BY TERMS

Unit: Million Pesos

Segment		Segment Length (Km)	Short Term (1987-1992)	Medium Term (1993-1998)	Total (1987-1998)
<b>North Study Section</b>					
Segment	N-1	46	139.29	62.34	201.63
	N-2	35	86.61	64.84	151.45
	N-3	42	46.66	135.36	182.02
	N-4	38	129.53	29.21	158.74
	N-5	39	139.60	26.62	166.22
Sub-Total		200	541.69	318.37	860.06
<b>South Study Section</b>					
Segment	S-1	42	42.22	138.39	180.61
	S-2	54	35.58	168.66	204.24
	S-3	46	101.53	85.08	186.61
	S-4	39	96.66	54.30	150.96
Sub-Total		181	275.99	446.43	722.42
<b>T O T A L</b>		<b>381</b>	<b>817.68</b>	<b>764.80</b>	<b>1,582.48</b>

Project cost for the medium term works was estimated to be 841.28 million pesos which is almost same amount or 93.5% of the short term. Cost for the north is 350.20 million pesos and for the south 491.08 million pesos.

TABLE 22.2-2 SUMMARY OF CONSTRUCTION COST FOR PAVEMENT REHABILITATION/DRAINAGE IMPROVEMENT BY TYPE OF WORKS

(Unit: Million P)

Segment	Segment Length (km)	Short-Term										Medium-Term				TOTAL					
		Pavement Rehabilitation					Drainage Improvement					Pavement Rehabilitation Total	Drainage Improvement	Pavement Rehabilitation	Drainage Improvement	Pavement Rehabilitation Total	Drainage Improvement	Pavement Rehabilitation	Drainage Improvement	Pavement Rehabilitation Total	Drainage Improvement
		2-Lane PCC Reconstruction	1-Lane PCC Reconstruction (Manila Bound)	1-Lane PCC Reconstruction (Opposite Lane)	2-Lane AC Overlay	Sub-Total	Treatment of Weak Subgrade	Side Ditch	Sub-Surface Drainage	Sub-Total	Total										
Segment N - 1	46	41.76	49.47	28.43	9.58	129.24	1.30	8.75	-	10.05	139.29	47.66	14.68	176.90	24.73	201.53					
Segment N - 2	35	54.17	5.64	5.19	17.28	82.28	-	4.33	-	4.33	86.61	50.32	14.52	132.60	18.85	151.45					
Segment N - 3	42	9.50	29.02	3.40	-	41.92	-	4.74	-	4.74	46.66	117.63	17.73	159.55	22.47	182.02					
Segment N - 4	38	21.99	33.96	25.34	31.02	112.31	-	17.22	-	17.22	129.53	27.60	1.61	139.91	18.83	158.74					
Segment N - 5	39	48.89	23.02	13.38	32.84	118.13	-	19.81	1.66	21.47	139.60	25.52	1.10	143.65	22.57	166.22					
Sub-Total	200	176.31	141.11	75.74	90.72	483.88	1.30	54.85	1.66	57.81	541.69	268.73	49.64	752.61	107.45	860.06					
Segment S - 1	42	19.10	13.58	2.86	-	35.54	-	6.68	-	6.68	42.22	122.42	15.97	157.96	22.65	180.61					
Segment S - 2	54	21.92	3.76	1.42	3.10	30.20	-	5.38	-	5.38	35.58	144.93	23.73	175.13	29.11	204.24					
Segment S - 3	46	74.88	5.92	1.82	-	82.62	-	13.15	5.76	18.91	101.53	73.78	11.30	156.40	30.21	186.61					
Segment S - 4	39	73.83	4.31	4.09	1.90	84.13	-	12.53	-	12.53	96.66	46.75	7.55	130.88	20.08	150.95					
Sub-Total	181	189.73	27.57	10.19	5.00	232.49	-	37.74	5.76	43.50	275.99	387.88	58.55	620.37	102.05	722.42					
TOTAL	381	366.04	168.68	85.93	95.72	716.37	1.30	92.59	7.42	101.31	817.68	656.61	108.19	1,372.98	209.50	1,582.48					

TABLE 22.2.3 SUMMARY OF PROJECT COST

Segment	Segment Length (Km)	Short Term (1987-1992)		Medium Term (1993-1998)		Total
		Construction	Consultancy	Construction	Consultancy	
<b>North Study Section</b>						
Segment N-1	46	139.29	13.92	62.34	6.23	221.79
N-2	35	86.61	8.66	64.84	6.48	166.59
N-3	42	46.66	4.67	135.36	13.54	200.23
N-4	38	129.53	12.95	29.21	2.92	174.61
N-5	39	139.60	13.96	26.62	2.66	182.84
Sub-Total	200	541.69	54.17	318.37	31.83	946.06
<b>South Study Section</b>						
Segment S-1	42	42.22	4.22	138.39	13.84	198.67
S-2	54	35.58	3.56	168.66	16.87	224.67
S-3	46	101.53	10.15	85.08	8.51	205.27
S-4	39	96.66	9.67	54.30	5.43	166.06
Sub-Total	181	275.99	27.60	446.43	44.65	794.67
<b>T O T A L</b>	<b>381</b>	<b>817.68</b>	<b>81.77</b>	<b>764.80</b>	<b>76.48</b>	<b>1,740.73</b>

## 22.3 ECONOMIC EVALUATION

### 22.3.1 General

#### (1) Quantified Benefit

Pavement benefits accrue primarily from direct reductions in transportation costs of the road users. These include vehicle operation cost, travel time, accidents discomfort. As agency costs, maintenance cost saving and salvage (or residual) value are also considered.

