GOVERNMENT OF PAKISTAN
PLANNING COMMISSION
NATIONAL TRANSPORT RESEARCH CENTRE

PC - II
NATIONAL TRANSPORT RESEARCH CENTRE
PHASE - II

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(b) It is important that the staff should be of the highest academic calibre as well as possessing managerial qualities which would enable them to accept responsibilities and take initiatives.

(c) The suggested Central Transport Planning Cell should be an addition to the existing planning institutions in West Pakistan. The provincial Transport Planning Cell should take care of the specific provincial transport coordination problems and should be developed according to the needs of each province. Similarly, railway, highway, air and pipeline transport planning institutions should be further strengthened and developed.

(d) The Central Transport Planning Cell should develop a special educational programme and run yearly courses for transport planners. The programme should be a continuation of the University education to produce planning specialists to cover the Central Cell's own needs and also to supply other transport planning institutions in West Pakistan with highly qualified personnel.

The need for such a Centre was also strongly stressed in the Fourth Five Year Plan in the following words:

"Transport and Communication system have been changing rapidly in the past decade. Continuous research is essential if we are not to end up using methods which are crude and have become obsolete. To prevent this happening the Transport Planning Cell in the provinces are being strengthened for proper co-ordination with the provincial and outside agencies and for the

sake of national perspective, a "National Transport Research Centre" will be set-up to undertake the much needed technical and economic research at the national level.

On the basis of above recommendations, a proposal for setting up the National Transport Research Centre was initiated by the Planning Commission in June 1971. The Centre was to be set-up with assistance from the UNDP in the form of experts and equipment. The Centre was included in the country-programme of UNDP for Pakistan from 1971 till 1975 but due to financial stringencies in the UNDP during the period, the technical assistance could not materialize.

Since the Centre was urgently required for carrying out studies in connection with preparation of Fifth Five Year Plan, the Planning Commission, in June 1973, decided to set up the nucleus of the Centre with the own resources and develop it in phases. The overall cost of Phase-I of the Centre was estimated at Rs. 1.929 million with a F.E.C. of Rs. 0.975 million. The Centre, however, actually became operational in June, 1974. The Centre was to achieve the following objectives:-

(i) Carrying out studies and research in economic forecasting and priority rating areas.

(ii) Preparing long-term coordinated investment, operation, tax, subsidy and price plans embracing all modes of transport.

(iii) Coordinating the research and planning work of planning agencies of the individual provinces and transport modes.

(iv) Continuing and updating of research and studies done by TRACO and other consultants in the past.

(v) Formulation and review of "national transport policies" leading to the preparation of integrated plan for the development of a well coordinated transport system.

(vi) Providing consultancy services to provincial and modal planning agencies to evolve sound planning policies.

(vii) Providing training and education in transport planning and project appraisal to ensure availability of trained staff for agencies concerned with planning, development, operation and maintenance of transport services and infrastructure.

The Centre operated as a development project upto June, 1978. During 1977-78, Ministry of Finance carried a detailed review of the scheme and made the following recommendations:-

a) Beginning financial year 1978-79, the expenditure in respect of staff, etc. of the Centre should transferred to non-development budget.

b) Only the expenditure on research studies should be reflected in the development budget.

Accordingly, the PC-II of the Centre was revised and approved by CDWP in May, 1978 at an estimated cost of Rs. 3.694 million with no Foreign Exchange Component.

During 1980-81, PC-II for Phase-II of the Centre was prepared. However, it was decided that commencement of the Phase-II of the Centre should be deferred to coincide with Sixth Five Year Plan. Accordingly, a revised scheme for Phase-I covering the period 1974-83 was prepared. The revised scheme was approved by the CDWP in January, 1981 at an

estimated cost of Rs. 10.304 million with a F.E.C. of Rs. 4.5 million. The charter of the Centre was also amended as follows:-

i) To enlarge the scope of research being undertaken in the Centre and to cover those modes of transport which hitherto have not been covered in the Centre.

ii) To provide additional facilities in terms of manpower, equipment and materials to enable the Centre to develop a reliable and effective in-house expertise for research in various modes of transport to relieve the dependence of the country on foreign experts.

iii) To establish close liaison with other such institutions in the developed as well as developing countries.

iv) To coordinate the research efforts taking place in the country to avoid un-necessary and wasteful duplication of research efforts.

v) To act as clearing house for all the research being undertaken in the country and project it among various international agencies.

vi) To help other institutions develop indigenous expertise and accelerate the pace of research and development in the field of transport.

vii) To persuade various international agencies to either sponsor research in areas where NTRC had built sufficient expertise to undertake research independently or collaborate in areas of mutual interest.

viii) To arrange maximum dissemination of research being undertaken by the Centre among various individuals and organization both at the local and international level.

ix) To disseminate the work being done by various international organizations among various individuals and agencies involved in the field of transport.

x) To implement/execute experimental pilot projects on the basis of research carried out in the Centre to give the research efforts undertaken in the Centre the "problem oriented outlook".

xi) To organize national and international seminars to discuss the problems facing the countries in the field of transport and make suitable recommendations to the Government.

xii) To arrange and organize training-courses in various modes of transportation planning, design, operation and maintenance.

5. JUSTIFICATION:

Realizing the crucial importance of transport, most developing countries invest as much as 25 to 30 percent of their total public expenditure in transport. In pakistan, during the four five years plan periods, approximately one-fifth of all public sector outlay was allocated to the transport sector. The Fifth Plan proposed an investment of Rs. 28.00 billion in transport sector during 1978-83. The tentative allocation for transport during Sixth Plan period are estimated at Rs. 45 billion. Much larger investments are still need to meet the growing needs of mobility.

There is therefore dire need for great care to be exercised to make only the right kind of investments in developing essential transport facilities. In fact, there are immense

possibilities of committing costly mistakes by making wrong investments in the fiel of transport i.e.investing where no investment should have been made, or vice-versa, and providing inappropriate/inadequate facilities not commensurate with requirements.

Modern transport is a very complex field in which numerous technological alternatives have became available for achieving the desired objectives. Each alternative (singly or in combination) has to be studied carefully to arrive at the optimum solution. The solution, has, of course, to be found in keeping with the nature of traffic, its compostion, density, size of consignments, distances involved, etc. as obtaining at present and as projected in future. Since the estimates of future needs are bound to alter with the passage of time, it is essential that assessment should be made on a continuing basis, using the latest available statistics and methods. As such, long-term transport planning is not something that can be taken up for a short while through sporadic arrangements. It has to be a continuous process of research and investigations, surveys and future forecast.

This type of planning is a typical Central responsibility, nevertheless it can only be carried out properly in cooperation with the provincial and other modal agencies. This is essential to enable the Central government to make sound and economically justified decisions.

The experience of developed countries shows that they were also faced with problems of similar character in the earlier stages of their development. In reacting to them, errors were made which resulted in economic waste on a large scale. As result of the experience thus gained, planning techniques were evolved which could help avoid such errors in future. It is imperative that advantage should be taken from the experience of the other. The administrative expenditure required in this context may possibly be large in absolute terms, but would be small in relations to the savings and benefits resulting from a balanced system of transport facilities.

During the past 20 years, a number of comprehensive transportation studies and surveys have been carried out in the country at a cost of millions of rupees, with a substantial component of foreign exchange. The U.S Corps of Engineers study - 1962, Transport Coordination (TRACO) - 1970 and currently in progress National Transport Plan Study by JICA are only a few examples. Besides, a multitude of Master Plan Studies pertaining to various individual sectors and still larger number of project feasibility studies have been carried out by foreign experts. This arrangement has three very distinct disadvantages. Firstly, all plan and studies are based on planning assumptions pertaining to the country of origin of the experts. How far they are applicable to Pakistan is only a matter of faith. Their relevence to Pakistan would continue to be questioned unless they are determined specifical for Pakistani conditions by carrying out research in the country

Secondly, the transport situation is always dynamic. It changes with time and economic development. It is, therefore, utmost important that the research in planning process should be conducted on a continuous basis. Thirdly, the arrangement leaves no residual expertise in the country. As a consequent every-time, costly foreign experts would need to be employed for carrying out project feasibility studies, sectoral master plan and comprehensive transportation plans. This can only be overcome by strengthening the indigenous R&D resources of the country.

There are obvious gaps in the present research effort which does not allow proper utilization of the existing facilities. There is also a need for establishing new institutions as well as enlarging the scope of the existing ones. There is need for streamlining the procedure to ensure that the results achieved by research institutions are in line with the national planning needs and priorities as brought out by a panel of experts during 1974-75.

5.1. Transport R&D Panel Findings:

A Panel of experts under the Chairmanship of the then Federal Secretary for Water and Power, Mr. T.H. Hashmi, was constituted by the Roadad Committee during 1974-75 regarding the state of affairs of R&D in the field of transport. The panel findings are summarized below:

1. The Research Institutions in the field of transportation are neither properly maintained nor adequately staffed.

2. The number of Research Institutions in the country are very few. There is a positive need for creating more facilities.

3. There is no coordination among existing research organizations. But the problem is more of lack of information about the research capabilities and research activities about other institutions. There is urgent need for creating a central agency to work as clearing house of information regarding research activity in the various organizations.

4. There are obvious gaps in the present research efforts which does not allow proper utilization of the existing facilities. There is also need for establishing new institutions as well as enlarging the scope of the existing ones.

5. There is need for streamlining the procedure to ensure that the Government is kept fully informed of the research activity in various institutions.

6. There is lack of accountability to ensure that results achieved by research institutions are commensurate with the amount spent on them. This may, however, be viewed in the light of the fact that only token amount was spent in R&D in the past in the field of transportation. Research has not been taken very seriously and as a result not much was expected from these institutions to justify existance.

7. The problems tackled by the existing institutions in the past were mostly local in nature and did not have wide spread impact.

5.2 Fifth Plan Provision:

The need for greater emphasis on R&D in the field of transport was also stressed in the Fifth Five Year Plan. The relevant abstracts are as follows:

Transport:- In this field R&D activity remained virtually stagnant for lack of directions, funds, equipment and qualified trained workers. Some R&D work is in progress at the Road Research Station, Railway Research & Development Cell, National Transport Research Centre and Material Testing Laboratories.

During the Fifth Plan, R&D work will be carried out for improvement in road building technologies alongwith the maximum use of local materials for better planning, design, construction and maintenance techniques adopted to local weather and traffic conditions. Research will be undertaken at the National Transport Research Centre for which Rs. 15 million have been provided.

From the preceding, it is obvious that the existing research facilities in the country are inadequate and concerted efforts are indeed required to develop proper and adequate research institutions in the field of transportation. This would require not only augmentation of the existing facilities but also setting up of new institutions. Unfortunately, in the past, research has not been taken very seriously. Only token allocations were made for the R&D. As a result, not much was expected from these institutions. However, this problem would be completely eliminated during Sixth Five Year Plan. As compared with 0.2% share of R&D in the development budget during Fifth Plan, according to tentative allocations, 1.5% of the entire development outlays are proposed to be spent on R&D. The share of R&D in transport is expected to be Rs. 750 million which is more than adequate.

The proposed scheme is aimed at full utilization of the existing indigenous expertise in the field of transportation and reduce the dependence of the country on foreign expertise. The proposal would also help make most economical use of the scarce resources for developing an efficient system of transport by providing reliable planning inputs.

