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Report No. 1082

PROJECT PERFORMANCE AUDIT REPORT

on

PAKISTAN FIRST AND SECOND HIGHWAY PROJECTS (CREDITS 54-PAK & S-1-PAK AND LOAN 578-PAK)

March 12, 1976

Operations Evaluation Department

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PREFACE

This report presents an audit of achievements under the Pakistan First and Second Highway Projects. The First Project was supported by Credit 54-PAK of 1964 in the amount of US\$17 million, of which US\$16.2 million was disbursed and the remainder ultimately cancelled in June 1973. The Second Project was engineered under Credit S-1 PAK for US\$1 million, and supported by Loan 578-PAK of 1968 in the amount of US\$35 million, of which US\$34 million was cancelled in July 1971 at the request of the Government, the remainder being disbursed by June 1973.

The report is based mainly on correspondence and reports in IBRD/IDA files (Loan and Credit Agreements, Appraisal Reports, Progress Reports, Supervision Reports, and correspondence between IBRD/IDA and the Borrower), discussions with IBRD/IDA staff, and a one-week mission to Pakistan to collect information and discuss the projects with officials concerned. The valuable assistance of the Ministry of Communications and Works and the Planning Commission is gratefully acknowledged.

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PAKISTAN FIRST AND SECOND HIGHWAY PROJECTS

(CREDITS 54-PAK & S-1-PAK AND LOAN 578-PAK)

PROJECT DATA

	Credit <u>54-PAK</u>	Credit S-1 PAK	Loan 578-PAK
Total amount	US\$17,000,000	US\$1,000,000	US\$35,000,000
Amount Disbursed	US\$16,226,3 9 9 U	US\$ 877,449	US\$ 1,001,637
Amount Cancelled	US\$ 773,601	US\$ 122,551	US\$33,998,363
Appraisal Mission Date	Nov./Dec. 1963	July/Aug. 1965	Mar./April 1968
Negotiations Date	April 9-16, 1964	July 29, 1966	June 5-10, 1968
Loan Agreement Date	June 11, 1964	August 22, 1966	December 20, 1968
Original Effectiveness Date	Aug. 10, 1964	Oct. 21, 1966	Feb. 21, 1969
Final Effectiveness Date	Aug. 10, 1964	Oct. 21, 1966	Feb. 27, 1969
Original Closing Date	Dec. 31, 1969	Sept. 30, 1968	December 31, 1972
Revised Closing Date	Dec. 31, 1972	Dec. 31, 1970	Dec. 31, 1972
Last Disbursement Date	June 1973	Jan. 18, 1971	June 1973
Cancellation Date	June 27, 1973		July 28, 1971
Number of Supervision Missions	10	: 8	6
Average Number of Months between Supervision missions	7.6	5.5	4
Exchange Rates: (Pakistan r	upee):		

1964-72	-	US\$1	-	PRs	4.76
1972	-	US\$1	=	PRs	11.03
1973-74	-	US\$1	=	PRs	9.93

PROJECT PERFORMANCE AUDIT SUMMARY

PAKISTAN FIRST AND SECOND HIGHWAY PROJECTS

(CREDITS 54-PAK & S-1-PAK and Loan 578-PAK)

I. Introduction

1. The main objective of the Pakistan Government's road program in the 1960s, as well as of the IDA-supported First Highway Project (US\$17 million Credit 54-PAK of 1964), Highway Engineering Project (US\$1 million Credit S-1 PAK of 1966), and Second Highway Project (US\$35 million Loan 578-PAK of 1968) was the construction of modern primary roads, to replace the old, underdesigned and undermaintained network existing at the time. Through these projects, the Bank sought to introduce modern standards of design and construction for primary roads and bridges. The projects also included major institutional components, as they provided for the reorganization and modernization of the agency responsible for road construction and operation in West Pakistan. The Bank also encouraged and partially financed improvements and modernization of road maintenance, which was previously very ineffective; the modernization of road planning techniques and increased use of laboratory facilities; and improved transport coordination.