Among those, quantified are:

- Road Traffic cost
  - running cost
  - fixed cost
  - time cost
- Maintenance Cost
- Salvage Value
  - Salvage value was considered in estimating the total discounted cost of construction/rehabilitation cost.

#### (2) Assumptions

##### Analysis Period and Discount Rate

Construction Year	: 1989
Opening Year	: middle of 1989
Analysis Period	: 25 years (1989-2013)
Discount Rate	: 15% p. a.

##### Pavement Serviceability

The serviceability performance was estimated based on the basic design equations recommended in AASHTO Guide 1986.

The initial serviceability index of new pavements was assumed to be 4.5 for PCC pavement and 4.2 for AC overlay. The terminal serviceability index of 2.5 was adopted for both types. When serviceability will reach to 2.5 after application of predicted traffic loads, the second rehabilitation will be implemented. In such a way, the rehabilitations will be repeated for the whole analysis period.

For the case without the project implementation, the average serviceability of 2.0 was assumed to be maintained provided that the necessary maintenance work will be performed.

### Investment Cost

The following economic costs were assumed in the cost-benefit analysis in general, but costs showed in Table 22.2-3 were used.

Construction Cost	100%
- Tax	- 15%
+ Detailed design cost	+ 4%
+ Construction supervision cost	+ 6%
<u>Economic Cost</u>	<u>95%</u>

#### 22.3.2 Road Traffic Cost

##### (1) Road Traffic Cost

The road traffic cost is composed of the following:

- Running cost : That portion of the vehicle operating cost which is calculated in units of distance (km) travelled.
- Fixed Cost : That portion of the vehicle operating cost which is calculated in units of time travelled.
- Passenger time Cost : *Passenger and car driver's time value.*

The basic road traffic cost was obtained from the Planning Service of the Department of Public Works and Highways (DPWH) which is shown in Table 22.3-1.

TABLE 22.3-1 BASIC ROAD TRAFFIC COST; ₱/KM

Surface Condition	Serviceability (RRI)	Car/Van	Jeepney	Tricycle	Bus	Truck
Good	4 or more	1.271	1.298	0.240	3.813	2.909
Fair	3	1.519	1.541	0.275	4.798	3.727
Bad	2	1.852	1.997	0.408	5.942	4.600
Very Bad	1 or less	2.184	2.452	0.690	7.407	5.582

Note: excluding tax costs

The road surface conditions were correlated with the rehabilitation requirement index (RRI) which are discussed in Chapter 13.

The cost analysis was made in accordance with the procedures outlined in DPWH Highway Planning Manual. The conventional economic indicators such as the present net value (NPV), Benefit cost ratio (B/C) and internal rate of return (IRR). The outputs of analysis of these economic indicators are reported in Appendix 22-3 for segments and stages, and in Appendix 22-4 for the North Study Section and the South.

## (2) Extra Length and Time

Aside from these conventional economic indicators, dl and dt values were analyzed. The dl-system simulates the extra running costs incurred by vehicles operating on roads with substandard surface conditions. Such extra costs are transformed into imaginary road lengths called dl, which actually expresses the extra running costs. The dt-system similarly simulates travel times on various road conditions. The dt value expresses operating time.

The dl value and operating speeds is obtained from the same office are shown in Table 22.3-2.

TABLE 22.3-2 dl-VALUES AND OPERATING SPEEDS

	Surface Condition	Service-ability (RRI)	Car/Van/	Jeep-ney	Tri-cycle	Bus	Truck
dl (km/actual km)	Good	4 or more	0	0	0	0	0
	Fair	3	0.2	0.2	0.2	0.3	0.3
	Bad	2	0.4	0.4	0.4	0.6	0.6
	Very Bad	1 or less	0.6	0.6	0.6	0.9	0.9
operating speed (km/hr.)	Good	4 or more	70	70	40	60	60
	Fair	3	60	60	35	50	50
	Bad	2	40	40	20	40	40
	Very Bad	1 or less	30	30	10	30	30

The outputs of analysis on dl and dt are also shown in Appendix 22-3 and 22-4.

### 22.3.3 Maintenance Cost

Saving in maintenance cost is the benefit derived from the pavement rehabilitation project. Difference in maintenance costs between without and with projects were estimated.

The maintenance cost for each maintenance activity were analyzed as shown in Table 22.3-3. Assuming the times of maintenance activities required in one year, the annual road maintenance costs were estimated as summarized in Table 22.3-4.

