# ROAD PLANNING

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# CHPATER 1 PRESENT CONDITION AND PROBLEMS

## 1.1 General

This chapter discusses present condition and problems of roads in Pakistan. The studies were made on inventories of infrastructure, road capacity, and road infrastructure operational issues.

The actual performance in the current five year plan period is also reviewed. In addition to the above, the unit cost of construction, and maintenance were formulated.

As a result, problem areas of road sector is discussed at the end of this chapter.

## 1.2 Road Administration

### (1) Functions

Road administration systems are responsible for repairing and maintenance, improvement and construction, and planning the development of road networks including bridges and structures.

### (2) Federal

The Ministry of Communications is the authority responsible for strategic roads called national highways. Within the MOC, the National Highway Board established in 1978 by re-organizing the Indus Super Highway Board is the agency performing the function for the planning, construction and maintenance of the national highways. At present the national highway system consists of seven numbered routes with a total length of 6,152 kilometers.

### (3) Province
(Communications and Works Department of Provincial Government)

The Chief Engineer for Highways and Bridges of Province is looking after Communications and Works Department (CWD).

The Highway Department of CWD is responsible for construction and the maintenance of provincial roads, and the Department is divided into provincial highway circles headed by Superintending Engineer, and the circles are again divided into Divisions headed by the Executive Engineer. The Divisions are further subdivided into Subdivisions headed by Subdivisional Officer.

CWD covers the roads in its province and the total length of roads under CWD is 43,900 kms.

(4) District/Municipality

District and municipalilty roads, mostly called community (neighbourhood) roads and rural roads are maintained and constructed by these councils. The total length of these roads is 65,000 kms.

## 1.3 Infrastructure

### 1.3.1 Road Network

(1) The Existing Road Network

These are 114,700 kms of road networks in Pakistan consists of some 49,000 km paved roads and 65,700 kms of gravel and unpaved roads in 1986. For administration purpose, these roads have been classified into 4 categories, namely national highway, provincial highway, district road and municipal road.

National highways constitute major interprovincial links and provincial highways cover a road network extending from the national highways to local core townships. Thus the main and inter-district roads are represented by national and a part of provincial highways. The position of road length by type of road as of 30 June, 1986 is shown in Table 1.3.1.

Currently national highways are 6,152 kms in total, including the Indus highway (1,245 kms) which was reclassified into Route N-55 from the provincial highway in January 1987. In the national highway network, Route N-5 (1,746 kms) is the heaviest trafficked trunk highway linking major highly populated cities (more than 5 hundred thousand population) such as Karachi, Hyderabad, Multan, Lahore, Gujranwala, Rawalpindi and Peshawar. Fig. 1.3.1 shows the national highway network.

The entire road network provides extensive coverage of Pakistan, but its quality is deficient and requires many improvements. Most of the paved road system is narrow, and only 1,200 kms of the National and Provincial highways are two full lanes or wider. As seen from Fig. 1.3.2 the average paved carriageway width of the all national and provincial highways is estimated as 5.3 m by the updated road inventory data.

(2) Study Road Network for the National Transport Plan

The total of 16,200 kms length basic road network was defined in the previous National Transport plan study 1983, based on the functional classification of the highway system consist of primary highways and secondary highways by the following policy and definitions;

Table 1.3.1 Pakistan Road Inventory 1986 (Fig. in Kms)

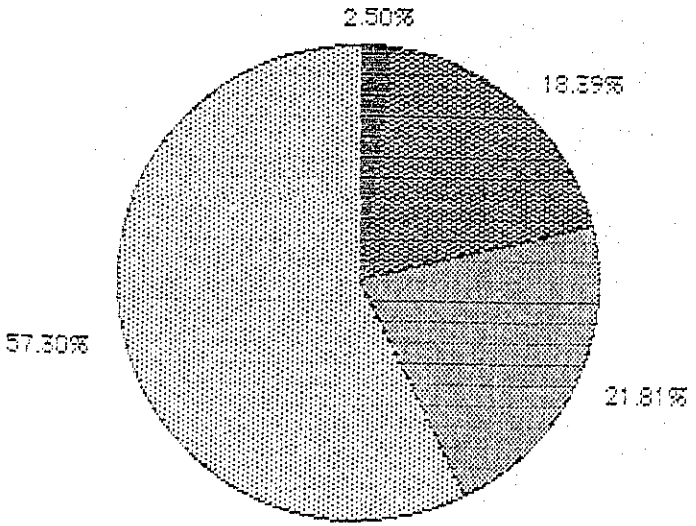
| PROVINCE / AGENCY | LOW TYPE | | | HIGH TYPE | | | | | | | | | GRAND TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EARTHEN | SHINGLE | TOTAL | <3.6m | 3.6-5.5m | 5.5-7.3m | 7.3-8.5m | 8.5-10.9m | 10.9-13.4m | 13.4-14.6m | >14.6m-D | >14.6m-UD | TOTAL | |
| 1-N/P | 398.00 | 47.00 | 445.00 | 9,637.00 | 1,287.00 | 4,558.00 | 270.00 | 229.00 | 63.00 | 66.00 | 25.00 | 47.00 | 16,182.00 | 16,627.00 |
| 1-D | 14,484.00 | 2,630.77 | 17,114.77 | 5,848.64 | 0.00 | 20.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5,868.82 | 22,983.59 |
| 1-M | 227.00 | 299.00 | 526.00 | 1,669.80 | 1,061.10 | 435.50 | 246.26 | 222.32 | 160.22 | 50.14 | 37.38 | 39.28 | 3,922.00 | 4,448.00 |
| SUB TOTAL | 15109 | 2976.77 | 18085.77 | 17155.44 | 2348.1 | 5013.68 | 516.26 | 451.32 | 223.22 | 116.14 | 62.38 | 86.28 | 25972.82 | 44058.59 |
| 2-N/P | 3,220.00 | 59.00 | 3,279.00 | 5,411.04 | 1,701.65 | 1,106.60 | 14.90 | 20.50 | 149.80 | 5.60 | 19.50 | 55.00 | 8,484.59 | 11,763.59 |
| 2-D | 12,991.85 | 599.69 | 13,591.54 | 612.13 | 126.46 | 13.68 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 752.27 | 14,343.81 |
| 2-M | 355.00 | 273.00 | 628.00 | 1,152.21 | 543.38 | 1,208.62 | 260.54 | 854.62 | 716.64 | 33.15 | 305.86 | 0.00 | 5,075.00 | 5,703.00 |
| SUB TOTAL | 16,566.85 | 931.69 | 17,498.54 | 7,175.38 | 2,371.47 | 2,328.90 | 275.44 | 875.12 | 866.44 | 38.75 | 325.36 | 55.00 | 14,311.86 | 31,810.40 |
| 3-N/P | 326.63 | 3,563.77 | 3,890.60 | 2,480.60 | 309.65 | 1,227.98 | 200.35 | 10.71 | 2.02 | 0.68 | 24.70 | 0.29 | 4,257.18 | 8,147.78 |
| 3-D | 3,615.51 | 2,441.59 | 6,057.10 | 230.95 | 58.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 289.45 | 6,346.55 |
| 3-M | 108.00 | 59.00 | 167.00 | 50.10 | 73.00 | 198.00 | 0.00 | 10.50 | 0.00 | 0.00 | 3.20 | 3.20 | 338.00 | 505.00 |
| SUB TOTAL | 4,050.34 | 6,064.36 | 10,114.70 | 2,761.85 | 441.15 | 1,425.98 | 200.35 | 21.21 | 2.02 | 0.68 | 27.90 | 3.49 | 4,884.63 | 14,999.33 |
| 4-N/P | 37.00 | 10,183.32 | 10,220.32 | 1,930.63 | 1,326.60 | 43.00 | 0.00 | 7.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3,307.23 | 13,527.55 |
| 4-D | 2,208.00 | 7,364.00 | 9,572.00 | 89.16 | 21.00 | 0.80 | 6.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 119.00 | 9,691.00 |
| 4-M | 63.00 | 142.00 | 205.00 | 270.66 | 73.00 | 21.00 | 16.90 | 5.78 | 0.00 | 3.22 | 0.00 | 3.22 | 393.78 | 598.78 |
| SUB TOTAL | 2,308.00 | 17,689.32 | 19,997.32 | 2,290.45 | 1,420.60 | 64.80 | 24.94 | 12.78 | 0.00 | 3.22 | 0.00 | 3.22 | 3,820.01 | 23,817.33 |
| T. N/PROVINCE | 3981.83 | 13853.09 | 17834.92 | 12459.47 | 4624.9 | 6935.58 | 485.25 | 267.21 | 214.82 | 72.28 | 89.2 | 102.29 | 32231 | 50065.92 |
| T. DISTRICT | 33,299.36 | 13,035.05 | 46,335.41 | 6,780.88 | 205.96 | 34.66 | 6.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7,029.54 | 53,364.95 |
| T.MINICIPAL | 753.00 | 773.00 | 1,526.00 | 3,142.77 | 1,750.46 | 1,863.12 | 523.70 | 1,093.22 | 876.86 | 86.51 | 346.44 | 45.70 | 9,728.78 | 11,254.78 |
| GRAND TOTAL | 38034.19 | 27662.14 | 65698.33 | 29383.12 | 6581.32 | 8833.36 | 1016.99 | 1360.43 | 1091.68 | 158.79 | 415.64 | 147.99 | 48989.32 | 114685.65 |

1. PUNJAB
2. SIND
3. N.W.F.P
4. BALUCHISTAN

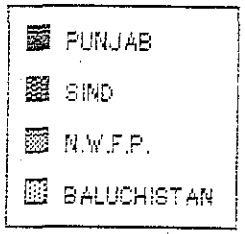
N - National Highway
P - Provincial Highway
D - District Road
M - Minucipal Road

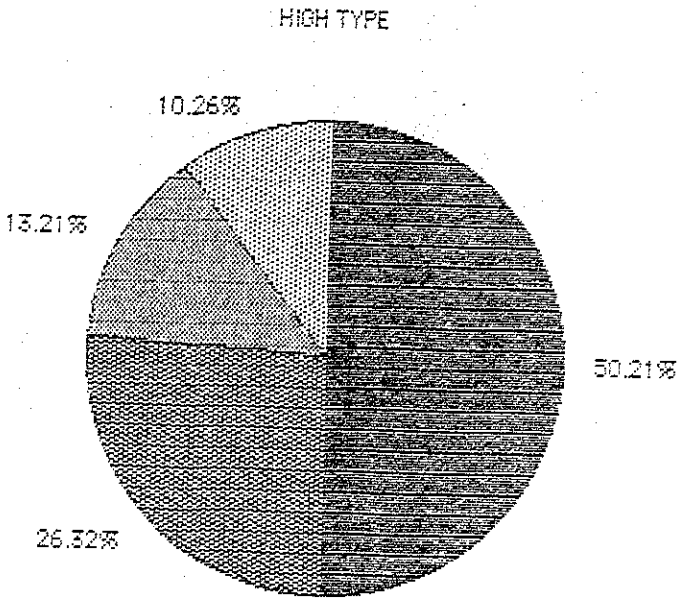
Source: NTRC





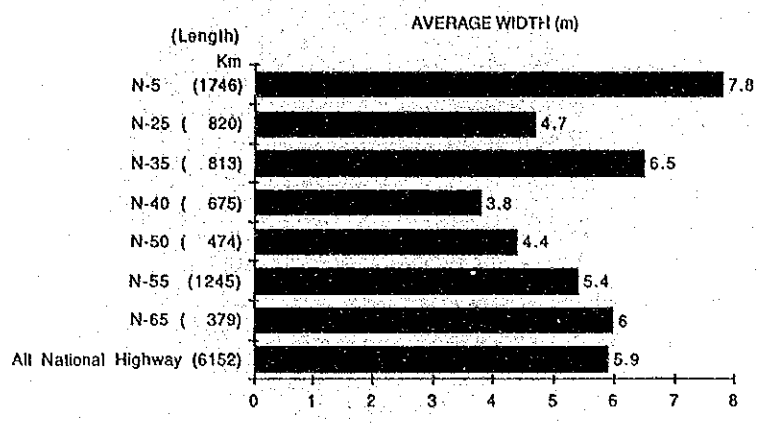

Percentage of Low Type Road by Province



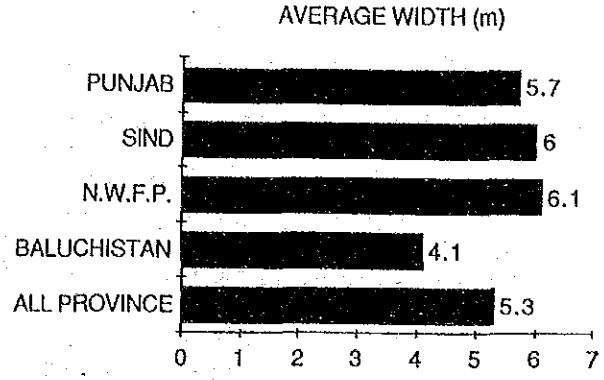

Percentage of High Type Road by Province

Fig. 1.3.1 National Highway Network




Source: JICA Study Team
using the inventory 1986, NTRC

Fig. 1.3.2 Average Carriageway Width of National and Provincial Highways




Policy

There are two types of classifications in the highway system;

i) Administrative classification
ii) Functional classification

The administrative classification existing in Pakistan such as National Highway and Provincial Highway are identified from their administrative point of view. The functional classification does not exist in Pakistan officially and the emphasis is primarily laid on the function and relative importance of the highway in the network. The latter is more important because it is required for the road users to utilize highway efficiently and in an economical manner.

Definition of Primary Highways

Primary highways mean the main highways which form a part of international routes and link up all federal and provincial capitals. These roads also pass through two or more provinces.

Definition of Secondary Highways

Secondary highways mean those highways which connect the divisional or district centers with each other and also link up divisional or district centers to primary highways.

In addition to the basic network selected in the previous study, a total of 2,500 kms additional roads is proposed to combine with the basic network for this study considering the traffic development as well as the regional development in recent years. The selected additional networks are;

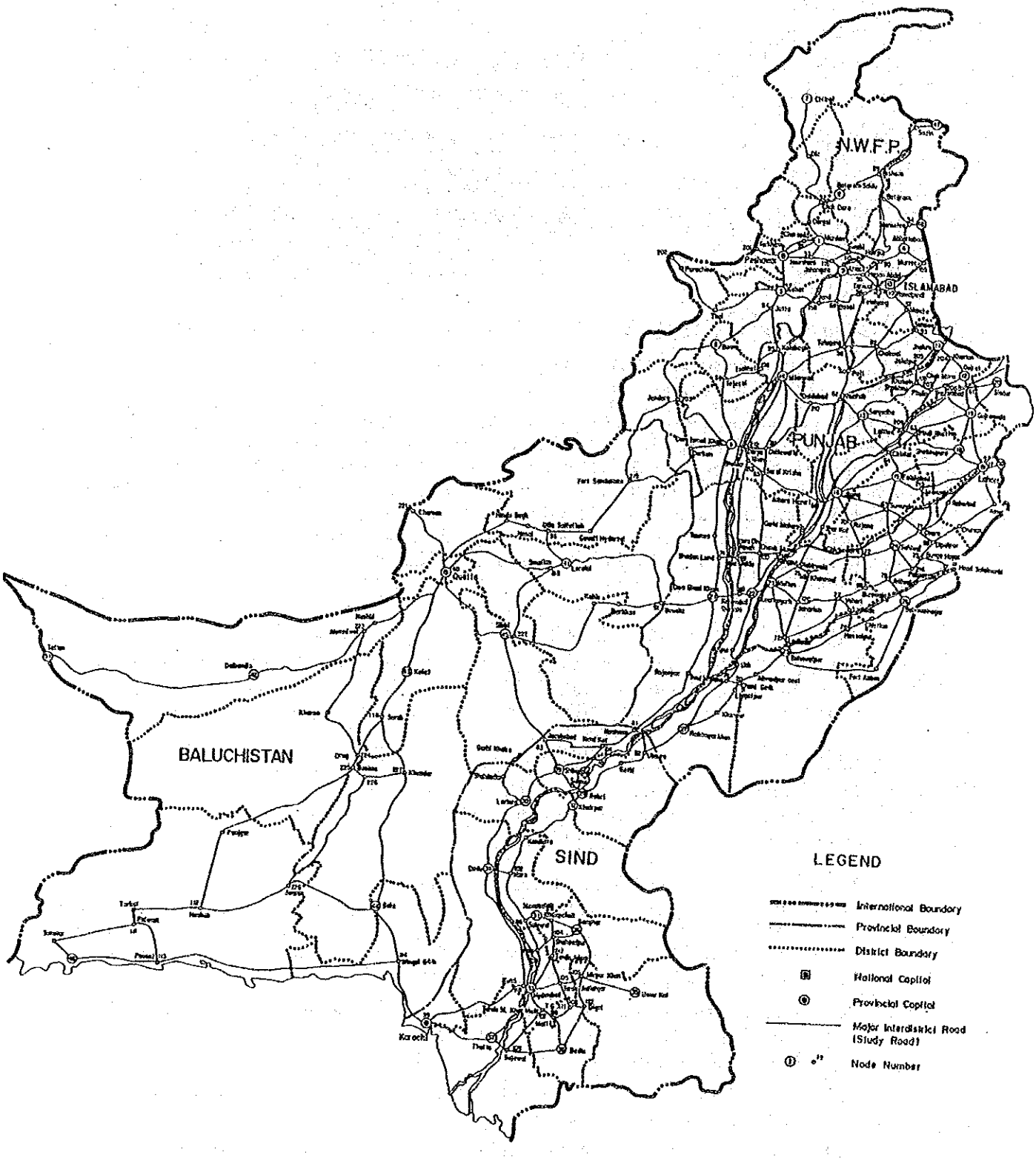
(a) Links having traffic volumes (1985/86 ADT) more than 500 vehicles and can be utilized for inter-zone traffic or with bypass functions.

(b) Inter-district links connecting zone to zone which were not included in the basic network in 1983.

(c) NLC route which can be utilized for inter-zone traffic.

A total of 18,284 kms length of the selected road network for this study is shown in Fig. 1.3.3 and the updated link data are shown in App. Table 1-2.

Fig. 1.3.3 Road Network for National Transport Study 1987




Remarks: List of Node Numbers and Location shall be referred to App. Table 1-1

### 1.3.2 Bridges

Since the nationwide bridge inventory data could not be obtained from the Government agencies, the Study Team updated bridge inventory of major highways in the country from their actual field survey record. Judging from the previous inventory data of JICA study in 1983 and this time conducted survey, it is estimated that approximately 700 bridges exist on the selected study road network. The average bridge interval in the national highway network is estimated at about 4 km which indicates higher rate of bridges than the provincial highway network.

A total of 16 defective bridges and 23 narrow bridges were observed in the national highway network during the survey.

The bridge inventory of major highway was updated and classified into the following categories:-

(1) Number of narrow bridges (less than 6 m width)
(2) Number of long span bridges (more than 100 m length)
(3) Number of poor bridges which require repairs in the near future
(4) Others (except items (1) - (3))

The results are presented in Appendix Table 1-3 - 1-5.

### 1.3.3 Road Standards

Several studies for preparing the road design and construction standard have been conducted in Pakistan, which are:

i) Suggested Design Standard for Two-Lane Highway by IBRD
ii) Tolerable Standards for 2-Lane Highways by U.S. Department of Transportation Federal Highway Administration
iii) Pakistan Rural Highway-Computed Highway Capacity by Techno-Consultant for "Master Plan for Highways" in 1978
iv) Construction Standards Recommended in "Classification of Highway System and Design Criteria June 1972" by Directorate of Planning and Design Highway Department, Lahore,
v) Design Characteristics for Roads in Different type of Terrain by Central Road Organization, MOC, Government of Pakistan

In 1971, a highway design manual was prepared to provide a uniform procedure for preparation of detailed highway plans within the Punjab Province. The basic standard was classified into the following in this manual;

Class I Highway; Highway provides means for a large volume of motorized traffic to travel at high speeds over long distances with minimum amount of delays. Access will be limited to locations

at selected cross roads, generally at not less than 8 kms (five miles) intervals in rural areas and 1.6 kms (one mile) intervals in urban areas. Class I highways will ultimately have 4-lanes and all highway and railroad intersections will be grade separated. (Initially, 2-lane width and at-grade-intersection may be permitted).

Class II Highway; Class II highway should be designed similar to the class I highway with provision for ultimate development to a median divided section with grade separated cross roads and railway intersections. Access points on this highways may be quite frequent with a minimum desirable distance between points of ingress and egress of 2.4 kms (one half miles). In developed area, service or frontage roads paralleling the main facilities are required.

Class III Highway; This highway will feed into the Class I and Class II highways from the smaller village and agricultural areas where relatively minor movement of people and goods are necessary.

Upon consideration a comparison of these standards above, JICA classified roads in five categories based on the construction standards recommended in "Classification of Highway System and Design Criteria June 1972" by the Directorate of Planning and Design Highway Department, Lahore for the National Transport Study in 1983 as shown in Table 1.3.2.

The existing roads in Pakistan have not been developed by one fixed standard. Specially, as far as shoulder widths and type of pavement structures are concerned, each road link is not unified due to various designs and construction manners in the past.

However, as a result of site reconnaissance conducted by the Study Team, it was confirmed that the selected five categories of roads currently used was a reasonable highway classification in terms of cross sectional width for systematic development of the Pakistani Highway from now on.

These are:

| | | |
|---|---|---|
| Case-I | Dual Carriageway 4-Lane divided | Highway represented by N-5 Peshawar - Nowshehra and Hasan Abdal - Rawalpindi Sections |
| Class-II | Wide 2-Lane 24 ft. (7.3 m) carpetted; carriageway with 6-ft. treated shoulder | Highway represented by N-5, Lahore-Rahwind, Rahwind-Okara and Karachi-Hyderabad Sections |

Table 1.3.2 Present Road Standards

| Classification of Highway System and Design Criteria[1] | | | | | JICA Recommendation (1983)[2] | | | Proposed Name of Classification in This Study |
|---|---|---|---|---|---|---|---|---|
| Volume limits (Vehicle/day) | Construction Standards | Type of Pavement | Formation Width | Right of Way | Class | Design Speed (km/hr) | Level of Service on opening | |
| 101-500 | Class III | 12-ft. (3.65m) surface treated | 32 feet (9.75m) | 110 feet (33.53m) | I | F: 80<br>R: 65<br>M: 40 | C | V |
| 501-1500 | Class II | 20-ft. (6.0m) surface treated | 44 feet (13.40m) | 110 feet (33.53m) | II | F: 90<br>R: 80<br>M: 50 | B | IV |
| 1501-4000 | Class I | 24-ft. (7.3m) surface treated | 50 feet (15.20m) | 220 feet (67.05m) | III | F: 95<br>R: 80<br>M: 60 | B | III |
| 4001-8000 | Class I Carpetted | 24-ft. (7.3m) carpetted with 6-ft. treated shoulders | 50 feet (15.20m) | 220 feet (67.05m) | IV | F: 100<br>R: 90<br>M: 70 | B | II |
| 8001-48000 | 4-Lane divided | Each 24-ft. (7.3m) carpetted with 6-ft. treated shoulders | 96 feet (29.05m) | 220 feet (67.05m) | V | F: 110<br>R: 100<br>M: 80 | B | I |

1/ Source: Classification of Highway System and Design Criteria in 1972 by Punjab Highway Department

2/ Source: The Study on National Transport Plan, JICA, May, 1983

Abbreviation F : Flat area
R : Rolling area
M : Mountainous area

| | | |
|---|---|---|
| Class-III | Wide 2-Lane 24 ft. (7.3 m) carpetted or surface treated | Highway represented by N-5, Rawalpindi-Gujranwala and Rohri-Hyderabad Sections |
| Class-IV | Narrow 2-Lane surface treated | Highway represented by N-55, D.I. Khan-Peshawar and N-65, Quetta-Shikarpur Sections |
| Class-V | Two-way, One-lane Surface treated | Road represented by N-25, Bela-Kalat and N-55, Kashmor-Rajampur Sections |

It is proposed for the selected 18,284 Kms-long study roads will be classified into the same five categories as stated above. The detailed road standard of the five categories for highway planning are presented in Table 1.3.3.

1.3.4 Development Over the Past Decade

Fig. 1.3.4 shows a diagram of development of road lengths from the beginning of Non-planned period (1970-78) to the middle of the Sixth Five Year Plan.

As shown in Fig. 1.3.4, Pakistan's road network consists of national, provincial, district and municipal roads. They increased from about 80,700 kms in 1976 to nearly 114,700 kms in 1986 at an annual growth rate of 3.6%. Road density[1/] of Pakistan increased from 0.10 to 0.14 km per square km during this past decade with a great effort, but Pakistan's figure still belongs to the low level group in the international comparison.[2/]

Before the Fifth plan, Pakistan experienced a limited amount of resources had been spread out over a large number of road projects and the progress on individual projects was slow. The gestation period of projects was prolonged, resulting in uneconomic returns on the investment. The government agencies, therefore, adopted the following basic strategy and policy for highway development since the Fifth plan from 1978;

i) Reallocate priorities on a large number of projects handled so that their numbers are reduced and spreading out of resources is avoided.

ii) Improvement of major national and provincial highways for the highest priority so that they could cater for the increased traffic.

1/ Average density of total national, provincial, district and provincial roads in Pakistan to June 1986 by the inventory data NRTC (Refer to App. Fig. 1-1)

2/ Refer to App. Table 1-8.

Table 1.3.3 Proposed Revised Standard Cross Section

| CLASSIFICATION | NUMBER OF LANES | DESIGN SPEED (Km/H) | TYPICAL CROSS SECTION | | | | | APPLICATION & TYPE OF PAVEMENT |
|---|---|---|---|---|---|---|---|---|
| | | | CARRIAGE-WAY WIDTH | SHOULDER WIDTH (LEFT) | MEDIAN WIDTH | FORMATION WIDTH | R.O.W. | |
| I | 4-Lane Divided | F : 110<br>H : 100<br>M : 80 | 14.60 m<br>( 24 x 2 ft ) | 3.65 m<br>( 12 ft ) | 3.65 m<br>( 12 ft ) | 29.20 m<br>( 96 ft ) | 66.90 m<br>( 220 ft ) | PH<br>AC |
| II | 2-Lane Hard Shoulder | F : 100<br>H : 80<br>M : 60 | 7.30 m<br>( 24 ft ) | 3.65 m<br>( 12 ft ) | - - - | 14.60 m<br>( 48 ft ) | 66.90 m<br>( 220 ft ) | PH<br>AC |
| III | 2-Lane Soft Shoulder | F : 100<br>H : 80<br>M : 60 | 7.30 m<br>( 24 ft ) | 3.65 m<br>( 12 ft ) | - - - | 14.60 m<br>( 48 ft ) | 66.90 m<br>( 220 ft ) | PH / SH<br>AC / TST |
| IV | 2-Lane | F : 80<br>H : 60<br>M : 50 | 6.00 m<br>( 20 ft ) | 3.65 m<br>( 12 ft ) | - - - | 13.40 m<br>( 44 ft ) | 33.40 m<br>( 110 ft ) | SH<br>AC / TST |
| V | 1-Lane | F : 60<br>H : 50<br>M : 40 | 3.65 m<br>( 12 ft ) | 3.00 m<br>( 10 ft ) | - - - | 9.70 m<br>( 32 ft ) | 33.40 m<br>( 110 ft ) | SH<br>TST |

Source: JICA Study Team

Abbreviation
F : Flat Area
H : Hilly Area (Rolling Area)
M : Mountainous Area

PH : Primary Highway
SH : Secondary Highway
AC : Asphalt Concrete
TST : Triple Surface Treatment

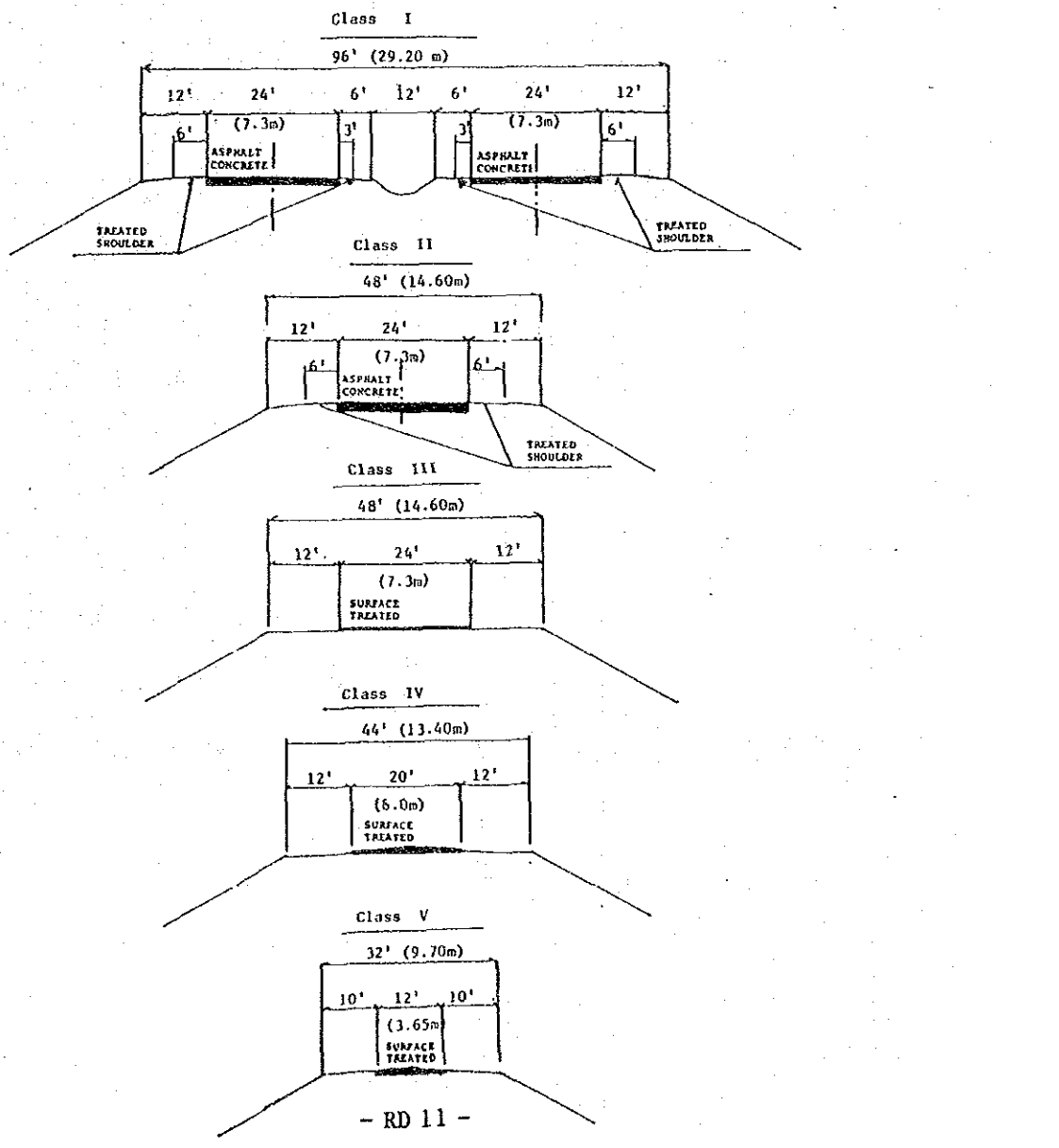
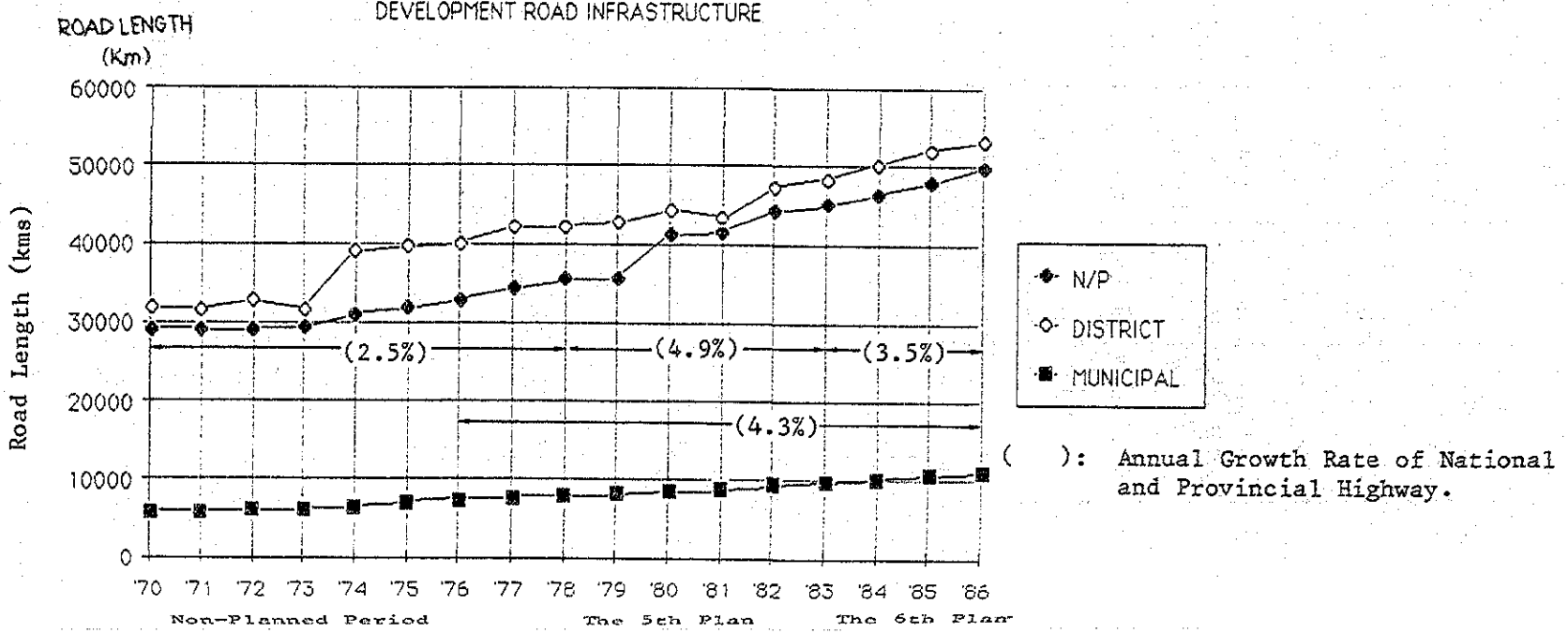


Fig. 1.3.4 Development Road Infrastructure

| YEAR | NATIONAL/PROVINCIAL HIGHWAY | | | DISTRICT ROAD | | | MUNICIPAL ROAD | | | TOTAL (KM) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LOW TYPE | HIGH TYPE | TOTAL | LOW TYPE | HIGH TYPE | TOTAL | LOW TYPE | HIGH TYPE | TOTAL | LOW TYPE | HIGH TYPE | TOTAL |
| 1970 | 12047 | 17231 | 29278 | 30159 | 1725 | 31884 | 846 | 5162 | 6008 | 43052 | 24118 | 67170 |
| 1971 | 12207 | 16942 | 29149 | 29982 | 1838 | 31820 | 846 | 5197 | 6043 | 43035 | 23977 | 67012 |
| 1972 | 12511 | 16763 | 29274 | 30833 | 1978 | 32811 | 853 | 5260 | 6113 | 44197 | 24001 | 68198 |
| 1973 | 12511 | 16985 | 29496 | 29774 | 2019 | 31793 | 898 | 5392 | 6290 | 43183 | 24396 | 67579 |
| 1974 | 12367 | 18736 | 31103 | 36654 | 2364 | 39018 | 997 | 5576 | 6573 | 50018 | 26676 | 76694 |
| 1975 | 12291 | 19549 | 31840 | 37074 | 2576 | 39650 | 1044 | 6131 | 7175 | 50409 | 28256 | 78665 |
| 1976 | 12344 | 20579 | 32923 | 37546 | 2646 | 40192 | 1129 | 6414 | 7543 | 51019 | 29639 | 80658 |
| 1977 | 12360 | 22087 | 34447 | 39056 | 3106 | 42162 | 1132 | 6718 | 7850 | 52548 | 31911 | 84459 |
| 1978 | 12361 | 23190 | 35551 | 39054 | 3198 | 42252 | 1181 | 6909 | 8090 | 52596 | 33297 | 85893 |
| 1979 | 11491 | 24288 | 35779 | 39201 | 3598 | 42799 | 1218 | 7071 | 8289 | 51910 | 34957 | 86867 |
| 1980 | 16243 | 24917 | 41160 | 40777 | 3706 | 44483 | 1262 | 7416 | 8678 | 58282 | 36039 | 94321 |
| 1981 | 15573 | 26080 | 41653 | 38892 | 4469 | 43361 | 1258 | 7710 | 8968 | 55723 | 38259 | 93982 |
| 1982 | 15580 | 28801 | 44381 | 41962 | 5534 | 47496 | 1395 | 8125 | 9520 | 58937 | 42460 | 101397 |
| 1983 | 15682 | 29491 | 45173 | 42848 | 5679 | 48527 | 1416 | 8474 | 9890 | 59946 | 43644 | 103590 |
| 1984 | | | | | ( N.A ) | | | | | | | |
| 1985 | 15336 | 32680 | 48016 | 44689 | 7961 | 52290 | 1537 | 9296 | 10833 | 61562 | 49937 | 111499 |
| 1986 | 17835 | 32231 | 50066 | 46335 | 7030 | 53365 | 1526 | 9729 | 11255 | 65696 | 48990 | 114686 |

Source: Transport Sector Profile, TECNECON/NTRC






( ): Annual Growth Rate of National and Provincial Highway.

iii) In case of other roads, priorities will be re-established and only those projects which contribute towards economic development of the country and indicate quick economic returns will be undertaken.

iv) New roads will now be provided only for opening up of hitherto isolated areas of the country.