2. The Credit Agreement 54-PAK was signed in June 1964, to help finance a US\$35 million equivalent project comprising the detailed engineering and construction of the new Karachi-Hyderabad highway, considered as the first priority in the country; design and construction of three important bridges; laboratory equipment, and consultants' services for the reorganization of the Buildings and Roads Branch (B&R) of the Ministry of Communications and Works. This project had been identified in 1962, with the Government proposing the construction of the Karachi-Hyderabad highway, and the Bank proposing the inclusion of the bridges and the consultants' services to help B&R.

3. Talks about a possible second highway project also started in 1964, when the Government proposed consideration of several road sections for financing under the project. Since neither the technical nor economic justification of these highways had been studied in detail, the Bank proposed the granting of an Engineering Credit to finance the necessary studies and provide a solid basis for a second project. The Government of Pakistan accepted this position and IDA Credit S-1 PAK was signed in August 1966, covering about 60% of the US\$1.7 million project, comprising detailed engineering, economic justification and, in general, all steps required to call bids, for the Lahore-Sheikhupura-Lyallpur (83 miles) and the Sheikhupura-Sargodha-Khushab (109 miles) roads, and for two major bridges on the Chenab and Jhelum Rivers. Processing of the second highway project was postponed for several reasons, mainly the Government's delays in setting up a separate highway organization (the Bank had made this a condition for proceeding with the appraisal); delays in the implementation of the Engineering Project, thus making it impossible to begin construction; and a shortage of IDA funds, which in the end was solved by Pakistan accepting a Bank loan. In December 1968, the Loan Agreement 578-PAK was signed, covering the foreign exchange component of a US\$76 million equivalent project. The components were construction of the Lahore-Lyallpur (80 miles) and Sheikhupura-Sargodha (90 miles) roads (the other proposed sections had been dropped due to their

lower priority and lack of funds) and feasibility studies for 500 miles of other primary roads. The project also included continuation of the consultants services helping in the reorganization and staff training of the Highways Department; financing of a Transport Coordination Study; and, at Bank's suggestion, a three-year maintenance program.

II. Implementation of the First Highway Project

4. Implementation of these projects was affected by several exogeneous factors that have to be kept in mind when judging the performance. These factors were the Indo-Pakistani war of 1965; the civil war and war with India in 1971; the administrative partition of West Pakistan into four provinces in 1970, and several important changes in Government.

In spite of these problems, implementation of the First Highway 5. Project was generally satisfactory. Initiation of construction was delayed, particularly of the bridges, because of the late completion of detailed engineering and difficulties in appointing consultants and awarding contracts. Total actual costs, at US\$38 million, were 7% over the appraisal estimate. This small overrun is primarily attributable to a 39% cost overrun in bridge construction (32% of total investment), mainly because of underestimation of prices and quantities in the original designs. Highway construction (57% of total investment) experienced a 4% underrun, largely explained by a lower than expected bid and improved alignment, factors which outweighed the effects of price escalation and procurement delays. Consulting services as a whole (11% of total investment) underwent a cost overrun of 5%, largely due to extra work required, while the allocation for laboratory facilities and training (about 0.5% of total investment) was decreased by 60% mainly because expenditures did not fully materialize. The main feature of the construction process was the many claims submitted to the Government by consultants and contractors -- claims which were handled very slowly and finally required international arbitration. Main reasons for the claims were price escalation. delayed payments and difficulties derived from the war with India.

6. Road and bridge construction were completed largely on schedule. The Karachi-Hyderabad road was completed in March 1970, three months after the original contract completion date, largely because of a slow bidding process. Two of the bridges were completed on time and one slightly ahead of schedule.