**TABLE 22.3-3 MAINTENANCE COST PER ACTIVITY**

	Unit Costs
1. Vegetable Control	175 ₱/km
2. Cleaning and Reshaping Ditches	852 ₱/km
3. Regrading Unpaved	1,692 ₱/km
4. Reshaping Unpaved	2,359 ₱/km
5. Unpaved Repair	37,186 ₱/km
6. Spot Replacement Unpaved	570 ₱/3
7. Pothole Patching	187 ₱/2
8. Seal Coat	34 ₱/2
9. Patching with Asphalt	1,670 ₱/3
10. Concrete Replacement	2,517 ₱/3
11. Concrete Cracking and Joint Sealing	15 ₱/

**TABLE 22.3-4 ANNUAL ROAD MAINTENANCE COSTS**

	Pavement Surface Type	Annual Road <sup>1)</sup> Maintenance Cost (₱/m)
"Without" Case	Concrete	44
"With" Case	Concrete Asphalt	28.5 35

Note: Costs excluding tax



#### 22.3.4 Economic Evaluation

Economic indications by segments including extra travel lengths and times are summarized in Table 22.3-5. The outputs of detailed analysis by an electric computer are reported in Appendix 22-4.

Economic evaluations are summarized as follows.

- Quantifiable benefits are mainly derived from saving in road traffic costs. Saving in maintenance costs are negligible.
- Among five (5) segments of the North Study Sections, Segment N-1 (Sta. Rita-Gapan) shows the highest indications, IRR of 120.3 and B/C of 5.43 followed by N-2 (Gapan-Cabanatuan), N-3 (Cabanatuan-San Jose) and N-4 (San Jose-Dalton). The lowest figures were obtained from N-5 (Dalton-Aritao) which are IRR of 38.1 and B/C of 2.31.
- Among four (4) segments of the South Study Section, Segment S-1 has the highest indicators, IRR of 134.3 and B/C of 7.19 which is highest among nine (9) segments of both Study Sections, followed by S-2 (Tiaong-Pagbilao) and S-3 (Pagbilao-Plaridel). S-4 shows the lowest, IRR of 34.9% and B/C of 2.08 which is the lowest among nine (9) segments.
- The economic indicators of the North Section, as a whole shows the remarkably high viability of the project, IRR of 70.8% B/C of 3.72 and NPV of 1376.80 million pesos against the initial construction cost of 541.69 million pesos.
- The economic indicators of the South Study Section, as a whole, shows the considerably high viability of the project, IRR of 54.4%, B/C of 3.23 and NPV of 517.59 million pesos against the initial construction cost of 275.99 million pesos.
- The economic indicators of all study sections, as a whole, shows the remarkably high viability of the project, IRR of 65.3%, B/C of 3.57 and NPV of 1894.39 million pesos against the initial construction cost of 817.68 million pesos.
- It is concluded that the proposed rehabilitation works including pavement rehabilitation, provision of side ditch and installation of subsurface drainage are highly feasible from the economic point of views.

TABLE 22.3-5 SUMMARY OF ECONOMIC EVALUATION BY SEGMENTS  
(Stage 1 and Stage 2)

Segment	Initial Cost (MP)		Benefit (MP)			Economic Indicator				
	Financial Cost	Economic Cost	Saving in Maintenance Cost:	Saving in Traffic Cost	Total	NPV (MP)	B/C	IRR	dI (km)	dt (min)
Segment N-1 l = 46 km.	139.29	130.13	10.89	3441.07	3451.95	603.07	5.43	120.3	19.60	29.10
Segment N - 2 l = 35 km.	86.61	80.06	6.28	1860.56	1866.84	335.88	5.02	111.8	8.11	12.88
Segment N - 3 l = 42 km.	46.66	43.84	3.75	729.60	1733.55	111.01	5.61	68.2	7.30	11.47
Segment N - 4 l = 39 km.	129.53	117.55	9.85	1577.70	1587.56	163.35	2.38	39.5	18.18	24.62
Segment N - 5 l = 39 km.	139.60	129.05	9.88	1370.83	1580.70	163.47	2.31	38.1	15.76	21.60
Sub-Total	541.69	502.63	40.65	8779.75	8820.40	1376.80	3.72	70.8	68.95	99.73
Segment S - 1 l = 42 km.	42.22	39.73	3.04	1168.04	1171.07	208.84	7.19	134.3	4.91	7.48
Segment S - 2 l = 54 km.	35.58	33.24	2.67	578.07	580.75	95.35	4.09	78.5	3.66	5.42
Segment S - 3 l = 46 km.	101.53	95.55	7.77	880.70	888.47	127.12	2.44	41.3	9.74	13.08
Segment S - 4 l = 39 km.	96.66	90.74	7.80	710.30	718.10	86.28	2.08	34.9	10.28	13.64
Sub-Total	275.99	259.26	21.29	3337.11	3358.39	517.59	3.23	54.4	28.78	39.62
T O T A L	817.68	761.89	61.94	12,116.85	12,178.79	1,894.39	3.57	65.3	97.73	139.34

✓ CONSTRUCTION COST ONLY

## 22.4 ENVIRONMENTAL ASSESSMENT

The Supplement to Official Gazette, Volume 78, No. 25, issued by National Environmental Protection Council (NEPC) June 21, 1982 proclaims certain areas and types of projects as environmentally critical and within the scope of the environmental impact statement (EIS) system.

According to this Official Gazette, infrastructure projects are categorized as environmental critical projects. Among infrastructure projects, major roads and bridges are defined in the Official Circular No. 3 by the Ministry of Public Works and Highway, August 1984, as follows:

### Major Road and Bridges

This shall refer to the construction of all national and provincial roads and bridges and any significant extension or improvement thereof which will:

- a) Traverse any highly developed urban area(s);
- b) Affect the hydrology of the traversed area(s);
- c) Substantially increase or impede traffic flow.