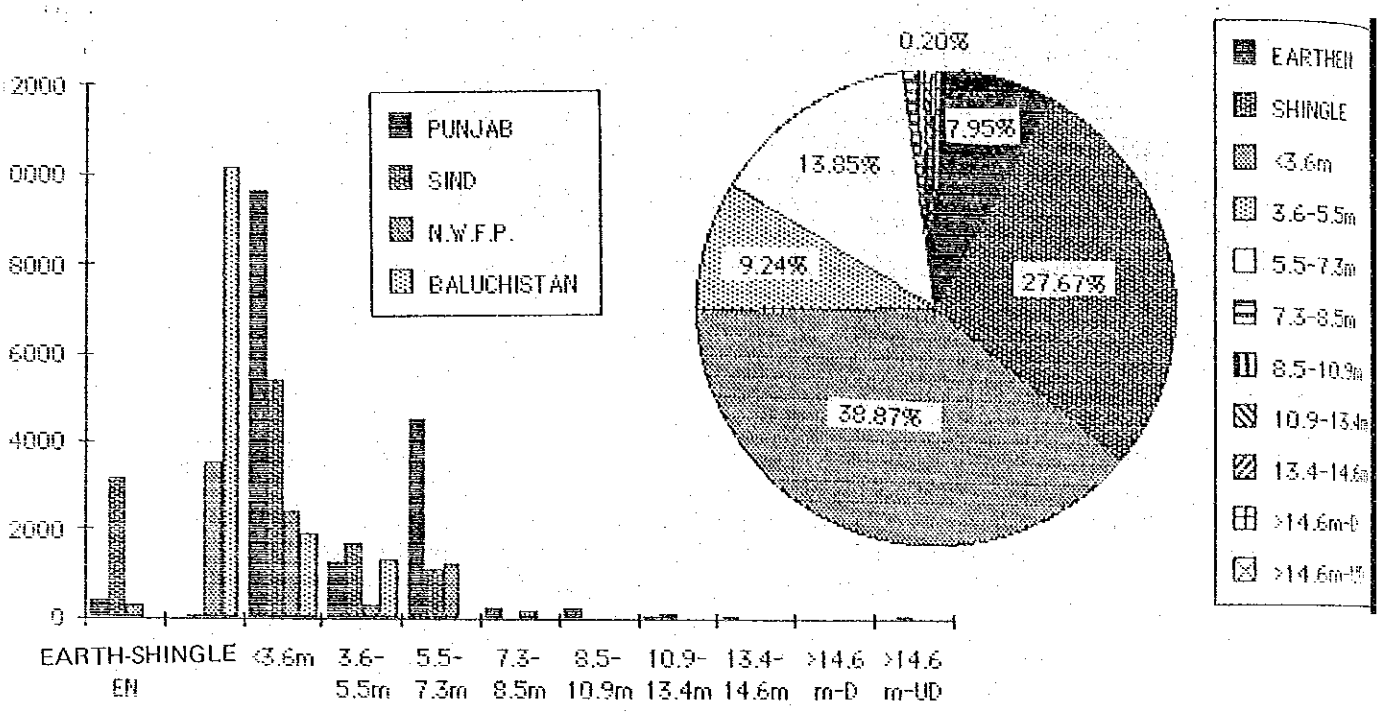
Based on the above policies, the Government proceeded with the highway development projects and placed high priority for the improvement projects of the existing roads rather than for new construction projects.

As a result, the national and provincial highways grew at an average rate of 4.9% p.a. during in the Fifth plan, and the targeted improvement projects (7,860 kms) and new construction projects (5,800 kms) in the Sixth plan are going on now.

By the road improvement and widening project through the development plans, the average carriageway width of the major network (the study roads selected in the previous JICA study, total of 16,200 kms) increased from about 4.8 m in 1982 to approximately 5.3 m in 1986.

Fig. 1.3.5 shows the lengths of national and provincial highways as per their carriageway width as of June 1986. It is observed that one-third of the arterial roads are still unpaved and more than two-thirds of the paved arterial roads do not have enough carriageway width for two lane roads in 1986.

Fig. 1.3.5 National/Provincial Road Inventory, 1986




| PROVINCE /AGENCY | LOW TYPE | | | HIGH TYPE | | | | | | | | | | GRAND TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EARTHEN | SHINGLE | TOTAL | <3.6m | 3.6-5.5m | 5.5-7.3m | 7.3-8.5m | 8.5-10.9m | 10.9-13.4m | 13.4-14.6m | >14.6m-D | >14.6m-UD | TOTAL | |
| PUNJAB | 398 | 47 | 445 | 9637 | 1287 | 4558 | 270 | 229 | 63 | 66 | 25 | 47 | 16182 | 16627 |
| SIND | 3220 | 59 | 3279 | 5411 | 1702 | 1107 | 15 | 21 | 150 | 6 | 20 | 55 | 8485 | 11764 |
| N.W.F.P. | 327 | 3564 | 3891 | 2401 | 310 | 1228 | 200 | 11 | 2 | 1 | 25 | 0 | 4257 | 8148 |
| BALUCHISTAN | 37 | 10183 | 10220 | 1931 | 1327 | 43 | 0 | 7 | 0 | 0 | 0 | 0 | 3307 | 13528 |
| TOTAL | 3982 | 13853 | 17835 | 19459 | 4625 | 6936 | 485 | 267 | 215 | 72 | 69 | 102 | 32231 | 50068 |

Source: NTRC

## 1.4 Road Capacity

### 1.4.1 Present Highway Capacity

The following road capacities have been used for highway planning in Pakistan;

Table 1.4.1 Volume Limits of Each Category of Roads

| Class | No. of Lanes | Carriageway Width | Volume Limits 1/ (Vehicle/day) |
|---|---|---|---|
| I (V) 2/ | 1 - Lane | 3.65 m - ST | 100 - 500 |
| II (IV) | 2 - Lane | 6.00 m - ST | 500 - 1,500 |
| III (III) | 2 - Lane | 7.30 m - ST | 1,500 - 4,000 (3,000) |
| IV (II) | 2 - Lane | 7.30 m - AC | 4,000 - 8,000 (3,000) (7,000) |
| V (I) | 4 - Lane | 14.60 m - AC | 8,000 - 48,000 (Over 7,000) |

1/ ( ) shows the volume limits proposed by NHB for the 7th Plan.
ST: Surface Treatment
AC: Asphalt concrete Surface

2/ Proposed name of Classification in this study

Source: Classification of Highway system and Design Criteria in 1972 by Punjab Highway Department/proposed Seventh Five Year plan, Nov. 1986, NHB.

Based on the above criteria, the previous JICA study recommended the design speed and its capacity of each category of roads for traffic assignment purposes as shown in Table 1.4.2. This recommended capacity was slightly higher than the present Pakistani standard as shown in Table 1.4.1.

It should be noted that the capacity of Class III and IV Highways are specified for quite different volumes in spite of the same crossectional width.

Table 1.4.2 Capacity (Qmax) Mixed Traffic

(Veh/day)

| Type of Terrain | Width (0.1m) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 36 | 36 | 60 | 60 | 72 | 72 | 108 | 73x2 |
| Flat | 500 | 1,500 | | 4,000 | | 8,000 | | 48,000 |
| Rolling (0.9xFlat) | 450 | 1,350 | | 3,600 | | 7,200 | | 43,000 |
| Mountainous (0.7xFlat) | 350 | 1,000 | | 2,800 | | 5,600 | | 34,000 |

Souce: National Transport Plan, JICA, 1983

1.4.2 Revised Highway Capacity

The highway capacity currently used in Pakistan was revised. Through the several discussions with PDD and NTRC counterpart staff, it was decided that the current standard is necessary to review and modify on the basis of actual conditions of the existing road and latest traffic survey data.

The Study Team conducted the supplementary survey[1/] (site reconnaissance for major highways - over 5,500 kms) during the study period, and it was confirmed by the Team that the estimated present congestion ratio (V/C) using the present capacity standard and traffic count data obtained from NTRC did not correspond to the actual position due to the underestimated road capacity.

The revision work for highway capacity has been carried out on the basis of the methodology described in "Highway Capacity Mannual, 1985 (HCM, 85)". Since the HCM '85 was established under the traffic characteristics in USA, the factor or coefficient shown in HCM '85 can not be directly adopted for Pakistan from the viewpoint of local conditions. The Team, therefore, modified these coefficients to correspond to local conditions as much as possible. A detail of the revised estimated highway capacity is presented in Appendix titled "HIGHWAY CAPACITY ANALYSIS".

The summary of the proposed revised road standards for highway planning are shown in Table 1.4.3.

It should be noted that the revised estimated capacity and coefficient shown in this paper is recommended to use for the future road improvemet plan as a guideline figure, and these guide lines have to be reviewed from time to time according to any variation of the traffic characteristics in future.

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1/ Refer to App. Fig. 1-2 Survey Route Map.

Table 1.4.3 Proposed Revised Road Standard for Highway Planning

| CLASSIFICATION | NUMBER OF LANES | DESIGN SPEED (Km/H) | PLANNING GUIDELINE (TRAFFIC) | | TYPICAL CROSS SECTION | | | | | APPLICATION & TYPE OF PAVEMENT |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | VOLUME LIMITS(MAX) (PCU / DAY) | LEVEL OF SERVICE [V / C RATIO] | CARRIAGE-WAY WIDTH | SHOULDER WIDTH (LEFT) | MEDIAN WIDTH | FORMATION WIDTH | R.O.W. | |
| I | 4-Lane Divided | F : 110<br>H : 100<br>M : 80 | 90000 | C [0.70] | 14.60 m ( 24 x 2 ft ) | 3.65 m ( 12 ft ) | 3.65 m ( 12 ft ) | 29.20 m ( 96 ft ) | 66.90 m ( 220 ft ) | PH<br>AC |
| II | 2-Lane Hard Shoulder | F : 100<br>H : 80<br>M : 60 | 24000 | C [0.70] | 7.30 m ( 24 ft ) | 3.65 m ( 12 ft ) | - - - | 14.60 m ( 48 ft ) | 66.90 m ( 220 ft ) | PH<br>AC |
| III | 2-Lane Soft Shoulder | F : 100<br>H : 80<br>M : 60 | 24000 | C [0.70] | 7.30 m ( 24 ft ) | 3.65 m ( 12 ft ) | - - - | 14.60 m ( 48 ft ) | 66.90 m ( 220 ft ) | PH / SH<br>AC / TST |
| IV | 2-Lane | F : 80<br>H : 60<br>M : 50 | 20000 | C [0.70] | 6.00 m ( 20 ft ) | 3.65 m ( 12 ft ) | - - - | 13.40 m ( 44 ft ) | 33.40 m ( 110 ft ) | SH<br>AC / TST |
| V | 1-Lane | F : 60<br>H : 50<br>M : 40 | 3500 | D [0.85] | 3.65 m ( 12 ft ) | 3.00 m ( 10 ft ) | - - - | 9.70 m ( 32 ft ) | 33.40 m ( 110 ft ) | SH<br>TST |

Source: JICA Study Team

Abbreviation
F : Flat Area
H : Hilly Area (Rolling Area)
M : Mountainous Area

PH : Primary Highway
SH : Secondary Highway
AC : Asphalt Concrete
TST : Triple Surface Treatment

Note: Guideline Factors of Average Passenger-car Equivalents for Trucks and Buses (Heavy Vehicles)

| | |
|---|---|
| Flat Area | 3.0 |
| Hilly Area | 4.0 |
| Mountainous Area | 6.0 |

Details are shown in Appendix, Highway Capacity Analysis, (3) Adjustment factors.

### 1.4.3 Congestion Ratio of Existing Major Highways

The congestion ratio is one of "Index" for judgement of the road improvement planning whether the road is to be improved or not. The congestion ratio is determined by the following equation:

$$CR = V/CD$$

where,

CR = Congestion Ratio
V = Traffic Volume (PCU/day)
CD = Design Capacity (PCU/day)
Possible Capacity (CP) x Rate of Level of Service

If the congestion ratio exceeds more than 1.0, actual traffic volume of the road exceeds the design capacity and the road does not keep its level of service for the road user. In order to keep the proper level of service, the road has to be improved taking some appropriate actions when the congestion ratio reaches 1.0.

The Level of Service for the road user is changed by the congestion ratio as follows:

| Congestion Ratio (V/CD) | (Highway Planning Level) Level of Service (V/CP) | |
|---|---|---|
| 0.5 | A | (0.35) |
| 0.8 | B | (0.55) |
| 1.0 | C | (0.70) |
| 1.2 | D | (0.85) |
| 1.5 | E | (1.00) |

The congestion ratio of existing major highways were calculated using the traffic count data in 1985/86 and the proposed revised design traffic capacity is shown in Table 1.4.3 link by link. The results are presented in App. Table 1-6.

It was observed that none of the existing major highways except few sections of one-lane, one-way road were exceeded congestion ratio 1.0 at the time of survey in 1985/86. The maximum congestion ratio of N-5, one of the heaviest trafficed highway in Pakistan indicates 0.95 in Karachi - Kotri Section.

Table 1.4.4 shows the sections in which the estimated congestion ratio exceeded more than 0.50.

Table 1.4.4 Major Highway Sections-Congestion Ratio of more than 0.5 (1985/86)

| Node No. | Section From - To | Road Class (Terr.) | Traffic Volume 85/86 (pcu/day) | Capacity (pcu/day) | Congestion Ratio |
|---|---|---|---|---|---|
| 150 - 27 | Boundary - Rahimyar Khan (N-5) | IV (F) | 15789 | 20000 | 0.79 |
| 80 - 25 | Chani Goth - Bahawalpur (N-5) | III (F) | 15849 | 24000 | 0.66 |
| 25 - 121 | Bahawalpur - Lodhran (N-5) | III (F) | 13857 | 24000 | 0.58 |
| 19 - 61 | Gujranwala - Wazirabad (N-5) | III (F) | 16122 | 24000 | 0.67 |
| 61 - 12 | Wazirabad - Lahore (N-5) | III (F) | 20403 | 24000 | 0.85 |
| 11 - 204 | Jhelum - Kharian (N-5) | III (F) | 16328 | 24000 | 0.68 |
| 204 - 12 | Kharian - Gujrat (N-5) | III (F) | 16162 | 24000 | 0.67 |
| 11 - 93 | Jhelum - Chakwal (N-5) | III (H) | 20199 | 24000 | 0.84 |
| 93 - 57 | Chakwal - Mandra (N-5) | III (H) | 18502 | 24000 | 0.77 |
| 57 - 10 | Mandra - Rawalpindi (N-5) | III (F) | 15831 | 24000 | 0.66 |
| 55 - 9 | Hassanabdal - Attock (N-5) | III (H) | 21093 | 24000 | 0.88 |
| 62 - 60 | Khushab - Pail | V (M) | 6991 | 11618 | 0.60 |
| 60 - 92 | Pail - Chakwal | V (F) | 2471 | 4529 | 0.55 |
| 19 - 20 | Gujranwala - Sialkot | V (F) | 6590 | 11618 | 0.57 |
| 64 - 13 | Chiniot - Sargodha | IV (F) | 13071 | 20000 | 0.65 |
| 39 - 118 | Karachi - Kotri (N-5) | II (F) | 22753 | 24000 | 0.95 |
| 33 - 87 | Hyderabad - Hala (N-5) | III (F) | 13469 | 24000 | 0.56 |
| 87 - 86 | Hala - Sakrand (N-5) | III (F) | 13480 | 24000 | 0.56 |
| 86 - 102 | Sakrand - Moro (N-5) | III (F) | 13710 | 24000 | 0.57 |
| 102 - 32 | Moro - Khairpur (N-5) | III (F) | 12319 | 24000 | 0.51 |
| 32 - 29 | Khairpur - Rohri (N-5) | III (F) | 20069 | 24000 | 0.84 |
| 29 - 82 | Rohri - Ubauro (N-5) | III (F) | 16064 | 24000 | 0.67 |
| 28 - 84 | Shikarpur - Kandhkot (N-55) | V (F) | 6861 | 11618 | 0.59 |
| 3 - 2 | Kohat - Reshawar (N-55) | IV (M) | 17284 | 20000 | 0.86 |
| 203 - 220 | Jandala - Boundary | V (M) | 2425 | 4529 | 0.54 |

Source: JICA Study Team

## 1.5 Road Sector Performance

### 1.5.1 Policy and Strategy for Road Development Plan

In the previous JICA study in 1983, the following policy was proposed for the comprehensive transport Master Plan upto the year 2000.

- Investment balance between infrastructure and equipment of each transport mode matching with the traffic volumes.
- Priority of investment should be given to projects having high and quick economic returns. (On the other hand, the transport investment to backward or isolated areas shall be made)
- Railways shall have major responsibility for the freight transport of long distances, and to improve the railway operational system and its management.
- Maximum utilization of the existing port facility for the future development of industry and trade of Pakistan.

Under the policy above, JICA recommended the development strategy for the Sixth Five Year Plan for road modes as follows:

- Emphasis should be placed on the completion of on-going programmes.
- Improvement of major national and provincial highways should have the highest priority so that they could cater for the increased traffic.
- The National Highway N-5 should be substantially improved keeping in view the traffic requirements in various sections.
- The balance of national highway network should be established by rationalizing the existing network including the roads of national importance such as Indus Highway, RCD Highway (Quetta-Taftan Section), Quetta-D.G. Khan route and Multan-Jhang-Gujranwala route.
- East-West trunk roads should be substantially improved to cater for future international or inter regional traffic.
- Greater priority should be given to rehabilitation and improvement of other arterial roads, which contribute to economic development of the country and ensure quick economic returns.
- Construction of bridges across the major rivers/main canals and by-passes of trunk roads around big cities such as new Kotri bridge for Route N-5 and long span bridge on Sargodha-Pindi Bhattian road should be given priority for elimination of the bottlenecks.

- New roads will be provided only for opening up of hitherto isolated areas of the country.

- The pace of farm-to-market roads should be accelerated to meet with the need of rapid socio-economic development of rural areas.

- Possibility of using canal roads for public transport should be seriously examined.

Keeping in view the above factor, the Government of Pakistan selected and adopted the following policy and strategy for the Sixth Plan.

a) Completion of the on-going programme (from Fifth Plan).

b) Emphasis on the rehabilitation and capacity enhancement of the existing networks to cater for the increased traffic needs.

c) Improving and opening up of canal roads to the public wherever feasible.

d) Limiting new road projects to only cases involving opening up of isolated areas.

e) Induction of Private sector for selected major highway projects to reduce the burden on the public exchequer.

1.5.2 Sixth Plan Review

(1) Financial Status

The following policies for road improvement plan above, a total of Rs. 13.6 billion, were allocated for the Sixth Plan.

Against an allocation of Rs. 13,600 million during the Sixth Plan period, an expenditure of Rs. 11,000 million was incurred on road and bridge projects. The position is summarized in Table 1.5.1.

It can be seen from Table 1.5.1 that financial achievement of the projects for national highways and provincial roads in Punjab is less when compared with the budget allocation for others.

(2) Physical Achievements

It was proposed to construct 5,800 Kms of new roads and improve/widen about 7,860 Kms of the existing roads in the Sixth Plan. The physical estimated achievements in terms of road length as of 1987/88 can be summarized as shown in Table 1.5.2.

It is found in Table 1.5.2 that the achievement of the new construction programmes for provincial roads indicates a high percentage which is far beyond the target, while the Federal government's programmes show a very low progress. Judging from a deviation of the Status of the financial and physical achievement from the initial targets, it should be noted that some more appropriate balance of investment among each road development programmes must be considered and carried over to the Seventh Plan.
The major works completed during the period were:-

(a) D.I. Khan and Ghazi Ghat Bridges.

(b) Rehabilitation of 150 Kms of National Highways in Punjab, 56 Kms in NWFP and 105 Kms in Sind, under the project financed by the World Bank (Third Highway Project).

(c) Construction of 35 Kms of additional carriageway between Peshawar and Nowshera.

(d) Five overhead bridges (Amangarh, Wan Radha Ram, Channi Ghot, Kharian and Adamwan)

Fig. 1.5.1 shows the location of proposed Plan of Action for the Sixth Plan by JICA Study in 1983, while Fig. 1.5.2 shows the actual location of the major projects on the selected study network in this study.

Table 1.5.1 Financial Achievements

| | Plan Allocation (Rs. Million) | Expenditure (Rs. Million) | Utilization (%) |
|---|---|---|---|
| 1. FEDERAL | | | |
| (a) National Highways and Bridges | 5,959 | 3,813 | ( 64) |
| (b) F.W.O. | 170 | 249 | (147) |
| (c) N.L.C. | - | 152 | - |
| (d) Roads in Special Areas | 1,930 | 2,024 | (105) |
| Sub-Total (Federal) | 8,059 | 6,238 | ( 77) |
| 2. PROVINCIAL | | | |
| (a) Punjab | 2,300 | 1,707 | ( 74) |
| (b) Sind | 1,720 | 1,483 | ( 86) |
| (c) NWFP | 1,065 | 1,041 | ( 98) |
| (d) Baluchistan | 456 | 510 | (112) |
| Sub-Total (Provincial) | 5,541 | 4,741 | ( 86) |
| Grand Total | 13,600 | 10,979 | ( 81) |

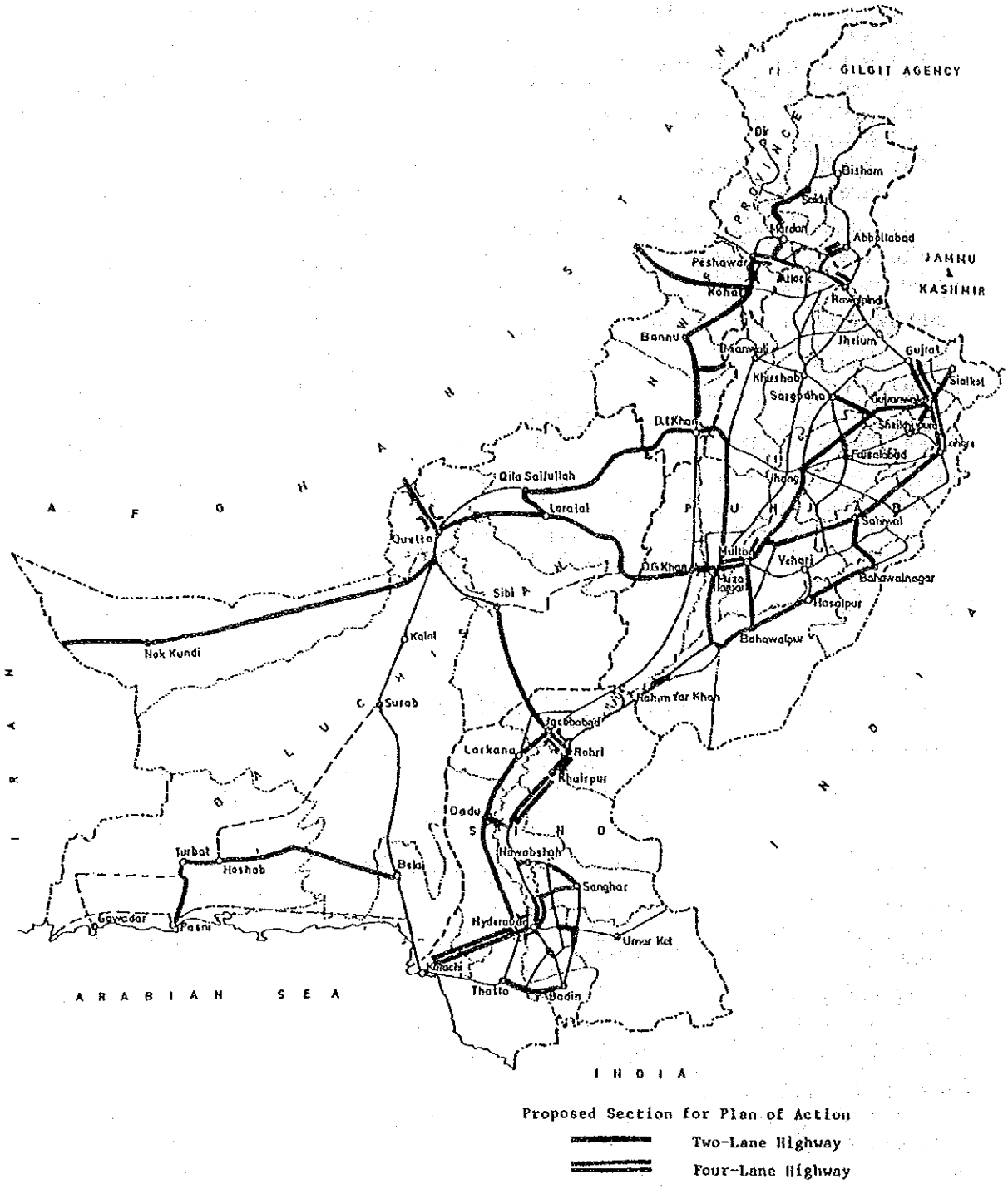
Source: PDD

Table 1.5.2 Physical Achievements

| Items | Sixth Plan Target | Achievement as of 1985/86 | | Estimated Achievement at End of 6th Plan | |
|---|---|---|---|---|---|
| | Kms | Kms | (%) | Kms | (%) |
| Roads (Federal) | | | | | |
| New construction | 1,865 | 112 | ( 6) | 512 | ( 27) |
| Rehabilitation | 2,975 | 626 | ( 21) | 2,104 | ( 71) |
| Roads (Provinces) | | | | | |
| New construction | 1,023 | 1,521 | (149) | 2,113 | (207) |
| Rehabilitation | 4,048 | 2,432 | ( 60) | 3,687 | ( 91) |
| Roads in Special Areas | | | | | |
| New construction | 2,912 | 1,420 | ( 49) | 2,774 | ( 95) |
| Rehabilitation | 837 | 257 | ( 31) | 768 | ( 92) |
| Total | | | | | |
| New construction | 5,800 | 3,053 | ( 53) | 5,399 | ( 93) |
| Rehabilitation | 7,860 | 3,315 | ( 42) | 6,559 | ( 83) |

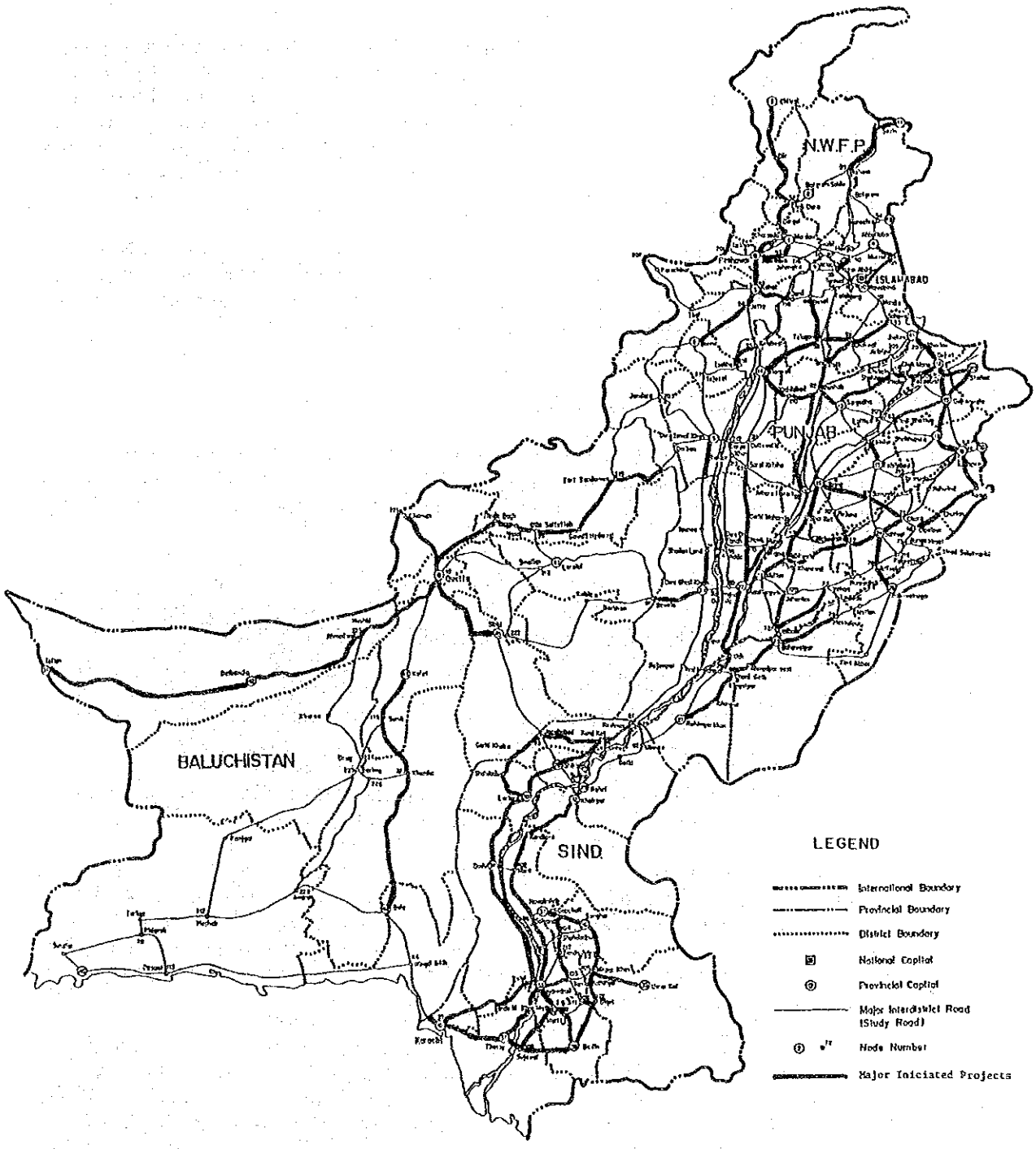
Source: PDD

Fig.1.5.1 Location Map of Action Plan for the 6th Five Year Plan Proposed by JICA Study in 1983




Source: The Study on National Transport Plan, JICA, May 1983

Fig. 1.5.2 Location Map of Major Iniciated Projects in the 6th Five Year Plan



## 1.6 Costs

### 1.6.1 Expenditures on Road Sector

(1) Historical Size of Five Year Plan

The relative magnitude of expenditures on roads is shown by the proportion it forms of the overall plan size and provision for transport and communications sector. Fig. 1.6.1 shows the historical changes in plan size from the First Five Year Plan and a detail of modal allocation of the transport sector plan in the Sixth Plan. A total of Rs. 13.6 billion was allocated for the road sector during the Sixth Plan period.

As a historical growth, it indicates that the expenditure on construction and maintenance of roads increased from an average of Rs. 539 million per year during 1970-75 to Rs. 1,405 million per year during 1975-80, and Rs. 2,948 million in 1984-85.

(2) Details of Road Expenditures

Table 1.6.1 shows details of estimated total, federal, provincial and local government expenditures, which included construction, maintenance and administration on roads in Pakistan between 1982/83 and 1984/85.

The data are summarized below in Rs. million:

| Year | Construction | Maintenance | Administration | Total |
|---|---|---|---|---|
| 1982/83 | 2,416 | 497 | 294 | 3,207 |
| 1983/84 | 2,907 | 541 | 383 | 3,830 |
| 1984/85 | 3,086 | 790 | 460 | 4,337 |

The average annual expenditure is approximately Rs. 4,100 million at 1985/86 price[1/].

The annual expenditure in the last three years has increased at an annual growth rate of 8%. The percentage allocation by works of each government agencies is shown in Table 1.6.2. It is indicated that nearly 3-quarters of the annual expenditure has been expended on the construction works under the new road construction or road improvement programme.

While, comparing the percentage allocation by each province, expenditures by Federal and Provincial government were distributed for 51 percent in Punjab, 19 percent in Sind, 18 percent in NWFP, and 12 percent in Baluchistan. This distribution can be compared with various other indicators related to road infrastructural investment for each of the provinces as shown in Table 1.6.3.