6. PRIORITY AREAS FOR TRANSPORT RESEARCH:

There are three possible areas of research in the field of transport namely; (i) Industrial Research; (ii) Structural Research; and (iii) Operational Research.

6.1. Industrial Research: None of the sub-sectors except railways is sufficiently developed to justify undertaking of indigenous manufacture of equipment and hence industrial research. Since the railways are not doing very much by way of research in this field, there is thus urgent need to fill this gap.

6.2. Structural Research: The size of road and rail infrastructure makes it imperative that structural research in both these sub-sectors should be undertaken to make optimum use of investment. For this purpose, a number of well-equipped laboratories exist in almost all highway departments, Pakistan Railways plus the Universities. However, all these laboratories are primarily engaged in Material Testing and no Structural Research of any significance is undertaken anywhere in the country. There is therefore pressing need for undertaking structural research in the sub-sectors of rail and road.

6.3 Operational Research: This type of research is required for all sub-sectors of transport, both at the level of individual modes as well as at the national level. The individual modes need such research to obtain maximum return from their existing assets by removing any bottlenecks and weak points. At the national level, this research is required to ensure coordinated development of all modes of

transport in the country. Unfortunately none of the individual agencies responsible for various sub-sectors carry out such research. At the national level i.e Planning Commission, this task is partly being performed by the National Transport Research Centre (NTRC). The thrust of research in the Centre has been primarily directed in the area of planning, economics and safety of road transport. No research could be undertaken in Railways, Ports, Shipping and Civil Aviation due to lack of in-house expertise in these fields. Therefore, the research requirements of Planning Commission in these sub-sectors remain unfilled.

6.4. Adaptive Vs Basic Research: The research in these areas could be either of Basic Type or Adaptive Type. Keeping in view the fact that extensive research has already been done in these areas in the developed countries, it would not be necessary to resort to Basic Research. Instead, efforts should be concentrated on adopting the results of such research to suit the conditions prevailing in the country. The priorities of research in the field of transport should therefore be to carry out Adaptive Research in the following areas:-

(a) Industrial Research - Railways
(b) Structural Research - Roads and Railways
(c) Operational Research - All Modes

7. STAFFING POSITION OF NTRC:

TRACO Experts had recommended the following scope of research for the Centre:-

a) Carrying out studies and research in the economic forecasting and priority rating areas.

b) With this background, preparing a rolling long term coordinated investment, operating, tax, subsidy and price plan embracing all modes of transport.

c) Coordinating the research and planning work of the planning agencies of the separate provinces and the transport sector.

The above responsibilities involve comprehensive transport planning studies on continuing basis involving regular estimation of demand, inventories, modal split, pricing and investment, etc. The achievement of the goals would require a multi-disciplinary team of researchers encompassing all modes of transport. Accordingly, the TRACO had recommended that the Cell should grow in size to between 40 and 50 members consisting of administrative staff, specialists from each principal mode and adequate representatives of the theoretical and applied economics, civil and mechanical engineering, social and economic geography, system analysis, statistics, electronic data processing, etc.

However, the present strength of staff of the Centre is 24, out of which only 6 are professionals namely one Chief, three Deputy Chiefs (only two in position), one Assistant Chief and one Research Officer. The staffing position of the Centre during the period 1974-82 may be seen at Annex.- I.

As regards representation of various disciplines, it may be mentioned that Chief is a Transportation Planner and in addition has specialization in Highway Safety. One of

the Deputy Chiefs is a Transport Economist and the other a Civil Engineer. The third post of Deputy Chief is earmarked for Statistics but is vacant at present. Assistant Chief has a Master Degree in Traffic Management while the Research Officer is an Electrical Engineer.

As a result, the scope of work of the Centre in the past has been determined primarily by the availability of staff and their fields of specialization. The thrust of the research in the Centre has thus been limited to the area of transport planning, transport economics, road transport and highway safety. No research could be undertaken in railways, civil aviation or ports and shipping due to lack of expertise in these areas.

The studies undertaken in the Centre also pose great difficulties. All these being emperical in nature, involve collection, compilation, analyses and storage of massive amounts of data. The Centre is handicaped in so far it does not have adequate lower staff to help with the data collection, compilation and analysis. At present, this need is being met by providing additional manpower at the level of Grade-16 and below on short term basis. This is however not a very satfactory arrangement for the following two reasons:-

(i) Individuals with appropriate qualifications do not come forth due to temporary nature of the assignment.

(ii) The services of those who get trained while working on one study cannot be utilized for longer periods as they leave as soon as a permanent job is available.

8. SELECTION OF STUDIES TOPICS:

The studies are selected keeping in view the following four factors:

(a) Work Plan of Research Studies.
(b) Requirements of the Planning Commission
(c) In-house expertise in the Centre.
(d) Availability of funds.

The following procedures were followed for carrying out research studies in the Centre:

(i) A research proposal, giving objective, scope, manpower requirement, cost estimates and approximate time of completion is prepared in the Centre.

(ii) The proposal is then placed before the Research Advisory Committee (RAC) of the Centre comprising of most eminent professionals in the field of transport.

(iii) The study proposal, after it has been examined and endorsed by the R.A.C., is submitted to the Secretary, Planning Commission for his administrative approval.

(iv) After the administrative approval, the study is submitted to Ministry of Finance for approval of the cost estimates.

(v) The study is undertaken by the Centre as and when funds become available.

This practice remained in force upto 1980-81, when Ministry of Finance suggested that a comprehensive scheme for all studies should be prepared and gotton approved by the competent authority. The procedures were incorporated in the Revised PC-II approved by the CDWP in January, 1981. Only the studies not specifically included in the PC-II and to be financed from Lump-sum provision were to be referred to the

Research Advisory Committee.

9. WORK DONE TODATE:

Inspite of all these difficulties as of 30th October, 1982, the Centre has completed 66 studies. In addition, 18 studies are in-hand. The list of the studies completed/in-hand is annexed at Annex-II.

The studies carried out by the Centre can be broadly categorized as follows:

A. Studies undertaken by Foreign Consultants
B. Studies undertaken by Local Consultants
C. Studies carried out by NTRC Staff.

The summary of the studies may be seen at Annex-III. Brief descriptinn is as follows:

9.1. Studies Carried out by Foreign Consultants:

To-date, 8 studies have been entrusted to the Foreign Consultants in the Centre. Out of these, all studies have since been completed and none are in-hand. Prior to 1980-81, the foreign consultants were given independent assignments, while at present all such studies are carried out in-collaboration with the Centre's staff.

9.2. Studies undertaken by Local Consultants:

A total of four such studies have been undertaken so far in the Centre. These studies have since been completed. and no study is given to any local consultant.

9.3. Studies Undertaken by NTRC Staff:

The studies carried out by the Centre are of two kind namely; Desk Studies and Primary Studies, as described below:

9.3.1. Desk Studies:

These studies are undertaken by the individual officers of the Centre. A total of 39 such studies have so far been undertaken by the Centre todate, out of which, 28 studies have already been completed and 11 are in-hand. Most of these studies have been done during the past five years. The motivation for such studies stems from the following factors:

i) Most of these studies are specifically assigned to the Centre by the Planning Commission in connection with preparation of Five Year Plan, Annual Plan or other important matters relating to transport sector planning policies.

ii) Primary studies undertaken by the staff some-time run into procedural difficulties or go through a stage such as collection, and compilation, etc. of data in which the coordinator of the studies can contribute very little. These studies are persued to make gainful use of the time thus available.

iii) While doing the primary studies, data is collectd which could also be used for other relevant issues as well. Additional studies are thus generated without any extra cost.

iv) It is the chartered duty of the Centre to collect and disseminate the latest development in the field of transport and prepare state-of-the-art reports for the benefit of those who do not have direct access to technical journals.

This type of research work has been deliberately encouraged for the following reasons:

i) These studies are done by the regular staff in their spare times, therefore, they do not cost any additional funds.

ii) This keeps the researcher abreast of technical development in the profession as it requires considerable library work and going through the relevant literature, etc.

iii) This also gives exposure to the junior staff to learn research techniques, so that in due course they could undertake research independently.

9.3.2. Primary Studies:

These studies are charged to the development budget of the Centre. Todate, the Centre has been sanctioned a total of 28 studies. Out of these, 11 studies have been completed and 17 studies are in hand.

10. Expenditure Incurred:

From 1974 to 1978, the entire expenditure of the Centre was charged to the development budget only. However, w.e.f. 1-7-1978, the expenditure on regular staff, etc. was transferred to the revenue budget and only the expenditure on studies was allowed to continue to be charged to the development budget.

As against the approved cost of Phase-I amounting to Rs. 10.304 million with a F.E.C. of Rs. 4.00 million, the total development expenditure by 30-6-1983 is estimated to be Rs. 5,670,198 with no F.E.C. Out of this, Rs. 1,593,385 was actually incurred on staff salaries, etc. during the period 1974-78 and Rs. 4,076,813 is estimated to be spent for studies during 1974-83 as detailed below:

DEVELOPMENT EXPENDITURE 1974-83

Year	Staff	Studies	Total
1974-75	481,800	87,477	569,277
1975-76	310,500	26,291	336,791
1975-76	347,085	92,517	439,602
1976-77	454,000	165,000	619,000
1977-78	-	560,000	560,000
1978-79	-	682,000	682,000
1989-81	-	559,840	559,840
1981-82	-	464,930	464,930
1982-83	-	1,290,000	1,290,000
Total:	1,593,385	4,076,813	5,670,198

11. IMPACT OF WORK DONE:

The impact of research carried out by the Centre can be felt at the three levels namely; the Planning Commission; national and international level.

11.1. Planning Commission:

At the Planning Commission's level, the main beneficiary of research carried out in the Centre has been the Transport and Communications Section. The studies have been directly used by T&C Section for the preparation of the Five Year Plans; appraisal of projects and National Transport Study being carried out by JICA for which major part of the data is being provided by the Centre, in the form of more than a dozen studies. It m y be pointed out that JICA was very reluctant to undertake the study in the begining. It was only after their fact finding mission visited Pakistan and learned about the work already done/underway in the Centre that they agreed to undertake the study.

The research carried out in the Centre has also helped improve the quality of project appraisal in the Transport and Communications Section. In the past, the assumptions and data

on which appraisal of the transport projects was based were either derived from foreign sources or were mere rules of thumb. However, as a result of the research carried out by the Centr, sound basis have now become available for proper appraisal of the projects.

11.3. National Level:

At the national level, a number of agencies have benefited from the work done by the Centre by providing them copies of the studies free of charge. As a result, the Centre has been able to build a large group of the users of its research. Some of the studies have generated great demand and have gone through 2nd and 3rd printing.