### Environmental Compliance Certificate

According to the Official Gazette mentioned above, the procedure to obtain an Environmental Compliance Certificate (ECC) are as follows.

The project proponent initially determines whether or not a project falls within the EIS System. In case of uncertainty, the project proponent shall request the assistance of the lead agency to make such determination;

In case of negative determination the project proponent may proceed with the project;

In case of a positive determination, the project proponent shall be required to file a Project Description with the NEPC in the form prescribed for this purposes;

### Environmental Impact Evaluation

Taking into consideration the nature and objectives of the project, the project may be considered not to fall within the EIS system. The environmental impact statement (EIS) of the project may, therefore, not be required.

However, Table 22.4-1 was prepared in accordance with the official format of EIS.

The favorable environmental impacts from the project were assessed, though there might be adverse impacts during construction, e.g. traffic flow disturbance.

TABLE 22.4-1 PAVEMENT REHABILITATION PROJECT ENVIRONMENTAL IMPACT SCHEDULE

Evaluation Items	During Construction		After Improvement		Remarks
	Favorable Impact	Adverse Impact	Favorable Impact	Adverse Impact	
					Favorable Impact ⊙ High ○ Medium Δ Minor - No Adverse Impact xxx High xx Medium x Minor - No
<b>1. Natural Environment</b>					
1.1 Land	-	-	○	-	Land values may increase...
1.2 Water	-	-	-	-	No change is expected since drainage system are proposed
1.3 Atmosphere		x	○		Air pollution may be decreased by improving road surface although number of traffic may increase. During construction, minor affect may be expected.
1.4 Terrestrial Life	-	-	-	-	
1.5 Aquatic Life	-	-	-	-	
1.6 Ecological Balance	-	-	-	-	
<b>2. Socio-Economic Conditions</b>					
2.1 Demographic	-	-	Δ	-	Population in local and rural areas may increase. Migration from urban to rural areas may be expected.
2.2 Lifestyle	-	-	Δ	-	Effect on cultural communities near/within proposed area may be expected.
2.3 Amenities	-	-	○	-	Quality of residential, cultural and spiritual community may be improved.
2.4 Cultural Minorities	-	-	-	-	
2.5 Historical Sites	-	-	-	-	
2.6 Health	-	-	-	-	Comfortable/safe transportation
2.7 Economics	-	x	⊙	-	Travel cost will remarkably decreased Additional economic activities may be encouraged
<b>3. Traffic</b>					
3.1 Traffic Flow	-	xx	⊙	-	During construction, traffic flow may be a little disturbed. Past/comfortable/safe transportation can be provided
3.2 Traffic Volume	-	-	⊙	-	Traffic volume may increase, which is very favorable impacts to road users, but adverse impacts to resident along project site may/may not be arised.



## CHAPTER 23 PROJECT IMPLEMENTATION

### 23.1 NATIONAL DEVELOPMENT POLICIES

The Medium-Term Philippine Development Plan for 1987-1992 states the policies on infrastructures as follows.

Government infrastructure activities shall support the objectives of employment generation and poverty alleviation, particularly in the rural area.

Greater emphasis shall be given to the maintenance of existing and about to be completed infrastructure facilities in order to maximize the utilize them more effectively and to avoid costly rebuilding. Likewise, on-going projects shall be given priority in funding to realize the benefits arising from their early completion. To the extent feasible, rehabilitation and restoration, as well as improvement, shall take precedence over replacement and new construction.

The Plan points out specifically the strategies, as follows'

Priority shall be given to the maintenance of existing and soon-to-be completed infrastructure to prolong their useful lives, reduce costs to the users, and postpone huge investments for their major rehabilitation or replacement.

Rehabilitation and restoration, as well as improvement and upgrading, of existing facilities shall take precedence over replacement and new construction as low-cost measures to provide acceptable levels of infrastructure.

### 23.2 PROJECT IMPLEMENTATION STRATEGY

Rehabilitation and improvement of major roads should be selectively carried out particularly in sections that can no longer economically service the present and immediate future traffic volume and where transport cost are excessively high so as to restrain production and marketing.

It was confirmed through the discussions with the representatives of DPWH that this project, road function improvement and pavement rehabilitation works including drainage system improvements is in line with the stress on the development policies envisioned in the Plan and rationalized by technical assessment and economic evaluation in the Study. The implementation of the project at the earliest possible time was, therefore, favorably proposed.

#### Prioritization of Segments

Table 23.2-1 summarizes the economic evaluation by segments on road function improvements, pavement rehabilitation (including drainage improvement) and for both as a whole.