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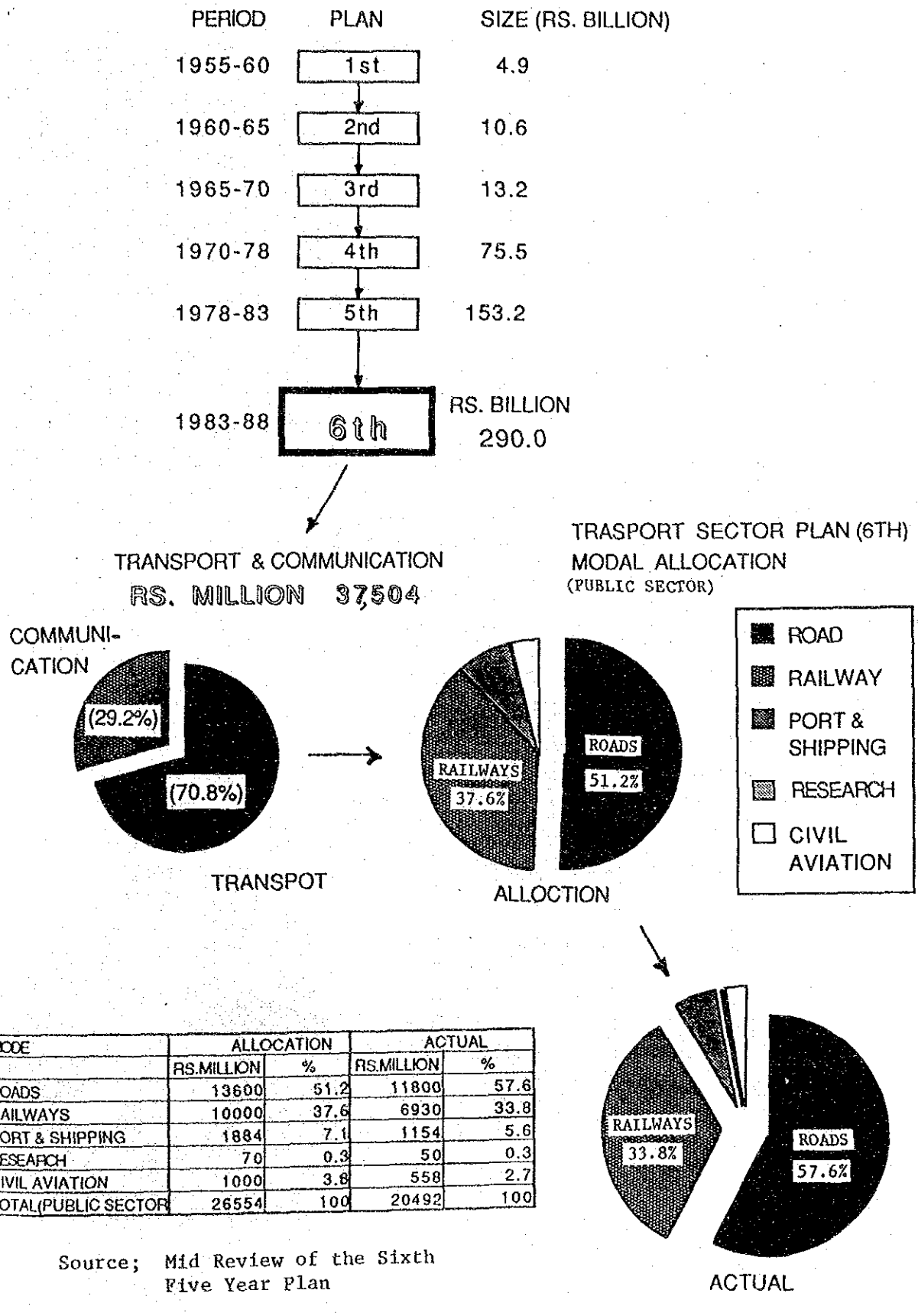
1/ Deflator for estimation of 1985/86 price is shown in Table 1.6.1.

Fig. 1.6.1 Size of Five Year Plan




| MODE | ALLOCATION | | ACTUAL | |
|---|---|---|---|---|
| | RS.MILLION | % | RS.MILLION | % |
| ROADS | 13600 | 51.2 | 11800 | 57.6 |
| RAILWAYS | 10000 | 37.6 | 6930 | 33.8 |
| PORT & SHIPPING | 1884 | 7.1 | 1154 | 5.6 |
| RESEARCH | 70 | 0.3 | 50 | 0.3 |
| CIVIL AVIATION | 1000 | 3.8 | 558 | 2.7 |
| TOTAL(PUBLIC SECTOR | 26554 | 100 | 20492 | 100 |

Source; Mid Review of the Sixth Five Year Plan

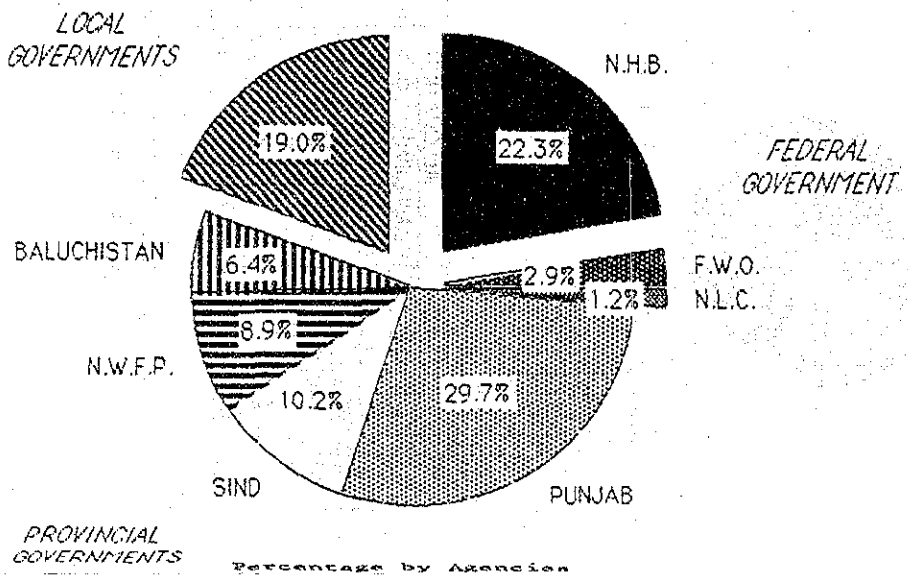
## Table 1.6.1 Expenditure on Roads

(Million Rs.)

| AGENCY | | CONSTRUCTION | | | MAINTENANCE | | | ADMINISTRATION | | | TOTAL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1982-83 | 1983-84 | 1984-85 | 1982-83 | 1983-84 | 1984-85 | 1982-83 | 1983-84 | 1984-85 | 1982-83 | 1983-84 | 1984-85 | AVERAGE |
| FEDERAL GOVERNMENT | N.H.B. - DIRECT | 150.0 | 230.7 | 161.0 | --- | --- | 1.0 | 2.0 | 1.6 | 1.7 | 152.0 | 232.3 | 163.7 | 182.7 |
| | - PUNJAB | 228.0 | 272.0 | 330.0 | 18.8 | 20.3 | 26.1 | 2.5 | 2.5 | 2.5 | 249.3 | 294.8 | 358.6 | 300.9 |
| | - SIND | 76.0 | 93.0 | 167.0 | 12.0 | 12.0 | 16.0 | --- | --- | --- | 88.0 | 105.0 | 183.0 | 125.3 |
| | - N.W.F.P. | 131.0 | 114.4 | 167.0 | 8.0 | 8.0 | 9.0 | --- | --- | --- | 139.0 | 122.4 | 176.0 | 145.8 |
| | - BALUCHISTAN | 51.3 | 62.1 | 110.0 | 14.0 | 15.0 | 28.0 | --- | --- | --- | 65.3 | 77.1 | 138.0 | 93.5 |
| | - SUB TOTAL | 636.3 | 772.2 | 935.0 | 52.8 | 55.3 | 80.1 | 4.5 | 4.1 | 4.2 | 693.6 | 831.6 | 1019.3 | 848.2 |
| | F.W.O. | 100.0 | 125.0 | 42.1 | 20.0 | 19.0 | 22.0 | --- | --- | --- | 120.0 | 144.0 | 64.1 | 109.4 |
| | N.L.C. | 43.4 | 21.5 | 9.5 | 5.0 | --- | 40.5 | 9.2 | --- | --- | 57.6 | 21.5 | 50.0 | 43.0 |
| | TOTAL | 779.7 | 918.7 | 986.6 | 77.8 | 74.3 | 142.6 | 13.7 | 4.1 | 4.2 | 871.2 | 997.1 | 1133.4 | 1000.6 |
| PROVINCIAL GOVERNMENTS | PUNJAB | 759.8 | 933.5 | 818.7 | 142.6 | 166.4 | 180.8 | 84.1 | 106.6 | 109.8 | 986.5 | 1206.5 | 1109.3 | 1100.8 |
| | SIND | 270.1 | 273.7 | 322.8 | 55.8 | 59.8 | 64.0 | 27.5 | 36.5 | 48.4 | 353.4 | 370.0 | 435.2 | 386.2 |
| | N.W.F.P. | 188.0 | 172.4 | 168.9 | 61.5 | 80.8 | 134.9 | 59.8 | 63.3 | 79.4 | 309.3 | 316.5 | 383.2 | 336.3 |
| | BALUCHISTAN | 59.4 | 79.1 | 63.8 | 86.8 | 57.5 | 86.5 | 67.9 | 109.3 | 111.1 | 214.2 | 245.9 | 261.4 | 240.5 |
| | TOTAL | 1277.3 | 1458.7 | 1374.2 | 346.7 | 364.5 | 466.2 | 239.3 | 315.7 | 348.7 | 1863.4 | 2138.9 | 2189.1 | 2063.8 |
| LOCAL GOVERNMENTS | PUNJAB | 295.0 | 432.8 | 583.8 | 55.6 | 73.6 | 132.2 | 29.8 | 41.0 | 71.8 | 380.4 | 547.4 | 787.8 | 571.9 |
| | SIND | 16.9 | 23.8 | 30.5 | 5.5 | 11.2 | 24.3 | 5.4 | 8.8 | 14.3 | 27.8 | 43.8 | 69.1 | 46.9 |
| | N.W.F.P. | 44.8 | 67.4 | 105.1 | 9.3 | 14.7 | 20.8 | 4.6 | 9.0 | 15.7 | 58.6 | 91.1 | 141.6 | 97.1 |
| | BALUCHISTAN | 2.5 | 5.4 | 6.0 | 1.9 | 2.2 | 4.3 | 1.5 | 4.2 | 5.5 | 5.9 | 11.8 | 15.8 | 11.2 |
| | TOTAL | 359.2 | 529.4 | 725.4 | 72.3 | 101.7 | 181.6 | 41.3 | 63.0 | 107.3 | 472.7 | 694.1 | 1014.3 | 727.0 |
| GRAND TOTAL | | 2416.2 | 2906.8 | 3086.2 | 496.8 | 540.5 | 790.4 | 294.3 | 382.8 | 460.2 | 3207.3 | 3830.1 | 4336.8 | 3791.4 |

Source: JICA Study Team, using the figures shown in Appendix Table 19, Transport Sector Profile






### Total Expenditure on Roads (85/86 Price)

(Million Rs.)

| AGENCY | | Total Expenditure on Road | | | |
|---|---|---|---|---|---|
| | | 1982-83 | 1983-84 | 1984-85 | AVERAGE |
| FEDERAL GOVERNMENT | N.H.B. - DIRECT | 180.7 | 244.4 | 168.0 | 197.7 |
| | - PUNJAB | 296.4 | 310.1 | 367.9 | 324.8 |
| | - SIND | 104.6 | 110.5 | 187.8 | 134.3 |
| | - N.W.F.P. | 165.3 | 128.8 | 180.6 | 158.2 |
| | - BALUCHISTAN | 77.6 | 81.1 | 141.5 | 100.1 |
| | - SUB TOTAL | 824.7 | 874.8 | 1045.8 | 915.1 |
| | F.W.O. | 142.7 | 151.5 | 65.8 | 120.0 |
| | N.L.C. | 68.5 | 22.6 | 51.3 | 47.5 |
| | TOTAL | 1035.9 | 1048.9 | 1162.9 | 1082.6 |
| PROVINCIAL GOVERNMENTS | PUNJAB | 1172.9 | 1269.2 | 1138.1 | 1193.4 |
| | SIND | 420.2 | 389.2 | 446.5 | 418.6 |
| | N.W.F.P. | 367.8 | 333.0 | 393.2 | 364.6 |
| | BALUCHISTAN | 254.7 | 258.7 | 268.2 | 260.5 |
| | TOTAL | 2215.6 | 2250.1 | 2246.0 | 2237.2 |
| LOCAL GOVERNMENTS | PUNJAB | 452.3 | 575.9 | 808.3 | 612.1 |
| | SIND | 33.1 | 46.1 | 70.9 | 50.0 |
| | N.W.F.P. | 69.7 | 95.8 | 145.3 | 103.6 |
| | BALUCHISTAN | 7.0 | 12.4 | 16.2 | 11.9 |
| | TOTAL | 562.0 | 730.2 | 1040.7 | 777.6 |
| GRAND TOTAL | | 3813.5 | 4029.3 | 4449.6 | 4097.5 |

**Deflator (Construction)**

| | Price Index |
|---|---|
| 1975/76 | 59.0 |
| 1976/77 | 66.5 |
| 1977/78 | 70.7 |
| 1978/79 | 76.4 |
| 1979/80 | 75.5 |
| 1980/81 | 76.2 |
| 1981/82 | 79.1 |
| 1982/83 | 84.1 |
| 1983/84 | 95.1 |
| 1984/85 | 97.4 |
| 1985/86 | 100.0 |

Table 1.6.2 Percentage by Works

| Government Agencies | Construction | Maintenance | Administration | Total |
|---|---|---|---|---|
| Federal Government | 89.5 | 9.8 | 0.7 | 100 |
| Provincial Government | 66.4 | 19.0 | 14.6 | 100 |
| Local Government | 74.0 | 16.3 | 9.7 | 100 |
| Average | 74.0 | 16.0 | 10.0 | 100 |

Source: JICA Study Team, using the figures in Table 1.6.1.

Figure in Table shows the average past three years (1982/83 - 1984/85)

Fig. 1.6.2, derived from Table 1.6.3, shows the unit expenditure of the five items which are total road lengths, paved road lengths, paved areas, vehicles on roads and population in each province for a comparison of Provincial allocations on the same basis. Judging from the comparison of items above, Sind province has been allocated comparatively small allocations, while, N.W.F.P. and Baluchistan Provinces indicate larger allocations than others in terms of percentage allocations within the limited budget.

## 1.6.2 Construction Costs

A standard construction cost of the roads in Pakistan was estimated by using various cost data from the on-going or the completed projects which are summarized in Table 1.6.4. Comparing unit costs of the typical estimated data, the unit construction cost per km estimated by NTRC using national-wide survey results seems to be quite low because it is based on the classical local construction method, while the estimated costs shown in Fourth Highway Project or that in the study report on Road User's Charge are high because they are based on new specifications.

As a result, the following unit construction costs were estimated as a guide line figure for new road construction;

| Category | Carriage width (m) | Guideline - Unit Cost (million Rs per km) | Standard Axles ($x10^6$) |
|---|---|---|---|
| I | 7.3 x 2 | 12.0 | 40 - |
| II | 7.3 | 6.0 | 40 - 10 |
| III | 7.3 | 5.2 | 10 - 6.0 |
| IV | 6.0 | 4.4 | 6.0 - 1.0 |
| V | 3.75 | 2.7 | - 1.0 |

Table 1.6.5 shows the unit rate of the typical work items of the road construction and Fig. 1.6.3 shows the road construction cost per km (national average) by each category of road.

Table 1.6.3 Expenditure and Various Indicators

| Items | | Punjab | Sind | N.W.F.P. | Baluchistan | Total |
|---|---|---|---|---|---|---|
| Expenditure 1/ | Mill.Rs. | 1402 | 512 | 482 | 334 | 2730 |
| | % | 51 | 19 | 18 | 12 | 100 |
| Total Road Length 2/ | Km | 16627 | 11764 | 8148 | 13528 | 50067 |
| | % | 33 | 24 | 16 | 27 | 100 |
| Paved Road Length 3/ | Km | 16182 | 8485 | 4257 | 3307 | 32231 |
| | % | 50 | 27 | 13 | 10 | 100 |
| Paved Area 4/ | Sq.m | 76055.4 | 37334 | 20433.6 | 13228 | 147051 |
| | % | 52 | 25 | 14 | 9 | 100 |
| Vehicles on Roads 5/ | Veh. | 464586 | 362388 | 85908 | 29396 | 942278 |
| | % | 49 | 39 | 9 | 3 | 100 |
| Population 6/ | 1000 persons | 47633 | 19029 | 13260 | 4332 | 84254 |
| | % | 56 | 23 | 16 | 5 | 100 |

Source:

1/ Average annual expenditures of Federal and Provincial Government (1982/83 - 1984/85), Refer to Table 1.6.1

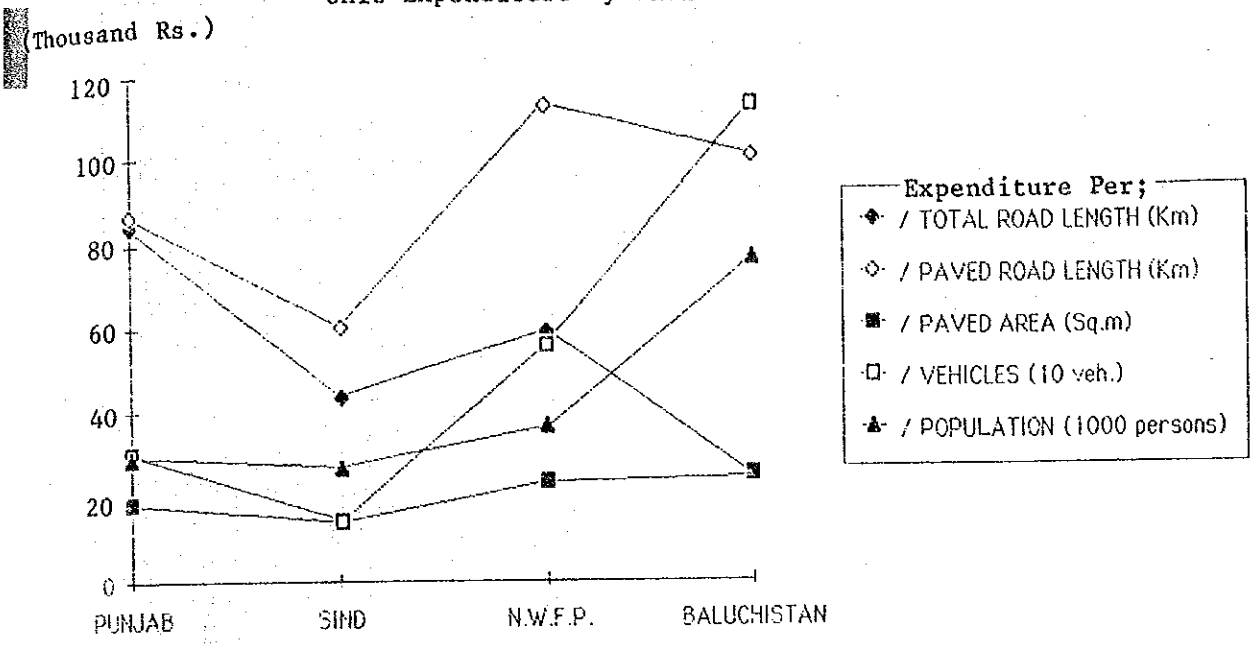
2/, 3/, 4/ Length shows National and Provincial highways, Refer to Table 1.3.1

5/ Transport Statistics 1984, NTRC

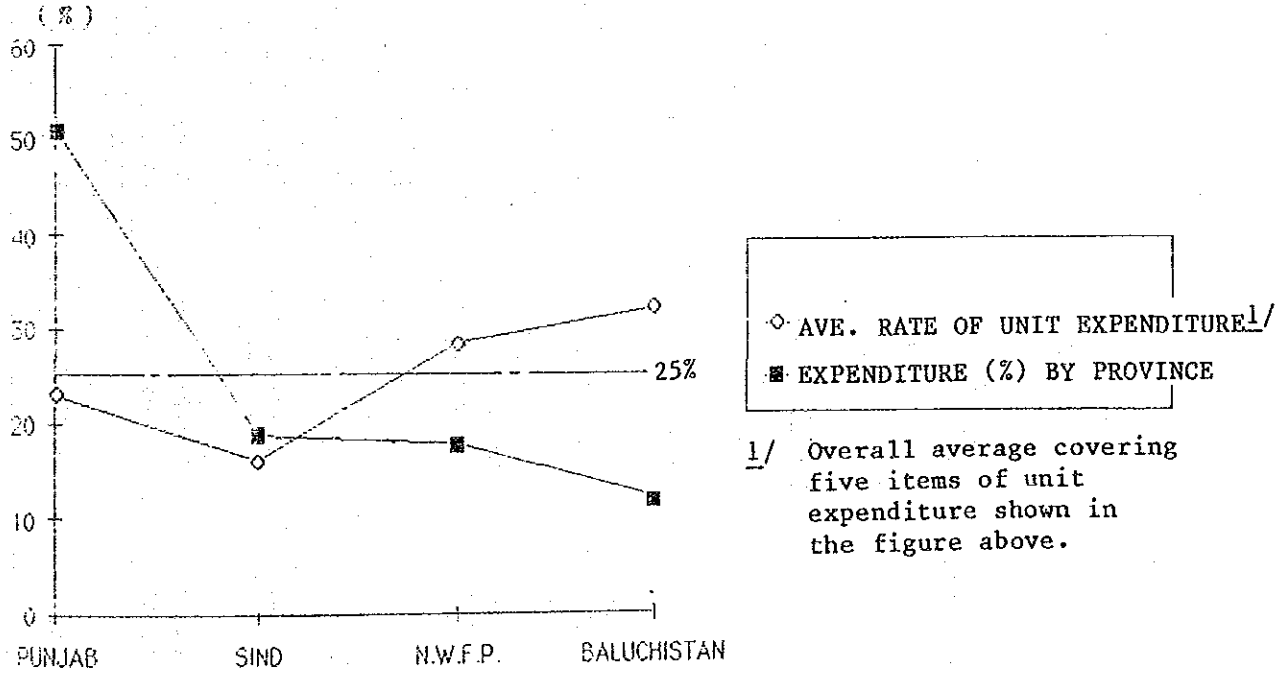
6/ 1980/81 Census

Fig. 1.6.2 Unit Expenditure

Unit Expenditure by Individual Items




Comparison of Percentage of Average Annual Road Expenditure and Overall Unit Expenditure by Province




1/ Overall average covering five items of unit expenditure shown in the figure above.

Source: JICA Study Team, using Table 1.6.3

Table 1.6.4 Comparison of Road Construction Cost per km

| Project | | | Source | Length | Cost | Unit Cost |
|---|---|---|---|---|---|---|
| Category | Section | Condition | | (Km) | (Million Rs.) | (Million Rs./Km) |
| Additional Carriageway (Forth Highway Project) 1/ | Karachi-Kotori (Phase I) | Additional Carrige way (7m) | Appraisal Report (IBRD) Jan '87 | 68.0 | 369.0 | 5.4 |
| | (Phase II) | | | 67.0 | 337.0 | 5.0 |
| | Mianchannu - Sahiwal | | | 81.0 | 473.0 | 5.8 |
| Additional Carriageway | Nowshera - Peshawar | Rural 7.3 m<br>Urban 11.0 m<br>AC Base | PWD-N.W.F.P '85 | 35.4 | 186.2 | 5.3 |
| Rehabilitaion of N-5 | Khanewal - Sahiwal | Overlay (6.2 m)<br>AC 8 cm | NHB | 120.0 | 293.8 | 2.4 |
| Rehabilitation of N-5 | Gujranwala - Lalamusa | Overlay (7.3 m)<br>AC 8 cm | NHB | 38.8 | 77.2 | 2.0 |
| Overlay N-5 | Nowshera - Peshawar | Wearing 4-5 cm<br>AC Base 6 cm | PWD-N.W.F.P. Feb '85 | 35.4 | 53.3 | 1.5 |
| Black Topping | Khanozai - Surkhab | Black Top (6.1 m)<br>Base 7.5 cm<br>Surface Treatment | PWD - Baluchistan | 21.3 | 20.0 | 0.9 |
| Improvement of N-40 | Quetta-Nushki - Taftan | Black Top (6.1 m) | PWD - Baluchistan | 14.0 | 22.0 | 1.6 |
| Widdening & Improvement | Muzaffar Garh Bewata Rd | Water Bound Macadam Base (10 cm)<br>Surface Treatment | Feasibility Study Punjab Highway Department | 56.4 | 67.0 | 1.2 |
| Construction | Jhol - Nauabad | 3.6 m Carriageway | PWD-Sind | 27.4 | 26.6 | 1.0 |

1/ Preliminary estimate, base costs June 1986 excluding Supervision and contingencies.

Table 1.6.5 Comparison of Unit Rates

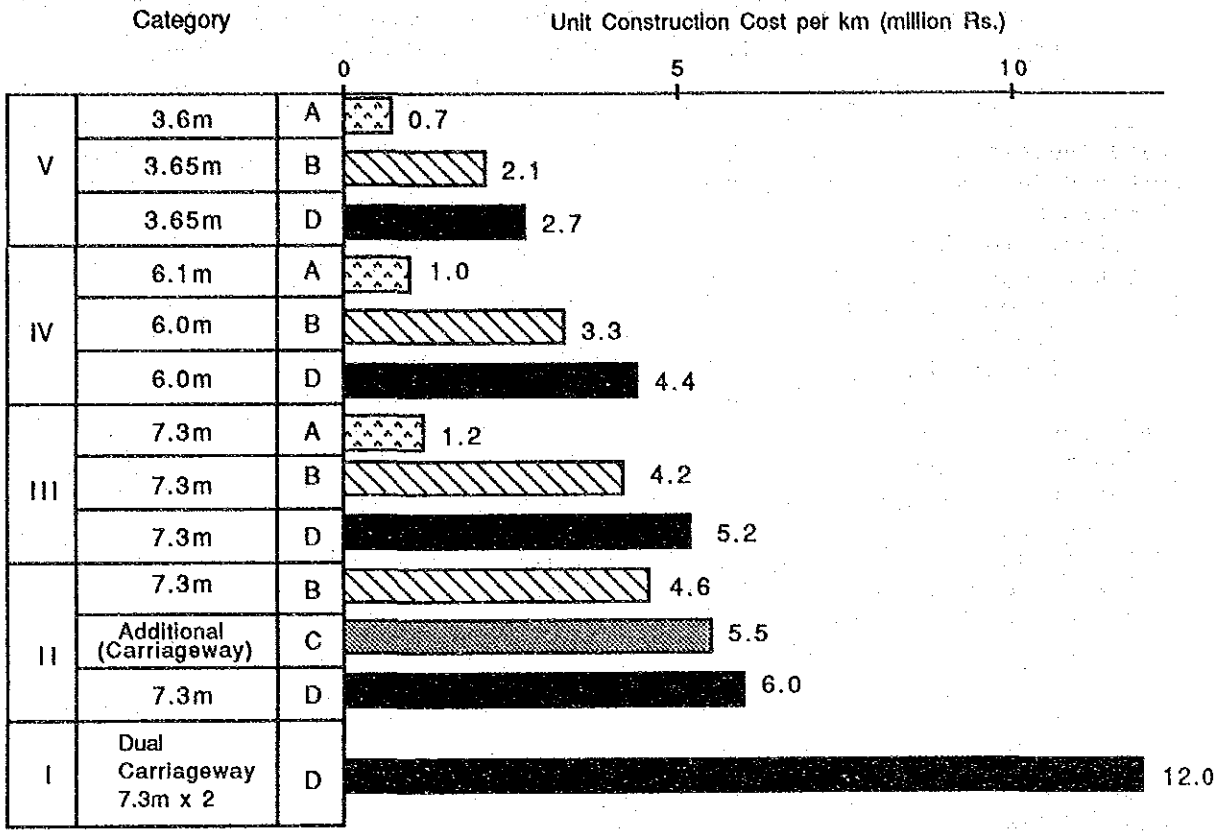
| Item | Unit | Rate Rupees 4th Highway Project 1/ | Road User's Charge 2/ | Unit Construction Cost 3/ |
|---|---|---|---|---|
| Land Aquisition | Km | | | 75,000 |
| D/D and Survey | Km | | | 5,000 |
| Earthwork | | | | |
| Clearing/Grubbing | $m^2$ | 3.9 | 5.0 | |
| Embankment | $m^3$ | | 72.0 | 9.0 |
| (Common Exca.) | $m^3$ | 44.4 | | |
| (Rock Exca.) | $m^3$ | 128.6 | | |
| (Borrow Exca.) | $m^3$ | 58.3 | | |
| Pavement | | | | |
| Sub base (Aggregate) | $m^3$ | 269.8 | | 255.0 |
| Base Course (Aggregate) | $m^3$ | 276.6 | 350.0 | 295.0 |
| Prime Coat | $m^2$ | 12.7 | 15.0 | |
| Tack Coat | $m^2$ | 4.8 | 5.0 | |
| Wearing Course (AC) | ton | 508.8 | | |
| D. Surface Treatment | $m^3$ | | 1,225.0 | |
| | $m^2$ | *36.6 | 35.0 | 32.0 |
| Structures | | | | 90,000 |
| Bridge & Culverts | Km | 433,000 | 250,000 - 500,000 | |
| Drainage & Safety Devices | Km | 16,300 | 20,000 - 40,000 | 6,300 |

1/ Source: 4th Highway project PC-1 PROFORMA, NOV. 1986 NHB, Averaged unit Rate Section 1 - 8

2/ Source: Road User charges in Pakistan (Draft Final Report) Jan. 1987, NTRC

3/ Source: Unit Cost of Construction of Roads in Pakistan, Aug. 1986, NTRC, Averaged Unit Rate of 4 Provinces

Fig. 1.6.3 Comparison of Road Construction Cost by Category of Road




A : Estimated Average Unit Cost (4 provinces) using "Unit Cost of Road in Pakistan", Aug. 1986, NTRC

B : Estimated Unit Cost by "Road User Charges in Pakistan", Draft Final Report, Jan. 1987, NTRC

C : Estimated Unit Cost by 4th Highway Project, Appraisal Report, Jan. 1987, IBRD

D : Guideline-Unit Cost used in this study (1985/86 price)

1.6.3 Maintenance Costs

The National Highways Board provided to the Provincial Communications and Works Departments funds for maintenance of National Highways at the following rates.

Table 1.6.6 Maintenance Expenditure Yardstick for National Highway's Rs. per Kilometer of 10 Ft. Equivalent Width

Rupees

| Sl. No. | Province | 1983-84 | 1984-85 | 1985-86 |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| 1. | Punjab | 12,500 | 9,480 | 10,483 |
| 2. | Sind | 12,500 | 9,306 | 10,268 |
| 3. | NWFP | 16,386 | 10,223 | 11,193 |
| 4. | Baluchistan | 12,166 | 9,331 | 10,121 |

Source: Road User charges in Pakistan (Draft Find Report) January, 1987

The current maintenance rates are Rs. 13,200 per Km of 10 feet (3m) equivalent width for N-5 and similar roads. Rs. 13,500 for difficult areas, Rs. 10,500 for N-50 and Rs. 6,870 for shingle roads. The Report on Road User Charge estimated that the average maintenance cost on all roads in Pakistan could be Rs. 10,000 per Km for 10 foot width. This average maintenance cost is equivalent to Rs. 20,000 per Km for Category IV road (6.0 Carriageway width) which is less than 1% of initial construction cost. This is too small to keep the normal maintenance operation for the highway.

Generally, for all types of asphalt roads, the maintenance costs over the first 25 years of their life can be expected equal to about half the initial of building the pavement. And annual average highway maintenance cost is estimated at 2 - 3% of the initial cost of construction of the highway.

## 1.7 Road and Operations

### 1.7.1 Construction Practice

It has been a difficult task to develop the road infrastructures in Pakistan due to various inherent geographical, technical, financial and other constraints. An classical and historical construction method had been taken for road construction work, which had been initially constructed by water-bound macadam base so called double or triple surface treatment on poorly compacted subgrade. It has affected damage on the pavement surface and reduced its pavement strength due to the rapid growth in road traffic recently, and the high proportion of heavily-laden trucks in the traffic flow.

Under these circumstances, the several highway improvement programmes are being processed by the Government, introducing modern highway construction methods.

The National Highway Board (NHB), under the Ministry of Communications, was established in 1979 to be responsible for the major inter-provincial routes was designated as National Highways and began an extensive programme of rebuilding N-5. As of the total of about 580 km had been reconstructed according to modern specifications.

NHB has usually awarded contracts for large reconstruction works directly to contractors, but for smaller works uses the Provincial Communications and Works Departments (C&Ws) as agents. NHB has been able to provide both sufficient volumes and continuity of works and technical assistance so that several Pakistani contracting firms are now competent to reconstruct or overlay roads in aggregate, between 15-25 kms of highway per month using modern techniques.

### 1.7.2 Road Maintenance

Highway maintenance is defined as the preserving and keeping of each roadway, structure, and facility as nearly as possible in its original condition as constructed or as subsequently improved and such additional work as is necessary to keep traffic moving safety. The most critical responsibilities in performing maintenance procedure lies in the maintenance and repair of pavement and structure. The road transport agency must maintain and repair highways so that it is free of damages for all who use it in a way normally expected of them.

According to the NTRC records, the average maintenance expenditure for the Pakistan's roads during the past 3 years was Rs. 610 millions which occupies approximately 16% of total annual expenditure as seen from Table 4.2.7.5 in Section 4.2.7 (2). However, above proper maintenance works have not been performed in Pakistan due to various reasons.

NHB has used the Provincial C&Ws as agents for maintaining those sections of the National Highways within each Province by these bodies, with their labor intensive methods, low technical standards and poor quality control measures, and do not have the skills or capacity to provide the standard of maintenance now needed.

For budgeting purposes and for distribution of maintenance funds, the Government and National Highways Board make use of a "Yardstick" system, which contains a set of formulae for estimating quantities for costs of a number of key items of maintenance work. However, this system is based on very few variable parameters, mainly pavement widths and terrain, and thus does not at all reflect the many other variables between regions, such as traffic, climate, axle loads, etc. Further more, it distributes the allocated annual funds equally to all roads within the same category irrespective of the road variable pavement conditions and other actual maintenance needs.

It is expected that the maintenance system will be modernized, and the maintenance budget will be rationalized by providing maintenance funds on the basis of actual field measurements and monitoring field parameters, instead of the yardstick basis.