7. The investments financed under this project are expected to have a higher return than estimated at appraisal. The audit estimate of the return on the Karachi-Hyderabad highway is 12%, instead of the 8-11% margin estimated at appraisal. The main reason was the lower than expected cost and higher than expected traffic volume because of a high level of diversion from the old road. The three bridges had returns between 12 and 38% (at appraisal, the return for only one bridge was calculated, at 10%), mainly because of higher than forecasted truck traffic. III. Implementation of the Highway Engineering Project and the Second Highway Project

8. The evolution of the Highway Engineering Project and the Second Highway Project suffered from serious difficulties which culminated in the cancellation of practically all the Second Project. The Engineering Project progressed very slowly: instead of 15 months, as estimated at appraisal it took about 50 months and two postponements of the closing date. A major part of the delay is attributable to the Directorate of Bridges, which took an inordinate length of time in processing the award of consultants' contracts. In general, the delays were due to the poor performance of the Government machinery in handling this project. The final cost of this Engineering Project was, however, 12% less than forecasted at appraisal, due to deletion of the review of the design of one large bridge.

9. As a consequence of these delays in the Engineering Project, the construction components of the Second Highway Project had a slow start. When bids were finally called, in mid-1970, it was found that they were about three times the original cost estimate. This prompted an investigation by the Bank, the Government and the consultants which concluded that the high cost level was due to a variety of reasons, such as inflation (explaining about 30% of the difference), the complexity of estimating construction costs, the risks involved in the unstable political situation, and the poor reputation that the Government had acquired under former credits for the payment of bills and settlement of claims. Further analysis concluded that, if the package were to be slightly modified, and the participation of local contractors encouraged, bids could be brought down to about twice the original estimates.

10. However, while these delays were taking place, it was found that traffic on the project roads had been growing at a slower than expected pace; that savings in maintenance costs would be lower than forecasted; and that the Government was already improving the old roads, thus reducing the benefits from new alternative highways. The pattern of increased costs and less traffic made the project much less productive than expected. Attempts were made to reconstitute the project with less ambitious investments, but they did not prosper and, in July 1971, the Government of Pakistan and the Bank agreed to cancel the uncommitted balance of US\$33.9 million out of the US\$35 million loan.

IV. Institutional Achievements

11. The one issue that was common to the three Bank operations in the highway sector was the need to strengthen a separate Highways Department. The effort was largely based on the services of consultants covering practically all aspects of highway operations. The consultants were hired at the end of 1964 and retained until mid-1971. However, progress in this area has been difficult to assess and it has not been possible in this audit to conclude whether it has been satisfactory. The creation of a separate Highways Department was delayed several years, until October 1967; it had a slow start, and advanced slowly due to major personnel changes. In addition, the Government considerably delayed the approval of recommendations made by the consultants; for example, the recommendations about reorganization of the Highways Department. made in October 1965 were only approved, in principle, in May 1967. However, the partial evidence available suggests that some progress has been made and the Highways Department is now better prepared to plan and construct roads; little improvement has been made in road maintenance.

12. The consultants generally made a positive contribution to highway operations in Pakistan, in spite of rather poor cooperation at the early stages from the Pakistani authorities, who tended to regard their services then as a necessary condition to receiving Bank/IDA funds, and the lack of experience of the consultants' staff in the rather distinct conditions of a developing country; there was significant improvement over time. The consultants proposed the new organization of the Highways Department and prepared reports, manuals and operational guidelines that seem to have been useful and widely They also trained staff and helped prepare the Bank-financed highway used. Nevertheless, they might have made a more positive contribution projects. on the issue of design standards appropriate for Pakistani conditions, and some of the measures proposed, particularly on maintenance, and contractor pregualification and selection, could have been better adapted to the needs of the country.

13. Finally, the Transport Coordination Study, prepared by the Planning and Development Department with the help of foreign experts, has been considered satisfactory but, to date, has not had a noticeable impact on transport planning in the country.

V. The Bank's Role

It is hard to properly assess the Bank's role in these projects in 14. light of the political and administrative difficulties in Pakistan at the time. In retrospect, the Bank seems to have helped by emphasizing the need for well-designed and maintained roads, the required reorganization and modernization of the Highways Department and the usefulness of a sector view of trans-It also seems to have pursued its objectives adequately, exercising as port. much pressure as seems to have been possible. But it has not been possible to reach an adequate answer in this audit on whether the Bank should have given more continuous and emphatic attention to improvement of existing primary and secondary roads as against the construction of new ones, which was the main component of the projects actually selected, and it may be that the Bank should have reviewed institutional objectives more thoroughly, especially at the time of the second loan, with a view to making them more modest.