TABLE 23.2-1 SUMMARY OF ECONOMIC EVALUATION

S e g m e n t s	Length (Km)	Road Function Improvement		Road Rehabilitation		Road Function/ Pavement Rehabilitation		Implementation Priority			
		IRR (%)	B/C	IRR (%)	B/C	IRR (%)	B/C				
N-1 (Sta. Rita-Gapan)	46	23.2	1.8	171.5	5.43	120.3	603.1	105.6	4.39	645.5	1
N-2 (Gapan-Cabanatuan)	35	53.1	4.6	295.8	5.02	111.8	335.8	76.1	4.78	631.7	1
N-3 (Cabanatuan-San Jose)	42	18.5	1.3	7.9	3.61	68.2	110.0	41.3	2.77	118.9	3
N-4 (San Jose-Dalton)	38	-	-	-	2.38	39.3	163.4	39.3	2.38	163.4	3
N-5 (Dalton-Aritao)	39	-	-	-	2.31	38.1	163.5	38.1	2.31	163.5	2
North Study Section	200	38.6	3.1	346.1	3.72	70.8	1,376.8	61.7	3.58	1,722.9	
S-1 (Calamba-Tiaong)	42	39.8	5.6	253.1	7.19	134.3	208.8	56.8	6.17	461.9	2
S-2 (Tiaong-Pagbilao)	54	- x	-	-	4.09	78.5	95.4	78.4	4.09	95.4	3
S-3 (Pagbilao-Plaridel)	46	-	-	-	2.44	41.3	127.1	41.3	2.44	127.1	1
S-4 (Plaridel-Calaug)	39	- x	-	-	2.08	34.9	86.3	34.9	2.08	86.3	3
South Study Section	181	39.8	5.6	253.1	3.23	54.4	517.6	49.9	3.67	770.7	
Whole Study Section	381	39.1	3.8	599.2	3.57	65.3	1,894.4	57.2	3.61	2,493.5	

X NOTE: Benefits from improvement of intersections in rural area and paving of shoulders and sidewalks within ROW were not considered because of no negligible amounts.

When considered both improvements and rehabilitation as a whole, the sections stand in order of high internal rate of returns (IRR) as follows:

IRR more than 60%; N-1, S-2, N-2  
IRR between 40 to 60%, S-1, N-3, S-3  
IRR less than 40%, N-4, N-5, S-4

As discussed in Chapter 19, the values of IRR do not necessarily specify the order of implementation. The major factors to be considered in implementation priority is severity of problems/deteriorations.

For road function problems, the length of sections, of which level of service is lower than the improvement level was taken into consideration.

On the other hand, the sections length with totally damaged pavements (considered as IRR less than 1.5) were given the precedences over the total length proposed for pavement rehabilitation.

Finally, the implementation priority for each segment was assigned, as follows.

Priority 1: N-1, N-2, S-3  
Priority 2: N-5, S-1  
Priority 3: N-3, N-4, S-2, S-4

The concrete plans were contrived and concluded as follows.

#### Implementation Schedule for Works under Short Term (1987-1992)

- Financial Arrangement for Implementation

Earliest possible time, preferably July 1987 to March 1988 (9 months)

- Detailed Engineering

April 1988 to March 1989 (12 months) for the design of the high and second priority segments, and October 1989 to June 1990 (9 months) for the third priority segments.

The detailed design of some road function improvements under the medium term which require the urgent implementation is included in short term.

- Prequalification, Tendering and Award of Contractor

Prequalification of prospective contractor for the high priority segments will be performed 3 months after the commencement of design works. Then, tendering and award of contractor will be finished within 9 months.

The second and third priority segments will follow the same procedures.



- Construction

The construction for the high priority segments including road function and pavement rehabilitation work will be commenced on April 1989, with the construction period of 24 months and the second priority segments on January 1990 with 18 months and the third priority on January 1991 with 24 months.

- Target Date for the Project Completion

December 1992, the period of the short term.

Implementation Schedule for Works under Medium Term (1993-1998)

Financial Arrangement	:	1992
Detailed Design	:	1993 to 1994
Construction	:	1994 to 1998

Implementation Schedule for Works under Long Term (1999-2010)

Feasibility Study	:	1997 to 1998
Financial Arrangement	:	1999
Detailed Engineering	:	2000 to 2001
Construction	:	2001 to 2010

## 23.3 FUND REQUIREMENTS

### (1) Construction Costs for Short and Medium Terms Works

The construction costs estimated for the short and medium terms works are shown in Table 23.3-1 for the road function improvement works and Table 23.3-2 for the pavement rehabilitation works including drainage improvement, broken down into components, e.g. foreign, local and tax.

### (2) Project Cost

Table 23.3-3 summarizes the project cost which consists of construction, right of way acquisition and consultancy costs.

The total project cost estimated for the short and medium terms works is 2176.41 million pesos, i.e., 1099.00 million pesos or 50.5% for the short and 1077.41 million pesos or 49.5% for the medium.

Under the short term, 1099.00 million pesos are required, in which 199.55 million pesos or 18.2% for the road function improvement works and 899.45 million pesos or 81.8% for pavement rehabilitation works.

For the medium term works, the total estimated project cost is 1077.41 million pesos, composed of 236.13 million pesos or 21.9% for function improvement and 841.28 million pesos or 78.1% for pavement rehabilitation.