## 1.8 Problem Areas

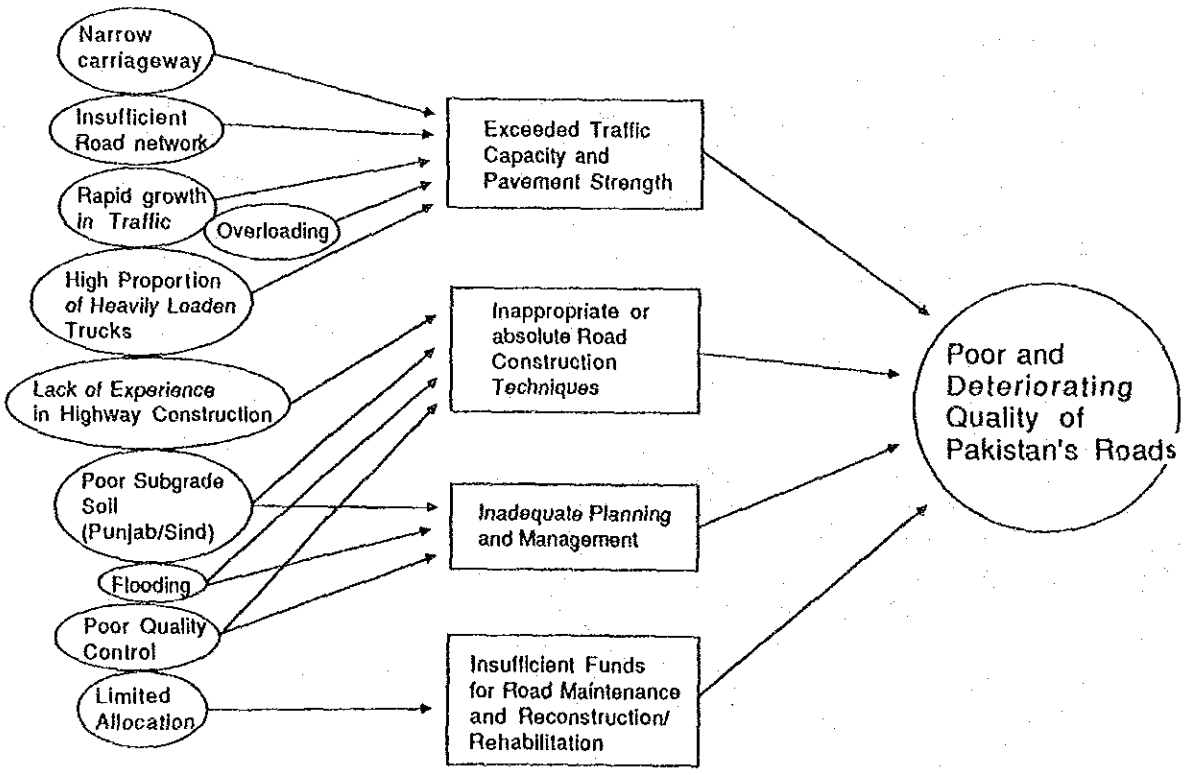
### 1.8.1 General

The following four major factors accounting for the poor and deteriorating quality of Pakistan's roads;

- the rapid growth in traffic during the past 15 years, and the high proportion of heavy-laden trucks in the traffic flows;
- expenditures in road maintenance, and reconstruction/ rehabilitation far below standards required by traffic growth;
- inadequate planning and management of highway development; and
- inappropriate or obsolete road construction techniques.

The other factors accounting for these problems are illustrated in Fig. 1.8.1.

Fig. 1.8.1 Major Factor Accounting for Poor and Deteriorating Quality



## 1.8.2 Pavement Conditions

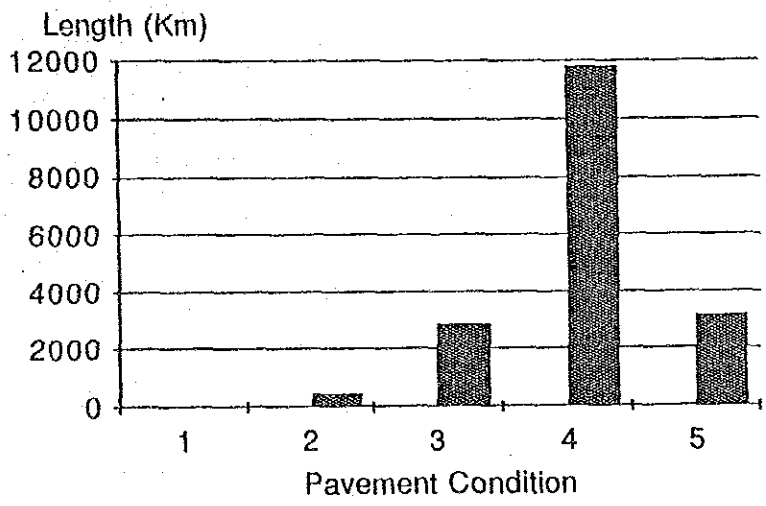
It was observed by the site reconnaissance, that approximately 15,000 kms of existing major highways belong to the "Poor" group to surface condition which amount to 80% of the total study road (8,284 kms). These problems have been caused by poor design, construction, quality control and maintenance. The summary of the surface conditions of the study roads is shown in 1.8.2. The highway sections belonging to the "poor" group must be improved by the rehabilitation programmes so that the proper traffic service can be maintained.

Fig. 1.8.2 Pavement Conditions of the Study Road

(Km)

| | National Highway | | | | | | Provincial Highway | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pavement Condition | | | | | | Pavement Condition | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | Sub Total | 1 | 2 | 3 | 4 | 5 | Sub Total | |
| | 0 | 35 | 85 | 37 | 0 | 157 | 0 | 0 | 0 | 0 | 0 | 0 | 157 |
| | 0 | 310 | 0 | 0 | 0 | 310 | 0 | 0 | 0 | 0 | 0 | 0 | 310 |
| | 0 | 70 | 187 | 414 | 204 | 875 | 0 | 0 | 74 | 818 | 21 | 913 | 1788 |
| | 0 | 0 | 417 | 1699 | 243 | 2359 | 0 | 50 | 752 | 3603 | 729 | 5134 | 7493 |
| | 0 | 0 | 310 | 816 | 895 | 2021 | 0 | 0 | 1037 | 4425 | 1053 | 6515 | 8536 |
| | 0 | 415 | 999 | 2966 | 1342 | 5722 | 0 | 50 | 1863 | 8846 | 1803 | 12562 | 18284 |

| SURFACE CONDITION | | ROUGHNESS |
|---|---|---|
| 1 | GOOD | - 2500 |
| 2 | FAIRLY GOOD | 2500 - 3000 |
| 3 | FAIR | 3000 - 4000 |
| 4 | POOR | 4000 - 6000 |
| 5 | VERY POOR | 6000 - |




Source: JICA Study Team

1.8.3 Design and Construction Problems

Accompanying development of the mortalization in Pakistan, the several highway improvement programmes are being proceeded by the Government introducing modern highway construction methods.

However, since the modern construction technique has just been introduced recently, the method of road construction in local area is not modernized and standardized yet. It was seen through the site reconnaissance conducted that some of the highway sections in the country are well constructed and maintained, but majority of them are poor and deteriorating.

It should be noted that a good road construction is not only based on the modern construction techniques but also to proper design and supervision as well. As a result of survey, many problem areas are founded. The major factor accounting for these problems concerning the construction and design of Pakistan highways can be summarized and categorized as follows:

(1) Design Problems

- Poor, drainage system design.
  (median drainage/side ditch/bridge surface drainage)
- Few drainage pipe and box culverts
- Poor vertical alignment
  (many sag and crests within one horizontal curve)
- Low formation level
- Poor horizontal alignment in Hilly or mountainous areas
- No proper superelevation rate
- Low cross fall rate for carriageway and shoulder
- Lack of bridges crossing wadi
- Lack of design for road safety devices
- No slope protection design for cut sections.

(2) Construction Problems

- No qualified supervisor for road construction works.
- Poor curve setting
- Overlay/widening method on the existing poor roads (Overlay and widening projects should be combined with rehabilitation programmes including vertical and horizontal re-alignment).
- Quality control for coarse aggregate for pavement layers
  (Specified size of aggregate should be kept by screening)
- Lack of experience in mix design and construction of asphalt concrete pavements[1/]
- Poor construction equipment for compaction and surfacing
- No proper slopes in cut sections
- Poor detour arrangement during construction for the existing road improvement

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1/ Refer to Appendix to Chapter 1, Pavement Distortion

# CHAPTER 2 MASTER PLAN

## 2.1 General

This chapter presents a prospective development plan for the Road Sector upto the target year of the Master Plan. Increase in traffic demand over the current level during the Master Plan period of 1985/86 - 2005/06 are shown in Table 2.1.1. By the end of the Master Plan period, the transport system in Pakistan would be carrying 124% more freight traffic and 137% more passenger traffic than the level of 1985/86.

Table 2.1.1 Demand Growth Factors

| Year | Road | | Railway | | Total | |
|---|---|---|---|---|---|---|
| | Freight | Pass. | Freight | Pass. | Freight | Pass. |
| 1985/86 | 26.9(100) | 97.4(100) | 8.3(100) | 16.7(100) | 35.2(100) | 114.1(100) |
| 1992/93 | 35.7(133) | 142.0(146) | 12.3(148) | 20.2(121) | 48.0(136) | 162.2(142) |
| 2005/06 | 46.4(172) | 243.3(250) | 32.5(392) | 27.5(165) | 78.9(224) | 270.8(237) |

Note: Figures in parenthesis are growth indicating total ton-kms (billion) and passenger-kms (billion) with 1985/86 levels as 100.

Source: Part II, Transport Demand Forcast, Table 6.3.1 and 6.3.4.

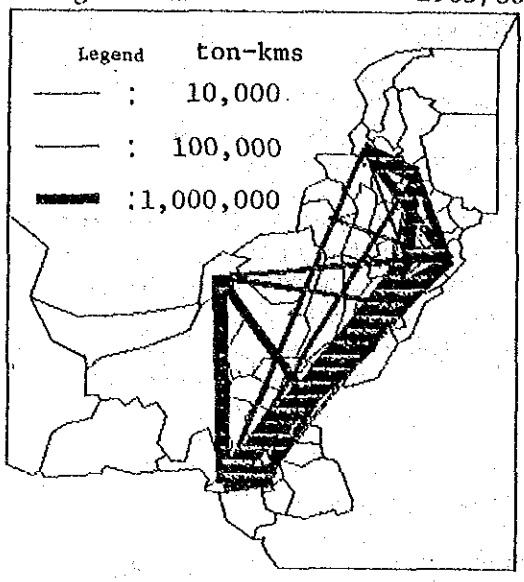
The formulation of the Master plan for roads presented hereinafter was made on the basis of strategic demand forecast and modal share between road and railways as shown in Table 2.1.1.
Fig. 2.1.1 shows the desired lines of road traffic demand during the Master Plan period.

The proposed Master Plan for road planning was prepared from the following points of view:

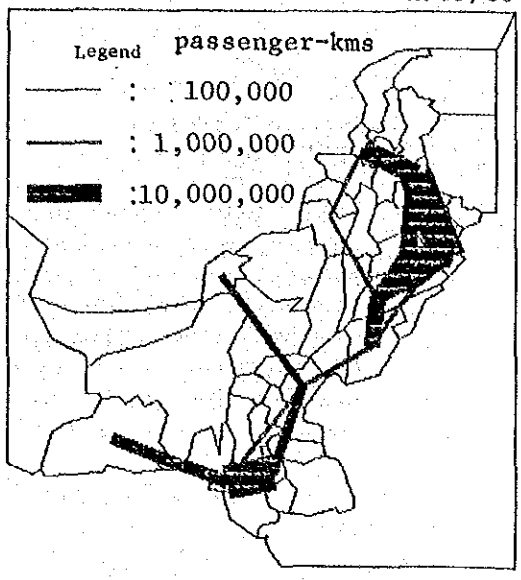
- By the strategic demand forecast (Case II),
- By the Proposed revised Highway capacity,
- By the visual investigation of the major highway,
- By the recommended level of service (Highway planning level),
- by the classification of road improvement plan, which are;
  Group-1: Construction scheme due to capacity deficiency
  Group-2: Rehabilitation scheme due to structural deficiencies
- By the Alternative Study
  Case A: Desirable Improvement plan
  Case B: Minimum Improvement plan

Fig. 2.1.1 Resired Lines of Road Traffic

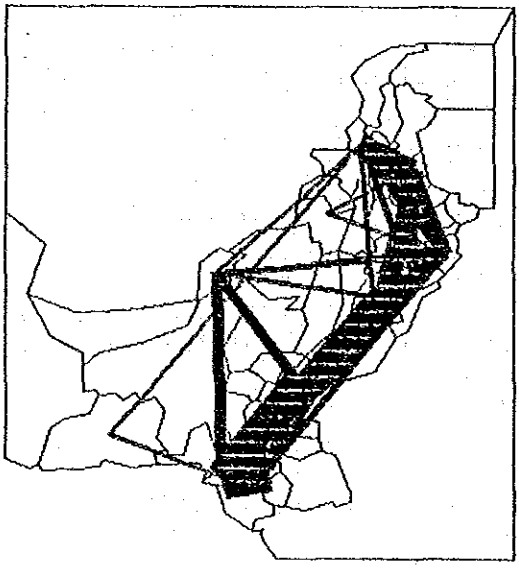
Freight Traffic 1985/86



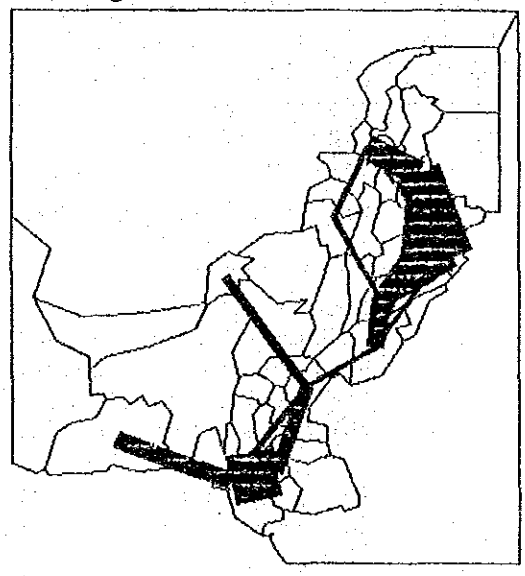

Passenger Traffic 1985/86



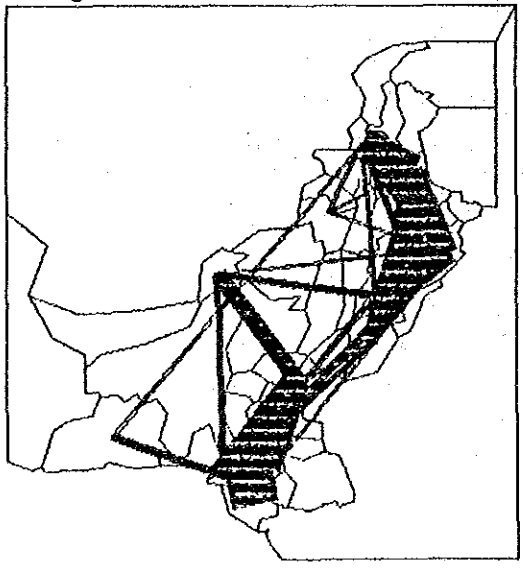

Freight Traffic 1992/93



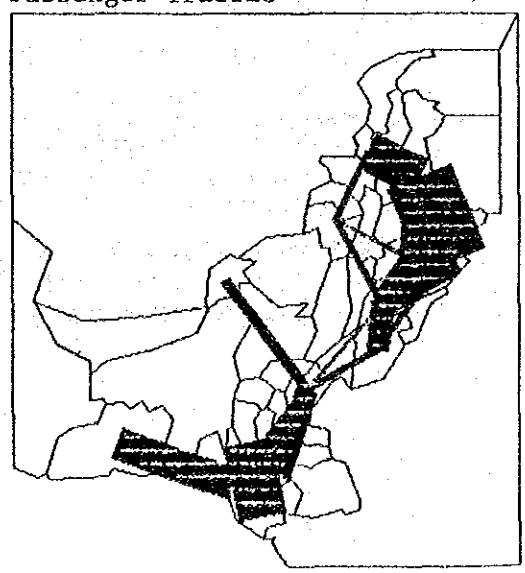
Passenger Traffic 1992/93



Freight Traffic 2005/06



Passenger Traffic 2005/06



## 2.2 Objectives and Strategies

Based on the assessment of existing conditions and desirable future traffic pattern, objectives of the road transport sector development and recommended strategies are proposed as follows:

### Objectives

1) Provision of adequate road access to all major centers of the country to ensure national integrity and the role of each center acting as a hub for the development of surrounding rural areas.

2) Reduction in the road transport cost where transport demand is substantial and operating conditions are poor.

3) Healthy growth of private sector operations.

4) Establishment of a better performance monitoring system in order to achieve higher managerial efficiency in operation and planning.

5) Improvement of road traffic safety.

### Strategies

1) Road improvement plan due to capacity and structural deficiencies in the primary highway network consists of all the national highways and part of provincial highways which carry substantial long-distance through-traffic should be given priority.

   This indicates that construction programmes of dual carriageway for the national highway N-5, part of the trunk road network should be given high priority.

2) Widening of the existing one-lane, two-way roads in the trunk road network located in high potential zones should be given priority

3) All of the selected widening projects should be combined with rehabilitation programme including vertical and horizontal re-alignment.

4) Reconstruction of narrow and damaged bridges located within the trunk road network should be given priority so that the running speed of through-traffic can be kept in the same condition as on the approaching sections.

5) In order to operate the primary and secondary highways more functionally, provision of bypass, frontage roads along the said highways in town areas for slow moving traffic, and maximum utilization of existing canal roads should be given priority.

6) Establishment of systematic data collection, and evaluation system for infrastructure. And development of Road research programmes for traffic safety measures.

7) Allocation of development funds to a fewer number of selected high priority projects to improve the efficiency of implementation.

8) Development of maintenance system operation.

9) Development of toll road system and private sector operation.

10) Development of International trunk road system.

## 2.3 Physical Target of Road Sector Plan - 2005/06

### 2.3.1 Perspective Development Plan for Existing Highways, 1985/86-2005/06

A Master Plan for road improvement programmes upto 2005/06 was made on the selected road networks in the study using the revised strategic traffic demand forecast and the revised estimated design capacity of each category of roads as proposed in Chapter 1. Section 1.4.

Analysis was made on the basis of congestion ratio (Volume -Design Capacity Ratio) for estimation of target road length to be improved. The road improvement programme can be divided into the following two groups:

| Group | Classification | Congestion Ratio (V/C) |
|---|---|---|
| G-1 | Construction due to Capacity deficiency. | More than 1.0 |
| G-2 | Rehabiliation due to Structural deficiency. | Less than 1.0 |

The highway sections belonging to Group G-1 are to be improvd by the construction programmes of either dual carriageway (4-lane highway) or widening/rehabilitation (2-lane highway) when the congestion ration reached 1.0[1/] or 1.2[2/], respectively.

While, the highway sections belonging to group G-2 have to be improved by the rehabilitation programmes so that the proper service can be maintained.

highways both of Group-1 and Group-2 stated above in the year of 2005/06. Based on these figures, the major development programmes upto 2005/06 can be categorized as follows:

---

1/ Desirable planning level (Level of Service-C)
2/ Minimum planning level (Level of Service-D).

Construction due to Capacity deficiency:

- Construction of dual carriageway (Class I highway)
- Widening of one-lane, two-way roads upgrade into two-lane highways (Class IC highway).

Rehabilitation due to Structural deficiencies:

- Rehabilitation of Class IV & V highways

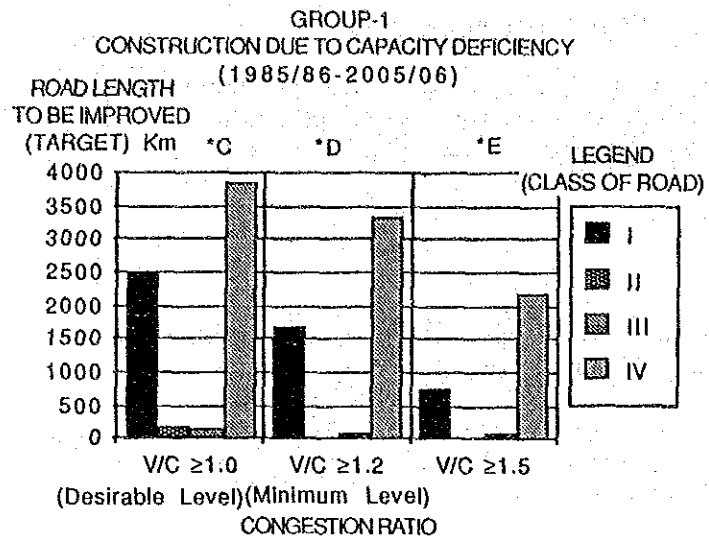
In case the desirable level of highway planning (congestion rate 1.0) is taken, the classification of the existing highways in the study road network would be changed as shown in Fig. 2.3.2.

## 2.3.2 The Physical Targets

The physical target of major road improvement plan by the year of 2005/06 are summarized and listed in Table 2.3.1.

Fig. 2.3.3 shows a desirable class of road on the primary highway network and Table 2.3.2 presents the highway sections to be improved by the year of 2005/06.

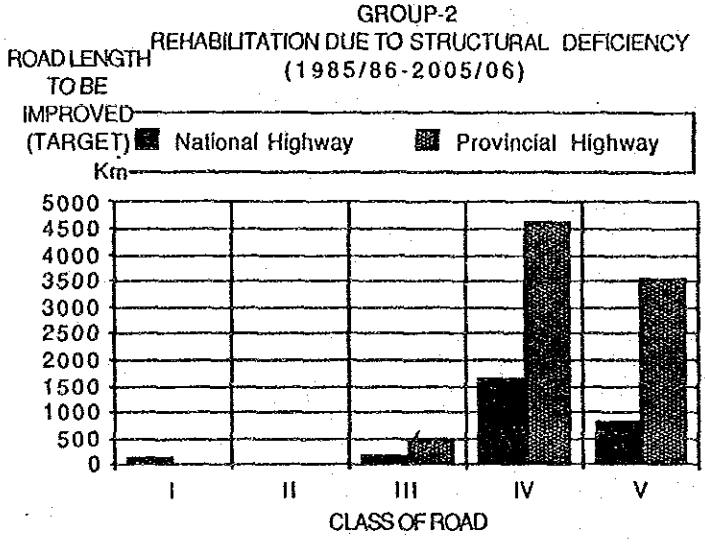
Fig. 2.3.1 Prospective Development Plan for Existing Highways
(1985/86–2005/06)




* Level of Service

(Km)

| Congestion Ratio(V/C) | Class of Road | Target (2005/06) |
|---|---|---|
| V/C ≥1.0 | I | 2478 |
| | II | 199 |
| | III | 169 |
| | IV | 3867 |
| V/C ≥1.2 | I | 1695 |
| | II | 0 |
| | III | 78 |
| | IV | 3354 |
| V/C ≥1.5 | I | 757 |
| | II | 0 |
| | III | 78 |
| | IV | 2200 |

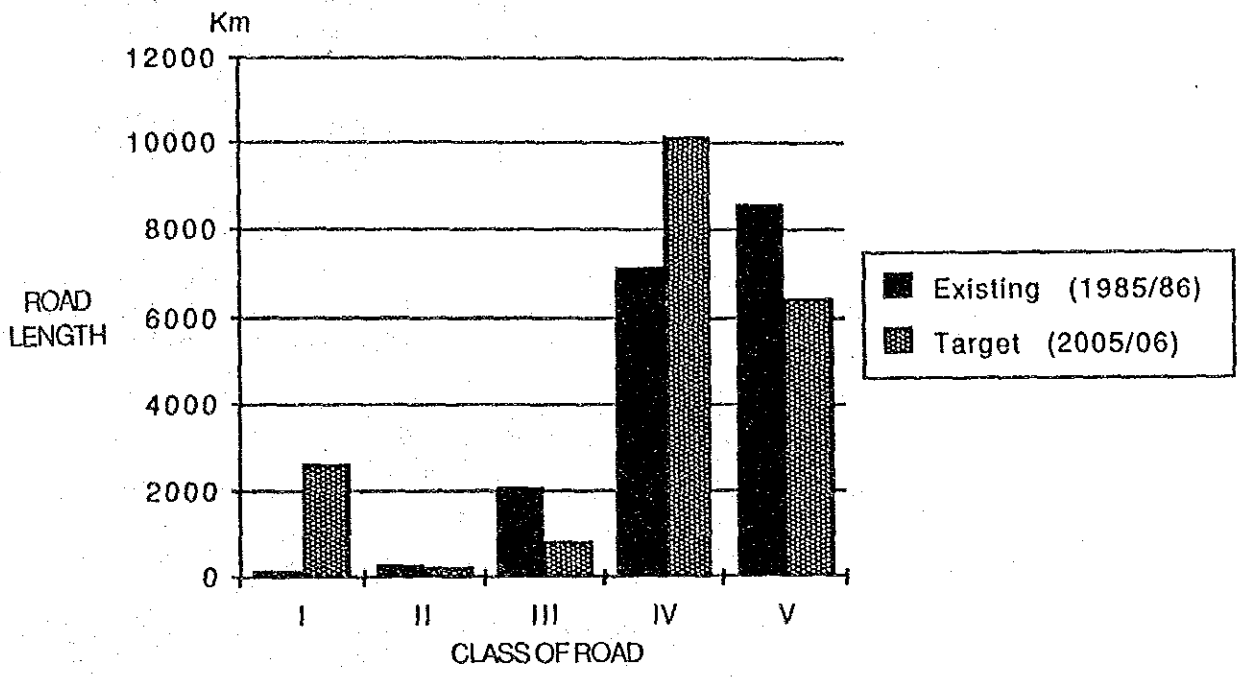



| Road of Class | Target(2005/06) | | |
|---|---|---|---|
| | National Highway | Provincial Highway | Total |
| I | 157 | 0 | 157 |
| II | 34 | 0 | 34 |
| III | 187 | 451 | 638 |
| IV | 1660 | 4655 | 6315 |
| V | 845 | 3582 | 4427 |

Note: Desirable impremention schedule by links is shown in App. Table 2-1 and 2-2.

Source: JICA Study Team

Fig. 2.3.2 Expected Highway Classification in The Study Road Network




(Km)

| Class of Road | Existing 1985/86 | Target 2005/06 |
|---|---|---|
| I | 157 (1) | 2635 (14) |
| II | 310 (2) | 233 (1) |
| III | 2070 (11) | 807 (5) |
| IV | 7175 (39) | 10182 (56) |
| V | 8572 (47) | 6446 (24) |
| Total | 18284 (100) | 18284 (100) |

Source: JICA Study Team

Table 2.3.1 The Physical Targets (2005/06)

| | | | |
|---|---|---|---|
| CASE A : | Desirable highway planning level, Congestion rate more than 1.0 (Level of Service: C) | | |
| Group-1: | Construction due to capacity deficiency | | |
| | Dual carriageway: | National Highway | 1,700 Kms |
| | | Provincial Highway | 800 Kms |
| | Widening and Rehabilitation: | National Highway | 1,200 Kms |
| | | Provincial Highway | 3,000 Kms |
| Group-2: | Rehabilitation due to structural deficiencies | | |
| | Overlay and Rehabilitation: | National Highway | 2,900 Kms |
| | | Provincial Highway | 8,700 Kms |
| CASE B: | Minimum highway planning level, Congestion rate more than 1.2 (Level of Service: D) | | |
| Group-1: | Construction due to capacity deficiency | | |
| | Dial carriageway: | National Highway | 1,200 Kms |
| | | Provincial Highway | 500 Kms |
| | Widening and Rehabilitation: | National Highway | 900 Kms |
| | | Provincial Highway | 2,500 Kms |
| Group-2 | Rehabilitation due to structural deficiency | | |
| | Overlay and Rehabilitation: | National Highway | 3,600 Kms |
| | | Provincial Highway | 9,600 Kms |

Fig. 2.3.3 Desirable Class of Roads on the Primary Highway Network

(2005/06)

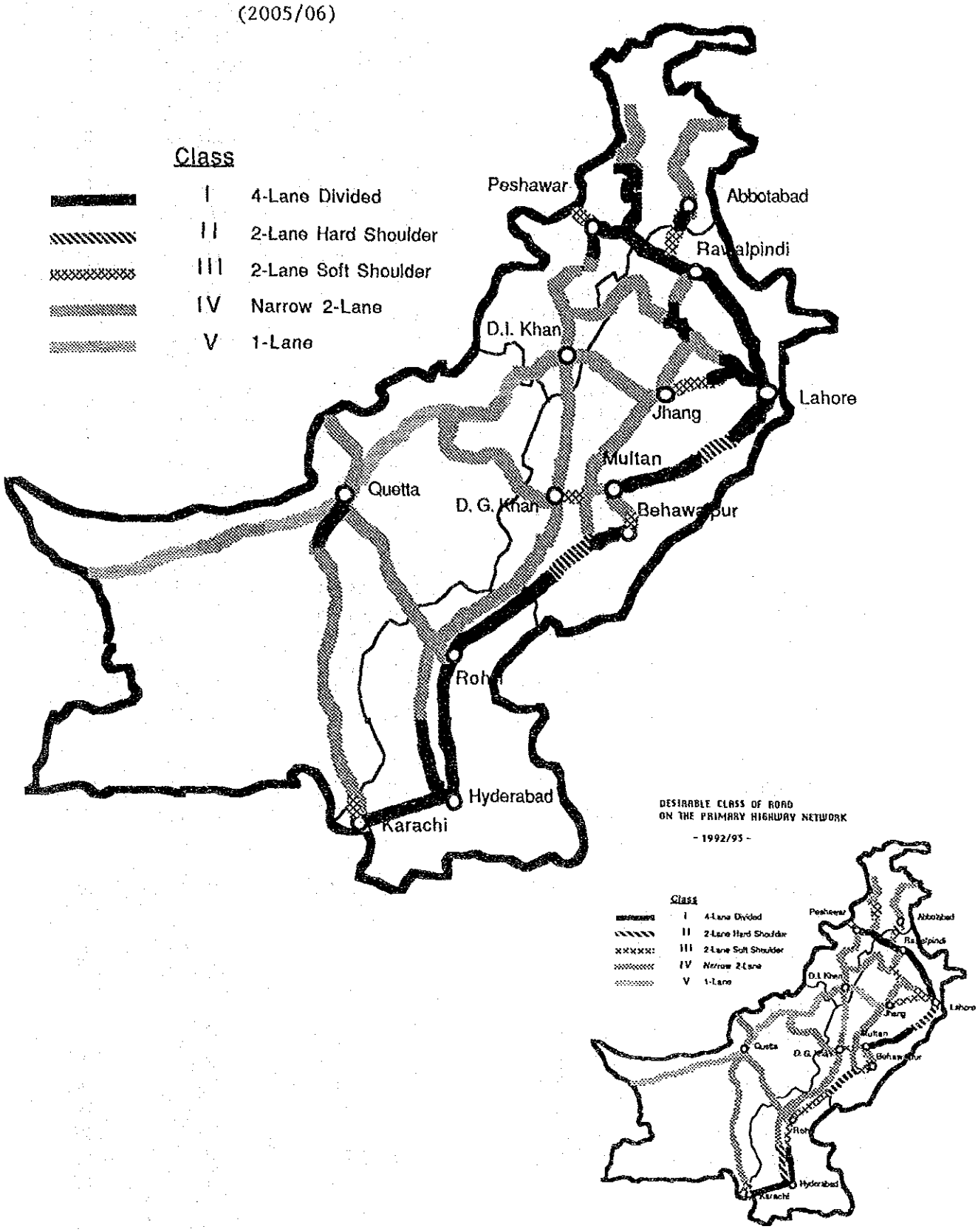


Table 2.3.2 List of Highway Section to be Improved by the Year of 2005/06 (V/C ≥ 1.0)

| SECTION | | | NODE.NO | 1986 | 2005/06 (V/C≥1.0) |
|---|---|---|---|---|---|
| [ N-5 ] | | | | | |
| Karachi | - | Kotri | 39 - 118 | II | I |
| Hyderabad | - | Kotri | 33 - 118 | II | I |
| Hyderabad | - | Hala | 33 - 87 | III | I |
| Sakrand | - | Hala | 86 - 87 | III | I |
| Sakrand | - | Moro | 86 - 102 | III | I |
| Khairpur | - | Moro | 32 - 102 | III | I |
| Rohri | - | Khairpur | 29 - 32 | III | I |
| Rohri | - | Ubauro | 29 - 82 | III | I |
| Rahimyar Khan | - | Boundary | 27 - 150 | IV | I |
| Rahimyar Khan | - | T. M. Panah | 27 - 79 | IV | II |
| Bahawalpur | - | Chani Goth | 25 - 80 | III | I |
| Multan | - | Kabirwala | 23 - 75 | IV | I |
| Lahore | - | Okara | 17 - 71 | II | I |
| Gujranwala | - | Wazirabad | 19 - 61 | III | I |
| Gujrat | - | Wazirabad | 12 - 61 | III | I |
| Gujrat | - | Kharian | 12 - 204 | III | I |
| Jhelum | - | Kharian | 11 - 204 | III | I |
| Jhelum | - | Sohawa | 11 - 93 | III | I |
| Mandra | - | Sohawa | 57 - 93 | III | I |
| Rawalpindi | - | Mandra | 10 - 57 | III | I |
| Attock | - | Hassanabdal | 9 - 55 | III | I |
| Attock | - | Jehangira | 9 - 116 | III | I |
| [ N-25 ] | | | | | |
| Wingai | - | Boundary | 114 - 151 | V | IV |
| Bera | - | Wingai | 44 - 114 | V | IV |
| Bera | - | Khuzdar | 44 - 227 | V | IV |
| Surab | - | Khuzdar | 110 - 227 | V | IV |
| Kalat | - | Surab | 43 - 110 | V | IV |
| Quetta | - | Kalat | 40 - 43 | IV | I |
| [ N-35 ] | | | | | |
| Haripur | - | Boundary | 90 - 152 | IV | III |
| Abbotabad | - | Haripur | 4 - 90 | III | I |
| [ N-40 ] | | | | | |
| Dalbandin | - | Ahmadwal | 42 - 223 | V | IV |
| [ N-50 ] | | | | | |
| Qila Saifullah | - | Zhob | 96 - 219 | V | IV |
| [ N-55 ] | | | | | |
| Kotri | - | Gopang | 118 - 232 | V | I |
| Dadu | - | Gopang | 34 - 232 | IV | I |
| Shikarpur | - | Kandhkot | 28 - 84 | V | IV |
| Boundary | - | Rajanpur | 159 - 231 | V | IV |
| Dera Ghazi Khan | - | Shadan Lund | 21 - 74 | V | IV |
| Dera Ismail Khan | - | Boundary | 5 - 160 | V | IV |
| Kohat | - | Jatta | 3 - 94 | V | IV |
| Peshawar | - | Kohat | 2 - 3 | IV | I |

Table 2.3.2 (Continued)

| SECTION | | | NODE.NO | 1986 | 2005/06 (V/C≥1.0) |
|---|---|---|---|---|---|
| [ Others ] | | | | | |
| Mardan | - | Chakdarra Fort | 1 - 52 | III | I |
| Mardan | - | Nowshera | 1 - 53 | IV | I |
| Peshawar | - | Charsada | 2 - 91 | III | I |
| Kohat | - | Boundary | 3 - 202 | V | IV |
| Attock | - | Basal | 9 - 68 | V | IV |
| Rawalpindi | - | Murree | 10 - 155 | IV | III |
| Jhelum | - | Jalalpur | 11 - 205 | V | IV |
| Sargodha | - | Jhang | 13 - 16 | V | IV |
| Sargodha | - | Khushab | 13 - 62 | III | I |
| Sargodha | - | Chiniot | 13 - 64 | IV | I |
| Mianwali | - | Talagang | 14 - 58 | V | IV |
| Mianwali | - | Kalabagh | 14 - 95 | V | IV |
| Faisalabad | - | Sheikhupura | 15 - 18 | III | I |
| Faisalabad | - | Chiniot | 15 - 64 | III | I |
| Faisalabad | - | Sumundri | 15 - 67 | IV | I |
| Jhang | - | Sumundri | 16 - 67 | V | IV |
| Lahore | - | Boundary | 17 - 50 | III | I |
| Sheikhupura | - | Pindi Bhattian | 18 - 63 | III | I |
| Gujranwala | - | Sialkot | 19 - 20 | V | IV |
| Gujranwala | - | Chak Mano | 19 - 206 | IV | II |
| Dera Ghazi Khan | - | Bewata | 21 - 97 | V | IV |
| Muzaffargarh | - | Rangpur | 22 - 101 | V | IV |
| Bahawalpur | - | Hassalpur | 25 - 78 | V | IV |
| Rahimyar Khan | - | Chani Goth | 27 - 80 | V | IV |
| Nawabshah | - | Gopchali | 31 - 103 | V | IV |
| Hyderabad | - | Thatta | 33 - 37 | III | I |
| Hyderabad | - | Tando Adam | 33 - 217 | V | I |
| Umarkot | - | Mirpur Khas | 35 - 106 | V | IV |
| Thatta | - | Karachi | 37 - 39 | III | I |
| Loralai | - | Qila Saifullah | 41 - 96 | V | IV |
| Loralai | - | Bewata | 41 - 97 | V | IV |
| Bera | - | Awaran | 44 - 228 | V | IV |
| Talagang | - | Chakwal | 58 - 92 | V | IV |
| Tajazai | - | Isakhel | 59 - 156 | V | IV |
| Pail | - | Khushab | 60 - 62 | V | I |
| Pail | - | Chakwal | 60 - 92 | V | IV |
| Khushab | - | Atharan Hazari | 62 - 66 | V | IV |
| Pindi Bhattian | - | Chiniot | 63 - 64 | IV | I |
| Saral Krisha | - | Bhakkar | 65 - 213 | V | IV |
| Basal | - | Boundary | 68 - 158 | V | IV |
| Okara | - | Jaranwala | 71 - 215 | V | IV |
| Vihari | - | Lodran | 77 - 121 | V | IV |
| Chakwal | - | Sohawa | 92 - 93 | V | IV |
| Chakwal | - | Jalalpur | 92 - 205 | V | IV |
| Kalabagh | - | Isakhel | 95 - 156 | V | IV |
| Chwk Munda | - | Dera Din Panah | 100 - 214 | V | IV |
| Gopchali | - | Shahdadpur | 103 - 104 | V | IV |
| T. M. Khan | - | Sujawal | 107 - 109 | V | IV |
| Surab | - | Drug | 110 - 224 | V | III |
| Boundary | - | Darya Khan | 161 - 212 | V | IV |
| Jandola | - | Boundary | 203 - 220 | V | IV |
| Darya Khan | - | Bhakkar | 212 - 213 | V | IV |
| Bhakkar | - | Dera Din Panah | 213 - 214 | V | IV |
| Ahmadwal | - | Drug | 223 - 224 | V | IV |

## 2.4 Outline of Investment Costs

The investment cost for the road improvement programme in the study road network was estimated based on the physical target of the Master Plan described in Section 2.3.3 using unit construction cost listed in Table 2.4.1 and the result is summarized in Table 2.4.2.