This would not have been possible without the relevence of research work done by the Centre to the problems faced by these agencies and the benefit they derive from it. This is further borne out by the fact that the Centre receives a large number of requests or technical assistance from various quarters. The Centre is also called upon to undertake studies on behalf of other Government agencies. The notable example in this regard is a numer of studies being carried out by the Centre for Ministry of Communications. The following are three specific examples of the impact of NTRC research had at national level:

(i) Travel Speed Survey: In evaluating road projects, the most important parameter is the savings in operating cost which is directly influenced by operating speeds. Previously, there was no data available regarding prevailing operating speeds for various types of vehicles on various types of roads in the

country. As a result, the sponsoring agencies could adopt any value of speeds to justify the road improvement i.e. from shingle to single lane or from single to two lane and so on. It was not possible for appraising agencies to judge whether or not the values adopted by the sponsoring agencies were reasonable. As a consequence, the relative viability of various projects could not be determined, on a uniform scale. However, as a result of Travel Speed Survey carried out by the Centre standard values for operating speeds for various types of vehicles on various types of roads in the country have been established. The results of the study have been supplied to all highway departments for incorporation in all their future projects. Copies of the study have also been supplied to T&C Section and Provincial Planning & Development Departments to enable them to ensure uniformity of speed values for appraising highway improvement projects.

(ii) Data Bank: Accurate statistical data is a prerequisite for sound planning. The transport statistics were either not readily available or were inconsistent, unreliable and inadequate. In the past, a number of efforts were made to collect and compile accurate data regarding transport but without any success. As a result, the planning continued to be based on not so reliable data. The Centre as one of its highest priorities undertook the task of collecting the required data. A number of teams of Investigators were formed to extract exact statistics from the records of various transport agencies.

As a result, NTRC was able to collect for the first time, accurate and reliable statistics for the period 1947-80. The data thus collected has been published in two volumes of 400 pages each. The effort has been greatly appreciated and the publications are extensively being used by all concerned. The publications are accepted as standard and the problem of lack of accurate statistics has been overcome. The statistics would be continuously updated in future.

(iii) Highway Safety: As a result of a number of studies carried out by the Centre in various aspects of highway safety namely; role of road, vehicle, road users, enforcement, laws, education, etc., the perception of the problem of highway safety has radically changed. On the basis of research in the Centre, it was proved that the past diagnoses of the problem, whereby the primary blame was laid on inadequacy of roads, mechanical fitness of vehicle, etc. was not correct and the remedial measures therefore tried had no effect. It was established that the basic problem of highway safety in the country was primarily due to three factors namely; ignorance of traffic safety rules on the part of road users; lack of effective enforcement; and out-moded legislation. The findings have resulted in a comprehensive programme of traffic safety education (designed in the Centre) and carried out through television, radio, newspapers, posters, etc. A new Highway Code was also produced. The impact of these efforts have been that since 1978 the level of the knowledge of the traffic safety rules on the part of road users has risen from almost zero to more than 30%, which though is still very low as compared to international standard of 95%.

To improve the enforcement, a comprehensive plan for Re-Organization of Traffic Police was produced and gotton approved by the federal Cabinet in December, 1978. Unfortunately, the decisions taken by the Government, for a number of reasons, have not yet been fully implemented by the Provincial Governments. Therefore, the enforcement still remains the weakest link.

As far the laws, a Comprehensive Road Safety Ordinance was prepared which after going thrcugh various stages of consultation with concerned provincial and federal agencies, was considered by Federal Cabinet in June, 1981. The Ordinance was referred to Cabinet Sub-Committee headed by Lt. Gen. S.M. Abbasi, Governor of Sind. The Sub-Committee has not yet finalized its recommendations.

Also a new scheme of Road Signs was prepared and gotton approved by the Government which has paved the way for adoption of international signs in the country. The new signs have started appearing as can be seen from the signs on Islamabad Highway between Zero Point and Airport.

11.4. International Level:

At the international level, the work done by the Centre has been appreciated by a number of international agencies. As a result, the Centre has received offer of collaborative research from a number of institutions. In this regard, Transportation & Road Research Laboratory, U.K. is an example with whom a two year's collaborative research programme in the field of highway safety is underway. Similar offers have been received from Australian Road Research Bureau and Drug Abuse Centre of W.H.O.

Also a number of agencies have expressed interest in helping the Centre with technical expert services and equipment, etc. In addition, some of the international agencies have offered consultancy assignment to the Centre in which the Centre has built considerable expertise. The notable example in this connection is ESCAP-Bangkok who has offered two studies to the Centre in the field of Road Transport.

From the preceding, it is obvious that in a short period of time NTRC has made a mark both at the national as well as international level. This has been achieved insnite of great difficulties encountered during past few years. Had the Centre received greater support, it would have been able to make even bigger impact.

1.2. PERFORMANCE REVIEW:

To keep close watch on the performance of the Centre, a Review Committee was constituted in 1977. The Committee has the following composition:-

Additional Secretary	- Chairman
Senior Chief, T&C	- Member
Joint Chief Economist	- Member
Chief, Economic Research Section	- Member
Chief, NTRC	- Member/ Secretary

However, while preparing the Revised PC-II for the Centre in 1980, the composition of the Committee was enlarged to also include the heads of all the Research & Development Cells in the various transport organizations in the country. The revised composition of the Committee was as follows:-

Additional Secretary	- Chairman
Senior Chief, T&C	- Member
Chief, Economic Research Section	- Member
Representative of M/o Communications	- Member
Representative of Railways	- Member
Representative of Port Qasim Authority	- Member
Representative of Karachi Port Trust	- Member
Representative of National Shipping Corp.	- Member
Representative of Civil Aviation	- Member
Representative of P.I.A.C.	- Member
Heads of Provl.Road Transport Labs.	- Member
Chief,NTRC	- Member/Secy.

The revised composition of the Committee has the following two advantages:

(i) It ensures avoidance of any duplication of research efforts.

(ii) The other Research & Development Agencies also report the progress of the work undertaken by them.

With the revival of Planning Commission, the Member-in-Charge of the Centre would now be the Chairman.

13. RESEARCH COORDINATION:

The Centre keeps all concerned individuals and agencies informed of the research carried out in the Centre by supplying copies of the studies free of cost. Also the research programme is periodically discussed with various federal and provincial transport agencies in the form of Review Committee meetings to avoid any duplication of efforts. Through such meetings, the research needs of various agencies are identified and entrusted to an agency most suitable for the purpose.

14. ORGANIZATIONAL SET-UP:

The TRACO experts had recommended that the Centre should be organized on the line of the "Institute of Transport Economy in Oslo, Norway". No efforts were made to study the organizational patterns of Oslo Institute before the Centre was set up.

Literature has now been obtained about the Oslo Institute. The Institute was founded in 1958 by the Royal Norwegian Council for Scientific and Industrial Research(NTNF) and is affiliated to the Council together with 13 other national institutes.

The main objectives of the Institute are to carry out research and to promote the application and use of results through consultative assistance to public authorities, transport industry, and others by means of information, education, and training. The Institute has also a responsibility for international cooperation within the transport sector. The Institute has a total staff of 110 employees of which 75 are professionals. The annual budget is approximately US $ 5 million (1981).

The Institute is governed by a Board of Directors. The day to day matters are looked after by a Managing Director, supported by six Assistant Directors. The research staff is organized in six departments. In addition, there is Administration Department and an Information Services Group. The organization chart of the Institute may be seen at Annex.IV.

Most activities are based on a multi-disciplinary approach and the staff consists of a wide variety of professions. Traditionally Economists and Engineers from the major groups but the staff also includes other professions as indicated below:

- Engineers
- Economists
- Political Scientists
- Geographers

- Statisticians
- Sociologists
- Psychologists
- Architects/Planners

The Institute carries out research and development projects and gives consultative assistance to public authorities, the transport industry and to others within the road, rail, sea and air transport sectors. The main field of activity are:

- Transport policy and sector development
- Institutional aspects
- Planning and decision making processes
- Economic analysis and demand forecasting
- Cost analysis
- Transport statistics
- Planning and Operation of transport systems
- Public transport studies
- Port and terminals studies
- Coastal shipping studies
- Road and traffic planning
- Traffic management and operation
- Road maintenance
- Road safety
- Socio-economic analysis
- Environmental analysis
- Work environment studies
- Business logistics studies

15 ADMINISTRATIVE SET-UP:

The Centre at present is headed by a grade-20 Officer having been delegated limited powers of a "Head of the Department". The Centre is thus responsible for its administration, budget and accounts,etc. However, research programme of the Centre is primarily determined by the Planning Commission, keeping in view its own priorities. In the past, concerns have been strongly voiced by a number of federal and provincial agencies with regard to lack of say on their part in the research programme of the Centre. It has been suggested that the Centre being the only agency in the country doing

worthwhile job in the field of transport research, should be considered as a national organization and should take care of the research needs of the other transport agencies. It has been proposed by these agencies that the Centre should be an autonomous body with a Board of Governors consisting of the administration heads of various concerned federal and provincial agencies.

16. LOCATION OF THE CENTRE:

The TRACO Study (1971) had recommended the setting up of a Transport Planning Unit at the federal level without specifying the exact location. Since the primary use of the work to be done in the Centre was in the field of transport planning, therefore, the initiative for setting up the Centre emanated from Planning Commission and the Centre was set up in June, 1974 as part of the Planning Commission.

Subsequently, a British Expert examined the question in detail and endorsed the location of the Centre in the Planning Commission on the grounds that this was the only agency where all transport sub-sectors were dealt with. However, questions continue to be raised regarding the location of the Centre and it has been suggested from time to time that the Centre should be located either in Ministry of Communications or Ministry of Science and Technology.

17. RECRUITMENT POLICIES:

The staff of the Centre is recruited strictly on the basis of Quota System. This poses great difficulties. As an example, the post of Deputy Chief (Statistics) could not be filled during last three years, primarily because of the fact that the quota belonged to Baluchistan, FATA or N.A.

The research is generally very un-attractive field due to prevailing socio-economic conditions. The problem is further aggravated by subjecting the research institutions to strict quota system. This results in staffing of these institutions by individuals who have no aptitude for research and therefore can not make any useful contribution. This is not in the interest of the country as on one hand the scarce sources are wasted and on the other hand the country continues to depend on foreign experts.

It is felt that there is no shortage of required expertise in any field in the country. The only problem is that this resource is not properly taped. Apart from other difficulties such as un-attractive pay and lack of professional freedom, the Quota System of recruitment is perhapse the most fundamental obstacle. The problem can be solved to a great extent by extempting the research brains could be made use of for research purposes on the national basis.

18. REMUNERATION:

The TRACO experts had categorically recommended that the Centre should not be allowed to fall into a rigid government scale of remuneration. The recommended that the appointment and salary should be agreed initially with each one of them and subsequent annual increments should be

granted individually in accordance with merit, notably performance in their job and in relation to their future potential.

However, at present the research staff of the Centre and paid strictly in accordance with government pay scales and there is no relationship between the productivity of the officer and his remuneration. This poses serious problems.

19. TRANSPORT ADVISORY COUNCIL:

The TRACO experts had recommended the setting up of a permanent "Central Transport Council" with representatives of each province and the federal government. In order that the decisions of the Council were based on expert advice, it was recommended to establish a "Central Transport Planning Cell". Accordingly, the Transport Advisory Council was constituted in the Ministry of Communications but the Centre was set up in Planning Commission.

The Council could not play very effective role in transport planning and coordination for the following reasons:

a) The Council did not have the support of experts as the proposed Central Transport Planning Cell was not established in the Ministry of Communications.

b) The scope of work of the Council was not confined to major planning and policy issues. Instead, the Council expended its energies on a large number of minor matters.

c) The Council was located in the Ministry of Communications which deals with only a part of transport sector, Two main modes of transport sector namely Railways and Civil Aviation were not within the purview of the Ministry of Communications and were therefore not effectively covered.