PAKISTAN FIRST AND SECOND HIGHWAY PROJECTS

(CREDITS 54-PAK & S-1-PAK AND LOAN 578-PAK)

I. Introduction

1.01 The basic objective of the Pakistan Government's road program, as well as of the IDA-supported First Highway Project (US\$17 million Credit 54-PAK of 1964), Highway Engineering Project (US\$1 million Credit S-1-PAK of 1966), and Second Highway Project (US\$35 million Loan 578-PAK of 1968) was the construction of modern primary roads. In the first project, the Bank 1/ sought to introduce modern standards of design and construction for primary roads and bridges, which were to be models for expansion of the road network; the second project was intended to provide for the construction of similar roads and bridges. Both the First and Second Projects included major institutional components, as they provided for the reorganization of the official authority responsible for road construction and operation in West Pakistan. Also, the Bank encouraged intermodal coordination, modernization of planning techniques, increased use of laboratory facilities, strengthening of field supervision of construction, and improvement of road maintenance practices.

II. The Bank and the Credits/Loan

2.01 In 1962, West Pakistan had a road network totalling some 21,000 miles of all types, about half of which was paved. Although these were passable in all weather, they were generally built to low standards and functionally obsolete for modern traffic. A substantial mileage of existing paved roads was subject to flooding and to damage from waterlogging, and was under frequent repair. Most of the paved roads were either single-lane or a substandard two-lane width which resulted in heavy damage to the pavement shoulders from meeting and passing vehicles. Thus, the need for modern primary roads was evident. In addition, the domestic contracting industry was at an early stage of development: construction equipment was limited to a few essential units, roads were being built almost entirely with low productivity, and largely unskilled, manual labor, and shortage of trucks and of loading/unloading equipment led to the common practice of using inferior road-building materials found immediately alongside the road. Road maintenance was also inadequate and of low quality. Thus, the combination of poor construction and poor maintenance resulted in excessive regular maintenance being required. The road program in West Pakistan was under the charge of the Buildings and Roads Branch (B&R) of the Ministry of Communications and Works (C&W).

1/ In this report, the Bank refers to the Bank Group.

2.02 The Government's First Five-Year Plan (1955-60) provided for the construction of 1,800 miles of new roads and the improvement of 2,000 miles of existing roads in West Pakistan. However, the work carried out fell short of the target. The Second Five-Year Plan (1960-65) provided for the construction of 2,050 miles and the improvement of 1,450 miles in West Pakistan. Because of political pressures, the program mainly consisted of the rebuilding of numerous, widely scattered short road sections. The works were further hindered by an insufficient allocation of funds to road construction, despite the prevailing high road user indirect charges. As a result, the main road system was never significantly upgraded.

2.03 In 1961 and 1962 two Bank missions visited West Pakistan to study, inter alia, the situation of the country's roads and road transport. Also in 1961-62, USAID engaged the services of Transportation Consultants Incorporated (TCI) to undertake a comprehensive transportation survey and to prepare a corresponding report for the U.S. Corps of Engineers. Aside from the deficiencies mentioned above, the consultants found that the organizational structure of the highway authority was too cumbersome, resulting in long delays for decisions to be taken.

2.04 At that time, USAID considered that the highest priority in road investments was an improvement of the link between Karachi and Hyderabad. It carried out a reconnaissance of a proposed new alignment, undertook traffic surveys and did a preliminary traffic estimate. However, in late 1962, USAID indicated to the country and the Bank its intention to concentrate investments in East Pakistan and to cease activities in West Pakistan.