Table 2.4.1 Estimated Unit Construction Cost to be used for the Master Plan

(1985/86 price)

| Item | Existing Class of Road(1985/86) | Proposed Class of Road | Unit Cost[1/] (Million Rp/Km) |
|---|---|---|---|
| Dual Carriageway Projects | Class- II | Class-I | 8.4 |
| | III | I | 8.4 |
| | IV | I | 9.6 |
| | V | I | 12.0 |
| Widening and Rehabilitation Projects | IV | II | 4.8 |
| | IV | III | 3.7 |
| | V | II | 6.0 |
| | V | III | 4.6 |
| | V | IV | 3.6 |
| Overlay and Rehabilitation Projects | I | I | 5.5 |
| | II | II | 2.7 |
| | III | III | 2.2 |
| | IV | IV | 1.7 |
| | V | V | 1.0 |

Source: JICA Study Team. 1985/86 price.

1/ Unit cost for dual Carriageway project includes rehabilitation cost for existing road.

The selected study network, total being 18,300 kms length highways, is estimated to carry about 57%[2/] of the passenger-kms and 88%[3/] of the ton-km of the total passenger and ton-kms, which occupies about 78% of the total national and provincial highway (50,000 kms) to be carried in the year of 2005/06.

While, pertaining to the physical share in terms of the paved area, the study roads occupy about 47% of the total national and provincial highways.

Taking these factors into account, the Study Team estimated that the investment cost for the roads outside of this study requires a fund equivalent to 40% of the total investment cost.

2/, 3/ Refer to "Appendix to Section 2.4, the role and weight of the Road Network selected for study in comparison with the entire network.

| Item | Share (%) | | |
|---|---|---|---|
| | Study Roads | Outside | Total |
| Paved Area | 47 | 53 | 100 |
| Ton-Km (68%)* | 88 | 12 | 100 |
| Passenger-Km (32%)* | 57 | 43 | 100 |
| Weighted Average | 62.5 | 37.5 | 100 |
| Say | (60) | (40) | (100) |

* ( ) shows the percentage of vehicle share.

Comparing Case-A with Case-B in the investment plan shown in Table 2.4.2 and Fig.2.4.1, the investment cost Case-A is about 17% higher than that of Case-B. However, since Case-A is a desirable planning level in terms of the level of service for road users, it is proposed to apply for Master Plan as a guideline in case sufficient financial resources are available.

Table 2.4.2 Summary of Investment Cost (Master Plan 2005/06)

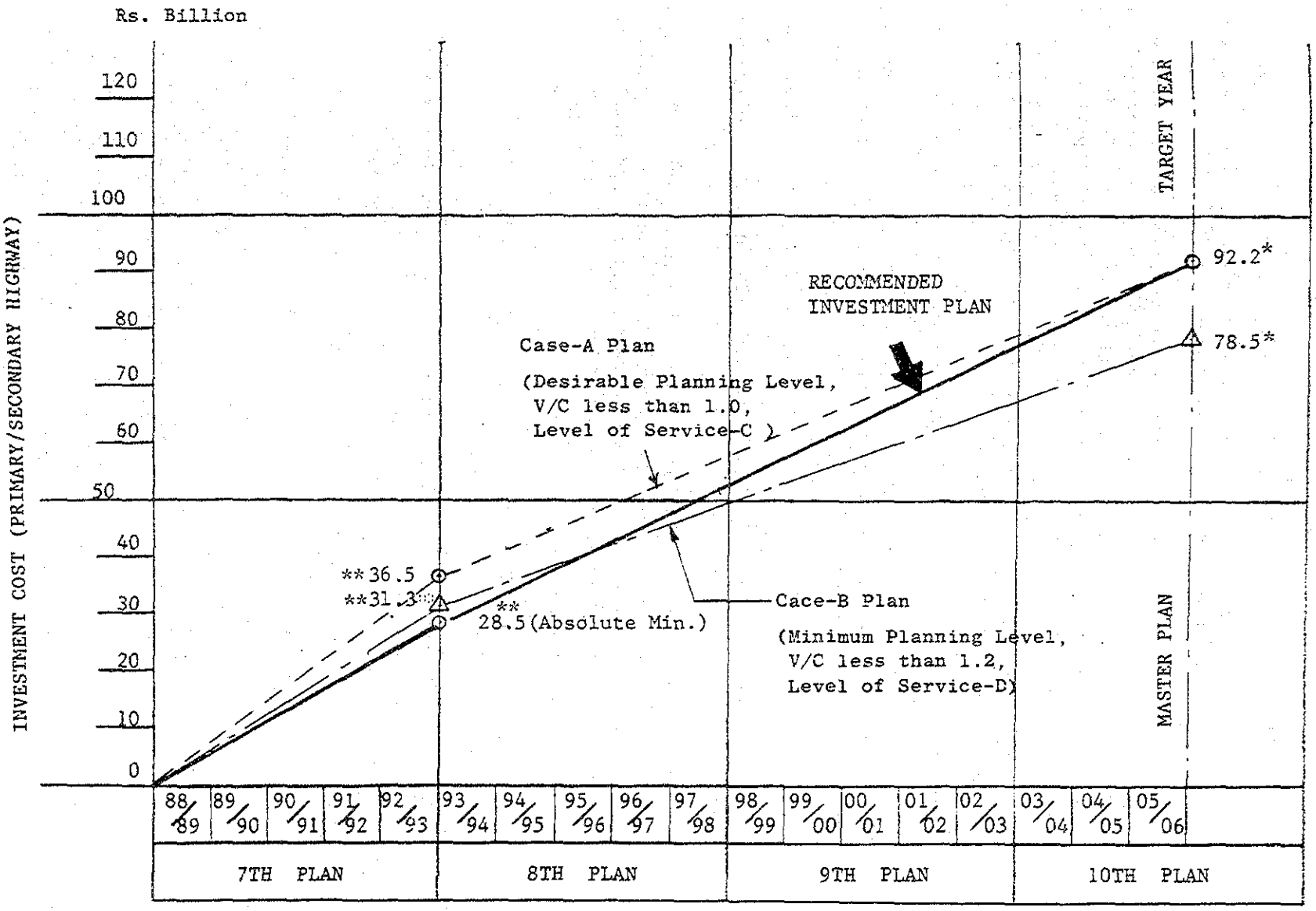
(Rs. Billion)

| Group | Items | CASE - A: Desirable Planning Level V/C less than 1.0 (level of Service - C) | | | | | | CASE - B: Minimum Planning Level V/C less than 1.2 (Level of Service - D) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | National Hwy | | Provincial Hwy | | Total | | National Hwy | | Provincial Hwy | | Total | |
| | | Km | Cost | Km | Cost | Km | Cost | Km | Cost | Km | Cost | Km | Cost |
| G-1 Construction due to capacity deficiency | Dual Carriageway (4-lane Highway) | 1,700 | 14.3 | 800 | 7.9 | 2,500 | 22.2 | 1,200 | 10.9 | 500 | 4.7 | 1,700 | 15.6 |
| | Widening and Rehabilitation | 1,200 | 4.6 | 3,000 | 11.0 | 4,200 | 15.6 | 900 | 3.2 | 2,500 | 9.2 | 3,400 | 12.4 |
| G-2 Rehabilitation due to structural deficiency | Overlay and Rehabilitation | 2,900 | 5.0 | 8,700 | 12.5 | 11,600 | 17.5 | 3,600 | 6.4 | 9,600 | 12.7 | 13,100 | 19.1 |
| Sub-Total (Study Network) | | 5,800 | 23.9 | 12,500 | 31.4 | 18,300 | 55.3 | 5,700 | 20.5 | 12,500 | 26.6 | 18,200 | 47.1 |
| * Outside the Study | | | | | | | 36.9 | | | | | | 31.4 |
| Grand Total | | | | | Rs. Billion | | 92.2 | | | | Rs. Billion | | 78.5 |

Remarks * Excludes Municipal/Local roads.

Source: JICA Study Team

Fig. 2.4.1 Investment Cost Plan




Remarks * Refer to Table 2.3.2
** Refer to Chapter 3, Section 3.4.2

Source: JICA Study Team

# CHAPTER 3 THE SEVENTH FIVE YEAR PLAN

## 3.1 General

This chapter presents a prospective development plan for road sector during the Seventh Five Year Plan.

In order to make investment balance properly among each transport modes, particularly between roads and railways, the Government of Pakistan planned to alter road/rail traffic distribution from 75/25 to 73/27 by the end of the Sixth Plan period expecting that the railway should have major responsibility of the freight transport to long distance connecting up-country with down-country. However, actual modal share of road/rail has not been significantly changed as expected.

While, a total of Rs. 13,600 million was allocated for the road improvement programmes during the Sixth Plan period, and an expenditure of Rs. 11,800 as 87 percent of the allocation was incurred on road and bridges projects, the planned allocation also could not be achieved.

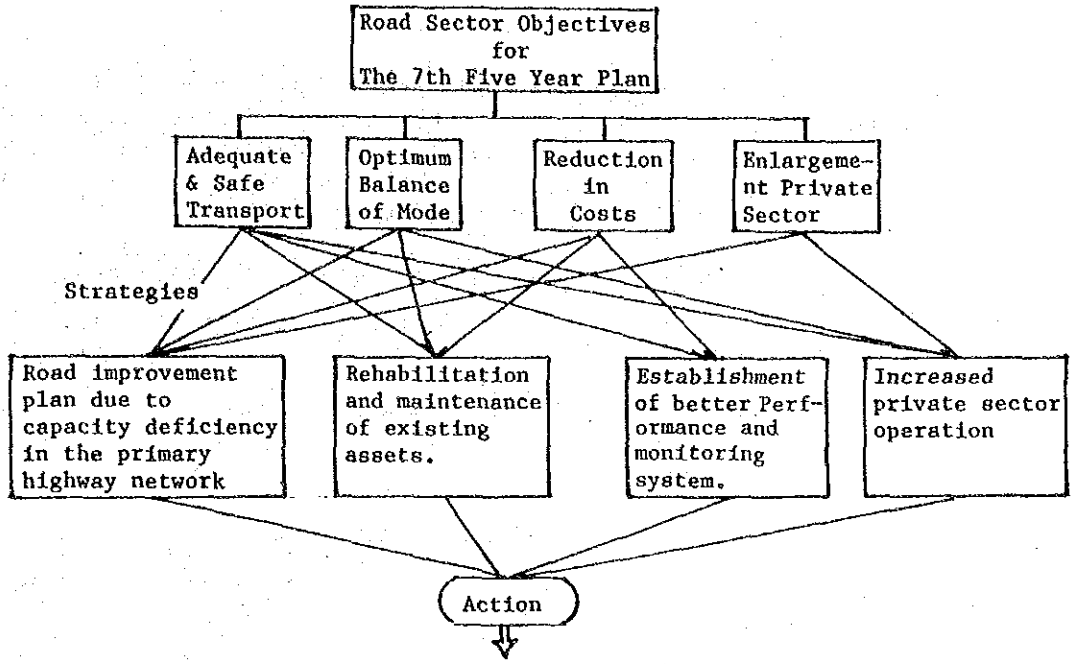
Following the objective of the Sixth Plan, the Study Team conducted a future projection of desirable modal split of inland traffic in the years of 1992-93 and 2005-06 (Details are shown in Tables 2.1.1.).

The preliminary formulation of the investment plan for roads during Seventh Five Year Plan presented hereinafter was made on the basis of strategic traffic demand forecast and modal share between roads/rail as stated above.

## 3.2 Development Strategies for Roads

The development strategy for road improvement plan in the Seventh Plan is proposed as shown in Fig. 3.2.1.

Fig. 3.2.1 Development Strategies for Roads




(1) Allocation of development funds to a fewer number of selected high priority projects to improve the efficiency of implementation.

(2) Project selection should be made on the basis of the strategic traffic demand forecast.

(3) Emphasis should be placed on the completion of ongoing projects (Major project to be funded beyond the 6th Plan).

(4) The National Highway N-5 should be substantially improved keeping in view the traffic requirements in various sections which include 4th Highway Project and Nowshera - Cablat and Rawalpindi - Karian Sections.

(5) Widening of existing one-lane, two way roads in the trunk road network located in high potential zones should be given priority. This indicated that National Highway N-55 (Indus Highway on the west bank of River Indus) and N-25 should be given priority.

(6) All selected widening and overlay projects should be combined with rehabilitation programmes including vertical and horizontal realignment together with improvement of drainage structures.

(7) Effort shall be made to introduce highway development programmes funded by the private sector.

(8) Development of a modern road construction industry in the country and for transfer of technology, and effort should be made to develop modern road design skills.

(9) Establishment of modernized road maintenance operation by systematic data collection and evaluation systems.

(10) Development of road research programme and road furnishings for road traffic safety.

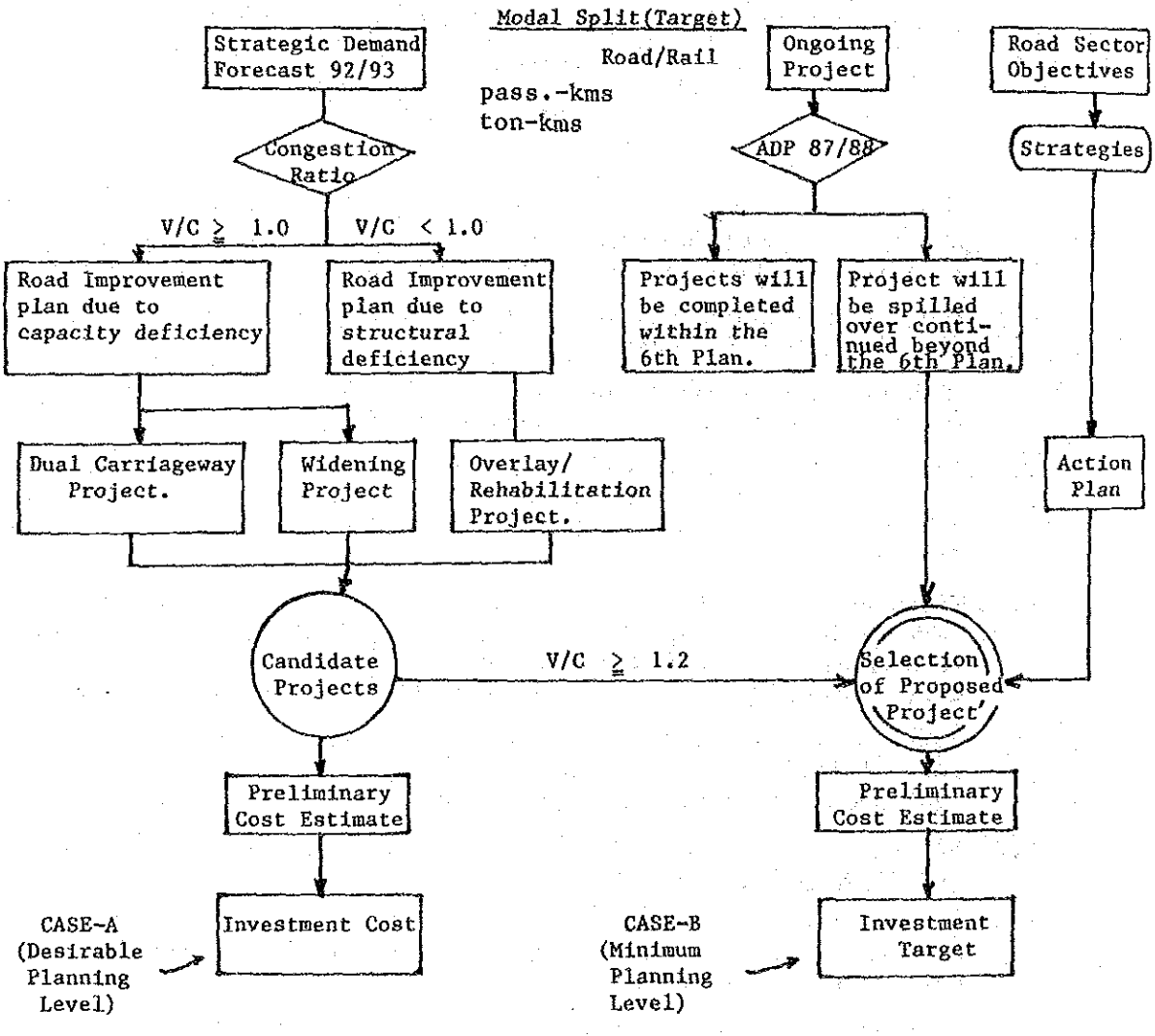
## 3.3 Project Selection

### 3.3.1 Procedure of Project Selection

The project selection for the preliminary formulation of the investment plan was made carefully on the basis of road sector's strategies proposed in Section 3.2 considering the result of strategic demand forecast, estimated congestion ratio in 1992/93 and the present status of ongoing projects.

The details of project selection procedure are presented in Fig. 3.3.1.

Fig. 3.3.1 Project Selection Procedure

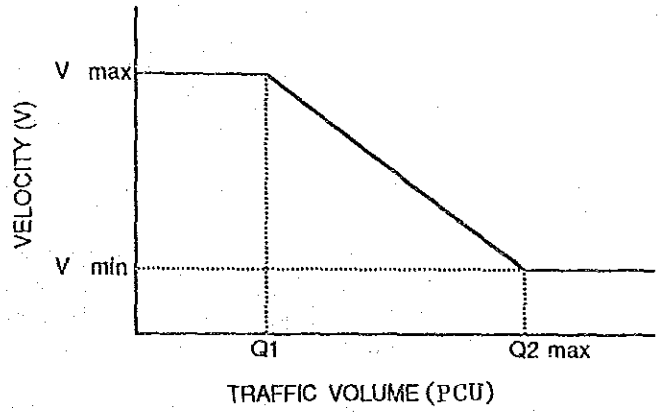


3.3.2 Candidate Projects

The selection of candidate road improvement projects to be considered in the 7th plan was made on the basis of traffic assignment on the study road network using the revised strategic traffic demand forecast and revised design capacity of each category of roads as shown in Chapter 1, Table 2.3.1.

In the traffic assignment simulation, an incremental capacity restraint process (Q-V method) was applied to determine reduction of travel speed due to restriction in traffic capacity of the link. The concept of this Q-V method is as shown in Fig. 3.3.2. The traffic volume of the O-D matrices is divided into 5 equal lots (30, 20, 20, 20 and 10 percent of the toll volume) for the assignment.

Fig. 3.3.2 Traffic Capacity Incremental Method (Q-V Method)




This volume is the assignment to the shortest route between the zones based on the travel speed on each link according to the classified conditions in the study road network. The shortest route is defined as the shortest time.

Analysis of Project selection was made on the basis of congestion ratio (Volume-Design Capacity Ratio) for listing up high priority sections in the light of the future traffic demand. The candidate project was selected by this method regardless of whether the section belongs to ongoing projects. The candidate road improvement programme was divided into the following two groups:

| Group | Classification | Congestion Ratio (V/C) |
|---|---|---|
| G-1 | Construction due to Capacity deficiency; | More than 1.0 |
| G-2 | Rehabilitation due to Structural deficiency; | More than 0.5 Less than 1.0 |

The highway sections belonging to Group G-1 are to be improved by the construction programme of either dual dual carriageway (4-lane highway) or widening/rehabilitation (2-lane highway) when the congestion ration reached 1.0 or 1.2, respectively.

As described in Chapter 1, Section 1.8.2. approximately 15,000 Kms of the existing major highway belonging to "poor" group to surface condition which amounts to 80% of the total study roads. Therefore, the highway sections belonging to group G-2 have to be improved by the rehabilitation programme so that the proper service can be maintained. And also the selected widening project belonging to group G-1 should be planned combining with rehabilitation programmes.

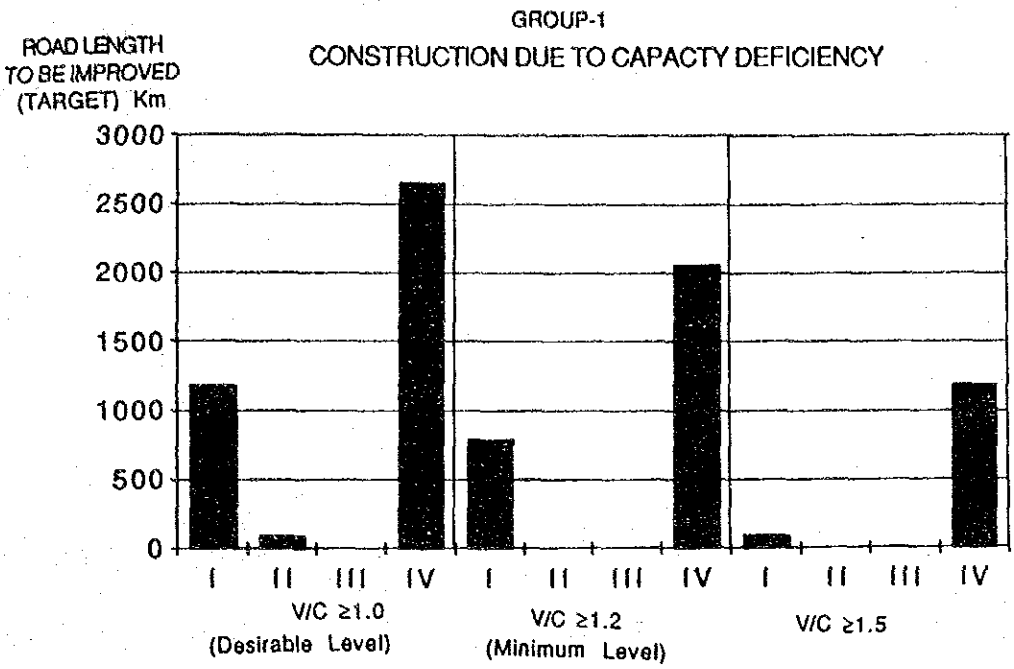
The list of candidate projects selected by the method above and the list of ongoing projects are presented in Table 3.3.1.

Judging from the congestion ratio, the candidate projects in the 7th Plan, could be summarized as shown in Fig. 3.3.3.

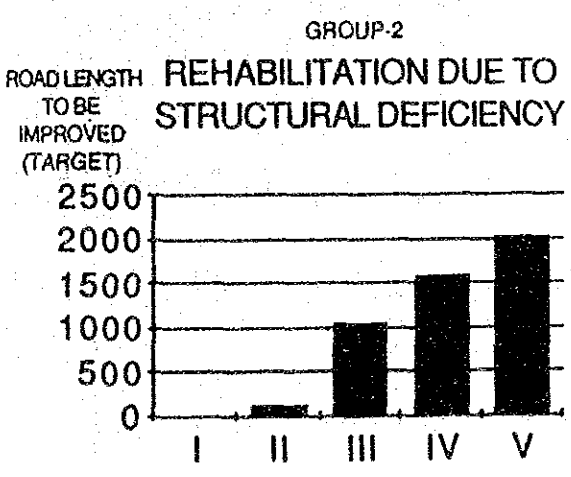
The abbreviations shown in Table 3.3.1 are as follows:

| | | |
|---|---|---|
| Road No. | : | 0 (Provincial Highway)<br>5, 25, 40, 35, 50, 55, 65 (Route Number of National Highway.) |
| Provincial No | : | 1 (Punjab) 2 (Sind) 3 (NWFP) 4 (Baluchistan) |
| Project Category | : | A (Additional Carriageway Project)<br>B (Widening/Rehabilitation Project)<br>C (Overlay/Rehabilitation Project)<br>BR (Bridge Construction Project) |
| ADP Reference No; | | F (ADP, Federal 87/88 & Sl.No.)<br>P (ADP, Punjab 87/88 & Sl.No.)<br>S (ADP, Sind 87/88 & SL.No.)<br>N (ADP, NWFP 87/88 & Sl.No.)<br>B (ADP, Baluchistan 87/88 & Sl.No.) |

Fig. 3.3.3 Summary of Candidate Projects




| Congestion Ratio(V/C) | Class of Road | Target(Km) (1992/93) |
|---|---|---|
| V/C>1.0 | I | 1195 |
| | II | 101 |
| | III | 0 |
| | IV | 2663 |
| V/C>1.2 | I | 800 |
| | II | 0 |
| | II | 0 |
| | IV | 2071 |
| V/C>1.5 | I | 105 |
| | II | 0 |
| | III | 0 |
| | IV | 1203 |




| Congestion Ratio(V/C) | Class of Road | Target(Km) (1992/93) |
|---|---|---|
| 0.5<V/C<1.0 | I | 0 |
| | II | 145 |
| | III | 1055 |
| | IV | 1604 |
| | V | 2033 |

Source: JICA Study Team

# Table 3.3.1 List of Candidate and Ongoing Projects

| ROAD NO. | PROVINCE NO. | NODE NO. | SECTION | CONGESTION RATIO (V/C) 1992/93 | EXISTING CLASS | PROPOSED CLASS | CANDIDATE PROJECTS: PROJECT CATEGORY | CANDIDATE PROJECTS: LENGTH (Km) | CANDIDATE PROJECTS: COST | AXLES | ON-GOING PROJECTS: ADP. REFERENCE NO. | ON-GOING PROJECTS: PROJECT CATEGORY | ON-GOING PROJECTS: LENGTH (Km) | ESTIMATED EXPENDITURE DURING SUBSEQUENT YEARS (BEYOND 6TH PLAN) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 3 | 1 - 2 | Mardan - Peshawar | 0.00 | III | III | | | | | | | | |
| 0 | 3 | 1 - 52 | Mardan - Chakdarra Fort | 0.70 | III | III | C | 66 | 184.8 | H | | | | |
| 0 | 3 | 1 - 53 | Mardan - Nowshera | 0.76 | IV | IV | C | 23 | 55.2 | H | N414 | A | 16.6 | 12.2 |
| 0 | 3 | 1 - 91 | Mardan - Charsada | 0.65 | III | III | | | | | | | | |
| 0 | 3 | 1 - 115 | Mardan - Swabi | 0.45 | III | III | | | | | | | | |
| 55 | 3 | 2 - 3 | Peshawar - Kohat | 1.42 | IV | I | A | 64 | 633.6 | H | F148, N287 | B,M (F) | 31.4 | 150.1 |
| 5 | 3 | 2 - 53 | Peshawar - Nowshera | 0.24 | I | I | | | | | F105, F108 | A (F) | 35 | 17.4 |
| 0 | 3 | 2 - 91 | Peshawar - Charsada | 0.65 | III | III | C | 29 | 63.8 | G | F110 | BR (F) | 63.8 | 11.0 |
| 5 | 3 | 2 - 201 | Peshawar - Torkham | 0.18 | III | III | | | | | | | | |
| 55 | 3 | 3 - 94 | Kohat - Jatta | 1.24 | V | IV | B | 29 | 84.1 | G | | | | |
| 0 | 3 | 3 - 158 | Kohat - Boundary | 0.38 | IV | IV | | | | | | | | |
| 0 | 3 | 3 - 202 | Kohat - Boundary | 1.40 | V | IV | B | 186 | 520.8 | D | | | | |
| 35 | 3 | 4 - 54 | Abbotabad - Mansehra | 0.49 | IV | IV | | | | | | | | |
| 35 | 3 | 4 - 90 | Abbotabad - Haripur | 0.96 | III | III | C | 47 | 131.6 | H | | | | |
| 0 | 3 | 4 - 155 | Abbotabad - Murree | 0.07 | IV | IV | | | | | | | | |
| 55 | 3 | 5 - 59 | D. I. Khan - Tajazai | 0.32 | IV | IV | | | | | | | | |
| 50 | 3 | 5 - 153 | D. I. Khan - Boundary | 0.14 | IV | IV | | | | | F107 | C (F) | 90 | 43.5 |
| 55 | 3 | 5 - 160 | D. I. Khan - Boundary | 1.17 | V | IV | B | 51 | 147.9 | G | | | | |
| 0 | 3 | 5 - 161 | D. I. Khan - Boundary | 0.24 | IV | IV | | | | | F106 | BR (F) | 0 | 68.9 |
| 0 | 3 | 5 - 203 | D. I. Khan - Jandola | 0.20 | IV | IV | | | | | | | | |
| 55 | 3 | 6 - 59 | Bannu - Tajazai | 0.35 | IV | IV | | | | | | | | |
| 55 | 3 | 6 - 94 | Bannu - Jatta | 0.18 | IV | IV | | | | | F111 | BR (F) | 0 | 2.5 |
| 0 | 3 | 6 - 203 | Bannu - Jandola | 0.07 | V | IV | | | | | | | | |
| 0 | 3 | 7 - 230 | Chitral - Dir | 0.24 | IV | IV | | | | | | | | |
| 0 | 3 | 8 - 52 | Batgram Saidu - Chakdarra Fort | 0.28 | IV | IV | | | | | | | | |
| 0 | 3 | 8 - 89 | Batgram Saidu - Bisham | 0.00 | V | V | | | | | | | | |
| 5 | 1 | 9 - 55 | Attock - Hassanabdal | 1.14 | III | I | A | 44 | 391.6 | H | | | | |
| 0 | 1 | 9 - 68 | Attock - Basal | 1.01 | V | IV | B | 81 | 226.8 | D | | | | |
| 5 | 3 | 9 - 116 | Attock - Jehangira | 0.72 | III | III | C | 9 | 25.2 | H | | | | |
| 5 | 1 | 10 - 57 | Rawalpindi - Mandra | 1.12 | III | I | A | 31 | 275.9 | H | F36 | A (F) | 52.5 | 6.9 |
| 5 | 1 | 10 - 117 | Rawalpindi - Tarnual | 0.45 | I | I | | | | | | | | |
| 0 | 1 | 10 - 155 | Rawalpindi - Murree | 0.47 | IV | IV | | | | | P31 | M | 54 | 19.5 |
| 5 | 1 | 11 - 93 | Jhelum - Sohawa | 1.15 | III | I | A | 40 | 356.0 | H | | | | |
| 5 | 1 | 11 - 204 | Jhelum - Kharian | 0.94 | III | III | C | 24 | 67.2 | H | F54 | BR (F) | 0 | 1.8 |
| 0 | 1 | 11 - 205 | Jhelum - Jalalpur | 1.48 | V | IV | B | 32 | 92.8 | G | | | | |
| 5 | 1 | 12 - 61 | Gujrat - Wazirabad | 1.06 | III | I | A | 11 | 97.9 | H | F38, F139 | A (F) | 11 | 105.1 |
| 5 | 1 | 12 - 204 | Gujrat - Kharian | 0.88 | III | III | C | 38 | 106.4 | H | F38, F139 | A (F) | 38 | 372.5 |
| 0 | 1 | 12 - 206 | Gujrat - Chak Mano | 0.38 | IV | IV | | | | | | | | |
| 0 | 1 | 13 - 16 | Sargodha - Jhang | 1.57 | V | IV | B | 117 | 339.3 | G | | | | |
| 0 | 1 | 13 - 62 | Sargodha - Khushab | 0.58 | III | III | C | 47 | 131.6 | H | P34 | BR | 0 | 53.5 |
| 0 | 1 | 13 - 64 | Sargodha - Chiniot | 0.76 | IV | IV | C | 52 | 124.8 | H | | | | |
| 0 | 1 | 13 - 208 | Sargodha - Khutiata | 0.35 | IV | IV | | | | | P369 | C | 15.7 | 2.1 |