**TABLE 23.3-1 CONSTRUCTION COST AND ROW ACQUISITION COST BY COMPONENTS (ROAD FUNCTION IMPROVEMENT)**

Segment	Foreign Currency Component	Local Currency Component			Sub-Total	Total
		Local	Tax	R O W		
North Study Section						
N - 1	3.61	1.75	0.9	7.11 <sup>1/</sup>	9.76	13.37
N - 2	24.31	13.33	6.15	1.05, 12.62 <sup>1/</sup>	33.15	57.46
N - 3	14.37	7.94	3.66	--	11.60	25.97
N - 4	--	--	--	--	--	--
N - 5	--	--	--	--	--	--
Sub-Total	42.29	23.02	10.71	20.78	54.51	96.80
South Study Section						
S - 1	35.95	17.31	8.91	4.28	30.50	66.45
S - 2	4.99	2.77	1.28	--	4.05	9.04
S - 3	--	--	--	--	--	--
S - 4	3.26	2.02	0.84	--	2.86	6.12
Sub-Total	44.20	22.10	11.03	4.28	37.41	81.61
<b>TOTAL</b>	<b>86.49</b>	<b>45.12</b>	<b>21.74</b>	<b>25.06</b>	<b>91.92</b>	<b>178.41</b>

- Short Term
- November 1986 Price
- Million Pesos

NOTE: <sup>1/</sup> ROW acquisition costs for the medium term works.

**TABLE 23.3-2 CONSTRUCTION COSTS BY COMPONENTS  
(PAVEMENT REHABILITATION AND DRAINAGE IMPROVEMENT)**

North Study Section Segment	Foreign Currency Component	Local Currency Component			Sub-Total	Total
		Local	Tax			
N - 1	83.82	34.48	20.99	55.47	139.29	
N - 2	53.07	19.70	13.84	33.54	86.61	
N - 3	27.86	11.99	6.81	18.80	46.66	
N - 4	79.16	29.53	20.84	50.37	129.53	
N - 5	84.12	33.19	2.39	55.48	139.60	
Sub-Total	328.03	128.89	84.77	213.66	541.69	
South Study Section						
S - 1	24.91	11.21	6.10	17.31	42.22	
S - 2	21.37	8.85	5.36	14.21	35.58	
S - 3	58.65	28.21	14.67	42.88	101.53	
S - 4	57.79	24.70	14.17	38.87	96.66	
Sub-Total	162.72	72.37	40.30	133.27	275.99	
<b>TOTAL</b>	<b>490.75</b>	<b>201.86</b>	<b>125.07</b>	<b>326.93</b>	<b>817.68</b>	

- Short Term
- November 1986 Price
- Million Pesos

**TABLE 23.3-3 SUMMARY OF PROJECT COST  
— ROAD FUNCTION IMPROVEMENT AND PAVEMENT REHABILITATION —**

North Study Section			Unit: Million Pesos Nov. 1987 Prices				
Segment	Short Term (1987-1992)		Sub-Total	Medium Term (1993-1998)		Sub-Total	Total
	Road Function	Pavement		Road Function	Pavement		
N - 1	17.42	153.22	170.64	90.63	68.57	159.20	329.84
N - 2	64.22	95.27	159.49	63.00	71.32	134.32	293.81
N - 3	28.57	51.33	79.90	—	148.90	148.90	228.80
N - 4	—	142.48	142.48	—	32.13	32.13	174.61
N - 5	—	153.56	153.56	—	29.28	29.28	182.84
Sub-Total	110.21	595.86	706.07	153.63	350.20	503.83	1,209.90
South Study Section							
S - 1	72.67	46.44	119.11	—	152.23	152.23	271.34
S - 2	9.94	39.14	49.08	82.50	185.53	268.03	317.11
S - 3	—	111.68	111.68	—	93.59	93.59	205.27
S - 4	6.73	106.33	113.06	—	59.73	59.73	172.79
Sub-Total	89.34	303.59	392.93	82.50	491.08	573.58	966.51
<b>TOTAL</b>	<b>199.55</b>	<b>899.45</b>	<b>1,099.00</b>	<b>236.13</b>	<b>841.28</b>	<b>1,077.41</b>	<b>2,176.41</b>

NOTE: Project cost included construction, right-of-way acquisition and consultancy costs.

## 23.4 FUND PREPARATION

### (1) Past and Projected Fund Requirements for Highways

Table 23.4-1 shows the fund requirements for highways from 1977 to 1987 obtained from the DPWH. See Figure 23.4-1.

The 6-years Plan has projected the Government Infrastructure Program Investment Requirement for the transport as presented in Table 23.4-2. See Figure 23.4-1.

### (2) Possible Fund Allocation to the Project.

Total project cost was estimated to be 1099.0 million pesos for the works identified as the short term, of which 647.15 million pesos or 58.9% is the foreign currency component and 451.85 million pesos or 41.4% for the local currency component.

Taking into consideration the amount involved, the 4-years construction plans was established through the discussion with the representatives of DPWH.

For the foreign currency, financial assistance from a foreign country or international institution was considered.

TABLE 23. 4-1 FUND REQUIREMENTS

	Gen. App. Act	Public Works Acts	Total
1977			1,380,163,000 <sup>1)</sup>
1978			1,536,191,000 <sup>1)</sup>
1979			1,610,010,000 <sup>2)</sup>
1980			2,164,581,000 <sup>2)</sup>
1981			1,668,760,000 <sup>2)</sup>
1982	1,194,400,000	2,951,700,000	4,146,100,000 <sup>3)</sup>
1983	784,300,000	3,944,400,000	4,728,700,000 <sup>3)</sup>
1984	188,100,000	1,679,800,000	2,867,900,000 <sup>3)</sup>
1985	100,000,000	2,100,434,000	2,200,434,000 <sup>3)</sup>
1986	157,500,000	2,118,976,000	2,276,476,000 <sup>3)</sup>
1987	910,000,000	3,904,335,000	4,814,335,000 <sup>3)</sup>