The Council functioned for only a very short time and gradually became inactive till it totally ceased to exist about three years ago. It is felt that for proper planning and coordination of transport sector development it is imperative to reactivate the Council and re-organize it on sound footings.

20. NATIONAL ROAD RESEARCH INSTITUTE:

A National Institute of Road Research (NIRR) was proposed to be set up during the Fifth Five Year Plan under the Ministry of Science and Technology. The scope of work of the Institute includes:

a) Structural Research
b) Operational Research
c) Road Research
d) Economic and Statistics

Since the above scope of work partly overlaps with the work of the Centre, it has been suggested in the past that NTRC and NIRR should be combined into one organization along the lines of Transport and Road Research Laboratory - U.K.

21. TRAFFIC COUNT PROGRAMME:

Field surveys are one of the most important source of obtaining data for transport planning and research. One of the most important planning data pertains to traffic counts. For this purpose, a Traffic Count Programme was initiated by the Ministry of Communications in 1975. The funds for the programme are provided by Ministry of Communications in their Development Budget. The counts are made by the respective provincial Highway Departments but the compilation and printing is entrusted to Punjab Highway Department.

The arrangement have not proved very satisfactory. There is no coordination among the provinces. On one hand the coverage of the counts has been very small in Sind, NWFP and Baluchistan and on the other hand the data has not been supplied by the other provinces to Punjab in-time. As a result, the Traffic Maps published by Punjab Highway Department were inadequate to meet the planning and research needs.

The data is required by the Centre for monitoring the growth rate and traffic composition on various type of roads in the country. The programme is also closely related with Origin-Destination Survey, Travel Speed Survey, Axle Load Survey beside others which are all done in the Centre. Since

the Ministry of Communications sponsored programme is coming to close, it is felt that this programme should be included in Phase-II of the Centre.

22. DISSEMINATION OF KNOWLEDGE:

Unfortunately, no systematic and reliable source exists in the country to keep the various professional and technical personnel, abreast of the technological developments taking place in the field of transport. In majority of the cases, the individuals are to rely on their own efforts to obtain such information at their own cost. To bridge the gap, the Centre has already compiled a mailing list of all technical and professional personnel working in various transport related agencies. The research studies of the Centre are regularly distributed among the relevant individuals. The arrangements have proved very beneficial to the target group as can be seen from the demand for the Centre's publications some of the studies of the Centre are going into third printing. It is felt that during 2nd Phase, this process should be expanded to cover the abstracts of work done in other institutions around the world.

23. CONSULTANCY:

Phase-I of the project envisaged providing consultancy services to other agencies but due to shortage of staff and number of other reasons, it has been possible to do only the following:-

a) Axle Load Survey for National Highway Board of Ministry of Communications.

b) Economic Implication of Road Maintenance - ESCAP - Bangkok.

c) Installation of Traffic Signs on Islamabad Highway - For National Highways Board of Ministry of Communications.

d) Economic Impact of Overloading for National Highway Board of Ministry of Communications.

The Centre has developed considerable expertise in the field of transport economics, road transport and highway safety. The work done by the Centre has caught the notice of a number of local and international agencies. In the Phase-II concerted efforts shall be made to seek consultancy work both at the national as well as international level for research in various aspects of transport.

24. SEMINARS:

During Phase-I, it had not been possible to organize any seminars/symposium by the Centre. However, in view of the tempo and quantum of research undertaken during last 5 years and the future programme, it is felt that holding of national and international seminars to discuss the transport problems in general and the work being done by the Centre in particular would be very desirable. It would help the Centre in securing the views of other experts with regard to its research programme.

25. TRAINING:

The TRACO experts as well as Professor B.T. Bayliss, had recommended that the Centre should develop a special educational programme and run yearly courses for training

transport planners. TRACO recommended that the programme should be a continuation of University education to produce planning specialists to cover the Central Cell's own needs and also to supply other transport planning institutions in Pakistan with highly qualified personnel.

The recommendations of TRACO were included in the charter of the Centre and Centre organized four courses on Transportation Projects Planning in collaboration with EDI-World Bank from 1976-79 and one course for Rural Road Planning with the assistance of US-AID. The EDI courses had a very positive effect on the quality of projects, prepared by various provincial and federal agencies. The courses were however discontinued in 1980.

26. DEMONSTRATION PROJECTS:

Experimentation is the essence of research. Demonstration projects are the most economical and quickest method of spreading the benefit of research to a wide area. There is considerable scope and need for experimentation and demonstration projects in road pavement geometrics, pavement thickness and urban traffic management such as exclusive bus lanes, parking meter, etc. However, apart from a few low costs highway safety measures, the Centre so far has not carried out any demonstration projects in the area where such projects could be undertaken. It is,however, envisaged to undertake demonstration projects in a big way during Phase-II.

27. OFFICE ACCOMMODATION FOR THE CENTRE:

The Centre so far has been housed in rented premises.

However, the Centre urgently needs Laboratory Space, Workshop and Conference facilities as well as testing grounds which is not possible in the hired accommodation. It is felt that the stage has reached where that Centre should have its own premises.

It may be pointed out that C.D.A. has earmarked I-8 as Transportation Sector, therefore, locating the Centre there would be an appropriate land-use in that sector.

28. FOREIGN ASSISTANCE:

During Phase-I, the services of the following three foreign experts were acquired for the Centre:-

1) Dr. R.D. Osmers from Netherlands worked in the Centre for a period of three years i.e. 1976-79. He carried out the following studies:-
   a) Pakistan Maritime Transport Study
   b) Containerization in Pakistan
   c) National Port Policy
   d) Ferry Service to Gulf by PNSC.

2) Government of U.K. made the services of Prof. B.T. Bayliss available for a short period of two months under U.K. Technical Assistance Programme to advise the Planning Commission regarding the future organizational set-up of the Centre.

3) The Overseas Unit of Transportation and Road Research Lab. - UK loaned the services of Mr. A. J. Downing for a period of two years w.e.f. May 1981 to carry out research in the field of highway safety. His assignment include the following:-
   a) Review of Road Accident Statistics
   b) Effectiveness of Road Safety Publicity campaigns
   c) Effectiveness of Mobile Police Foot-Patrol.

d) Effects of a Re-training Course on Bus Drivers Behaviour.
e) Bus Driver Training - Pilot Study.
f) Driver Behaviour at Signalized Intersection.
g) Skid Resistance on Roads in Pakistan
h) The Effect of Police Presence on Driver Behaviour
i) The Effect of Police Radar Trans on Drivers Speeds and Accidents
j) The Effectiveness of Low Cost Remedial Measures on Urban Roads
k) Effect of Road Markings on Driver Behaviour in Pakistan.

Since the Centre has built up considerable expertise in certain areas, the foreign assistance would be limited to only those areas where in-house expertise is not available. The foreign assistance would, however, be welcome in providing equipment/instruments for data collection, analysis, storage, retrieval, printing and meeting the needs of the Centre, in respect of training, literature, etc. Assistance would also be welcome for undertaking joint research studies of mutual interest in collaboration with other international agencies, especially in the area of Highway Safety and Transport Economics - the two areas where the Centre has developed considerable expertise. Efforts shall be made to take advantage of U.N. Programmes such as "Transfer of Know-how Through Expatriate Nationals" and recently established "U.N. Interim Fund for Science and Technology for Development" (UNIFSTD).

29. RESEARCH PROGRAMME:

Keeping in view the experience gained during last eight years, a comprehensive programme of research in the field of transport has been drawn in consultation with all concerned federal and provincial transport agencies.

programme may be seen at Annex.-V. The summary of programme is as follows:

1. Road and Road Transport.

- NTRC	-48
- Punjab Highway Department	- 8
- Pakistan Automobile Corporation	- 4

2. Railways

- NTRC	-14
- Pakistan Railways	-25

3. Air Transport

- NTRC	- 9
- P.I.A.C.	-N.A

4. Ports

- NTRC	- 5
- K.P.T.	-N.A
- P.Q.A.	-N.A

5. Shipping

- NTRC	- 3
- PNSC	-N.A

6. Inter modal Studies

- NTRC	- 8
Grand Total:	124

30. RECOMMENDATIONS OF THE RESEARCH ADVISORY COMMITTEE:

The issues discussed in the preceding pages were also placed before the R.A.C. of the Centre. The Committee examined each and every issue in detail and has made the following recommendations:-

30.1- Performance of the Centre: The Committee expressed their full satisfaction over the performance of the Centre and lauded the work done todate.

30.2- Organizational Set-Up: The Committee was of the view that there was no justification for developing the Centre strictly in the mould of any foreign institution. The Committee felt that each country has its own peculiar needs and recommended that the future organizational set up of the Centre should be evolved keeping in view our actual requirements.

30.3- Administrative Set Up: The Committee appreciated the feeling of those agencies and agreed that the Centre should be an autonomous body within the Planning Commission on the lines of P.I.D.E. The Committee was, however, of the view that the Board of Governors should comprise high level personnel with, as far as possible, professional background.

30.4- Location of the Centre: The Committee considered various possibilities of location of the Centre. The Committe was of the view that Ministries of Communications, Defence and the Railways covered only a part of the transport sector, therefore, the location of the Centre in any of the three

Ministries would result in problems of co-ordination. In the case of Ministry of Science and Technology, the Centre would be divorced from the main stream of transport planning operations.

The Committee was, therefore, of the firm opinion that Planning Commission was the most appropriate location of this Centre under the present circumstances.

The Committee was also of the view that there was urgent need for development of counterpart institutions at the provincial level, without which Research and Development in the field of transport cannot be established on sound footing.

30.5 Scope of Work: The Committee was of the view that the Centre must undertake research in all important modes of transport; however, since this would require a very large increase in staff and the problem may be further aggravated due to difficulties of mobilizing properly qualified technical and professional staff, the Committee recommended the following course of action to cope with the situation:-

i) The Centre should substantially increase research temps in areas where it has already built considerable expertise by hiring additional staff.

ii) In the areas not so far covered such as Railways, Ports, Civil Aviation and I.W.T. only a modest beginning should be made by acquiring the services of only one senior professional in each of these modes to do planning research.

iii) For specific studies where in-house expertise is not available/adequate, Task Forces should be organized consisting of professionals from various federal and provincial transport agencies, consulting firms, universities, and other experts available in the private sector.

30.6- Staff Requirements: The Committee noted that NTRC in its present form was set up as a nucleus Cell to be expanded into a fullfledged organization in due course. However, due to budgetary constaints and restrictions on creation of posts in the past, proper development of the Centre has not taken place. The Committee viewed with concern that the strength of professional staff at the Centre had actually declined over the years. The Committee, therefore, recommended that necessary additional staff commensurate with the scope of research recommended in the preceding para may be provided to the Centre to enable it to discharge its functions effectively.

30.7 Research Coordination: The Committee expressed full satisfaction with the efforts made by the Centre in achieving coordination among various research institution. The Committee however recommended that the following agencies should also be associated with the work done in the Centre:

a) Federal Bureau of Statistics
b) Provincial Bureaus of Statistics
c) Provincial Transport Departments
d) Provincial Highway Departments
d) District Councils.