Table 3.3.1 Continued

| ROAD NO. | PROVINCE NO. | NODE NO. | SECTION | CONGESTION RATIO (V/C) 1992/93 | EXISTING CLASS | PROPOSED CLASS | CANDIDATE PROJECTS: PROJECT CATEGORY | CANDIDATE PROJECTS: LENGTH (Km) | CANDIDATE PROJECTS: COST | AXLES | ON-GOING PROJECTS: ADP. REFERENCE NO. | ON-GOING PROJECTS: PROJECT CATEGORY | ON-GOING PROJECTS: LENGTH (Km) | ESTIMATED EXPENDITURE DURING SUBSEQUENT YEARS (BEYOND 6TH PLAN) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 13 - 209 | Sargodha - Lalian | 0.30 | IV | IV | | | | | | | | |
| 0 | 1 | 14 - 58 | Mianwali - Talagang | 2.32 | V | IV | B | 99 | 346.5 | H | P371 | B | 40.7 | 12.1 |
| 0 | 1 | 14 - 95 | Mianwali - Kalabagh | 1.68 | V | IV | B | 48 | 139.2 | G | | | | |
| 0 | 1 | 14 - 210 | Mianwali - Qaidabad | 0.25 | IV | IV | | | | | | | | |
| 0 | 1 | 14 - 211 | Mianwali - Dullewala | 0.43 | IV | IV | | | | | | | | |
| 0 | 1 | 14 - 212 | Mianwali - Darya Khan | 0.53 | V | V | C | 100 | 150.0 | D | | | | |
| 0 | 1 | 15 - 16 | Faisalabad - Jhang | 0.66 | III | III | C | 82 | 229.6 | H | | | | |
| 0 | 1 | 15 - 18 | Faisalabad - Sheikhupura | 0.73 | III | III | C | 97 | 271.6 | H | | | | |
| 0 | 1 | 15 - 64 | Faisalabad - Chiniot | 0.58 | III | III | C | 37 | 103.6 | H | | | | |
| 0 | 1 | 15 - 67 | Faisalabad - Sumundri | 0.68 | IV | IV | C | 40 | 96.0 | H | | | | |
| 0 | 1 | 15 - 215 | Faisalabad - Jaranwala | 0.39 | IV | IV | | | | | | | | |
| 0 | 1 | 16 - 64 | Jhang - Chiniot | 0.26 | IV | IV | | | | | | | | |
| 0 | 1 | 16 - 66 | Jhang - Atharan Hazari | 0.51 | IV | IV | C | 32 | 76.8 | H | | | | |
| 0 | 1 | 16 - 67 | Jhang - Sumundri | 0.74 | V | V | C | 64 | 102.4 | G | | | | |
| 0 | 1 | 16 - 70 | Jhang - Rajana | 0.20 | IV | IV | | | | | | | | |
| 0 | 1 | 16 - 75 | Jhang - Kabirwala | 0.70 | IV | IV | C | 113 | 271.2 | H | | | | |
| 0 | 1 | 17 - 18 | Lahore - Sheikhupura | 0.58 | III | III | C | 38 | 106.4 | H | | | | |
| 5 | 1 | 17 - 19 | Lahore - Gujranwala | 0.38 | I | I | | | | | | | | |
| 0 | 1 | 17 - 50 | Lahore - Boundary | 0.66 | III | III | C | 68 | 190.4 | H | | | | |
| 0 | 1 | 17 - 69 | Lahore - Dipalpur | 0.18 | IV | IV | | | | | | | | |
| 5 | 1 | 17 - 71 | Lahore - Okara | 0.63 | II | II | C | 111 | 321.9 | H | | | | |
| 0 | 1 | 17 - 215 | Lahore - Jaranwala | 0.28 | IV | IV | | | | | | | | |
| 0 | 1 | 18 - 19 | Sheikhupura - Gujranwala | 0.60 | IV | IV | C | 53 | 127.2 | H | | | | |
| 0 | 1 | 18 - 63 | Sheikhupura - Pindi Bhattian | 0.67 | III | III | C | 70 | 196.0 | H | | | | |
| 0 | 1 | 19 - 20 | Gujranwala - Sialkot | 2.10 | V | IV | B | 48 | 139.2 | G | P344 | C | 8 | 1.6 |
| 5 | 1 | 19 - 61 | Gujranwala - Wazirabad | 1.20 | III | I | A | 39 | 347.1 | H | F38, F139 | A (F) | 39 | 520.7 |
| 0 | 1 | 19 - 63 | Gujranwala - Pindi Bhattian | 0.09 | IV | IV | | | | | | | | |
| 0 | 1 | 19 - 206 | Gujranwala - Chak Mano | 0.53 | IV | IV | C | 69 | 165.6 | H | | | | |
| 0 | 1 | 20 - 61 | Sialkot - Wazirabad | 0.35 | IV | IV | | | | | | | | |
| 55 | 1 | 21 - 74 | D. G. Khan - Shadan Lund | 0.81 | V | V | C | 51 | 81.6 | G | | | | |
| 0 | 1 | 21 - 85 | D. G. Khan - Karamdad Qurashi | 0.46 | III | III | | | | | F35 | BR (F) | 0 | 269.7 |
| 0 | 1 | 21 - 97 | D. G. Khan - Bewata | 2.77 | V | IV | B | 92 | 322.0 | H | | | | |
| 55 | 1 | 21 - 231 | D. G. Khan - Rajanpur | 0.35 | IV | IV | | | | | | | | |
| 0 | 1 | 22 - 23 | Muzaffargarh - Multan | 0.75 | IV | IV | C | 34 | 81.6 | H | | | | |
| 0 | 1 | 22 - 79 | Muzaffargarh - T. M. Danah | 0.74 | IV | IV | C | 129 | 309.6 | H | | | | |
| 0 | 1 | 22 - 85 | Muzaffargarh - Karamdad Qurashi | 0.55 | IV | IV | C | 23 | 55.2 | H | | | | |
| 0 | 1 | 22 - 100 | Muzaffargarh - Chowk Munda | 0.28 | IV | IV | | | | | | | | |
| 0 | 1 | 22 - 101 | Muzaffargarh - Rangpur | 1.51 | V | IV | B | 63 | 220.5 | H | | | | |
| 5 | 1 | 23 - 75 | Multan - Kabirwala | 0.95 | IV | IV | C | 29 | 69.6 | H | F37, F | BR,A (F) | 29 | 174.0 |
| 0 | 1 | 23 - 120 | Multan - Jahanian | 0.41 | IV | IV | | | | | | | | |
| 5 | 1 | 23 - 121 | Multan - Lodhran | 0.44 | IV | IV | | | | | | | | |
| 0 | 1 | 24 - 67 | Sahiwal - Sumundri | 0.15 | IV | IV | | | | | | | | |

Table 3.3.1 Continued

| ROAD NO. | PROVINCE NO. | NODE NO. | SECTION | CONGESTION RATIO (V/C) 1992/93 | EXISTING CLASS | PROPOSED CLASS | CANDIDATE PROJECTS: PROJECT CATEGORY | CANDIDATE PROJECTS: LENGTH (Km) | CANDIDATE PROJECTS: COST | AXLES | ON-GOING PROJECTS: ADP. REFERENCE NO. | ON-GOING PROJECTS: PROJECT CATEGORY | ON-GOING PROJECTS: LENGTH (Km) | ESTIMATED EXPENDITURE DURING SUBSEQUENT YEARS (BEYOND 6TH PLAN) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 1 | 24 - 71 | Sahiwal - Okara | 0.80 | II | II | C | 34 | 98.6 | H | | | | |
| 5 | 1 | 24 - 72 | Sahiwal - Chichawatni | 0.64 | III | III | C | 42 | 117.6 | H | F39 | A (F) | 42 | 45.7 |
| 0 | 1 | 24 - 76 | Sahiwal - Arifwala | 0.55 | IV | IV | C | 46 | 110.4 | H | | | | |
| 0 | 1 | 24 - 216 | Sahiwal - Pakpattan | 0.15 | IV | IV | | | | | | | | |
| 0 | 1 | 25 - 26 | Bahawalpur - Bahawalnagar | 0.40 | V | V | | | | | P427, P429 | C | 15.7 | 252.0 |
| 0 | 1 | 25 - 78 | Bahawalpur - Hassalpur | 1.04 | V | IV | B | 91 | 263.9 | G | | | | |
| 5 | 1 | 25 - 80 | Bahawalpur - Chani Goth | 1.32 | III | I | A | 71 | 724.2 | J | | | | |
| 5 | 1 | 25 - 121 | Bahawalpur - Lodhran | 0.85 | III | III | C | 20 | 56.0 | H | | | | |
| 0 | 1 | 26 - 73 | Bahawalnagar - Bunga Hayat | 0.14 | IV | IV | | | | | | | | |
| 0 | 1 | 26 - 76 | Bahawalnagar - Arifwala | 0.15 | IV | IV | | | | | P415 | BR | 0 | 43.0 |
| 0 | 1 | 26 - 78 | Bahawalnagar - Hassalpur | 0.24 | IV | IV | | | | | | | | |
| 5 | 1 | 27 - 79 | Rahimyar Khan - T. M. Panah | 1.07 | IV | II | B | 101 | 393.9 | H | F43 | C (F) | 9.5 | 3.6 |
| 0 | 1 | 27 - 80 | Rahimyar Khan - Chani Goth | 4.17 | V | IV | B | 107 | 374.5 | H | | | | |
| 5 | 1 | 27 - 150 | Rahimyar Khan - Boundary | 1.43 | IV | I | A | 48 | 542.4 | J | F42 | C (F) | 13.7 | 6.5 |
| 65 | 2 | 28 - 29 | Shikarpur - Rohri | 0.65 | IV | IV | C | 31 | 74.4 | H | | | | |
| 55 | 2 | 28 - 30 | Shikarpur - Larkana | 0.94 | IV | IV | | | | | S1270 | B | 20 | 6.0 |
| 65 | 2 | 28 - 83 | Shikarpur - Jacobabad | 0.53 | IV | IV | C | 42 | 100.8 | H | | | | |
| 55 | 2 | 28 - 84 | Shikarpur - Kandhkot | 5.19 | V | IV | B | 64 | 224.0 | H | S1243 | B | 15.9 | 5.2 |
| 5 | 2 | 29 - 32 | Rohri - Khairpur | 1.39 | III | I | A | 25 | 255.0 | J | F | C (F) | 25 | 87.5 |
| 5 | 2 | 29 - 82 | Rohri - Ubauro | 1.05 | III | I | A | 112 | 996.8 | H | | | | |
| 55 | 2 | 30 - 34 | Larkana - Dadu | 0.69 | IV | IV | C | 119 | 285.6 | H | S1203 | C | 24.9 | 6.9 |
| 0 | 2 | 30 - 83 | Larkana - Jacobabad | 0.00 | V | V | | | | | | | | |
| 0 | 2 | 31 - 86 | Nawabshah - Sakrand | 0.55 | III | III | C | 21 | 58.6 | H | S1185 | B | 51.5 | 5.6 |
| 0 | 2 | 31 - 103 | Nawabshah - Gopchali | 2.25 | V | IV | B | 16 | 56.0 | H | S1266,S1344 | B | 15 | 6.0 |
| 5 | 2 | 32 - 102 | Khairpur - Moro | 0.94 | III | III | C | 137 | 383.6 | H | F | C (F) | 137 | 112.5 |
| 0 | 2 | 33 - 37 | Hyderabad - Thatta | 0.95 | III | III | C | 100 | 280.0 | H | S1188,S1256 | B | 100 | 23.4 |
| 5 | 2 | 33 - 87 | Hyderabad - Hala | 1.18 | III | I | A | 46 | 409.4 | H | F139 | A (F) | 45 | 278.3 |
| 0 | 2 | 33 - 105 | Hyderabad - Tando Allahyar | 0.73 | III | III | C | 34 | 95.2 | H | | | | |
| 0 | 2 | 33 - 107 | Hyderabad - T. M. Khan | 0.26 | IV | IV | | | | | S1204 | B | 31.4 | 4.5 |
| 5 | 2 | 33 - 118 | Hyderabad - Kotri | 1.52 | II | I | A | 15 | 153.0 | J | F72, F73 | A,BR (F) | 15 | 180.2 |
| 0 | 2 | 33 - 217 | Hyderabad - Tando Adam | 9.22 | V | I | A | 60 | 702.0 | J | | | | |
| 0 | 2 | 34 - 102 | Dadu - Moro | 0.49 | IV | IV | | | | | | | | |
| 55 | 2 | 34 - 232 | Dadu - Gopang | 1.44 | IV | I | A | 165 | 1633.5 | H | S1205 | B | 12.3 | 6.5 |
| 0 | 2 | 35 - 106 | Umarkot - Mirpur Khas | 2.36 | V | IV | B | 74 | 214.6 | G | S1197 | B | 24.4 | 3.3 |
| 0 | 2 | 36 - 103 | Sanghar - Gopchali | 0.06 | IV | IV | | | | | | | | |
| 0 | 2 | 36 - 104 | Sanghar - Shahdadpur | 0.26 | IV | IV | | | | | | | | |
| 0 | 2 | 36 - 106 | Sanghar - Mirpur Khas | 0.12 | IV | IV | | | | | S1186,S1261 | B | 47.8 | 33.9 |
| 0 | 2 | 37 - 39 | Thatta - Karachi | 1.27 | III | I | A | 102 | 907.8 | H | S1207,S1256,S1278 | B | 83.8 | 31.6 |
| 0 | 2 | 37 - 109 | Thatta - Sujawal | 0.37 | IV | IV | | | | | | | | |
| 0 | 2 | 38 - 88 | Badin - Tando Ghulam Ali | 0.13 | IV | IV | | | | | S1217 | C | 62.4 | 13.8 |
| 0 | 2 | 38 - 109 | Badin - Sujawal | 0.85 | V | V | C | 81 | 129.6 | G | S1192,S1201,S1274 | B | 76.8 | 21.2 |
| 0 | 2 | 38 - 122 | Badin - Digri | 0.06 | IV | IV | | | | | | | | |

Table 3.3.1 Continued

| ROAD NO. | PROVINCE NO. | NODE NO. | SECTION | CONGESTION RATIO (V/C) 1992/93 | EXISTING CLASS | PROPOSED CLASS | CANDIDATE PROJECTS: PROJECT CATEGORY | CANDIDATE PROJECTS: LENGTH (Km) | CANDIDATE PROJECTS: COST | AXLES | ON-GOING PROJECTS: ADP. REFERENCE NO. | ON-GOING PROJECTS: PROJECT CATEGORY | ON-GOING PROJECTS: LENGTH (Km) | ESTIMATED EXPENDITURE DURING SUBSEQUENT YEARS (BEYOND 6TH PLAN) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 2 | 39 - 118 | Karachi - Kotri | 1.30 | II | I | A | 150 | 1530.0 | J | F72, F139 | A (F) | 150 | 812.0 |
| 25 | 2 | 39 - 151 | Karachi - Boundary | 0.43 | III | III | | | | | | | | |
| 25 | 4 | 40 - 43 | Quetta - Kalat | 0.91 | IV | IV | C | 145 | 348.0 | H | | | | |
| 65 | 4 | 40 - 45 | Quetta - Sibi | 0.49 | IV | IV | | | | | F130 | C (F) | 148 | 22.5 |
| 50 | 4 | 40 - 96 | Quetta - Qila Saifullah | 0.71 | V | V | C | 175 | 280.0 | D | F125 | C (F) | 175 | 65.5 |
| 0 | 4 | 40 - 218 | Quetta - Smallan | 0.40 | V | V | | | | | | | | |
| 25 | 4 | 40 - 221 | Quetta - Chaman | 0.47 | IV | IV | | | | | | | | |
| 40 | 4 | 40 - 223 | Quetta - Ahmadwal | 0.52 | V | V | C | 129 | 193.5 | D | | | | |
| 0 | 4 | 41 - 96 | Loralai - Qila Saifullah | 0.72 | V | V | C | 72 | 108.0 | D | | | | |
| 0 | 4 | 41 - 97 | Loralai - Bewata | 0.80 | V | V | C | 189 | 302.4 | G | | | | |
| 0 | 4 | 41 - 218 | Loralai - Smallan | 0.17 | V | V | | | | | | | | |
| 40 | 4 | 42 - 51 | Dalbandin - Taftan | 0.18 | V | V | | | | | F135, F127 | C (F) | 130 | 143.3 |
| 40 | 4 | 42 - 223 | Dalbandin - Ahmadwal | 0.63 | V | V | C | 181 | 271.5 | D | | | | |
| 25 | 4 | 43 - 110 | Kalat - Surab | 0.78 | V | V | C | 69 | 110.4 | G | F128 | BR (F) | 69 | 0.5 |
| 25 | 4 | 44 - 114 | Bera - Wingai | 1.34 | V | IV | B | 76 | 212.8 | D | | | | |
| 25 | 4 | 44 - 227 | Bera - Khuzdar | 1.20 | V | IV | B | 196 | 548.8 | D | F128 ,F129 | BR (F) | 196 | 55.3 |
| 0 | 4 | 44 - 226 | Bera - Awaran | 0.54 | V | V | C | 173 | 276.8 | G | | | | |
| 65 | 4 | 45 - 154 | Sibi - Boundary | 0.50 | IV | IV | C | 147 | 352.8 | H | | | | |
| 0 | 4 | 45 - 222 | Sibi - --- | 0.03 | V | V | | | | | | | | |
| 0 | 4 | 46 - 111 | --- - Pidarak | 0.28 | V | V | | | | | | | | |
| 0 | 4 | 46 - 113 | --- - Pasani | 0.36 | V | V | | | | | | | | |
| 99 | 0 | 47 - 229 | Gilgit - Boundary | 0.00 | IV | IV | | | | | | | | |
| 0 | 3 | 48 - 54 | Boundary - Mansehra | 0.00 | IV | IV | | | | | | | | |
| 99 | 0 | 49 - 201 | Kabul - Torkham | 0.01 | III | III | | | | | | | | |
| 99 | 0 | 49 - 221 | Boundary - Chaman | 0.01 | IV | IV | | | | | | | | |
| 0 | 3 | 52 - 230 | Chakdarra Fort - Dir | 0.24 | IV | IV | | | | | | | | |
| 5 | 3 | 53 - 116 | Nowshera - Jehangira | 0.67 | III | III | C | 22 | 61.6 | H | | | | |
| 35 | 3 | 54 - 89 | Mansehra - Bisham | 0.12 | IV | IV | | | | | | | | |
| 5 | 1 | 55 - 117 | Hassanabdal - Tarnual | 0.32 | I | I | | | | | | | | |
| 35 | 1 | 55 - 152 | Hassanabdal - Boundary | 0.55 | III | III | C | 14 | 39.2 | H | | | | |
| 0 | 1 | 56 - 58 | Fatehjang - Talagang | 0.55 | IV | IV | C | 87 | 208.8 | H | | | | |
| 0 | 1 | 56 - 68 | Fatehjang - Basal | 0.21 | IV | IV | | | | | | | | |
| 0 | 1 | 56 - 117 | Fatehjang - Tarnual | 0.55 | IV | IV | C | 30 | 72.0 | H | | | | |
| 0 | 1 | 57 - 92 | Mandra - Chakwal | 0.49 | IV | IV | | | | | | | | |
| 5 | 1 | 57 - 93 | Mandra - Sohawa | 1.15 | III | I | A | 33 | 293.7 | H | F48 | C (F) | 0 | 2.9 |
| 0 | 1 | 58 - 60 | Talagang - Pail | 0.16 | IV | IV | | | | | | | | |
| 0 | 1 | 58 - 68 | Talagang - Basal | 0.10 | IV | IV | | | | | | | | |
| 0 | 1 | 58 - 92 | Talagang - Chakwal | 1.26 | V | IV | B | 46 | 128.8 | D | | | | |
| 0 | 3 | 59 - 156 | Tajazai - Isakhel | 1.13 | V | IV | B | 39 | 109.2 | D | | | | |
| 0 | 1 | 60 - 62 | Pail - Khushab | 4.56 | V | IV | B | 46 | 161.0 | H | | | | |
| 0 | 1 | 60 - 92 | Pail - Chakwal | 1.51 | V | IV | B | 58 | 168.2 | G | | | | |
| 0 | 1 | 62 - 66 | Khushab - Atharan Hazari | 0.69 | V | V | C | 138 | 220.8 | G | | | | |

Table 3.3.1 Continued

| ROAD NO. | PROVINCE NO. | NODE NO. | SECTION | CONGESTION RATIO (V/C) 1992/93 | EXISTING CLASS | PROPOSED CLASS | CANDIDATE PROJECTS: PROJECT CATEGORY | CANDIDATE PROJECTS: LENGTH (Km) | CANDIDATE PROJECTS: COST | AXLES | ON-GOING PROJECTS: ADP. REFERENCE NO. | ON-GOING PROJECTS: PROJECT CATEGORY | ON-GOING PROJECTS: LENGTH (Km) | ESTIMATED EXPENDITURE DURING SUBSEQUENT YEARS (BEYOND 6TH PLAN) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 62 - 210 | Khushab - Qaidabad | 0.46 | IV | IV | | | | | | | | |
| 0 | 1 | 63 - 64 | Pindi Bhattian - Chiniot | 0.60 | IV | IV | C | 33 | 79.2 | H | | | | |
| 0 | 1 | 63 - 209 | Pindi Bhattian - Lalian | 0.27 | IV | IV | | | | | | | | |
| 0 | 1 | 65 - 66 | Sarai Krisha - Atharan Hazari | 0.68 | V | V | C | 94 | 150.4 | G | | | | |
| 0 | 1 | 65 - 100 | Sarai Krisha - Chowk Munda | 0.42 | IV | IV | | | | | | | | |
| 0 | 1 | 65 - 211 | Sarai Krisha - Dullewala | 0.36 | IV | IV | | | | | | | | |
| 0 | 1 | 65 - 213 | Sarai Krisha - Bhakkar | 0.97 | V | V | C | 20 | 32.0 | G | | | | |
| 0 | 1 | 66 - 101 | Atharan Hazari - Rangpur | 0.23 | IV | IV | | | | | | | | |
| 0 | 1 | 67 - 70 | Sumundri - Rajana | 0.28 | IV | IV | | | | | | | | |
| 0 | 1 | 67 - 71 | Sumundri - Okara | 0.17 | IV | IV | | | | | | | | |
| 0 | 1 | 68 - 158 | Basal - Boundary | 1.01 | V | IV | B | 38 | 110.2 | G | | | | |
| 0 | 1 | 69 - 71 | Dipalpur - Okara | 0.38 | IV | IV | | | | | | | | |
| 0 | 1 | 69 - 73 | Dipalpur - Bunga Hayat | 0.25 | IV | IV | | | | | | | | |
| 0 | 1 | 70 - 72 | Rajana - Chichawatni | 0.28 | IV | IV | | | | | | | | |
| 0 | 1 | 71 - 215 | Okara - Jaranwala | 0.55 | V | V | C | 62 | 93.0 | D | | | | |
| 0 | 1 | 72 - 98 | Chichawatni - Burewala | 0.21 | IV | IV | | | | | | | | |
| 5 | 1 | 72 - 119 | Chichawatni - Khanewal | 0.74 | IV | IV | C | 80 | 192.0 | H | F | A (F) | 80 | 480.0 |
| 0 | 1 | 73 - 216 | Bunga Hayat - Pakpattan | 0.15 | IV | IV | | | | | | | | |
| 0 | 1 | 74 - 99 | Shadan Lund - Kot Addu | 0.14 | IV | IV | | | | | | | | |
| 55 | 1 | 74 - 160 | Shadan Lund - Boundary | 0.70 | V | V | C | 106 | 169.6 | G | | | | |
| 5 | 1 | 75 - 119 | Kabirwala - Khanewal | 0.52 | IV | IV | C | 14 | 33.6 | H | F | A (F) | 14 | 84.0 |
| 0 | 1 | 76 - 98 | Arifwala - Burewala | 0.46 | IV | IV | | | | | | | | |
| 0 | 1 | 76 - 216 | Arifwala - Pakpattan | 0.13 | IV | IV | | | | | | | | |
| 0 | 1 | 77 - 78 | Vihari - Hassalpur | 0.15 | IV | IV | | | | | | | | |
| 0 | 1 | 77 - 98 | Vihari - Burewala | 0.49 | IV | IV | | | | | | | | |
| 0 | 1 | 77 - 120 | Vihari - Jahanian | 0.27 | IV | IV | | | | | | | | |
| 0 | 1 | 77 - 121 | Vihari - Lodran | 1.09 | V | IV | B | 99 | 287.1 | G | | | | |
| 5 | 1 | 79 - 80 | T. M. Panah - Chani Goth | 0.75 | IV | IV | C | 13 | 31.2 | H | | | | |
| 0 | 2 | 81 - 82 | Kashmor - Ubauro | 0.09 | IV | IV | | | | | | | | |
| 55 | 2 | 81 - 84 | Kashmor - Kandhkot | 0.71 | IV | IV | C | 47 | 112.8 | H | | | | |
| 55 | 2 | 81 - 159 | Kashmor - Boundary | 0.23 | IV | IV | | | | | | | | |
| 5 | 2 | 82 - 150 | Ubauro - Boundary | 0.74 | III | III | C | 13 | 36.4 | H | | | | |
| 0 | 2 | 83 - 84 | Jacobabad - Kandhkot | 0.04 | IV | IV | | | | | S1255 | B | 16.1 | 8.9 |
| 65 | 2 | 83 - 154 | Jacobabad - Boundary | 0.58 | IV | IV | C | 11 | 26.4 | H | | | | |
| 0 | 1 | 85 - 99 | Karamdad Qurashi - Kot Addu | 0.37 | IV | IV | | | | | | | | |
| 5 | 2 | 86 - 87 | Sakrand - Hala | 1.08 | III | I | A | 39 | 347.1 | H | F | A (F) | 39 | 272.6 |
| 5 | 2 | 86 - 102 | Sakrand - Moro | 1.35 | III | I | A | 70 | 714.0 | J | F81 | A (F) | 1.6 | 427.8 |
| 0 | 2 | 87 - 104 | Hala - Shahdadpur | 0.13 | IV | IV | | | | | | | | |
| 0 | 2 | 88 - 107 | Tando Ghulam Ali - T. M. Khan | 0.13 | IV | IV | | | | | F82, S1217 | C | 16 | 4.6 |
| 0 | 2 | 88 - 108 | Tando Ghulam Ali - Matli | 0.00 | IV | IV | | | | | | | | |
| 35 | 3 | 89 - 229 | Bisham - Boundary | 0.08 | IV | IV | | | | | | | | |
| 0 | 3 | 90 - 115 | Haripur - Swabi | 0.27 | III | III | | | | | | | | |

Table 3.3.1 Continued

| ROAD NO. | PROVINCE NO. | NODE NO. | SECTION | | | CONGESTION RATIO (V/C) 1992/93 | EXISTING CLASS | PROPOSED CLASS | CANDIDATE PROJECTS: PROJECT CATEGORY | CANDIDATE PROJECTS: LENGTH (Km) | CANDIDATE PROJECTS: COST | AXLES | ON-GOING PROJECTS: ADP. REFERENCE NO. | ON-GOING PROJECTS: PROJECT CATEGORY | ON-GOING PROJECTS: LENGTH (Km) | ON-GOING PROJECTS: ESTIMATED EXPENDITURE DURING SUBSEQUENT YEARS (BEYOND 6TH PLAN) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 35 | 3 | 90 - 152 | Haripur | - | Boundary | 0.81 | IV | IV | C | 19 | 45.6 | H | | | | |
| 0 | 1 | 92 - 93 | Chakwal | - | Sohawa | 0.67 | V | V | C | 68 | 102.0 | D | | | | |
| 0 | 1 | 92 - 205 | Chakwal | - | Jalalpur | 1.21 | V | IV | B | 91 | 283.9 | G | | | | |
| 0 | 3 | 94 - 157 | Jatta | - | Boundary | 0.72 | V | V | C | 37 | 55.5 | D | | | | |
| 0 | 1 | 95 - 156 | Kalabagh | - | Isakhel | 1.06 | V | IV | B | 54 | 156.6 | G | | | | |
| 0 | 1 | 95 - 157 | Kalabagh | - | Boundary | 0.72 | V | V | C | 27 | 40.5 | D | | | | |
| 50 | 4 | 96 - 219 | Qila Saifullah | - | Zhob | 1.14 | V | IV | B | 139 | 403.1 | G | F125 | C (F) | 139 | 52.0 |
| 0 | 4 | 97 - 222 | Bewata | - | --- | 0.24 | V | V | | | | | | | | |
| 0 | 1 | 99 - 214 | Kot Addu | - | Dera Din Panah | 0.45 | V | V | | | | | | | | |
| 0 | 1 | 100 - 101 | Chwk Munda | - | Rangpur | 0.33 | V | V | | | | | | | | |
| 0 | 1 | 100 - 214 | Chwk Munda | - | Dera Din Panah | 0.86 | V | V | C | 9 | 14.4 | G | | | | |
| 0 | 2 | 103 - 104 | Gopchali | - | Shahdadpur | 1.91 | V | IV | B | 30 | 105.0 | H | | | | |
| 0 | 2 | 104 - 217 | Shahdadpur | - | Tando Adam | 0.54 | IV | IV | C | 41 | 98.4 | H | | | | |
| 0 | 2 | 105 - 106 | Tando Allahyar | - | Mirpur Khas | 0.32 | IV | IV | | | | | | | | |
| 0 | 2 | 105 - 108 | Tando Allahyar | - | Matli | 0.00 | V | V | | | | | | | | |
| 0 | 2 | 105 - 217 | Tando Allahyar | - | Tando Adam | 0.54 | IV | IV | C | 14 | 33.6 | H | S1223, S1277 | C | 23.8 | 11.2 |
| 0 | 2 | 106 - 122 | Mirpur Khas | - | Digri | 0.04 | IV | IV | | | | | S1187 | B | 19.3 | 2.3 |
| 0 | 2 | 107 - 109 | T. M. Khan | - | Sujawal | 1.64 | V | IV | B | 77 | 223.3 | G | | | | |
| 0 | 2 | 108 - 122 | Matli | - | Digri | 0.00 | IV | IV | | | | | | | | |
| 0 | 4 | 110 - 224 | Surab | - | Drug | 2.89 | V | IV | B | 78 | 273.0 | H | | | | |
| 25 | 4 | 110 - 227 | Surab | - | Khuzdar | 1.28 | V | IV | B | 104 | 291.2 | D | F128 | BR,B (F) | 0 | 0.5 |
| 0 | 4 | 111 - 112 | Pidarak | - | Hoshab | 0.21 | V | V | | | | | | | | |
| 0 | 4 | 111 - 113 | Pidarak | - | Pasani | 0.22 | V | V | | | | | | | | |
| 0 | 4 | 112 - 225 | Hoshab | - | Basima | 0.30 | V | V | | | | | | | | |
| 0 | 4 | 112 - 228 | Hoshab | - | Awaran | 0.21 | V | V | | | | | | | | |
| 0 | 4 | 113 - 114 | Pasani | - | Wingai | 0.36 | V | V | | | | | | | | |
| 25 | 4 | 114 - 151 | Wingai | - | Boundary | 1.70 | V | IV | B | 77 | 215.6 | D | | | | |
| 0 | 3 | 115 - 116 | Swabi | - | Jehangira | 0.25 | IV | IV | | | | | | | | |
| 55 | 2 | 118 - 232 | Kotri | - | Gopang | 8.21 | V | I | A | 30 | 306.0 | H | | | | |
| 0 | 1 | 119 - 120 | Khanewal | - | Jahanian | 0.56 | IV | IV | C | 31 | 74.4 | H | | | | |
| 0 | 1 | 120 - 121 | Jahanian | - | Lodhran | 0.58 | IV | IV | C | 57 | 136.8 | H | | | | |
| 50 | 4 | 153 - 219 | Boundary | - | Zhob | 0.61 | V | V | C | 70 | 112.0 | G | F125 | C (F) | 70 | 26.0 |
| 55 | 1 | 159 - 231 | Boundary | - | Rajanpur | 1.99 | V | IV | B | 109 | 381.5 | H | | | | |
| 0 | 1 | 161 - 212 | Boundary | - | Darya Khan | 1.33 | V | IV | B | 12 | 34.8 | G | | | | |
| 0 | 3 | 203 - 220 | Jandola | - | Boundary | 1.28 | V | IV | B | 80 | 224.0 | D | | | | |
| 0 | 1 | 204 - 207 | Kharian | - | Phalia | 0.03 | IV | IV | | | | | | | | |
| 0 | 1 | 205 - 208 | Jalalpur | - | Khutiata | 0.31 | IV | IV | | | | | | | | |
| 0 | 1 | 206 - 207 | Chak Mano | - | Phalia | 0.17 | IV | IV | | | | | | | | |
| 0 | 1 | 207 - 208 | Phalia | - | Khutiata | 0.20 | IV | IV | | | | | | | | |
| 0 | 1 | 207 - 209 | Phalia | - | Lalian | 0.04 | V | V | | | | | | | | |
| 0 | 1 | 210 - 211 | Qaidabad | - | Dullewala | 0.00 | IV | IV | | | | | | | | |
| 0 | 1 | 211 - 212 | Dullewala | - | Darya Khan | 0.11 | IV | IV | | | | | | | | |

Table 3.3.1 Continued

| ROAD NO. | PROVINCE NO. | NODE NO. | SECTION | | | CONGESTION RATIO (V/C) 1992/93 | EXISTING CLASS | PROPOSED CLASS | CANDIDATE PROJECTS | | | AXLES | ON-GOING PROJECTS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | PROJECT CATEGORY | LENGTH (Km) | COST | | ADP. REFERENCE NO. | PROJECT CATEGORY | LENGTH (Km) | ESTIMATED EXPENDITURE DURING SUBSEQUENT YEARS (BEYOND 6TH PLAN) |
| 0 | 1 | 212 - 213 | Darya Khan | - | Bhakkar | 1.44 | V | IV | B | 16 | 46.4 | G | | | | |
| 0 | 1 | 213 - 214 | Bhakkar | - | Dera Din Panah | 0.62 | V | V | C | 118 | 177.0 | D | | | | |
| 0 | 4 | 218 - 222 | Smallan | - | --- | 0.24 | V | V | | | | | | | | |
| 0 | 4 | 219 - 220 | Zhob | - | Boundary | 0.00 | V | V | | | | | | | | |
| 0 | 4 | 223 - 224 | Ahmadwal | - | Drug | 0.47 | V | V | | | | | B12 | B | 110 | 3.6 |
| 0 | 4 | 224 - 225 | Drug | - | Basima | 0.28 | V | V | | | | | | | | |
| 0 | 4 | 225 - 226 | Basima | - | --- | 0.42 | V | V | | | | | | | | |
| 0 | 4 | 226 - 227 | --- | - | Khuzdar | 0.00 | V | V | | | | | | | | |
| 0 | 4 | 226 - 228 | --- | - | Awaran | 0.42 | V | V | | | | | | | | |

## 3.4 Proposed Projects for the 7th Plan

### 3.4.1 Proposed Projects

(1) Overview

As desired in Section 3.3.1, Procedure of Project Selection, the project selection was made considering the candidate projects coupled with major on going projects. Judging from the Annual Development Programmes of the federal and four Provincial Governments in 1987/88, a total of 60 projects in the study network will be carried over beyond the 6th Plan as listed in Table 3.3.1. These project are expected to be completed within the 7th Plan. The project selection was also made considering all possible items that could be done by the private sector, particularly in relation to the second carriageway project.

A total of 139 highway sections in the study road network consists of 104 new improvement schemes and 35 ongoing schemes were selected for the 7th plan. In the ongoing schemes, some minor rehabilitation or improvement programmes are converted into category of the new scheme as a large size scheme.