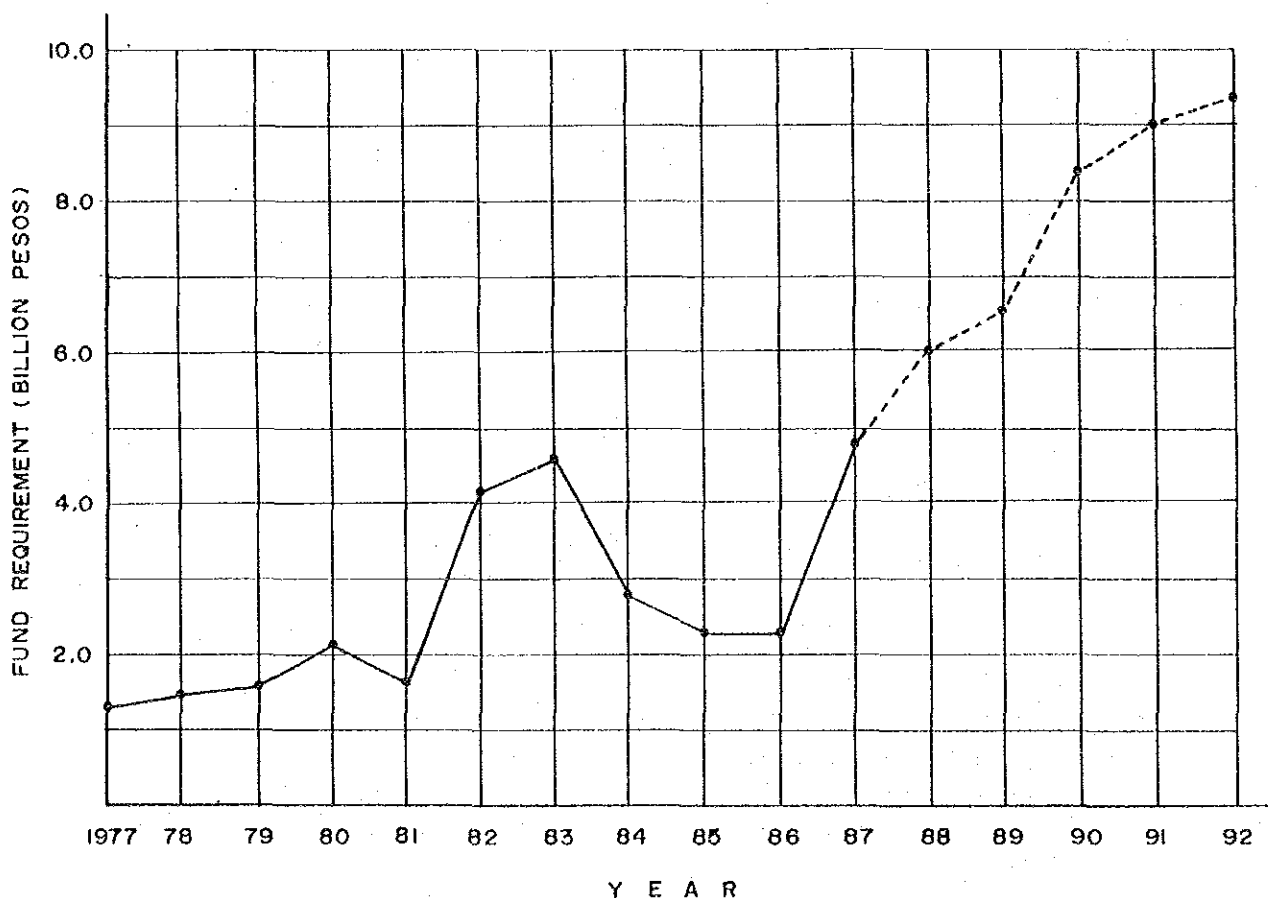
NOTE: 1) Fund Requirements of the Department of Public Highways (DPH)  
 2) Fund Requirements of the Ministry of Public Highways (MPH)  
 3) Fund Requirements for Highways of the Ministry of Public Works and Highways (MPWH)

**TABLE 23.4-2 GOVERNMENT INFRASTRUCTURE PROGRAM INVESTMENT REQUIREMENT BY SECTOR 1986 – 1992 (IN MILLION PESOS AT CURRENT PRICE)**

Sector	Program	Projections <sup>1</sup>						Total
	1986	1987	1988	1989	1990	1991	1992	
Transport Total	5,813	7,241	8,667	9,818	11,655	12,586	13,321	63,288
Highways	4,544	5,356	6,008	6,587	8,418	9,058	9,301	44,728
Ports	944	1,194	1,559	1,674	1,588	1,638	2,005	9,658
Urban Transport	186	251	183	142	469	1,039	1,298	3,382
Railways	69	282	561	556	555	574	600	3,128
Airports and Airways	70	158	356	859	625	277	117	2,392

NOTE: <sup>1</sup> Includes proposed projects which are still subject to evaluation.  
 Sources of basic data: Infrastructure ministries, major public infrastructure corporation, other agencies, and NEDA.  
 (As of 25 November 1986)

<sup>2</sup>Source  
 The Medium-Term Philippine Development Plan for 1987-1992.