30.8- Transport Advisory Council: The Committee felt strongly that the Transport Advisory Council should be reactivated and reorganized so that it was able to play its vital role in a most effective manner. The Committee was of the view that the achievement of this objective would be facilitated if the Council was located

in the Planning Commission where it had the benefit of technical support of the Centre. The Committee also recommended that Governing Body for the Centre suggested earlier should be so constituted as to enable it to function as Transport Advisory Council as well.

30.9. National Road Research Institute: The Committee felt that it was better to keep the two projects separate as the nature of research to be carried out in the Institute was of a different nature.

30.10. Traffic Counting Programme: The Committee was of the view that one of the main reasons for the difficulties was the fact that one province was entrusted the task of co-ordinatinn. The Committee felt that this job should have been the responsibility of one of the concerned federal agencies.

It was noted by the Committee that NTRC are undertaking a number of Surveys and Studies which involve traffic counting e.g. O-D Survey, Axle Load Survey, Speed Survey, etc. Besides, the Centre was the main user of the traffic count data. The Committee therefore recommended the following:

i) The Traffic Counting Programme should be taken over by the Centre, to ensure effective co-ordination and timely availability of the data.

ii) NTRC should concentrate on Traffic Counts on the National Highways which would require permanent count stations.

iii) Traffic Counts for the remaining roads should continued to be carried out by the Provincial Government, with funds provided by the Centre.

iv) If necessary, trained staff from the Provincial Highway Departments may be obtained for this work on deputation.

30.11- Consultancy Jobs: The Committee was of the view that consultancy was a means of spreading the benefits of expertise developed by the Centre in a most effective manner. This would also result in better utilization of such expertise, ensure that research is problem oriented, develop confidence in the local institutions and obviate the need for expensive foreign consultants.

The Committee recommended the following:

i) The NTRC should actively seek consultancy jobs within the country as well as abroad.

ii) Experts in various disciplines in other Government Departments should also be associated, if needed, with consultancy jobs secured by the Centre.

iii) Collaboration with private sector consulting firms should also be encouraged as far as possible.

30.12- Training: The Committee lamented the declining standards of project planning and stressed the need for training programmes for the staff of various transport agencies engaged in planning. It was noted that training programmes run in the past especially in collaboration with EDI of the World Bank had resulted in considerable improvements in project planning and evaluation, but the gains have been largely nullified due to interruption of courses since 1979.

The Committee recommended that training courses should be resumed by the Centre.

30.13- Demonstration Projects: It was noted by the Committee that demonstration projects are the quickest means of spreading the benefits of research and are very cost effective. The Committee recommended that demonstration projects should be undertaken by the Centre where necessary.

30.14- Office Accommodation: The Committee fully endorsed the idea and recommended that NTRC should have its own office building and suggested that necessary formalities for

securing a suitable plot of land in Islamabad may be initiated on top priority basis.

3015. Recruitment Policy: The Committee was of the firm opinion that the existing quota system was necessary to give due representation to backward areas. It was however suggested by the Committee that the quota may be fixed on the basis of overall size of an organization but within these limits it should be possible for the agency to make needed adjustments for different categories of staff in case of technical personnel in certain specific fields is not available from the backward areas in question.

3016. Remuneration: It was noted by the Committee that Research and Development efforts have not been given due importance in the country. The existing pay scales and terms and conditions are not adequate to attract suitably qualified and trained personnel in research. The need for better terms and conditions and higher remuneration for the research staff cannot be emphasised. The Committee therefore redommended the following:

i) An attractive scale of remuneration for professional staff should be framed.

ii) As an interim measure qualified staff in the Centre should be given Management Grades as in other autonomous organizations.

3017. Research Programme: The Committee considered the list of research studies proposed to be carried out by NTRC and others during the Sixth Five Year Plan period. The Committee felt that the list was too tentative to be considered in detail and decided that the proposed programme of research should be firmed up only after the position regarding availability of suitably qualified/ experienced research staff becomes more clear.

31. THE PROPOSAL:

Keeping in view the recommendation of Research Advisory Committee, the following is proposal for further development of the Centre during the Sixth Five Year Plan.

31.1. Administrative Set-Up: As recommended by the Research Advisory Committee, the Centre would be made into an autonomous organization along the lines of Pakistan Institute of Development Economics (P.I.D.E.). The resolution for declaring the Centre as autonomous is under preparation and would be submitted to the Planning Commission for approval shortly.

31.2. Organizational Set-up: The Centre would have a Board of Governors, assisted by two advisory bodies namely; Research Advisory Committee and Transport Advisory Council. The Centre would have a full-time Director in Grade (20 - 21). There would be two divisions headed by Grade-20 Officers namely Economic Division and Engineering Division. In addition, there would be two sections for administration and coordiantion, respectively. The organizational set up of the Centre may be seen at Annex. VI. No provision for staff, etc. has been made in the PC-II as it would be provided from the Revenue Budget.

31.3. Research Programme: An amount of Rs. 10 million is proposed for carrying out Research Studies during Sixth Plan period. This includes Rs. 784,000 for completing the on-going studies and the balance for undertaking additional studies as per the tentative programme indicated at Annexure - V.

31.4. Traffic Counting Programme: The existing programme of traffic counting financed by Ministry of Communications cost approximately Rs. 1.0 million per year. The requirements of funds for traffic counting programme of the Centre is estimated to cost only Rs. 0.5 million per year with a total outlay of Rs. 2.5 million for five years.

31.5. Data Bank: The statistics collected during Phase-I would continue. In addition, statistics would be collected in the areas not covered during Phase-I. The statistics collected would be stored on a computer. An amount of Rs. 1.000 million is proposed for this purpose.

31.6 Dessimination of Knowledge: An allocation of Rs. 1.000 million is proposed which would enable the Centre to print/re-print the studies carried out by the Centre itself as well as those received from outside agencies for circulation among the various individuals and organizations concerned with transport.

31.7 Demonstration Projects: An amount of Rs. 0.50 million is proposed for demonstration projects during the Sixth Plan period.

31.8 Training: An allocation of Rs. 0.500 million has been made to organize training courses, seminars and symposia in the field of transport planning for the benefit of the persons associated with transport in the country.

31.9 Foreign Assistance: An amount of Rs. 2.5 million would be required during Sixth Plan for acquiring various equipments for carrying out the studies and other technical assistance.

31.10. Office Building: An amount of Rs. 1.90 million has been provided as the cost of 5 acres of land at approx. Rs.75 per sq. yard and engaging an Architect for preparing detailed plan and design of the building and completing the preliminaries.

31.11. Contingencies: An amount of Rs. 0.5 million is proposed as Contingencies to meet the unforeseen expenses.

31.12 Summary: Total programme is estimated to cost Rs.19.90 million with a F.E.C. of Rs. 2.5 million as per details below:

S.NO.	I T E M	Rs. Million
1.	Research Studies	10.00
2.	Traffic Counting Programme	2.500
3.	Data Bank	1.000
4.	Dessimination of Research	0.500
5.	Demonstration Projects	0.500
6.	Training Courses	0.500
7.	Foreign Assistance	2.500
8.	Office Building	1.900
9.	Contigencies	0.500
	T o t a l :	19.900

32. PHASING:

The phasing of the expenditure would be as follows. Details may be seen at Annexure - VII.

Year	Total	Local	F.E.C.
1983 - 84	2,200,000	2,200,000	-
1984 - 85	5,000,000	4,500,000	500,000
1985 - 86	4,100,000	3,100,000	1,000,000
1986 - 87	4,600,000	3,600,000	1,000,000
1987 - 88	4,000,000	4,000,000	-
Total :	19,900,000	17,400,000	2,500,000

33. REQUIREMENTS OF MATERIAL, ETC.:

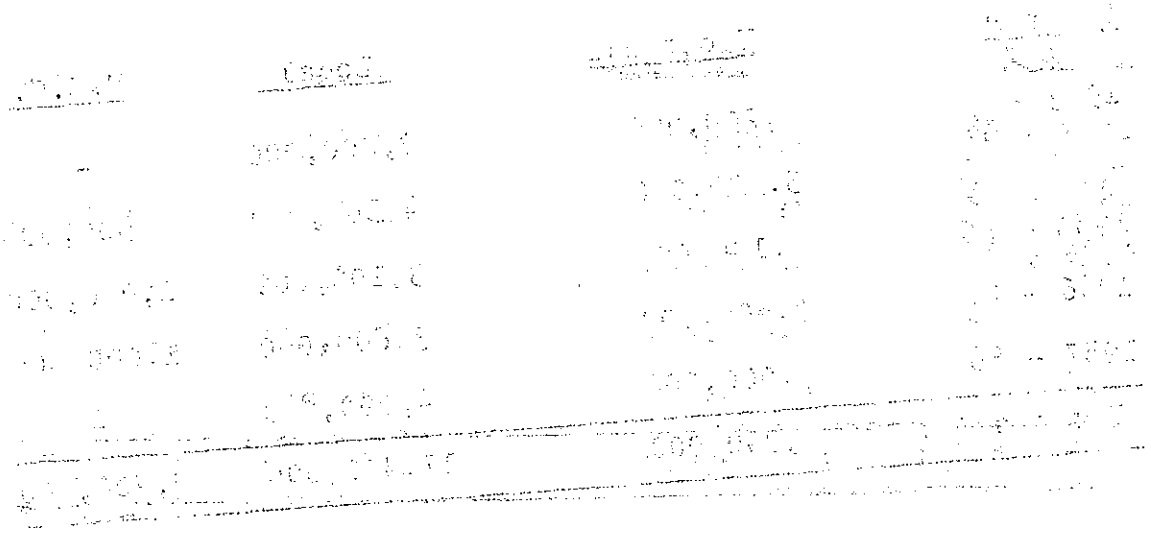
a) Plant and Machinery:
- Workshop equipment
- Laboratory equipment
- Data Storage, Analysis and Retrieval.
- Specialized Equipment

b) Structural: - NIL -

c) Power : - NIL -

34. RECURRING EXPENDITURE:

The annual recurring expenditure of the Centre is estimated to increase from current year's level (1982-83) of Rs. 709,000 to Rs. 3,320,000 per year) by the end of Sixth Plan period due to expansion in staff in line with the proposed research programme. Details of recurring expendiqure estimates may be seen at Annexure - VIII.