The project in the highway sections where the congestion rate will exceed 1.2 are defined as primary schemes. However, some road sections where the assigned traffic volume is estimated by the Q-V method as described in Section 3.3.2 for the year 1992/93 was extremely high compared to the existing volume were adjusted appropriately in the process of project selection. These typical sections are as follows:

| | |
|---|---|
| Karachi - Thatta Section | (Node 37 - 39) |
| Kotri - Dadu Section | (Node 33 - 34) |
| Hyderabad - Tando Adam Section | (Node 33 - 217) |

As a result, the selected projects are listed in Table 3.4.2.

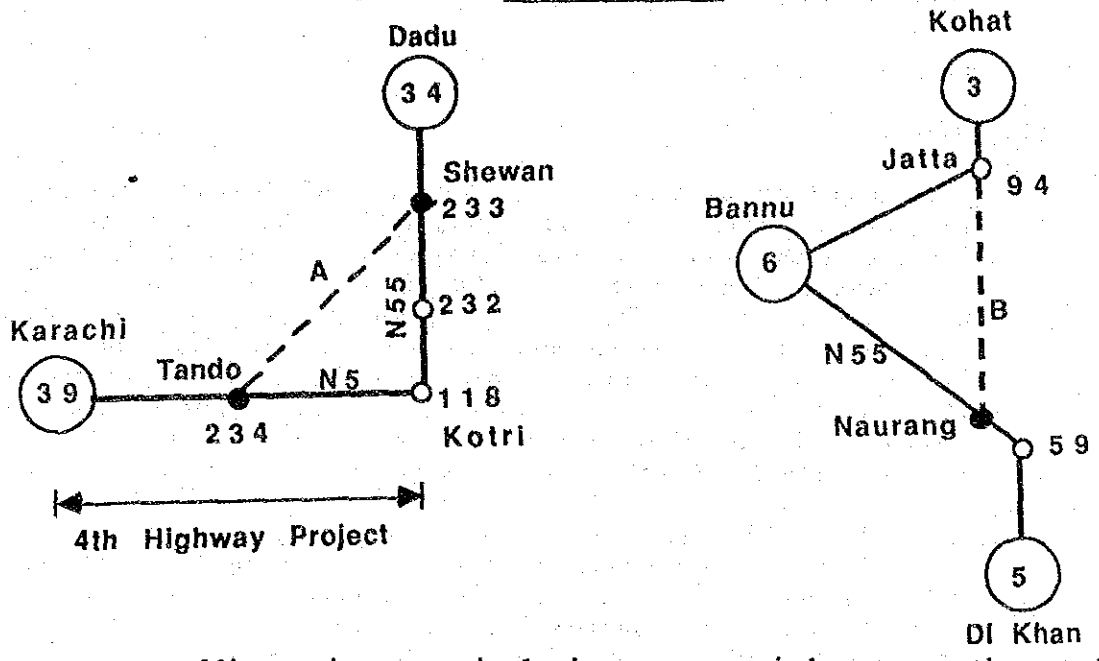
(2) New Road Links

Basically, the selection of road improvement projects which was made in the selected study road network consist of the existing primary and secondary highways as described in Chapter 1, Section 1.3.1.

This is based on the policy from the 6th and 7th plan which new construction of roads should be restricted to opening up of isolated areas.

These are some new road links related to National Highway N55 (Primary Highway) which are presently studied in Pakistan. The Study Team, therefore, assessed the following two projects as one of on-going new schemes.

Fig. 3.4.1 New Road Links




The traffic assignment simulation was carried out on the study road network adding the above new links, and the results are presented in Table 3.4.1.

Table 3.4.1 New-Network Link Volume (1992/93)

(Veh/day)

| LINK | CAR | BUS | TRUCK | TOTAL |
|---|---|---|---|---|
| 39 - 234 | 1756 | 589 | 9721 | 12066 |
| 234 - 118 | 1555 | 523 | 6169 | 8247 |
| 118 - 232 | 867 | 290 | 4118 | 5275 |
| 232 - 233 | 867 | 290 | 4118 | 5275 |
| 233 - 34 | 1068 | 356 | 7670 | 9094 |
| 233 - 234 | 201 | 66 | 3552 | 3819 |
| 59 - 235 | 1308 | 349 | 1881 | 3538 |
| 235 - 6 | 1248 | 316 | 1167 | 2731 |
| 6 - 94 | 179 | 168 | 239 | 586 |
| 94 - 235 | 60 | 33 | 714 | 807 |

As a result of the overall evaluation as summarized in the table below, both new link projects A and B are concluded as feasible projects for improvement of the North-South traffic generated in the West bank of the Indus River. However, since Link-A projects can be considered as secondary projects as compared with the on-going dual carriage construction projects excuted under the 4th Highway projects, the Study Team recommend to select Link-B project in the 7th Plan.

| Items to be evaluated | New Link - A | New Link - B |
|---|---|---|
| Section | Tando - Shewan | Jatta - Naurang |
| Road Length (Approx.) | 170 km | 80 km |
| Reduced Length | 70 km (29%) | 40 km (34%) |
| Major Traffic | Karachi-Datu-Shikarpur | D.I. Khan-Kohat-Peshawar |
| Traffic Volume (1992/93) | 3,800 veh/day ⟨ (4,000) | 800 veh/day ⟨ (1,000) |
| Highway Class | Class - III | Class - IV |
| Alternative Route | N5/N55 | N55 |
| Terrain of existing road | Flat | Hilly Area |
| Route Location | Minor road network | Isolated Areas |
| Major on-going Projects | N5-4th HWY Project | None |
| Difficulty of Existing-road improvement | Moderate | Difficult (Solt damage) |
| Feasibility | High | Moderate |
| Overall Evaluation | Moderate | Positive |

# Table 3.4.2 List of Selected Projects (7th F.Y.P)

| ROAD NO. | PROV. NO. | NODE NO. | | | SECTION | | | SELECTED PROJECTS (7TH FYP) CATEGORY | SCHEME | ENS.CLASS | PROPOSED | LENGTH (KM) | COST (RS MILLION) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 3 | 1 | - | 2 | Mardan | - | Peshawar | | | III | | | | |
| 0 | 3 | 1 | - | 52 | Mardan | - | Chakdarra Fort | C | NEW | III | III | 86 | 184.80 | |
| 0 | 3 | 1 | - | 53 | Mardan | - | Nowshera | C | NEW | IV | IV | 23 | 55.20 | |
| 0 | 3 | 1 | - | 91 | Mardan | - | Charsada | C | NEW | III | III | 28 | 78.40 | |
| 0 | 3 | 1 | - | 115 | Mardan | - | Swabi | | | III | | | | |
| 55 | 3 | 2 | - | 3 | Peshawar | - | Kohat | B, M | ON-GOING | IV | III | 31.4 | 550.10 | |
| 5 | 3 | 2 | - | 53 | Peshawar | - | Nowshera | A | ON-GOING | I | I | 35 | 17.40 | |
| 0 | 3 | 2 | - | 91 | Peshawar | - | Charsada | C | NEW | III | III | 29 | 63.80 | |
| 5 | 3 | 2 | - | 201 | Peshawar | - | Torkham | | | III | | | | |
| 55 | 3 | 3 | - | 94 | Kohat | - | Jatta | B | NEW | V | IV | 29 | 84.10 | |
| 0 | 3 | 3 | - | 158 | Kohat | - | Boundary | | | IV | | | | |
| 0 | 3 | 3 | - | 202 | Kohat | - | Boundary | | | V | | | | |
| 35 | 3 | 4 | - | 54 | Abbotabad | - | Mansehra | | | IV | | | | |
| 35 | 3 | 4 | - | 90 | Abbotabad | - | Haripur | C | NEW | III | III | 47 | 131.60 | |
| 0 | 3 | 4 | - | 155 | Abbotabad | - | Murree | | | IV | | | | |
| 55 | 3 | 5 | - | 59 | D. I. Khan | - | Talazal | | | IV | | | | |
| 50 | 3 | 5 | - | 153 | D. I. Khan | - | Boundary | C | ON-GOING | IV | IV | 90 | 43.50 | |
| 55 | 3 | 5 | - | 160 | D. I. Khan | - | Boundary | C | NEW | V | IV | 51 | 147.90 | |
| 0 | 3 | 5 | - | 161 | D. I. Khan | - | Boundary | BR | ON-GOING | IV | IV | | 68.99 | |
| 0 | 3 | 5 | - | 203 | D. I. Khan | - | Jandola | | | IV | | | | |
| 55 | 3 | 6 | - | 59 | Bannu | - | Talazal | | | IV | | | | |
| 55 | 3 | 6 | - | 94 | Bannu | - | Jatta | C | ON-GOING | IV | IV | | 2.50 | |
| 0 | 3 | 6 | - | 203 | Bannu | - | Jandola | | | IV | | | | |
| 0 | 3 | 7 | - | 230 | Chitral | - | Dir | | | IV | | | | |
| 0 | 3 | 8 | - | 52 | Batgram Saidu | - | Chakdarra Fort | | | IV | | | | |
| 0 | 3 | 8 | - | 89 | Batgram Saidu | - | Bisham | | | V | | | | |
| 5 | 1 | 9 | - | 55 | Attock | - | Hassanabdal | A | NEW | III | I | 44 | 391.60 | P |
| 0 | 1 | 9 | - | 68 | Attock | - | Basal | | | V | | | | (B V-IV 226.8) |
| 5 | 3 | 9 | - | 116 | Attock | - | Jehangira | A | NEW | III | I | 9 | 80.10 | P |
| 5 | 1 | 10 | - | 57 | Rawalpindi | - | Mandra | A | NEW | III | I | 31 | 275.90 | P |
| 5 | 1 | 10 | - | 117 | Rawalpindi | - | Tamual | | | I | | | | |
| 0 | 1 | 10 | - | 155 | Rawalpindi | - | Murree | M | ON-GOING | IV | IV | 54 | 19.50 | |
| 5 | 1 | 11 | - | 93 | Jhelum | - | Sohawa | A | NEW | III | I | 40 | 356.00 | P |
| 5 | 1 | 11 | - | 204 | Jhelum | - | Kharian | A | NEW | III | I | 24 | 213.60 | P |
| 0 | 1 | 11 | - | 205 | Jhelum | - | Jalalpur | B | NEW | V | IV | 32 | 92.80 | |
| 5 | 1 | 12 | - | 61 | Gujrat | - | Wazirabad | A | ON-GOING | III | I | 11 | 105.10 | 4th Highway |
| 5 | 1 | 12 | - | 204 | Gujrat | - | Kharian | A | ON-GOING | III | I | 38 | 372.50 | 4th Highway |
| 0 | 1 | 12 | - | 206 | Gujrat | - | Chak Mano | | | IV | | | | |
| 0 | 1 | 13 | - | 16 | Sargodha | - | Jhang | B | NEW | V | IV | 117 | 339.30 | |
| 0 | 1 | 13 | - | 62 | Sargodha | - | Khushab | BR | ON-GOING | III | III | | 53.50 | |
| 0 | 1 | 13 | - | 64 | Sargodha | - | Chiniot | C | NEW | IV | IV | 52 | 124.80 | |
| 0 | 1 | 13 | - | 208 | Sargodha | - | Khuliata | C | ON-GOING | IV | IV | 15.7 | 2.10 | |
| 0 | 1 | 13 | - | 209 | Sargodha | - | Lallian | | | IV | | | | |
| 0 | 1 | 14 | - | 58 | Mianwali | - | Talagang | B | NEW | V | IV | 99 | 348.50 | |
| 0 | 1 | 14 | - | 95 | Mianwali | - | Kalabagh | B | NEW | V | IV | 48 | 139.20 | |
| 0 | 1 | 14 | - | 210 | Mianwali | - | Qaidabad | | | IV | | | | |
| 0 | 1 | 14 | - | 211 | Mianwali | - | Dulfewala | | | IV | | | | |
| 0 | 1 | 14 | - | 212 | Mianwali | - | Darya Khan | | | V | | | | (C V-V 150.0) |
| 0 | 1 | 15 | - | 16 | Faisalabad | - | Jhang | C | NEW | III | III | 82 | 229.60 | |
| 0 | 1 | 15 | - | 18 | Faisalabad | - | Sheikhupura | C | NEW | III | III | 97 | 271.60 | |
| 0 | 1 | 15 | - | 64 | Faisalabad | - | Chiniot | C | NEW | III | III | 37 | 103.60 | |
| 0 | 1 | 15 | - | 67 | Faisalabad | - | Sumundri | C | NEW | IV | IV | 40 | 96.00 | |
| 0 | 1 | 15 | - | 215 | Faisalabad | - | Jaranwala | | | IV | | | | |
| 0 | 1 | 16 | - | 64 | Jhang | - | Chiniot | | | IV | | | | |
| 0 | 1 | 16 | - | 66 | Jhang | - | Atharan Hazari | C | NEW | IV | IV | 32 | 76.80 | |
| 0 | 1 | 16 | - | 67 | Jhang | - | Sumundri | | | V | | | | (B V-IV 185.6) |
| 0 | 1 | 16 | - | 70 | Jhang | - | Rajana | | | IV | | | | |
| 0 | 1 | 16 | - | 75 | Jhang | - | Kablewala | C | NEW | IV | IV | 113 | 271.20 | |
| 0 | 1 | 17 | - | 18 | Lahore | - | Sheikhupura | C | NEW | III | III | 38 | 106.40 | |
| 5 | 1 | 17 | - | 19 | Lahore | - | Gujranwala | | | I | | | | |
| 0 | 1 | 17 | - | 50 | Lahore | - | Boundary | C | NEW | III | III | 68 | 190.40 | |
| 0 | 1 | 17 | - | 69 | Lahore | - | Dipalpur | | | IV | | | | |
| 5 | 1 | 17 | - | 71 | Lahore | - | Okara | | | II | | | | |
| 0 | 1 | 17 | - | 215 | Lahore | - | Jaranwala | | | IV | | | | |
| 0 | 1 | 18 | - | 19 | Sheikhupura | - | Gujranwala | C | NEW | IV | IV | 53 | 127.20 | |
| 0 | 1 | 18 | - | 63 | Sheikhupura | - | Pindi Bhattian | C | NEW | III | III | 70 | 196.00 | |
| 0 | 1 | 19 | - | 20 | Gujranwala | - | Sialkot | B | NEW | V | IV | 48 | 139.20 | |
| 5 | 1 | 19 | - | 61 | Gujranwala | - | Wazirabad | A | ON-GOING | III | I | 39 | 520.70 | 4th Highway |
| 0 | 1 | 19 | - | 63 | Gujranwala | - | Pindi Bhattian | | | IV | | | | |
| 0 | 1 | 19 | - | 206 | Gujranwala | - | Chak Mano | C | NEW | IV | IV | 69 | 165.60 | |
| 0 | 1 | 20 | - | 61 | Sialkot | - | Wazirabad | | | IV | | | | |
| 55 | 1 | 21 | - | 74 | D. G. Khan | - | Shadan Lund | B | NEW | V | IV | 51 | 147.90 | |
| 0 | 1 | 21 | - | 85 | D. G. Khan | - | Karamdad Quraishi | BR | ON-GOING | III | III | | 269.70 | |
| 0 | 1 | 21 | - | 97 | D. G. Khan | - | Bowata | B | NEW | V | IV | 92 | 322.00 | |
| 55 | 1 | 21 | - | 231 | D. G. Khan | - | Rajanpur | | | IV | | | | |
| 0 | 1 | 22 | - | 23 | Muzaffargarh | - | Multan | C | NEW | IV | IV | 34 | 91.60 | |
| 0 | 1 | 22 | - | 79 | Muzaffargarh | - | T. M. Danah | C | NEW | IV | IV | 129 | 309.60 | |
| 0 | 1 | 22 | - | 85 | Muzaffargarh | - | Karamdad Quraishi | C | NEW | IV | IV | 23 | 55.20 | |
| 0 | 1 | 22 | - | 100 | Muzaffargarh | - | Chowk Munda | | | IV | | | | |
| 0 | 1 | 22 | - | 101 | Muzaffargarh | - | Rangpur | B | NEW | V | IV | 83 | 220.50 | |
| 5 | 1 | 23 | - | 75 | Multan | - | Kablewala | A | ON-GOING | IV | I | 29 | 174.00 | 4th Highway |
| 0 | 1 | 23 | - | 120 | Multan | - | Jahanian | | | IV | | | | |
| 5 | 1 | 23 | - | 121 | Multan | - | Lodhran | | | IV | | | | |
| 0 | 1 | 24 | - | 67 | Sahiwal | - | Sumundri | | | IV | | | | |
| 5 | 1 | 24 | - | 71 | Sahiwal | - | Okara | | | II | | | | |
| 5 | 1 | 24 | - | 72 | Sahiwal | - | Chichawatni | A | ON-GOING | III | I | 42 | 252.00 | 4th Highway |
| 0 | 1 | 24 | - | 78 | Sahiwal | - | Arifwala | C | NEW | IV | IV | 46 | 110.40 | |
| 0 | 1 | 24 | - | 216 | Sahiwal | - | Pakpattan | | | IV | | | | |
| 0 | 1 | 25 | - | 26 | Bahawalpur | - | Bahawalnagar | C | ON-GOING | V | V | 15.7 | 5.40 | |
| 0 | 1 | 25 | - | 78 | Bahawalpur | - | Hassalpur | | | V | | | | (B V-IV 263.9) |
| 5 | 1 | 25 | - | 80 | Bahawalpur | - | Cheri Goth | C | NEW | III | III | 71 | 248.50 | |
| 5 | 1 | 25 | - | 121 | Bahawalpur | - | Lodhran | C | NEW | III | III | 20 | 56.00 | |
| 0 | 1 | 26 | - | 73 | Bahawalnagar | - | Bunga Hayat | | | IV | | | | |
| 0 | 1 | 26 | - | 78 | Bahawalnagar | - | Arifwala | BR | ON-GOING | IV | IV | | 43.00 | |
| 0 | 1 | 26 | - | 78 | Bahawalnagar | - | Hassalpur | | | IV | | | | |
| 5 | 1 | 27 | - | 79 | Rahimyar Khan | - | T. M. Panah | B | NEW | IV | II | 101 | 393.90 | |

Table 3.4.2 Continued

| ROAD NO. | PROV. NO. | NODE NO. | | SECTION | | | SELECTED PROJECTS (7TH FYP) CATEGORY | SCHEME | EXIS.CLASS | PROPOSED | LENGTH (KM) | COST (RS MILLION) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 27 | 80 | Rahimyar Khan | - | Chani Goth | B | NEW | V | IV | 107 | 374.50 | |
| 5 | 1 | 27 | 150 | Rahimyar Khan | - | Boundary | B | NEW | IV | II | 48 | 220.80 | |
| 65 | 2 | 28 | 29 | Shikarpur | - | Rohri | C | NEW | IV | IV | 31 | 74.40 | |
| 55 | 2 | 28 | 30 | Shikarpur | - | Larkana | C | NEW | IV | IV | 62 | 148.80 | |
| 65 | 2 | 28 | 83 | Shikarpur | - | Jacobabad | C | NEW | IV | IV | 42 | 100.80 | |
| 55 | 2 | 28 | 84 | Shikarpur | - | Kandhkot | B | NEW | V | IV | 64 | 268.80 | |
| 5 | 2 | 29 | 32 | Rohri | - | Khairpur | C | NEW | III | III | 25 | 87.50 | |
| 5 | 2 | 29 | 82 | Rohri | - | Ubauro | C | NEW | III | III | 112 | 313.60 | |
| 55 | 2 | 30 | 34 | Larkana | - | Dadu | C | NEW | IV | IV | 119 | 285.60 | |
| 0 | 2 | 30 | 83 | Larkana | - | Jacobabad | | | V | | | | |
| 0 | 2 | 31 | 86 | Nawabshah | - | Sakrand | C | NEW | III | III | 21 | 58.80 | |
| 0 | 2 | 31 | 103 | Nawabshah | - | Gopchall | B | NEW | V | IV | 15 | 56.00 | |
| 5 | 2 | 32 | 102 | Khairpur | - | Moro | C | NEW | III | III | 137 | 383.60 | |
| 0 | 2 | 33 | 37 | Hyderabad | - | Thatta | C | NEW | III | III | 100 | 280.00 | |
| 5 | 2 | 33 | 87 | Hyderabad | - | Hala | A | ON-GOING | III | I | 45 | 278.30 | 4th Highway |
| 0 | 2 | 33 | 105 | Hyderabad | - | Tando Allahyar | C | NEW | III | III | 34 | 95.20 | |
| 0 | 2 | 33 | 107 | Hyderabad | - | T. M. Khan | B | ON-GOING | IV | IV | 31.4 | 4.50 | |
| 5 | 2 | 33 | 118 | Hyderabad | - | Kotri | A,BR | ON-GOING | II | I | 15 | 180.20 | |
| 0 | 2 | 33 | 217 | Hyderabad | - | Tando Adam | B | NEW | V | II | 60 | 300.00 | |
| 0 | 2 | 34 | 102 | Dadu | - | Moro | | | IV | | | | |
| 55 | 2 | 34 | 232 | Dadu | - | Gopeng | B | NEW | IV | II | 165 | 643.50 | |
| 0 | 2 | 35 | 106 | Umarkot | - | Mirpur Khas | B | NEW | V | IV | 74 | 214.60 | |
| 0 | 2 | 36 | 103 | Sanghar | - | Gopchall | | | IV | | | | |
| 0 | 2 | 36 | 104 | Sanghar | - | Shahdadpur | | | IV | | | | |
| 0 | 2 | 36 | 106 | Sanghar | - | Mirpur Khas | B | ON-GOING | IV | IV | 47.8 | 33.90 | |
| 0 | 2 | 37 | 39 | Thatta | - | Karachi | C | NEW | III | III | 102 | 285.60 | |
| 0 | 2 | 37 | 109 | Thatta | - | Sujawal | | | IV | | | | |
| 0 | 2 | 38 | 88 | Badin | - | Tando Ghulam Ali | C | ON-GOING | IV | IV | 52 | 13.80 | |
| 0 | 2 | 38 | 109 | Badin | - | Sujawal | C | NEW | V | V | 81 | 129.60 | |
| 0 | 2 | 38 | 122 | Badin | - | Digri | | | IV | | | | |
| 5 | 2 | 39 | 118 | Karachi | - | Kotri | A | ON-GOING | II | I | 150 | 812.00 | 4th Highway |
| 25 | 2 | 39 | 151 | Karachi | - | Boundary | C | NEW | III | III | 23 | 64.40 | |
| 25 | 4 | 40 | 43 | Quetta | - | Kalat | C | NEW | IV | IV | 145 | 348.00 | |
| 65 | 4 | 40 | 45 | Quetta | - | Sibi | C | ON-GOING | IV | IV | 148 | 22.50 | |
| 50 | 4 | 40 | 96 | Quetta | - | Qila Saifullah | C | ON-GOING | V | V | 175 | 65.50 | |
| 0 | 4 | 40 | 218 | Quetta | - | Smallan | | | V | | | | |
| 25 | 4 | 40 | 221 | Quetta | - | Chaman | | | IV | | | | |
| 40 | 4 | 40 | 223 | Quetta | - | Ahmadwal | C | NEW | V | V | 129 | 193.50 | |
| 0 | 4 | 41 | 96 | Loralai | - | Qila Saifullah | | | V | | | | (C V-V 108.0) |
| 0 | 4 | 41 | 97 | Loralai | - | Bewata | | | V | | | | (B V-IV 548.1) |
| 0 | 4 | 41 | 218 | Loralai | - | Smallan | | | V | | | | |
| 40 | 4 | 42 | 51 | Dalbandin | - | Taftan | C | ON-GOING | V | V | 130 | 143.30 | |
| 40 | 4 | 42 | 223 | Dalbandin | - | Ahmadwal | C | NEW | V | V | 181 | 271.50 | |
| 25 | 4 | 43 | 110 | Kalat | - | Surab | B | NEW | V | IV | 69 | 200.10 | |
| 25 | 4 | 44 | 114 | Bora | - | Wingal | B | NEW | V | IV | 76 | 212.80 | |
| 25 | 4 | 44 | 227 | Bora | - | Khuzdar | B | NEW | V | IV | 196 | 548.80 | |
| 0 | 4 | 44 | 228 | Bora | - | Awaran | C | NEW | V | V | 173 | 276.80 | |
| 65 | 4 | 45 | 154 | Sibi | - | Boundary | C | NEW | IV | IV | 147 | 352.80 | |
| 0 | 4 | 45 | 222 | Sibi | - | --- | | | V | | | | |
| 0 | 4 | 46 | 111 | --- | - | Pidarak | | | V | | | | |
| 0 | 4 | 46 | 113 | --- | - | Pasani | | | V | | | | |
| 99 | 0 | 47 | 229 | Gilgit | - | Boundary | | | IV | | | | |
| 0 | 3 | 48 | 54 | Boundary | - | Mansehra | | | IV | | | | |
| 99 | 0 | 49 | 201 | Kabul | - | Torkham | | | III | | | | |
| 99 | 0 | 49 | 221 | Boundary | - | Chaman | | | IV | | | | |
| 0 | 3 | 52 | 230 | Chakdarra Fort | - | Dir | | | IV | | | | |
| 5 | 3 | 53 | 116 | Nowshera | - | Jehangira | A | NEW | III | I | 22 | 195.80 | P |
| 35 | 3 | 54 | 89 | Mansehra | - | Bisham | | | IV | | | | |
| 5 | 1 | 55 | 117 | Hassanabdal | - | Tarnual | | | I | | | | |
| 35 | 1 | 55 | 152 | Hassanabdal | - | Boundary | C | NEW | III | III | 14 | 39.20 | |
| 0 | 1 | 56 | 58 | Fatehjang | - | Talagang | C | NEW | IV | IV | 87 | 208.80 | |
| 0 | 1 | 56 | 68 | Fatehjang | - | Basal | | | IV | | | | |
| 0 | 1 | 56 | 117 | Fatehjang | - | Tarnual | C | NEW | IV | IV | 30 | 72.00 | |
| 0 | 1 | 57 | 92 | Mandra | - | Chakwal | | | IV | | | | |
| 5 | 1 | 57 | 93 | Mandra | - | Sohawa | A | NEW | III | I | 33 | 293.70 | P |
| 0 | 1 | 58 | 60 | Talagang | - | Pail | | | IV | | | | |
| 0 | 1 | 58 | 68 | Talagang | - | Basal | | | IV | | | | |
| 0 | 1 | 58 | 92 | Talagang | - | Chakwal | B | NEW | V | IV | 46 | 128.80 | |
| 0 | 3 | 59 | 156 | Tejazai | - | Isakhel | | | V | | | | (B V-IV 109.2) |
| 0 | 1 | 60 | 62 | Pail | - | Khushab | B | NEW | V | III | 46 | 193.20 | |
| 0 | 1 | 60 | 92 | Pail | - | Chakwal | B | NEW | V | IV | 58 | 168.20 | |
| 0 | 1 | 62 | 66 | Khushab | - | Atharan Hazari | | | V | | | | (B V-IV 400.2) |
| 0 | 1 | 62 | 210 | Khushab | - | Qaidabad | | | IV | | | | |
| 0 | 1 | 63 | 64 | Pindi Bhattian | - | Chiniot | C | NEW | IV | IV | 33 | 79.20 | |
| 0 | 1 | 63 | 209 | Pindi Bhattian | - | Lalian | | | IV | | | | |
| 0 | 1 | 65 | 66 | Sarai Krisha | - | Atharan Hazari | C | NEW | V | V | 94 | 150.40 | |
| 0 | 1 | 65 | 100 | Sarai Krisha | - | Chowk Munda | | | IV | | | | |
| 0 | 1 | 65 | 211 | Sarai Krisha | - | Dullewala | | | IV | | | | |
| 0 | 1 | 65 | 213 | Sarai Krisha | - | Bhakkar | | | V | | | | (B V-IV 58.0) |
| 0 | 1 | 66 | 101 | Atharan Hazari | - | Rangpur | | | IV | | | | |
| 0 | 1 | 67 | 70 | Sumundri | - | Rajana | | | IV | | | | |
| 0 | 1 | 67 | 71 | Sumundri | - | Okara | | | IV | | | | |
| 0 | 1 | 68 | 156 | Basel | - | Boundary | | | V | | | | (B V-IV 110.2) |
| 0 | 1 | 69 | 71 | Dipalpur | - | Okara | | | IV | | | | |
| 0 | 1 | 69 | 73 | Dipalpur | - | Bunga Hayat | | | IV | | | | |
| 0 | 1 | 70 | 72 | Rajana | - | Chichawatni | | | IV | | | | |
| 0 | 1 | 71 | 215 | Okara | - | Jaranwala | C | NEW | V | V | 62 | 93.00 | |
| 0 | 1 | 72 | 98 | Chichawatni | - | Burewala | | | IV | | | | |
| 5 | 1 | 72 | 119 | Chichawatni | - | Khanewal | A | ON-GOING | IV | I | 80 | 480.00 | 4th Highway |
| 0 | 1 | 73 | 216 | Bunga Hayat | - | Pakpattan | | | IV | | | | |
| 0 | 1 | 74 | 99 | Shaden Lund | - | Kot Addu | | | IV | | | | |
| 55 | 1 | 74 | 160 | Shaden Lund | - | Boundary | C | NEW | V | V | 106 | 169.60 | |
| 5 | 1 | 75 | 119 | Kabirwala | - | Khanewal | A | ON-GOING | IV | I | 14 | 84.00 | 4th Highway |
| 0 | 1 | 76 | 98 | Arifwala | - | Burewala | | | IV | | | | |
| 0 | 1 | 76 | 216 | Arifwala | - | Pakpattan | | | IV | | | | |
| 0 | 1 | 77 | 78 | Vihari | - | Hassalpur | | | IV | | | | |

## Table 3.4.2 Continued

| ROAD NO. | PROV. NO. | NODE NO. | | | SECTION | | | SELECTED PROJECTS (7TH FYP) CATEGORY | SCHEME | EXIS.CLASS | PROPOSED | LENGTH (KM) | COST (RS MILLION) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 77 | - | 98 | Vihari | - | Burewala | | | IV | | | | |
| 0 | 1 | 77 | - | 120 | Vihari | - | Jahanian | | | IV | | | | |
| 0 | 1 | 77 | - | 121 | Vihari | - | Lodhran | | | V | | | | (B V-IV 287.1) |
| 5 | 1 | 79 | - | 80 | T. M. Panah | - | Chani Goth | C | NEW | IV | IV | 13 | 31.20 | |
| 0 | 2 | 81 | - | 82 | Kashmor | - | Ubauro | | | IV | | | | |
| 55 | 2 | 81 | - | 84 | Kashmor | - | Kandhkot | C | NEW | IV | IV | 47 | 112.80 | |
| 55 | 2 | 81 | - | 159 | Kashmor | - | Boundary | | | IV | | | | |
| 5 | 2 | 82 | - | 150 | Ubauro | - | Boundary | C | NEW | III | III | 13 | 36.40 | |
| 0 | 2 | 83 | - | 84 | Jacobabad | - | Kandhkot | B | ON-GOING | IV | IV | 16.1 | 8.90 | |
| 65 | 2 | 83 | - | 154 | Jacobabad | - | Boundary | C | NEW | IV | IV | 11 | 26.40 | |
| 0 | 1 | 85 | - | 99 | Karamdad Qurashi | - | Kot Addu | | | IV | | | | |
| 5 | 2 | 86 | - | 87 | Sakrand | - | Hala | A | ON-GOING | III | I | 39 | 272.60 | 4th Highway |
| 5 | 2 | 86 | - | 102 | Sakrand | - | Moro | A | ON-GOING | III | I | 70 | 427.80 | 4th Highway |
| 0 | 2 | 87 | - | 104 | Hala | - | Shahdadpur | | | IV | | | | |
| 0 | 2 | 88 | - | 107 | Tando Ghulam Ali | - | T. M. Khan | C | ON-GOING | IV | IV | 16 | 4.80 | |
| 0 | 2 | 88 | - | 108 | Tando Ghulam Ali | - | Matli | | | IV | | | | |
| 35 | 3 | 89 | - | 229 | Bisham | - | Boundary | | | IV | | | | |
| 0 | 3 | 90 | - | 115 | Haripur | - | Swabi | | | III | | | | |
| 35 | 3 | 90 | - | 152 | Haripur | - | Boundary | C | NEW | IV | IV | 19 | 45.60 | |
| 0 | 1 | 92 | - | 93 | Chakwal | - | Sohawa | C | NEW | V | V | 68 | 102.00 | |
| 0 | 1 | 92 | - | 205 | Chakwal | - | Jalalpur | B | NEW | V | IV | 91 | 263.90 | |
| 0 | 3 | 94 | - | 157 | Jatta | - | Boundary | | | V | | | | (C V-V- 55.5) |
| 0 | 1 | 95 | - | 156 | Kalabagh | - | Isakhel | | | V | | | | (B V-VI 156.6) |
| 0 | 1 | 95 | - | 157 | Kalabagh | - | Boundary | | | V | | | | (C V-V- 40.5) |
| 50 | 4 | 96 | - | 219 | Qila Saifullah | - | Zhob | C | ON-GOING | V | V | 139 | 52.00 | |
| 0 | 4 | 97 | - | 222 | Bewata | - | - - - | | | V | | | | |
| 0 | 1 | 99 | - | 214 | Kot Addu | - | Dera Din Panah | | | V | | | | |
| 0 | 1 | 100 | - | 101 | Chwk Munda | - | Rangpur | | | V | | | | |
| 0 | 1 | 100 | - | 214 | Chwk Munda | - | Dera Din Panah | | | V | | | | (B V-IV 26.1) |
| 0 | 2 | 103 | - | 104 | Gopchali | - | Shahdadpur | B | NEW | V | IV | 30 | 105.00 | |
| 0 | 2 | 104 | - | 217 | Shahdadpur | - | Tando Adam | C | NEW | IV | IV | 41 | 98.40 | |
| 0 | 2 | 105 | - | 106 | Tando Allahyar | - | Mirpur Khas | | | IV | | | | |
| 0 | 2 | 105 | - | 108 | Tando Allahyar | - | Matli | | | V | | | | |
| 0 | 2 | 105 | - | 217 | Tando Allahyar | - | Tando Adam | C | NEW | IV | IV | 14 | 33.60 | |
| 0 | 2 | 106 | - | 122 | Mirpur Khas | - | Digri | B | ON-GOING | IV | IV | 19.3 | 2.30 | |
| 0 | 2 | 107 | - | 109 | T. M. Khan | - | Sujawal | B | NEW | V | IV | 77 | 223.30 | |
| 0 | 2 | 108 | - | 122 | Matli | - | Digri | | | IV | | | | |
| 0 | 4 | 110 | - | 224 | Surab | - | Drug | B | NEW | V | IV | 78 | 327.60 | |
| 25 | 4 | 110 | - | 227 | Surab | - | Khuzdar | B | NEW | V | IV | 104 | 291.20 | |
| 0 | 4 | 111 | - | 112 | Pidarak | - | Hoshab | | | V | | | | |
| 0 | 4 | 111 | - | 113 | Pidarak | - | Pasani | | | V | | | | |
| 0 | 4 | 112 | - | 225 | Hoshab | - | Basima | | | V | | | | |
| 0 | 4 | 112 | - | 228 | Hoshab | - | Awaran | | | V | | | | |
| 0 | 4 | 113 | - | 114 | Pasani | - | Wingai | | | V | | | | |
| 25 | 4 | 114 | - | 151 | Wingai | - | Boundary | B | NEW | V | IV | 77 | 215.80 | |
| 0 | 3 | 115 | - | 116 | Swabi | - | Jehangira | | | IV | | | | |
| 55 | 2 | 118 | - | 232 | Kotri | - | Gopeng | B | NEW | V | II | 30 | 126.00 | |
| 0 | 1 | 119 | - | 120 | Khanewal | - | Jahanian | C | NEW | IV | IV | 31 | 74.40 | |
| 0 | 1 | 120 | - | 121 | Jahanian | - | Lodhran | C | NEW | IV | IV | 57 | 136.80 | |
| 50 | 4 | 153 | - | 219 | Boundary | - | Zhob | C | ON-GOING | V | V | 70 | 28.00 | |
| 55 | 1 | 159 | - | 231 | Boundary | - | Rajanpur | B | NEW | V | IV | 109 | 381.50 | |
| 0 | 1 | 161 | - | 212 | Boundary | - | Darya Khan | B | NEW | V | IV | 12 | 34.80 | |
| 0 | 3 | 203 | - | 220 | Jandola | - | Boundary | | | V | | | | |
| 0 | 1 | 204 | - | 207 | Kharian | - | Phalia | | | IV | | | | |
| 0 | 1 | 205 | - | 208 | Jalalpur | - | Khutiata | | | IV | | | | |
| 0 | 1 | 206 | - | 207 | Chak Mano | - | Phalia | | | IV | | | | |
| 0 | 1 | 207 | - | 208 | Phalia | - | Khutiata | | | IV | | | | |
| 0 | 1 | 207 | - | 209 | Phalia | - | Lalian | | | V | | | | |
| 0 | 1 | 210 | - | 211 | Qaidabad | - | Dutlewala | | | IV | | | | |
| 0 | 1 | 211 | - | 212 | Dutlewala | - | Darya Khan | | | IV | | | | |
| 0 | 1 | 212 | - | 213 | Darya Khan | - | Bhakkar | B | NEW | V | IV | 16 | 46.40 | |
| 0 | 1 | 213 | - | 214 | Bhakkar | - | Dera Din Panah | C | NEW | V | V | 118 | 177.00 | |
| 0 | 4 | 218 | - | 222 | Smallan | - | - - - | | | V | | | | |
| 0 | 4 | 219 | - | 220 | Zhob | - | Boundary | | | V | | | | |
| 0 | 4 | 223 | - | 224 | Ahmadwal | - | Drug | B | ON-GOING | V | V | 110 | 3.60 | |
| 0 | 4 | 224 | - | 225 | Drug | - | Basima | | | V | | | | |
| 0 | 4 | 225 | - | 226 | Basima | - | - - - | | | V | | | | |
| 0 | 4 | 226 | - | 227 | - - - | - | Khuzdar | | | V | | | | |
| 0 | 4 | 226 | - | 228 | - - - | - | Awaran | | | V | | | | |
| 55 | 3 | 54 | - | 59 | Jatta | - | Talazai | B | ON-GOING | - | IV | 80 | 354.40 | NEW ROUTE |

Abbreviation for Remarks

P ; Projects will be funded by Private Sector

(B V-VI 156.6) ; Provisional projects for the 7th plan

- 156.6 — Investment cost (Rs million)
- VI — Proposed Highway class
- V — Existing Highway class
- B — Project category

3.4.2 Cost Estimation

A preliminary cost estimation for the road improvement project selected for the 7th plan was made link by link using traffic assignment result presented in App. Table 3-1.