2.05 A Bank mission in late 1962 agreed with the high priority of the Karachi-Hyderabad link and began the analysis of the main issue around it, which was whether to improve the old road, or build a completely new link. A related issue in Pakistan was the prevailing mixture of non-motorized and motorized traffic on primary roads, which was a permanent cause of concern. The Bank felt that significant benefits could be obtained by traffic segregation. A new road between Karachi and Hyderabad would have the additional advantage of helping in that segregation. The Bank considered that construction of a new road was preferable to improvement of the existing one due to the bad state of the existing road, the fact that the proposed new alignment benefitted from a distance reduction of about 30 miles, and that USAID had already carried out a preliminary study and made the reconnaissance of the proposed alignment. An additional benefit considered at the time was that the proposed highway was to be the first in Pakistan to be constructed with modern techniques, and the Bank attached great importance to the demonstration effect. However, in retrospect, it seems that the alternative of improvement was dismissed both by the Government and the Bank before a thorough investigation was made. At least one Bank officer suggested a third possibility, namely, to leave the paved road as it was and build a parallel dirt road for slow-moving traffic, which would have been a cheaper interim solution. In addition, the terms of reference for the feasibility study may not have been flexible enough for the improvement alternative to be considered by the consultants.

2.07 Since additional cost information was needed by the Bank to support the case for construction of the new highway, the consulting firm, Amman & Whitney International Limited (USA) was engaged by the Government in early 1963 to carry out a feasibility study. A draft study was submitted in November 1963 for consideration by the Bank appraisal mission, and the final report was completed in February 1964. Subsequently, since the project appeared technically and economically justified, it was agreed that detailed engineering and construction of the highway be performed under the proposed credit.

2.08 Feasibility studies for the Jhelum and Ravi Bridges had been prepared by a Canadian consultant for the Central Government; such studies, however, were without the benefit of either a foundation investigation or a reliable topographic survey, so that the cost estimates were only very tentative figures. The B&R, which was opposed to having consultants carry out bridge feasibility studies, on the grounds that they themselves had the required technical capacity, altered the proposed design of the Jhelum Bridge and decided to carry out both the final design and construction supervision. However, the Bank requested in mid-1963, and the Government agreed, that foreign consultants review the designs made by B&R. It was also agreed that the same procedure would be followed with the Ravi and Sutlej Bridges, in order to save about 75% of the cost of the studies.

2.09 Consideration was also being given by the Government to the establishment of separate departments within B&R and some steps had already been taken to separate buildings from the roads functions at some levels. The Bank was very much in favor of engaging consultants to assist in the process of organizing the new department and the Government agreed that these services should be included in the project.

2.10 Negotiations took place in April 1964, during which the composition of the project was agreed upon as follows (for details see Annex 1):

- (i) Karachi-Hyderabad Highway: detailed engineering and bidding documents by consultants, construction by contractors, and construction supervision by consultants (US\$20.2 million);
- (ii) consultants' services for feasibility studies of access to Karachi and Hyderabad (US\$0.1 million);
- (iii) review of designs by consultants, construction by contractors, and construction supervision by consultants of the Jhelum, Ravi and Sutlej Bridges (US\$7.7 million);
- (iv) general consultants' services to advise and assist B&R on highway organization and operations (US\$1.5 million); and
- (v) equipment for central and field laboratory facilities (US\$0.5 million).

The overall contingency allowance was set at about 18%, thus bringing the total cost of the project to US\$35.5 million.

- 2.11 Supplementary letters dealt with the following points:
 - (a) modern highway design standards, including a limited number of access points and providing sufficient right-of-way for future expansion to a four-lane width;
 - (b) restriction of traffic on the highway only to fast-moving motorized vehicles, while relocating slow-moving traffic to that part of the right-of-way reserved for the future two extra lanes;
 - (c) periodic traffic counts to be carried out for a period of ten years;
 - (d) tolls to be levied on the highway on a contractual basis through private parties, rather than directly by the Government; and
 - (e) all construction contracts would be let on the basis of international competitive bidding, contracts for highway construction to be unit priced and for at least US\$3 million, in order to attract international tenders, while no further restrictions were put on contracts for bridge construction.