ANNEX-I

STAFF POSITION OF NATIONAL TRANSPORT RESEARCH CENTRE

Sl. No.	Post	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83
1.	Chief	-	-	1	1	1	1	1	1	1
2.	Deputy Chief	3	3	3	3	3	2	2	3	3
3.	Assistant Chief	1	1	1	1	1	1	1	1	1
4.	Planning Officer	1	2	1	1	1	--	-	-	-
5.	Research Officer	-	-	1	1	1	1	1	1	1
6.	Superintendent	-	1	1	1	1	1	1	1	1
7.	Assistant	2	3	1	1	1	1	1	1	1
8.	Stenographer	2	3	3	3	3	3	3	3	3
9.	Stenotypist	1	3	3	2	2	2	2	2	2
10.	U.D.C.	-	1	1	1	1	1	1	1	1
11.	Draughtsman	-	1	1	1	1	1	1	1	1
12.	Librarian	-	-	-	-	-	-	-	-	1
13.	L.D.C.	-	1	1	1	1	1	1	1	1
14.	D.M.O.	-	1	1	-	-	-	-	1	1
15.	Driver	-	1	1	1	1	1	1	1	1
16.	Peon	3	7	7	7	7	7	7	7	7
	Total:	12	28	29	25	25	23	23	25	26

ANNEX-II

LIST OF NTRC RESEARCH STUDIES

Sl. No.	Title	Author/ Co-ordinator	Date
1.	2.	3.	4.
	A. COMPLETED(STUDIES)		
	1974-75		
1.	Economics of Electrification, Comparative Cost of Diesel Electric Traction on Khanewal-Samasatta Section of Pakistan Railways.	Mr.Abdul Majeed Deputy Chief	February, 1975
2.	Inland Water Transport	NESPAK Ltd.	May, 1975
	1975-76		
3.	Highway Improvement Priority Criteria	Mr.M.Sadiq Swati, Chief	January, 1976
4.	Pilot Origin & Destination Survey at Mile 11 Lahore Multan Road on 21st October, 1975.	Mr.Abdul Majeed, Deputy Chief	January, 1976
5.	Inland Traffic Forecast 1980-81.	Mr.Abdul Majeed, Deputy Chief	January, 1976
6.	Cargo Port Traffic Forecast for Pakistan (1974-75 to 1989-90)	i. Dr.Ghulam Pasul, J.C.E. & ii. Mr.Abdul Majeed, Deputy Chief	February, 1976
7.	Organization of NTRC-Interim Report	Prof.B.T. Bayliss, Consultant, NTRC	April,1976
	1976-77		
8.	Effects of Highway Design Elements on the Capacity of 2-Lane Roads.	Malik M.Saeed Khan, Deputy Chief	August, 1976
9.	Farm-to-Market Roads Survey	i. Transport Consultants and Surveys ii. Ascon and Bolan Ltd. iii. Sharp International Ltd. iv. Republic Engineering Ltd.	

1.	2.	3.	4.
10.	Pakistan Maritime Transport Study.	Dr.R.D.Osmers, Adviser Shipping	January, 1977
11.	Lowari Pass Ropeway Study	Mr. Burnhard Burgi, Swiss Consultant	February, 1977
	1977-78		
12.	A Note on Petrol Versus Diesel Transport - An Assessment of a Policy	Mr.Abdul Majeed, Deputy Chief	August, 1977
13.	Re-Organization of Administrative Control of Transport.	Mr.M.Sadiq Swati, Chief	October, 1977
14.	Change of Passenger Class Structure of Pakistan Railways-Effect on Revenues	Mr.Abdul Majeed, Deputy Chief	November, 1977
15.	Containerization in Pakistan-Interim Report	Dr.R.D.Osmers, Adviser Shipping	November, 1977
16.	Economics of Pipeline Versus Rail.	Mr.Abdul Majeed, Deputy Chief	December, 1977
17.	Pakistan Highway Code	Mr.M.Sadiq Swati, Chief	December, 1977
18.	Re-Organization of Traffic Police.	Mr.M.Sadiq Swati, Chief	January, 1977
19.	Draft Motor Vehicle Ordinance, 1978	Mr.M.Sadiq Swati, Chief	January, 1978
20.	Traffic Survey of Islamabad Highway(Dual Carriageway)	Mr.Abdul Majeed, Deputy Chief	June,1978
	1978-79		
21.	Organization of N.T.R.C. Final Report.	Prof.B.T.Bayliss, Consultant,NTRC	July,1978
22.	Effect of Increase in Bus Fares on Common Man's Budget.	Mr.Abdul Majeed, Deputy Chief	July,1978
23.	Highway Operating Speeds of Government and Private Bus Drivers.	Mr.Abdul Majeed, Deputy Chief	August,1978

Annex-II (Contd)

1.	2.	3.	4.
24.	Transport Requirements-Shortage of Buses.	Mr.Abdul Majeed, Deputy Chief	October, 1978
25.	Modern Transportation	i. Mr.M.Sadiq Swati, Chief ii. Mr.M.Kazim Idris, Assistant Chief	December, 1978
26.	Survey of Bus Services from Islamabad Sectt.	Mr.Abdul Majeed, Deputy Chief	December, 1978
27.	Accident Study for Punjab.	i. Mr.M.Sadiq Swati, Chief ii. Mr.M.Kazim Idris, Assistant Chief	December, 1978
28.	Containerization in Pakistan Final Report.	Dr.R.D.Osmers, Adviser Shipping	January, 1979
29.	Feasibility study for the Operation of a Passenger/ro-ro Ferry Service to the Gulf by P.N.S.C.	Dr.R.D.Osmers, Adviser Shipping	March, 1979
30.	Transport Data Collection Storage and Retrieval System.	Mr.M.Asif Khan, Deputy Chief	March 1979
31.	Highway Transportation Studies and Surveys	Mr.M.Aslam Farouk, Deputy Chief	April,1979
32.	National Port Policy	Dr.R.D.Osmers, Adviser Shipping	May, 1979
33.	Bus Passenger Loads and Mileage. A Survey of Intercity Bus Operations.	Mr.Abdul Majeed, Deputy Chief	May,1979
34.	Revised Draft of Motor Vehicle Ordinance,1979.	Mr.M.Sadiq Swati, Chief	May,1979
	1979-80		
35.	Canal Roads for Public Use(Feasibility Study)	i. Mr.M.Sadiq Swati, Chief ii. Mr.M.A.Farouk, Deputy Chief	July,1979

Annex-II (Contd)

1.	2.		
36.	Choice of Mode for Journey to Work(For Government Employees).	Mr.Abdul Majeed, Deputy Chief	August,1979
37.	Report on Fourth EDI-Planning Commission Course on Transportation Projects Planning.	i. Mr.M.Sadiq Swati, Chief ii. Mr.M.Kazim Idris, Assistant Chief	November,79
38.	Traffic Enforcement Plan for Rawalpindi.	Mr.M.Sadiq Swati, Chief	November,79
39.	Psychological Attitudes Towards Highway Safety	i. Mr.M.Sadiq Swati, Chief ii. Prof.Mumtaz Daniel Shah	January,1980
40.	Bus Make Study	Mr.M.A.Farouk, Deputy Chief	March,1980
41.	Abstract of Research/ Desk Studies of National Transport Research Centre.	Mr.M.Kazim Idris, Assistant Chief	June,1980
42.	Computerized Reservation of PIAC-A Re-appraisal of the Project.	Mr.Abdul Majeed, Deputy Chief	June,1980
	1980-81		
43.	Establishment of NTRC Phase-I(Revised)PC-II	i.Mr.M.Sadiq Swati, Chief ii.Mr.Abdul Majeed, Deputy Chief	July, 1980
44.	Role of Transportation in Development	Mr.M.A.Farouk, Deputy Chief	July,1980
45.	Investment Programme and Development Projects of PIAC.	Mr.Abdul Majeed, Deputy Chief	July,1980
46.	Review of Port Traffic Forecasts with particular reference to fertilizer imports.	Mr.Abdul Majeed, Deputy Chief	Aug.,1980
47.	Effectiveness of Traffic Police Training.	i.Mr.Sadiq Swati, Chief ii.Mr.Syed Muhammad, Consultant	Sept.1980

(Annex-II(Contd)

1.	2.	3.	4.
48.	Road Safety Ordinance, 1980.	Mr.M.Saqiq Swati, Chief	Ocober 1980
49.	Real Problem of Highway Safety in Pakistan.	Mr.M.Sadiq Swati, Chief	November, 1980
50.	Transport Bulletin	Dr.M.Qasim Rind, Assistant Chief	November, 1980
51.	Highway Speed Survey	Mr.Abdul Majeed, Deputy Chief	November, 1980
52.	Energy Use in Transport System.	Dr.M.Abdullah, Chairman,Deptt of Electrical Engg:Peshawar.	February, 1981
53.	Utilization of Technical Manpower in PWD .	i. Mr.M.A.Farouk, Deputy Chief ii. Mr.M.Kazim Idris, Assistant Chief	February, 1981
54.	Effect of Enforcement on Road User's Behaviour.	i. Mr.M.Sadiq Swati, Chief ii. Mr. Syed Muhammad, Consultant	March,1981
	1981-82		
55.	Manual of Uniform Traffic Control Devices.	Mr.M.Sadiq Swati, Chief	July,1981
56.	Fuel Consumption Study	Mr.Abdul Majeed, Deputy Chief	July,1981
57.	Inland Water Transport	Mr.M.A.Farouk, Deputy Chief	Sept,1981
58.	Transport Research and Development in Pakistan.	Mr.M.A.Farouk, Deputy Chief	October,1981
59.	Transport Bulletin (Supplementary No.I)	Mr.Naeem Ullah, Research Officer	November,1981

Annex-II (Contd)

1.	2.	3.	4.
60.	A Review of Vehicle Operating Equipment and Inventory in Pakistan.	Mr.Abdul Majeed, Deputy Chief	November, 1981
61.	Bus Driver Training	i. Mr.M.Sadiq Swati, Chief ii. Mr.A.J.Downing, Adviser	December, 1981
62.	Traffic Factors for Pakistan.	i. Mr.M.Sadiq Swati, Chief ii. Mr.M.Kazim Idris, Assistant Chief	March,1982
63.	Economic Importance of Road Maintenance.	Mr.M.Sadiq Swati, Chief	April,1982
	1982-83		
64.	Multi Axle Vehicle Survey	Mr.Abdul Majeed, Deputy Chief	October, 1982
65.	Axle Load Survey	Mr.Abdul Majeed, Deputy Chief	November, 1982
	B. STUDIES IN HAND		
66.	Highway Origin-Destination Survey.	Mr.Abdul Majeed, Deputy Chief	
67.	Survival Rate of Motor Vehicles	i. Mr.Sadiq Swati, Chief ii. Mr.M.Kazim Idris, Assistant Chief	
68.	Inter Modal Choice Motivation	i. Mr.M.Sadiq Swati, Chief ii. Mr.M.Kazim Idris, Assistant Chief	
69.	Transport Demand for Major Commodities.	Mr.Abdul Majeed, Deputy Chief	
70.	Transport Alternatives for Sixth Five Year Plan.	Mr.M.Sadiq Swati, Chief	

Annex - II (Contd)

1.	2.	3.	4.
71.	Review of Road Accident Statistics.	i. Mr.M.Sadiq Swati, Chief ii. Mr.A.J.Downing Adviser	
72.	Effectiveness of Road Safety Publicity Campaign.	i. Mr.M.Sadiq Swati, Chief ii. Mr.A.J.Downing, Adviser	
73.	The Effect of Police Presence on Driver Behaviour.	i. Mr.M.Sadiq Swati, Chief ii. Mr.A.J.Downing, Adviser	
74.	Accident Black Spots on National Highways.	i. Mr.M.Sadiq Swati, Chief ii. Mr.Tahir Shah, Inspector	
75.	Door-to-Door Cost of Transport.	Mr.Abdul Majeed, Deputy Chief	
76.	National Transport Study.	i. N.T.R.C. ii. T&C Section iii. JICA	
77.	Public Service Vehicle Survey.	Mr.M.A.Farouk, Deputy Chief	
78.	O-D-Survey for Rail	i. Mr.Abdul Majeed, Deputy Chief ii. JICA team	
79.	Vehicle Operating Costs.	i. Mr.Abdul Majeed, Deputy Chief ii. U.N.D.P.	
80.	Motor Vehicle Utilization Survey.	Mr.M.A.Farouk, Deputy Chief	
81.	Re-training bus drivers and accident reduction	i. Mr.M.Sadiq Swati, Chief ii. Mr.A.J.Downing, Adviser	