**FIGURE 23.4-1 PAST AND PROJECTED FUND REQUIREMENT FOR HIGHWAY**

## 23.5 PROJECT IMPLEMENTATION

The proposed implementation schedule for the short-term is shown in Table 23.5-1. Also presented in the Table are the annual financial requirements in November 1987 price estimated in accordance with the proposed schedule and the escalated fund requirement projected assuming the escalations rate of 6% for local currency. No escalation for the foreign currency was presumed.

The total escalated cost was projected 1227.54 million pesos, of which the pavement rehabilitation requires 1000.83 million pesos or 81.5% and road function improvement 226.71 million pesos or 10.5%

During the project implementation period of 5 years (1988 to 1992) the biggest amount, 463.31 million pesos or 37.7% will be required in 1990, followed by 358.78 million pesos in 1991. The amount for the other years required is less than 200 million pesos per year.

Table 23.5-2 shows the project cost broken down into types of activities i.e. the detailed engineering, right-of-way acquisition, construction and construction supervision costs.

The services of detailed engineering requires 49.14 million pesos or 4.5% of the construction costs which was estimated to be 1084.69 million pesos.

The right-of-way acquisition cost which include the right-of-way for some mechanism turn works were estimated 31.46 million pesos or 2.9% of the construction cost.

The consultancy cost for construction supervision was proposed to be 62.25 million pesos or 5.7% of the construction cost.

TABLE 23.5-1 IMPLEMENTATION SCHEDULE (SHORT TERM 1987 - 1992)

	1986	1987	1988	1989	1990	1991	1992	Total
Feasibility Study (This Study)								
Financial Arrangement for Implementation								
Detailed Engineering								
Prequalification/Tender								
Construction								
High Priority Segments (N-1, N-2, S-3)								
Second Priority Segments (N-5, S-1)								
Third Priority Segments (N-3, N-4, S-2, S-4)								
Construction Supervision								
Project Cost								
Foreign Component		1.98 ( 1.98)		28.80 ( 28.80)	31.40 ( 31.40)	36.97 ( 36.97)	-	99.15 ( 99.15)
Local Component		6.65 ( 7.47)		21.83 ( 26.00)	28.49 ( 35.97)	43.43 ( 58.12)	-	100.40 ( 127.56)
Total		8.63 ( 9.45)		50.63 ( 54.80)	57.89 ( 67.37)	80.40 ( 95.09)	-	199.55 ( 226.71)
Nov. 1986 Price (Escalated Cost)								
Foreign Component		10.70 ( 10.70)		77.50 ( 77.50)	216.45 ( 216.45)	141.10 ( 141.10)	102.25 ( 102.25)	548.00 ( 548.00)
Local Component		4.58 ( 5.15)		48.05 ( 53.34)	142.17 ( 179.49)	91.61 ( 122.59)	65.04 ( 92.26)	351.45 ( 452.83)
Total		15.28 ( 15.85)		125.55 ( 130.84)	358.62 ( 395.94)	232.71 ( 263.69)	167.29 ( 194.51)	899.45 ( 1,000.83)
Unit: Million P								
Foreign Component		12.68 ( 12.68)		106.30 ( 106.30)	247.85 ( 247.85)	178.07 ( 178.07)	102.25 ( 102.25)	647.15 ( 647.15)
Local Component		11.23 ( 12.62)		69.88 ( 79.34)	170.66 ( 215.46)	135.04 ( 180.71)	65.04 ( 92.26)	451.85 ( 580.39)
Total		23.91 ( 25.30)		176.18 ( 185.64)	418.51 ( 463.31)	313.11 ( 358.78)	167.29 ( 194.51)	1,099.00 ( 1,227.54)

NOTE: Figures in parenthesis show the escalated fund requirement.  
 Annual escalation rate: Foreign Currency: 0%  
 Local Currency : 6%

TABLE 23.5-2 PROJECT COST

Unit: Million Peso

		November 1986 Price			Escalated Cost		
		Road Function	Pavement Improvement	Total	Road Function	Pavement Improvement	Total
Detailed Engineer- ing	Foreign	7.97	22.90	30.87	7.97	22.90	30.87
	Local/Tax	5.34	9.81	15.15	6.71	11.56	18.27
	Total	13.31	32.71	46.02	14.68	34.46	49.14
Right-of- way Acqui- sition	Foreign	—	—	—	—	—	—
	Local/Tax	25.06	—	25.06	31.46	—	31.46
	Total	25.06	—	25.06	31.46	—	31.46
Con- struc- tion	Foreign	86.49	490.75	577.24	86.49	490.75	577.24
	Local/Tax	66.86	326.93	393.79	85.45	422.00	507.45
	Total	153.35	817.68	971.03	171.94	912.75	1,084.69
Con- struction Super- vision	Foreign	4.69	34.35	39.04	4.69	34.35	39.04
	Local/Tax	3.14	14.71	17.85	3.94	19.27	23.21
	Total	7.83	49.06	56.89	8.63	53.62	62.25
TOTAL	Foreign	99.15	548.00	647.15	99.15	548.00	647.15
	Local/Tax	100.40	351.45	451.85	127.56	452.83	580.39
	Total	199.55	899.45	1,099.00	226.71	1,000.83	1,227.54







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