It was further agreed that adequate maintenance would be provided upon completion of highway and bridge construction, and that the existing traffic regulations would be enforced. Also, there was a provision in the Credit Agreement that no withdrawals could be made before the general consultants were appointed.

2.12 The Credit Agreement 54-PAK was signed on June 11, 1964 for an amount of US\$17 million to finance the foreign exchange component of the US\$35.5 million equivalent highway project. The credit became effective on August 10, 1964.

2.13 Talks about a possible Second Highway Project also started in 1964. In June of that year, the Government of West Pakistan submitted draft feasibility studies of the Lahore-Multan, Lahore-Lyallpur and Lahore-Sargodha-Khushab roads (see map) to the Bank for review and opinion on possible Bank financing. In late 1964, IDA decided not to pursue consideration of the Lahore-Multan road since some doubts were raised with regard to the computation of the benefits, the road was paralleled by Pakistan Western Railway's main line, and USAID appeared interested in financing it. In June 1965, the Government requested an IDA credit for the construction of the Lahore-Lyallpur and Sheikhupura-Sargodha roads in accord with the recommendations of the TCI study; the latter section included a bridge over the Chenab River. The corresponding feasibility studies had been carried out by Louis Berger, Inc., and, at the request of IDA, the Lahore-Lyallpur road had been reviewed by the general consultants under Credit 54-PAK, who had recommended a 15% less costly alignment. However, detailed engineering had not been prepared for either of the two roads and the Bank proposed that, instead of a construction credit, IDA would make a credit under which detailed engineering would be carried out. Two additional advantages were considered to attach to this course. First, the credit would assure selection of an engineering consulting firm acceptable to IDA, thus overcoming local pressures on the Government to employ domestic and often inexperienced firms and, second, a condition for the credit would be that the Government proceed during execution with the necessary acquisition of right-of-way so that construction might be commenced without delay should IDA decide to finance construction. It was understood that the engineering of the bridges was again to be carried out by C&W, subject to revision by consultants.

2.14 In early 1966, the Government requested the inclusion in the proposed engineering project of two more components, namely, the detailed engineering of the Sargodha-Khushab road, which included a major bridge over the Jhelum River, and the detailed engineering of the D.I. Khan Bridge over the Indus River. While the former was accepted by IDA, the latter was rejected on grounds that it was unconnected with the rest of the components and that the corresponding hydraulic study had not yet been made. It was, however, understood that the Government would finance the feasibility study of D.I. Khan Bridge, and that IDA was willing, in principle, to finance the required engineering in the future.

2.15 Negotiations were conducted in July 1966, and no major issues emerged. The project composition agreed upon was as follows: (a) preparation of technical and economic justification, detailed engineering, cost estimates and bidding documents by consultants of the Lahore-Sheikhupura-Lyallpur road (83 miles) and the Sheikhupura-Sargodha-Khushab road (109 miles); (b) detailed engineering, cost estimates and bidding documents by the Ministry of Communications and Works of two major bridges over the Chenab and Jhelum Rivers; and (c) review by consultants of (b) above. Details are in Annex 2 and in Map IBRD 1610R.

2.16 On August 22, 1966, Credit S-1 P.K (with ten-year maturity) vas signed for US\$1 million equivalent covering about 60% of the US\$1.7 million project. The foreign exchange component amounted to 42% of the total project cost; in addition, the credit was to finance about 30% of the expenditures in local currency. Supplementary letters to the Credit Agreement stipulated, inter alia, that IDA's comments be secured about toll collection on the two roads under the project, and the intention of the Government to establish within C&W a long-awaited highway organization by January 1, 1967. The credit became effective on October 21, 1966.