The pavement cost for both widening and rehabilitation projects were estimated by each highway class and the cumulative number of standard axles on the highway sections.

The equivalent standard axle load for trucks and buses to be used for the pavement design were estimated as 2.5[1/] and 0.75[2/] respectively.
For the pavement design convenience, the estimated cumulative number of standard axles were divided into the following six groups:

| Group | Cumulative number of standard Standard Axles (10 years from 92/93) ($\times 10^6$) |
|---|---|
| A | - 0.1 |
| B | 0.1 - 1.0 |
| D | 1.0 - 6.0 |
| G | 6.0 - 10.0 |
| H | 10.0 - 40.0 |
| J | 40 - |

The pavement design was made by Road Note 29 and 31 comparing with the AASHTO design method.

The AASHTO interim Guide design procedures gives pavement thicknesses on the comparatively thicker side than those determined using Road Note 29. The principal difference between the two procedures in flexibility in the design. For a given set of conditions (CBR values, traffic volumes, etc.) Road Note 29, by use of graphs gives either the minimum thickness or the actual thickness for a pavement component. AASHTO Interim Guide gives for the same conditions a structural number which is related to the thicknesses of the pavement components by a coefficient representative of the material being used. Road Note 29 is commonly used for conceptual design.

For comparison, the design of structural layers of flexible pavement for new carriage-ways of typical highways in this study network worked out with two different design methods shown in the Appendix. "Comparative Study of Pavement Design" for 10 years design life.

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1/, 2/ Details of standard axle load factors are shown in Chapter 1, Section 1.3.2 and 2.3.3, Road Transport Planning.

As a result, the overall requirement of the pavement structure under a condition having design CBR values ranging between 5% to 7% worked out by AASHTO and Road Note 29 Method for 10 years life is not very much different. The Study Team, therefore, adopted the Road 29 Method for the investment cost estimation of the pavement as a guideline of the 7th plan.

However, since more flexible and realistic design is expected to be made by the AASHTO Interim Guide method, it is recommended to use the AASHTO method for future detailed pavement design when all design parameters are defined by field data.

Table 3.4.3 shows the unit prices used for the cost estimation and the thickness of pavement structure adopted.

Table 3.4.3 Unit Price and Pavement Structure

| ITEMS | UNIT | (Rp.) U. PRICE | WIDTH OF PAVEMENT (M) | | | | | THICKNESS OF PAVEMENT(M) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | w-I | w-II | w-III | w-IV | w-V | t-A | t-B | t-D | t-G | t-H | t-J |
| SUBBASE | M3 | 270 | 17.00 | 8.50 | 8.50 | 7.20 | 4.85 | 0.15 | 0.15 | 0.20 | 0.20 | 0.25 | 0.25 |
| AGGREGATE BAS | M3 | 300 | 17.00 | 8.50 | 8.50 | 7.20 | 4.85 | 0.15 | 0.15 | 0.20 | 0.25 | 0.25 | 0.00 |
| A. SHOULDER | M3 | 300 | 3.65 | 3.65 | 7.30 | 7.30 | 6.00 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| AC BASE | M3 | 1100 | 17.00 | 8.50 | 8.50 | 7.20 | 4.85 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.20 |
| PRIME COAT | M2 | 15 | 17.00 | 8.50 | 8.50 | 7.20 | 4.85 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| TACK COAT | M2 | 5 | 14.60 | 7.30 | 7.30 | 6.00 | 3.65 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| BINDER C | M3 | 1200 | 14.60 | 7.30 | 7.30 | 6.00 | 3.65 | 0.00 | 0.00 | 0.06 | 0.06 | 0.06 | 0.06 |
| WEARING C | M3 | 1300 | 14.60 | 7.30 | 7.30 | 6.00 | 3.65 | 0.00 | 0.00 | 0.04 | 0.04 | 0.04 | 0.04 |
| SURFACE T. | M2 | 36 | 14.60 | 7.30 | 7.30 | 6.00 | 3.65 | 0.05 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| S.T. SHOULDER | M2 | 36 | 5.50 | 3.65 | 0.00 | 0.00 | 0.00 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |

Abbreviation w-I : pavement width of class-I Highway
t-A : pavement thickness of cumulative number of standard Axles, Group·A

Source: JICA Study Team

The unit construction cost per km for new roads is estimated as shown in Table 3.4.4 and Table 3.4.5 shows the unit construction cost for each category of projects by the group of camulative number of standard axles. The unit costs shown in Table 3.4.5 were used for the investment plan of the 7th plan and the result is presented in Table 3.4.2.

Table 3.4.4 Unit Construction Cost for New Roads

| ITEMS | CLASS OF HIGHWAY I | II | III | IV | V |
|---|---|---|---|---|---|
| PAVEMENT | | | | | |
| C.S.AXLES -A | * | * | * | * | 1.00 |
| C.S.AXLES -B | * | * | * | * | 1.09 |
| C.S.AXLES -D | * | * | * | 2.03 | 1.37 |
| C.S.AXLES -G | * | 2.55 | 2.49 | 2.14 | 1.44 |
| C.S.AXLES -H | 6.29 | 3.23 | 3.17 | 2.71 | * |
| C.S.AXLES -J | 7.64 | 3.90 | 3.84 | * | * |
| EARTHWORK | 2.90 | 1.40 | 1.40 | 1.30 | 0.90 |
| BRIDGE/CULVERT | 0.65 | 0.50 | 0.50 | 0.41 | 0.25 |
| DRAINAGE | 0.23 | 0.12 | 0.12 | 0.11 | 0.08 |
| MISCELLANEOUS | 0.41 | 0.20 | 0.20 | 0.18 | 0.13 |
| SUBTOTAL | | | | | |
| C.S.AXLES -A | * | * | * | * | 2.36 |
| C.S.AXLES -B | * | * | * | * | 2.45 |
| C.S.AXLES -D | * | * | * | 4.03 | 2.73 |
| C.S.AXLES -G | * | 4.77 | 4.71 | 4.14 | 2.8 |
| C.S.AXLES -H | 10.48 | 5.45 | 5.39 | 4.71 | * |
| C.S.AXLES -J | 11.83 | 6.12 | 6.06 | * | * |
| OTHERS | | | | | |
| C.S.AXLES -A | * | * | * | * | 0.24 |
| C.S.AXLES -B | * | * | * | * | 0.25 |
| C.S.AXLES -D | * | * | * | 0.40 | 0.27 |
| C.S.AXLES -G | * | 0.48 | 0.47 | 0.41 | 0.28 |
| C.S.AXLES -H | 1.05 | 0.55 | 0.54 | 0.47 | * |
| C.S.AXLES -J | 1.18 | 0.61 | 0.61 | * | * |
| TOTAL COST | | | | | |
| C.S.AXLES -A | * | * | * | * | 2.60 |
| C.S.AXLES -B | * | * | * | * | 2.70 |
| C.S.AXLES -D | * | * | * | 4.43 | 3.00 |
| C.S.AXLES -G | * | 5.25 | 5.18 | 4.55 | 3.08 |
| C.S.AXLES -H | 11.53 | 6.00 | 5.93 | 5.18 | * |
| C.S.AXLES -J | 13.01 | 6.73 | 6.67 | * | * |

Table 3.4.5 List of Unit (Construction Cost for Each Category of Projects (7th F.Y.P) (85/86 price)

| GROUP | CLASSIFICATION | HIGHWAY CLASS EXIST. - PROP. | C.STANDARD AXLES | UNIT COST (RP MILLION/KM) |
|---|---|---|---|---|
| G-1 | | II - I | H | 8.90 |
| | DUAL | | J | 10.20 |
| CONSTRUCTION | CARRIAGEWAY | III - I | H | 8.90 |
| DUE TO | | | J | 10.20 |
| CAPACITY | | IV - I | H | 9.90 |
| DEFICIENCY | | | J | 11.30 |
| | | V - I | H | 10.20 |
| | | | J | 11.70 |
| | WIDENING | IV - II | H | 3.90 |
| | AND | | J | 4.60 |
| | REHABILITAION | IV - III | G | 3.10 |
| | | | H | 3.80 |
| | | V - II | H | 4.20 |
| | | | J | 5.00 |
| | | V - III | H | 4.20 |
| | | V - IV | D | 2.80 |
| | | | G | 2.90 |
| | | | H | 3.50 |
| G-2 | | I - I | H | 5.60 |
| | OVERLAY | | J | 6.90 |
| REHABILITATION | AND | II - II | H | 2.90 |
| DUE TO | REHABILITATION | III - III | A | 1.50 |
| STRUCTURAL | | | D | 2.10 |
| DEFICIENCY | | | G | 2.20 |
| | | | H | 2.80 |
| | | | J | 3.50 |
| | | IV - IV | A | 1.30 |
| | | | B | 1.50 |
| | | | D | 1.80 |
| | | | G | 1.90 |
| | | | H | 2.40 |
| | | V - V | A | 1.20 |
| | | | B | 1.30 |
| | | | D | 1.50 |
| | | | G | 1.60 |

Source: JICA Study Team

## 3.5 Project Evaluation

### 3.5.1 Preliminary Economic Evaluation of the Overall Projects

1) Methodology

In order to assess the economic viability of the proposed projects up to the target year of the master plan, a preliminary benefit/cost analysis was conducted.

The benefit attributable to the project was taken as the possible savings in vehicle operating cost. On the network improved by the proposed projects, vehicles will be able to run with higher speed free from traffic congestion on the well maintained road surface. High speed (not too high) and smooth road surface will reduce vehicle operating costs considerably. This is the benefit of the proposed road projects. Time savings of passengers and goods were not taken into consideration.

The cost of the proposed projects is two-fold; construction cost and maintenance cost. The maintenance cost was assumed to be 2% of the initial construction cost.

The economic benefit and cost thus calculated were formed into a year-by-year data stream using interpolation techniques when necessary. Then a benefit/cost ratio was calculated with a discount rate of 12% per year.

2) Benefit

The possible benefit of the proposed projects was calculated as VOC savings which was computed based on the traffic assignments as follows:

(Total VOC on the road network of "Do-Nothing" or "Without" case)

1992/93 - 58,832 (Million Rs.)
2005/06 - 85,693 (Million Rs.)

(Total VOC on the road network improved by the proposed projects or "With" network)

1992/93 - 53,498 (Million Rs.)
2005/06 - 64,352 (Million Rs.)

(Total VOC savings)

1992/93 - 5,334 (Million Rs.)
2005/06 - 21,341 (Million Rs.)

3) Cost

The cost of the proposed road projects was estimated in financial prices as shown in Table 3.5.1.

Table 3.5.1 Financial Cost Stream of Proposed Road Projects

(Million Rs.)

| Year | Construction Cost | Maintenance Cost |
|---|---|---|
| 1988/89 | 5,700 | 114 |
| 1989/90 | 5,700 | 114 |
| 1990/91 | 5,700 | 114 |
| 1991/92 | 5,700 | 114 |
| 1992/93 | 5,700 | 114 |
| 1993/94 | 4,900 | 98 |
| 1994/95 | 4,900 | 98 |
| 1995/96 | 4,900 | 98 |
| 1996/97 | 4,900 | 98 |
| 1997/98 | 4,900 | 98 |
| 1998/99 | 4,900 | 98 |
| 1999/00 | 4,900 | 98 |
| 2000/01 | 4,900 | 98 |
| 2001/02 | 4,900 | 98 |
| 2002/03 | 4,900 | 98 |
| 2003/04 | 4,900 | 98 |
| 2004/05 | 4,900 | 98 |
| 2005/06 | 4,900 | 98 |

Source: JICA Study Team

Maintenance cost additionally incurred by the proposed projects was assumed to be 2% of the construction cost.

The project life of road construction was assumed at 20 years.

For estimating economic cost from financial cost, a conversion factor of 0.77 was used. This is the same value as the World Bank's Fourth Highway Project.

4) Benefit/Cost Analysis

Using the benefit and cost calculated above, a benefit/cost analysis was conducted.

Firstly, the master plan projects proposed by the year 2005/06 was tested as shown in Table 3.5.2.

Table 3.5.2 Economic Evaluation of Road Projects upto 2005/06

(milion Rs.)

| Year | Total Benefit | Discounted Benefit | Total Cost | Discounted Cost |
|---|---|---|---|---|
| 1988/89 | 1,067 | 759 | 4,477 | 3,186 |
| 1989/90 | 2,134 | 1,356 | 4,477 | 2,845 |
| 1990/91 | 3,200 | 1,816 | 4,477 | 2,540 |
| 1991/92 | 4,267 | 2,162 | 4,477 | 2,268 |
| 1992/93 | 5,334 | 2,413 | 4,477 | 2,025 |
| 1993/94 | 5,934 | 2,397 | 3,848 | 1,554 |
| 1994/95 | 6,602 | 2,381 | 3,848 | 1,388 |
| 1995/96 | 7,345 | 2,365 | 3,848 | 1,239 |
| 1996/97 | 8,172 | 2,349 | 3,848 | 1,106 |
| 1997/98 | 9,092 | 2,334 | 3,848 | 988 |
| 1998/99 | 10,115 | 2,318 | 3,848 | 882 |
| 1999/00 | 11,254 | 2,303 | 3,848 | 787 |
| 2000/01 | 12,520 | 2,287 | 3,848 | 703 |
| 2001/02 | 13,929 | 2,272 | 3,848 | 628 |
| 2002/03 | 15,497 | 2,257 | 3,848 | 561 |
| 2003/04 | 17,241 | 2,242 | 3,848 | 500 |
| 2004/05 | 19,182 | 2,227 | 3,848 | 447 |
| 2005/06 | 21,341 | 2,212 | -35,972 | -3,729 |
| Total | 174,226 | 38,450 | 32,593 | 19,919 |

B/C Ratio at a Discount Rate of 12 %/year : 1.93
Internal Rate of Return : 29.94 %/year

The B/C ratio was calculated at 1.93 when discounted by 12% per year.

Secondly, the projects proposed for the Seventh Five Year Plan period were assessed. The result is shown in Table 3.5.3.

Table 3.5.3 Economic Evaluation of Road Projects for the Seventh Five Year Plan Period

(milion Rs.)

| Year | Total Benefit | Discounted Benefit | Total Cost | Discounted Cost |
|---|---|---|---|---|
| 1988/89 | 1,067 | 759 | 4,477 | 3,186 |
| 1989/90 | 2,134 | 1,356 | 4,477 | 2,845 |
| 1990/91 | 3,200 | 1,816 | 4,477 | 2,540 |
| 1991/92 | 4,267 | 2,162 | 4,477 | 2,268 |
| 1992/93 | 5,334 | 2,413 | -15,274 | -6,909 |
| Total | 16,002 | 8,506 | 2,633 | 3,931 |

B/C Ratio at a Discount Rate of 12 %/year : 2.16
Internal Rate of Return : 36.79 %/year

The B/C ratio was arrived at 2.16 with a discount rate of 12% per year.

5) The proposed projects were found highly feasible economically both for the master plan period and the Seventh Five Year Plan period. The high economic viability thus determined seems extremely stable considering the huge possible benefit in contrast with the moderate project cost.

3.5.2 Evaluation by Sections

(1) Methodology of Economic Evaluation by Section

The projects proposed for the 7th FYP were evaluated section-wise economically in terms of benefit/cost ratio and internal rate of return. However, several ongoing projects of bridge construction were excluded due to the following reasons:

- already ongoing
- Methodological difficulty to reflect the effects of improved bridges on the simulation of vehicular traffic.

The section-wise benefit/cost ratio and internal rate of return were calculated based on the following procedure:

1) All the projects were assumed to start and to be completed in 1992/93. The benefit and cost were calculated from 1992/93 to 2005/06.

2) For benefit calculation, the savings of vehicle operating cost due to the proposed project were taken. This is realized if vehicles run faster due to the proposed widening project and smoother due to the proposed rehabilitation project.

3) The initial cost was assumed to be spent only in 1992/93. For the remaining years, a maintenance cost of 2% of the initial cost was allocated yearly. The project life was assumed to be 20 years and the residual value of the initial cost was subtracted from the cost of the year 2005/06. In addition, a 0.77 factor to convert market prices into economic cost was applied.

(2) Overall Evaluation by Section

All projects were selected by means of the system of project selection criteria described in Section 3.3.1, and the selected projects are defined as primary projects for the 7th F.Y.P.

In order to make project ranking in the selected projects, the following criteria for project ranking shown in Table 3.5.4 is proposed.

Table 3.5.4 Criteria for Project Ranking

| Ranking | B/C Ratio | Pavement Condition | Widening 1 to 2-Lane | Primary Network | Continuity |
|---|---|---|---|---|---|
| S | more than 2.5 | | | | |
| | more than 2.0 | very poor(5) | | Yes | |
| A | 2.0-2.5 | | | | |
| | more than 1.0 | very poor(5) | Yes | Yes | |
| B | 1.0-2.0 | | | | |
| | less than 1.0 | very poor(5) | Yes | Yes | Yes |
| C | less than 1.0 | | | | |

Source: JICA Study Team

Ranking
S: Most Desirable
A: Desirable
B: Moderately Desirable
C: Minimally Acceptable

For highway improvement projects, Benefit Cost ratio (B/C) should be used for the evaluation items such as adequate road system or transport cost reduction with the heaviest weight.

The proposed criteria was used for the project evaluation both of the links requiring improvement due to capacity deficiency and due to structural deficiency.

Table 3.5.5 and 3.5.6 shows the results of overall valuation, "Ranking of the Proposed Projects", for the construction projects and rehabilitation projects, respectively.

As seen from Table 3.5.5 and 3.5.6, the widening projects on the National Highway N-5 belong to high ranking group-S and A, while rehabilitation projects for one-lane two-way roads on the Provincial Highway network belong to low ranking group-C due to low traffic volume. The Study Team, however, recommend to implement these projects belonging to low ranking group during the 7th FYP period for road traffic safety measures.

## Table 3.5.5 Ranking of the Proposed Projects

**Construction Projects due to Capacity Deficiency**

| Road No. | Province No. | Node (A) | Node (B) | Distance (km) | Road Class (existing) | Road Class (proposed) | V/C Ratio (1992/93) | B/C Ratio | Project On-Going | Pavement Condition | 1 to 2 Lanes | Prime Not | Conti-nuity | Ranking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 2 | 39 | 118 | 150 | II | I | 1.30 | 3.72 | O | 2 | | O | | S |
| 5 | 2 | 86 | 102 | 70 | III | I | 1.35 | 3.33 | O | 4 | | O | | S |
| 5 | 2 | 33 | 87 | 45 | III | I | 1.16 | 3.33 | O | 4 | | O | | S |
| 5 | 2 | 86 | 87 | 39 | III | I | 1.08 | 2.99 | O | 2 | | O | | S |
| 5 | 1 | 10 | 57 | 31 | III | I | 1.12 | 2.82 | | 3 | | O | | S |
| 5 | 1 | 23 | 75 | 29 | IV | I | 0.95 | 2.72 | O | 4 | | O | | S |
| 5 | 1 | 12 | 61 | 11 | III | I | 1.06 | 2.61 | O | 4 | | O | | S |
| 5 | 1 | 11 | 204 | 24 | III | I | 0.94 | 2.53 | | 4 | | O | | S |
| 5 | 1 | 9 | 55 | 44 | III | I | 1.14 | 2.46 | | 3 | | O | | A |
| 0 | 2 | 35 | 106 | 74 | V | IV | * | 2.45 | | 4 | O | | | A |
| 5 | 1 | 19 | 61 | 39 | III | I | 1.20 | 2.43 | O | 4 | | O | | A |
| 5 | 1 | 11 | 93 | 40 | III | I | 1.15 | 2.42 | | 4 | | O | | A |
| 5 | 1 | 57 | 93 | 33 | III | I | 1.15 | 2.41 | | 4 | | O | | A |
| 5 | 1 | 72 | 119 | 80 | IV | I | 0.74 | 2.38 | O | 4 | | O | | A |
| 0 | 1 | 19 | 20 | 48 | V | IV | * | 2.38 | | 4 | O | | | A |
| 25 | 4 | 114 | 151 | 77 | V | IV | * | 2.35 | | 4 | O | O | | A |
| 0 | 2 | 33 | 217 | 60 | V | II | * | 2.32 | | 4 | O | | | A |
| 5 | 1 | 12 | 204 | 38 | III | I | 0.88 | 2.29 | O | 4 | | O | | A |
| 25 | 4 | 44 | 114 | 76 | V | IV | 1.34 | 2.25 | | 4 | O | O | | A |
| 55 | 2 | 34 | 232 | 165 | IV | II | 1.44 | 2.23 | | 4 | | O | | A |
| 0 | 1 | 13 | 16 | 117 | V | IV | * | 2.22 | | 5 | O | O | | S |
| 55 | 2 | 118 | 232 | 30 | V | II | * | 2.17 | | 5 | O | O | | S |
| 0 | 1 | 80 | 92 | 58 | V | IV | * | 2.15 | | 5 | O | | | A |
| 0 | 1 | 58 | 92 | 46 | V | IV | 1.26 | 2.14 | | 5 | O | | | A |
| 0 | 1 | 14 | 95 | 48 | V | IV | * | 2.12 | | 4 | O | O | | A |
| 5 | 3 | 9 | 116 | 9 | III | I | 0.72 | 2.11 | | 2 | | O | | A |
| 5 | 1 | 27 | 150 | 48 | IV | II | 1.43 | 2.08 | | 4 | | O | | A |
| 0 | 2 | 107 | 109 | 77 | V | IV | * | 2.07 | | 5 | O | | | A |
| 0 | 1 | 14 | 58 | 99 | V | IV | * | 2.03 | | 5 | O | | | A |
| 5 | 1 | 27 | 79 | 101 | IV | II | 1.07 | 2.02 | | 4 | | O | O | A |
| 0 | 1 | 27 | 80 | 107 | V | IV | * | 2.02 | | 3 | O | | | A |
| 55 | 2 | 28 | 84 | 64 | V | IV | * | 1.99 | | 4 | O | O | | B |
| 5 | 1 | 24 | 72 | 42 | III | I | 0.64 | 1.99 | O | 5 | | O | | B |
| 0 | 1 | 212 | 213 | 16 | V | IV | 1.44 | 1.94 | | 4 | O | | | B |
| 0 | 2 | 31 | 103 | 16 | V | IV | * | 1.91 | | 4 | O | | | B |
| 5 | 1 | 75 | 119 | 14 | IV | I | 0.52 | 1.88 | O | 4 | | O | | B |
| 0 | 1 | 92 | 205 | 91 | V | IV | 1.21 | 1.75 | | 3 | O | | | B |
| 5 | 3 | 53 | 116 | 22 | III | I | 0.67 | 1.74 | | 2 | | O | | B |
| 55 | 1 | 159 | 231 | 109 | V | IV | * | 1.67 | | 4 | O | O | | B |
| 0 | 1 | 11 | 205 | 32 | V | IV | 1.48 | 1.67 | | 4 | O | | | B |
| 55 | 3 | 5 | 160 | 51 | V | IV | 1.17 | 1.64 | | 5 | O | O | O | A |
| 0 | 2 | 103 | 104 | 30 | V | IV | * | 1.56 | | 3 | O | | | B |
| 0 | 1 | 22 | 101 | 63 | V | IV | * | 1.47 | | 4 | O | O | | B |
| 55 | 3 | 3 | 94 | 29 | V | IV | 1.24 | 1.34 | | 5 | O | O | | A |
| 25 | 4 | 43 | 110 | 69 | V | IV | 0.78 | 1.27 | | 5 | O | O | O | A |
| 0 | 1 | 161 | 212 | 12 | V | IV | * | 1.23 | | 4 | O | | | B |
| 0 | 4 | 110 | 224 | 78 | V | IV | * | 1.21 | | 4 | O | | | B |
| 0 | 1 | 60 | 62 | 46 | V | V | * | 1.16 | | 5 | O | O | | A |
| 55 | 1 | 21 | 74 | 51 | V | IV | 0.81 | 1.13 | | 5 | O | O | O | A |
| 25 | 4 | 110 | 227 | 104 | V | IV | 1.28 | 0.69 | | 5 | O | O | | C |
| 0 | 1 | 21 | 97 | 92 | V | IV | * | 0.68 | | 4 | O | | | C |
| 25 | 4 | 44 | 227 | 196 | V | IV | 1.20 | 0.60 | | 5 | O | O | | C |

Note : On-going Project O : 4th Highway Project

V/C ratio *: Congestion Ratio exceeds more than 1.5

Ranking S: Most Desirable
A: Desirable
B: Moderately Desirable
C: Minimally Acceptable

## Table 3.5.6 Ranking of the Proposed Project

Rehabilitation Projects due to Structural Deficiency

| Road No. | Province No. | Node (A) | Node (B) | Distance (km) | Road Class (existing) | Road Class (proposed) | V/C Ratio (1992/93) | B/C Ratio | Pavement Condition | Prime Net | Conti-nuity | Ranking |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 2 | 37 | 39 | 102 | III | III | 1.27 | 2.62 | 4 | | | S |
| 5 | 2 | 29 | 32 | 25 | III | III | 1.39 | 2.44 | 5 | O | | S |
| 5 | 2 | 29 | 82 | 112 | III | III | 1.05 | 2.40 | 3 | O | | A |
| 0 | 3 | 2 | 91 | 29 | III | III | 0.65 | 2.40 | 4 | | | A |
| 5 | 1 | 25 | 80 | 71 | III | III | 1.32 | 2.36 | 4 | O | | A |
| 0 | 2 | 33 | 37 | 100 | III | III | 0.95 | 2.34 | 4 | | O | A |
| 0 | 3 | 1 | 53 | 23 | IV | IV | 0.76 | 2.29 | 3 | O | | A |
| 5 | 2 | 32 | 102 | 137 | III | III | 0.94 | 2.28 | 5 | O | | S |
| 0 | 1 | 13 | 64 | 52 | IV | IV | 0.76 | 2.28 | 4 | | | A |
| 25 | 4 | 40 | 43 | 145 | IV | IV | 0.91 | 2.26 | 4 | O | O | A |
| 0 | 1 | 17 | 50 | 68 | III | III | 0.66 | 2.23 | 4 | | | A |
| 0 | 1 | 15 | 67 | 40 | IV | IV | 0.68 | 2.23 | 4 | | | A |
| 5 | 1 | 25 | 121 | 20 | III | III | 0.85 | 2.19 | 3 | O | | A |
| 0 | 1 | 22 | 23 | 34 | IV | IV | 0.75 | 2.17 | 4 | | | A |
| 0 | 1 | 18 | 63 | 70 | III | III | 0.67 | 2.16 | 4 | | | A |
| 0 | 1 | 15 | 18 | 97 | III | III | 0.73 | 2.16 | 4 | O | | A |
| 35 | 3 | 90 | 152 | 19 | IV | IV | 0.81 | 2.15 | 4 | O | | A |
| 0 | 1 | 63 | 64 | 33 | IV | IV | 0.60 | 2.13 | 4 | | | A |
| 0 | 1 | 22 | 79 | 129 | IV | IV | 0.74 | 2.11 | 3 | O | | A |
| 35 | 3 | 4 | 90 | 47 | III | III | 0.96 | 2.10 | 4 | O | | A |
| 0 | 1 | 15 | 64 | 37 | III | III | 0.58 | 2.09 | 4 | | | A |
| 0 | 2 | 33 | 105 | 34 | III | III | 0.73 | 2.09 | 4 | | | A |
| 5 | 1 | 79 | 80 | 13 | IV | IV | 0.75 | 2.08 | 4 | O | | A |
| 0 | 1 | 16 | 75 | 113 | IV | IV | 0.70 | 2.08 | 4 | | | A |
| 55 | 2 | 30 | 34 | 119 | IV | IV | 0.69 | 2.07 | 3 | O | | A |
| 0 | 1 | 18 | 19 | 53 | IV | IV | 0.60 | 2.07 | 4 | | | A |
| 0 | 3 | 1 | 52 | 66 | III | III | 0.70 | 2.07 | 3 | O | | A |
| 0 | 1 | 19 | 206 | 69 | IV | IV | 0.53 | 2.06 | 4 | | | A |
| 55 | 2 | 81 | 84 | 47 | IV | IV | 0.71 | 2.06 | 4 | O | | A |
| 65 | 2 | 28 | 29 | 31 | IV | IV | 0.65 | 2.05 | 4 | O | | A |
| 5 | 2 | 82 | 150 | 13 | III | III | 0.74 | 2.04 | 4 | O | | A |
| 0 | 1 | 56 | 58 | 87 | IV | IV | 0.55 | 2.04 | 5 | O | | S |
| 0 | 1 | 15 | 16 | 82 | III | III | 0.66 | 2.03 | 4 | O | | A |
| 0 | 1 | 17 | 18 | 38 | III | III | 0.58 | 2.03 | 4 | | | A |
| 0 | 1 | 56 | 117 | 30 | IV | IV | 0.55 | 2.00 | 4 | O | | A |
| 65 | 2 | 83 | 154 | 11 | IV | IV | 0.58 | 1.94 | 4 | O | | B |
| 0 | 1 | 24 | 76 | 46 | IV | IV | 0.55 | 1.79 | 4 | | | B |
| 0 | 1 | 16 | 66 | 32 | IV | IV | 0.51 | 1.79 | 4 | O | | B |
| 0 | 1 | 120 | 121 | 57 | IV | IV | 0.58 | 1.73 | 4 | | | B |
| 35 | 1 | 55 | 152 | 14 | III | III | 0.55 | 1.73 | 4 | O | | B |
| 0 | 1 | 119 | 120 | 31 | IV | IV | 0.56 | 1.68 | 4 | | | B |
| 0 | 1 | 22 | 85 | 23 | IV | IV | 0.55 | 1.67 | 4 | | | B |
| 65 | 2 | 28 | 83 | 42 | IV | IV | 0.53 | 1.67 | 4 | O | | B |
| 0 | 2 | 104 | 217 | 41 | IV | IV | 0.54 | 1.66 | 4 | | | B |
| 0 | 2 | 105 | 217 | 14 | IV | IV | 0.54 | 1.66 | 4 | | | B |
| 25 | 2 | 39 | 151 | 23 | III | III | 0.43 | 1.63 | 4 | O | O | B |
| 65 | 4 | 45 | 154 | 147 | IV | IV | 0.50 | 1.60 | 5 | O | | A |
| 0 | 2 | 31 | 86 | 21 | III | III | 0.55 | 1.42 | 5 | | | B |
| 55 | 2 | 28 | 30 | 62 | IV | IV | 0.44 | 1.30 | 4 | O | O | B |
| 0 | 3 | 1 | 91 | 28 | III | III | 0.65 | 1.20 | 3 | | | B |
| 0 | 1 | 92 | 93 | 68 | V | V | 0.67 | 0.86 | 5 | | O | C |
| 0 | 1 | 213 | 214 | 118 | V | V | 0.62 | 0.76 | 4 | | | C |
| 0 | 2 | 38 | 109 | 81 | V | V | 0.85 | 0.71 | 5 | | | C |
| 55 | 1 | 74 | 160 | 106 | V | V | 0.70 | 0.67 | 4 | O | | C |
| 0 | 1 | 71 | 215 | 62 | V | V | 0.55 | 0.66 | 3 | | | C |
| 0 | 4 | 44 | 228 | 173 | V | V | 0.54 | 0.62 | 4 | | | C |
| 0 | 1 | 65 | 66 | 94 | V | V | 0.68 | 0.61 | 4 | O | | C |
| 40 | 4 | 42 | 223 | 181 | V | V | 0.63 | 0.55 | 3 | O | | C |
| 40 | 4 | 40 | 223 | 129 | V | V | 0.52 | 0.46 | 3 | O | | C |