Annex-II (Contd)

1.	2.	3.	4.
82.	Drivers Awareness of Road Work Signs and their reactions to them.	i. Mr.M.Sadiq Swati, Chief ii. Mr.A.J.Downing, Adviser	
83.	Skidding Resistance Values on Main Roads in Pakistan.	i. Mr.M.Sadiq Swati, Chief ii. Mr.A.J.Downing, Adviser	
84.	Low Cost Remedial Measures on the National Highwys in Pakistan.	i. Mr.M.Sadiq Swati, Chief ii. Mr.A.J.Downing, Adviser	
85.	Road Accident Data Collection and Analysis in Pakistan.	i. Mr.M.Sadiq Swati, Chief ii. Mr.A.J.Downing, Adviser	
86.	The Effects of Police Radar Trapes on Drivers Speeds and Accidents.	i. Mr.M.Sadiq Swati, Chief ii. Mr.A.J.Downing, Adviser	
	C. STUDIES IN PIPELINE		
87.	Economics of Truck Sizes.	Mr.Abdul Majeed, Deputy Chief	
88.	Driver Behaviour at Signalized Intersections.	i. Mr.M.Sadiq Swati, Chief ii. T.R.R.L. - London	
89.	Standards for Driver Training School.	Mr.M.Sadiq Swati, Chief	
90.	PIA Fleet Expansion Vs Paralle Development of Facilities of Civil Aviation.	Mr.M.A.Farouk, Deputy Chief	
91.	Transport Indices for Pakistan-A comparison	Deputy Chief (Stat.)	

Annex-II (Contd)

1.	2.	3.	4.
92.	Air Traffic Forecasts.	Mr.Abdul Majeed, Deputy Chief	
93.	Port Traffic Forecasts	Mr.Abdul Majeed, Deputy Chief	
94.	Inland Traffic Forecasts.	Mr.Abdul Majeed, Deputy Chief	
95.	Drug Abuse by PSV Drivers.	i. Mr.M.Sadiq Swati, Chief	
		ii. Dr.S.D.Ferrara, W.H.O.	
96.	Accident Investigation Manual.	Mr.M.Sadiq Swati, Chief	
97.	Manual of Road Construction Sign.	Mr.M.Sadiq Swati, Chief	
98.	Design of Route Markers	Mr.M.Sadiq Swati, Chief	
99.	Low Cost Roads.	Mr.M.A.Farouk, Deputy Chief	
100.	Highway Needs Study.	i. Mr.M.Sadiq Swati, Chief	
		ii. U.N.D.P.	
101.	Intercity Road Passenger Traffic Survey.	Mr.Abdul Majeed, Deputy Chief	
102.	Minimum Economic Length of Rail Haul.	Mr.M.Sadiq Swati, Chief	
103.	Rail-Road Coordination.	i. Mr.M.Sadiq Swati, Chief	
		ii. U.N.D.P.	
104.	Economic Impact of Axle Loads.	Mr.Abdul Majeed, Deputy Chief	
105.	The Effectiveness of Low Cost Remedial Measures on Urban Roads.	i. Mr.M.Sadiq Swati, Chief	
		ii. Mr.A.J.Downing, Adviser	

Annex - II (Contd)

1.	2.	3.	4.
106.	Effect of Road Markings on Driver.	i. Mr. M.Sadiq Swati, Chief ii. Mr. A.J.Downing, Adviser	
107.	Effects of a Retraining Course on Bus Drivers Behaviour.	i. Mr. M.Sadiq Swati, Chief ii. Mr. A.J.Downing, Adviser	
108.	Economics of Battery Operated Buses for Urban Transport.	Mr. M.Sadiq Swati, Chief	

ANNEX-III

UPTODATE POSITION OF RESEARCH STUDIES

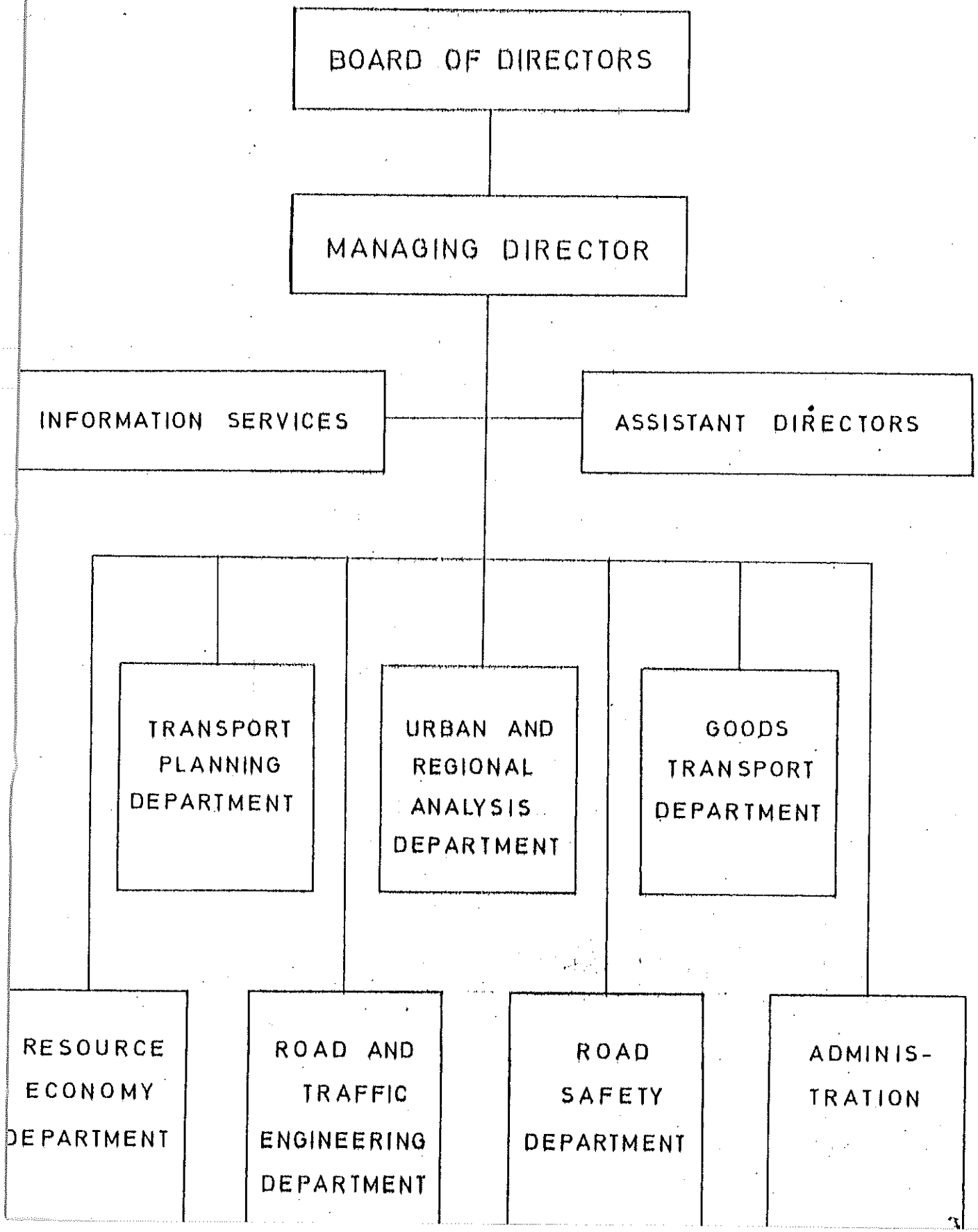
(30-06-1982)

Years	Foreign Experts	Local Consultant	T&C Section	NTRC Staff	Total	Remarks
1.	2.	3.	4.	5.	6.	7
1974-75	-	1	-	1	2	
1975-76	1	-	1	3	5	
1976-77	2	1	1	-	4	
1977-78	1	-	-	8	9	
1978-79	4	-	-	10	14	
1979-80	-	-	-	8	8	
1980-81	-	1	-	11	12	
1981-82	-	-	-	7	7	
1982-83	-	-	-	17	17	
Total:	8	4	2	65	78	

ANNEXURE : IV.

ORGANIZATIONAL CHART

(INSTITUTE OF TRANSPORT ECONOMY - OSLO)



RESEARCH PROGRAMME DURING THE 6TH PLAN (1983 - 1988)

I. ROADS AND ROAD TRANSPORT:

A. Studies to be carried out by N.T.R.C.

1. Highway and bridge inventories
2. Traffic Volume counts
3. Road Origin-Destination Surveys for passenger and goods traffic.
4. Operating Characteristics of Public Service Vehicles.
5. Motor Vehicles Utilization Survey.
6. Highway construction and improvements cost survey.
7. Road Vehicle Operating Cost Study.
8. Fuel consumption by Motor Vehicles.
9. Optimisation of labour and capital in highway construction.
10. Financing of highway construction and improvements.
11. Road users charges
12. Extent of tax evasion in road transport.
13. Financial performance of toll roads and bridges.
14. Manual of highway maintenance procedures.
15. Criteria for determining unrban/rural bus services requirements.
16. Criteria for determining public service vehicles fares and charges.
17. Accident costs assessment.
18. Accident compensation assessment.
19. Land slide problems in hilly areas.
20. Regional variations in road surfacing specifications.
21. Alternate Materials for decking suspension bridges.

Annex-V(Contd)

22. Accident rate versus environmental factors.

23. Manual for Bridge inspection.

24. Road traffic growth rates in Pakistan.

25. Relationship between GNP/GDP and growth of traffic.

26. Practical Capacities of various width of road pavements.

27. Speed flow relationship for Pakistan.

28. Passenger car equivalency factors for various types of vehicles.

29. Accident rates and road geometrics.

30. Axle Load Studies.

31. Highway Needs Study.

32. Motor Vehicle ownership trends.

33. Parking problem in urban areas.

34. Low cost roads for developing countries.

35. Provision of public utilities and services along rural roads.

36. Impact of Farm-To-Market Roads in the national economy.

37. Effect of K.K.H. improvement on local economy.

38. Traffic Factors for Pakistan.

39. Road Traffic Speed Monitoring.

40. Demonstration Projects:

i) Creteways
ii) Parking meters
iii) Exclusive bus lane
iv) Traffic markings

41. Urban Traffic Management problems.

42. Transport Industry in Pakistan.

43. Financing problems of road transport.

44. Transport demand for major commodities.

Annex-V (Contd)

45. Scope of Standardization of motor vehicles for import and local manufacture/assembly.

46. Appropriate pay loads for various motor vehicles.

47. Electric Transport for Urban Areas.

48. Role of NLC in freight movement.

B. STUDIES TO BE CARRIED OUT BY PUNJAB HIGHWAY DEPARTMENT:

49. Selection of a suitable bituminous binder for surface treatment.

50. Weathering properties of tar and asphalt binders.

51. Strength of various types of road sub-bases.

52. Selection of a suitable design moisture for flexible pavements.

53. Cement and lime stabilized sub-base and bases.

54. Performance of portland cement concerete pavements.

55. Deflection studies of convential flexible pavements. in Pakistan.

56. Pavement temperature studies in Punjab.

C. STUDIES TO BE CARRIED OUT BY PAKISTAN AUTOMOBILE CORPORATION (PACO):

57. Scope for creation of new automative manufacture facilities during the Sixth Five Year Plan.

58. Potential of ancillary industries for development of local components of automative industry.

59. Manpower training need in transport industry during the Sixth Plan.

60. Market surveys for road transport demand estimation.

Annex-V (Contd)

II. RAILWAYS

A. Studies to be carried out by N.T.R.C:

61. Inventory of rail infrastructure, rolling wagons stock, etc.
62. Criteria for determining sectional capacities of rail lines.
63. Trends in rail freight and passenger traffic.
64. Origin-Destination Survey of freight and Passenger Traffic.
65. Operating characteristics of rail passenger and goods services.
66. Rolling stock performance evaluation.
67. Improvement of administration procedures for freight handling.
68. Wagon allocation procedures.
69. Travel and Transportation time studies.
70. Rail constructions and improvement cost survey.
71. Operating costs of rail passenger and goods services for various categories of traffic.
72. Economics of different types of rail passengers and goods services.
73. Criteria for closing un-economic railway lines.
74. Economics of Electrification.

B. Research Studies to be carried out by the Railways Research Cell:

75. Tests for riding quality of railway track.
76. Strain gauge tests with couplings, drawbars and drawhooks.
77. Flange force and axle-box clearance trials for various types of locomotives and stocks to achieve modification.
78. Load tests on various types of wagons and coaches.
79. Tests on the performance of buffers for use in the rolling stock.
80. Investigations into the adequacy of roller bearings on bogi-axles.
81. Investigations into train formations and speed restrictions.
82. Efficiency of fuel consumption for maximum power.
83. Improvement of electric traction equipment.
84. Development of pressure cells for determining distribution of live load over sleepers and formation.
85. Development of rectifier assemblies for use on generation system.

Annex-V (Contd)

86. Modification of Hallade Track Recorder to make it more sensitive for obtaining riding quality of vehicles.

87. Developing magnetic strain gauges for bridge tests.

88. Developing various electro-magnetic detector assemblies.

89. Investigations/trials to improve upon the existing signalling equipment and standards.

90. Scope for local manufacture of rail components.

91. Lateral strength of track with different sleeper densities.

92. Lateral strength of track with different heights of boxing ballast.

93. Study of stress distribution in rails and fish plates.

94. Fatigue strength of different types of Welded joints.

95. Improvement in the design of concrete sleepers.

96. Formation of pressure cells for determining soil pressure distribution.

97. Survey of locally available building and construction materials.

98. Modernization of the system of passenger tickets.

99. Containerization on railways.

III. AIR TRANSPORT:

A. Studies to be carried out by N.T.R.C.

100. Inventory of air transport infrastructure, facilities and services.

101. Trends in growth of inland air traffic.

102. Origin-Destination Surveys.

103. Operating costs for air transport

104. Air traffic analysis.

105. Financing of air transport industry.

106. Second airline for domestic operation.

107. Avenues and modalities of revenue generation at aerodromes.

108. Human stress factors on operational manpower developed at aerodromes.

Annex-V(Contd)

B. Studies to be carried out by PIAC:

109. Economic and financial evaluation of existing as well as new routes.

110. Performance evaluation and analysis of various aircarfts and engines.

111. Fleet Plan studies for P.I.A.

112. Forecasts of passenger traffic on city pair basis for existing as well as new routes.

113. Forecasts of cargo traffic on city pair basis for existing as well as new routes.

114. Forecasts of excess baggage traffic on city pair basis for existing as well as new routes.

115. Forecast of mail traffic on city pair basis for existing as well as new routes.

116. Inflight passenger services.

IV. PORTS

A. Studies to be carried out by N.T.R.C.

117. Inventories of port facilities and infrastructure.

118. Survey of port capacities.

119. Port traffic forecasts.

120. Integration of inland transport facilities & the port.

121. Port congestion, ship arrival rates and cargo accumulation studies.

B. Studies to be carried out by Karachi Port Trust (KPT):

122. Traffic forecasting.

123. Improvement of cargo handling techniques.

C. Studies to be carried out by Port Qasim Authority(PQA):

(List of studies to be finalized)

Annex-V (Contd)

D. Studies to be carried out by Directorate General of Ports and Shipping:

(List of studies to be finalized)

V. SHIPPING:

A. Studies to be carried out by NTRC:

124. Operational performance of Pakistan's shipping fleet.

125. Operating costs of major components.

126. Financial performance of National Shipping Industry.

B. Studies to be carried out by Pakistan National Shipping Corporation (PNSC):

(List to be finalized)

VI. INTER MODAL STUDIES

A. Studies to be carried out by NTRC:

127. Relative costs and charges by rail and road for major commodities.

128. Relative costs and fares for rail and air services for high class passengers.

129. Impact of highway improvements on rail traffic.

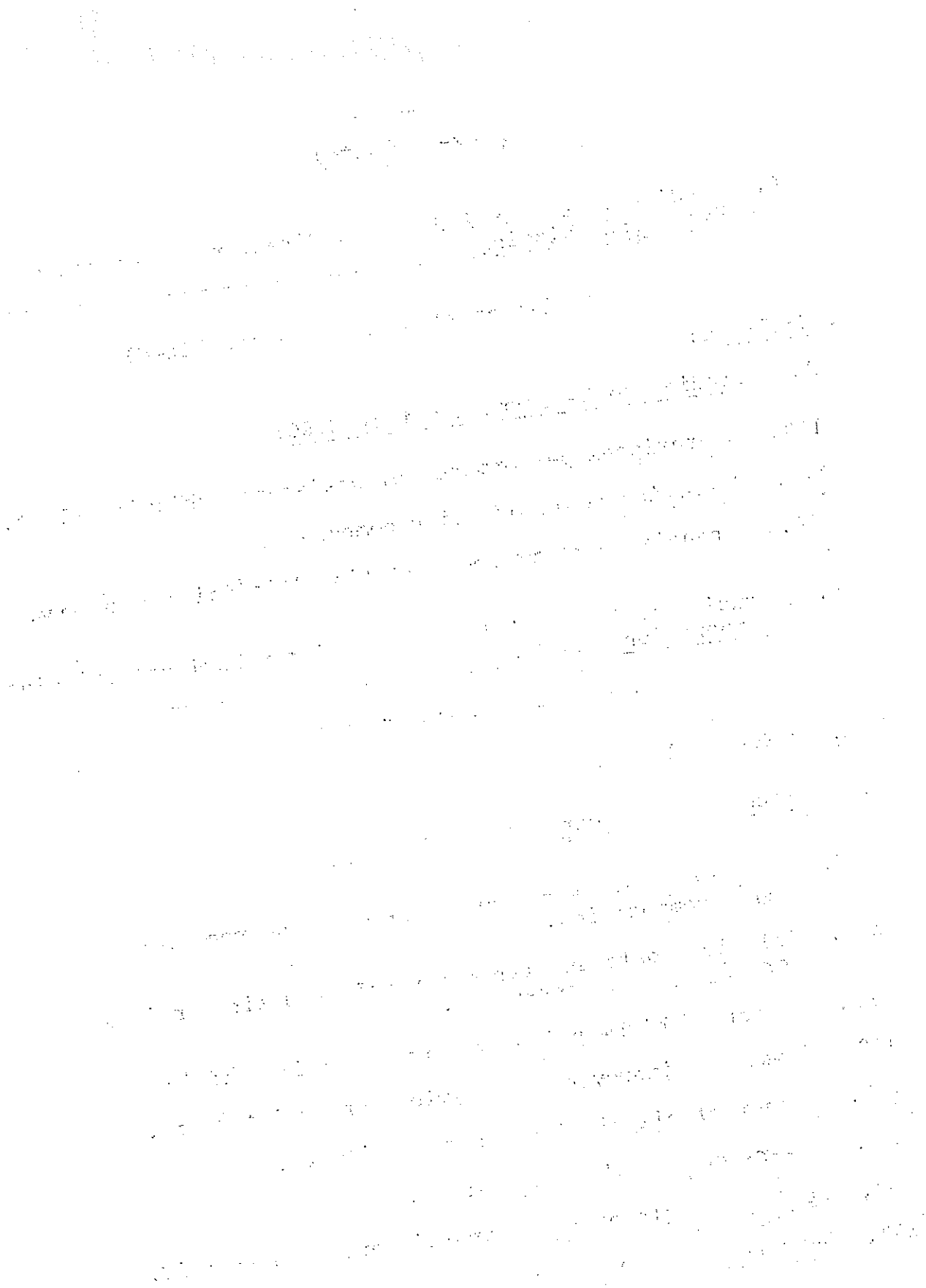
130. Impact of improved bus services on rail traffic.

131. Impact of oil pipeline on the railways.

132. Inter-Modal Choice Motivation.

133. Optimum length of haul for rail and road traffic.

134. Data Bank for Transport.



PHASING OF EXPENDITURE
1983 - 1988

Annex VII

Sl. No.	Item	1983-84	1984-85	1985-86	1986-87	1987-88	Total
1.	Research	1,100,000	1,500,000	2,000,000	2,500,000	3,400,000	10,000,000
2.	Data Bank	200,000	200,000	200,000	200,000	200,000	1,000,000
3.	Dessimination of Research	100,000	100,000	100,000	100,000	100,000	500,000
4.	Traffic Counts	500,000	500,000	500,000	500,000	500,000	2,500,000
5.	Demonistration Projects.	100,000	100,000	100,000	100,000	100,000	500,000
6.	Training Course.	100,000	100,000	100,000	100,000	100,000	500,000
7.	Foreign Assistant.	-	1,000,000	500,000	-	1,000,000	2,500,000
8.	Office Building.	-	1,900,000	-	-	-	1,900,000
9.	Contingencies	100,000	100,000	100,000	100,000	100,000	500,000
	TOTAL :	2,200,000	5,000,000	4,100,000	4,600,000	4,000.000	19,900,000

ANNEXURE - VIII

ESTIMATE OF RECURRING EXPENDITURE

Sl No.	I t e m s	1982 - 83	1988 - 89
1.	Basic Salary Officer	185,000	798,750
2.	Basic Salary Other Staff	88,800	572,850
3.	Regular Allowances	151,000	1,472,604
4.	Other Allowances	39,600	100,000
5.	Purchase of Durable Goods.	12,000	20,000
6.	Maintenance of Goods.	21,000	30,000
7.	Personal T.A.	14,000	25,000
8.	Commodities & Services.	19,000	30,000
9.	Communication	43,000	60,000
10.	Utilities	22,100	30,000
11.	Stationery/ Printing/Books.	27,000	40,000
12.	Rent of Office Building	72,000	120,000
13.	Uniforms.	5,000	5,000
14.	Other Contigent Expd.	7,000	10,000
15.	Entertainment.	2,500	5,000
	T O T A L:	709,000	3,319,204