2.17 Shortly after the engineering work was started in December 1966, the Government requested IDA assistance for the construction of the two roads and two bridges being engineered. However, IDA decided to delay consideration of this request as Pakistan had not yet complied with the establishment, by January 1, 1967, of a separate highway organization. This Highway Department was created in October 1967, and an IDA appraisal mission was sent to Pakistan in early 1968. The proposed project consisted of the two roads and bridges mentioned above, two additional items proposed by IDA, the extension of the general consultants' services, mainly because of the delays in establishing the new Highway Department, and a first-stage maintenanace program, since no real progress in maintenance had been made in Pakistan in the last four or five years. In addition, the Government had asked for the inclusion of the final engineering of parts of the Hyderabad-Multan road, and a feasibility study of the improvement of another part of the same road from Lahore to Peshawar and the Afghan border, both of which had been formerly recommended by the TCI study as initial steps for further expansion of the primary road network. The original appraisal estimate of the foreign exchange component was between US\$35 and US\$45 million depending on which items would be finally included in the project.

2.18 The request by the Government to include the final engineering for the reconstruction of all of the Hyderabad-Multan road was questioned by IDA on grounds that a less costly blend of improvement and reconstruction would be more desirable, and IDA subsequently made an offer to finance the engineering of the sections to be reconstructed. A further request made by the Government to include the final engineering of the D.I. Khan Bridge over the Indus River was also rejected by IDA because a recent cost estimate was over 200% more than the original estimate; however, since the feasibility study of the D.I. Khan Bridge had been carried out in 1964, thus needing to be updated, IDA offered to include a new feasibility study in the proposed credit.

2.19 Subsequently IDA faced a shortage of funds and had to limit the amount available for the proposed project to a maximum of US\$35 million. Such a limitation brought about the need to either narrow down the project composition or, keeping the project unchanged, to restrict IDA's participation, with Pakistan providing for the overrun in both local and foreign currencies.

2.20 Negotiations were held in June, 1968. Several matters were agreed upon by the Government of Pakistan and IDA in the course of these negotiations. First, construction of the road from Sardogha to Khushab was to be deferred in view of IDA's fund shortage; however, it was agreed that if the actual cost of the project were to be less than anticipated, the excess funds could be used either for the construction of this road, or for the provision of a fourlane width on the Lahore-Sheikhupura section; second, to include in the project a Transport Coordination Study, which had been earlier proposed by the Planning Commission in order to provide a suitable basis for continued intermodal tranportation planning. It was agreed, however, that IDA financing would be provided for only if expected financing from USAID and UNDP failed to materialize. Third, the Government agreed to extend the contract of the general consultants from June 30, 1968 until the signing of the new credit, which it wanted to include provision for a further extension. Fourth, the Government also agreed to take several measures designed to accelerate the improvements

in efficiency of the Highways Department, mainly through the granting of increased authority to the Director General, and the provision of financial or other inducements in order to retain badly needed qualified staff. Finally, it was agreed to include in the proposed project the design of a new bridge over the Indus River at Hyderabad and that the Highways Department would prepare plans for essential short-term improvements of the Sargodha-Khushab and Hyderabad-Multan roads for which engineering was not to be carried out under the proposed project.

2.21 During negotiations, provision was also made for Engineering Credit S-1PAK to be refinanced on the effective date of the proposed project, and for disbursements to continue thereafter under the new project for the completion of whatever work was outstanding. Due to delays in completing the work under the Engineering Credit, the Bank agreed in October 1968 to the extension of the closing date from September 30, 1968 until March 31, 1969, and provision was made for the refinancing under the proposed loan to take place on the closing date of S-1 PAK and not on the effective date of the new loan.

2.22 After negotiations were completed, a further delay was incurred by IDA's delay in fund replenishment. The Bank management made an offer to the Government of Pakistan for financing the proposed project under an IBRD loan as an alternative to a longer delay before an IDA credit could be approved; the Government accepted the offer. Refinancing of S-1 PAK was dropped, with the shift to the harder terms of a loan.

2.23 On December 20, 1968, the Loan Agreement 578-PAK for US\$35 million was signed, covering the foreign exchange component of a US\$76.2 million equivalent project. The loan became effective on February 27, 1969, slightly behind schedule due to delay in Pakistan's compliance with prerequisites.

2.24 The project agreed upon was the following:

- (a) construction by contractors, and construction supervision by consultants, of the Lahore-Lyallpur (about 80 miles, including a nine-mile link road to the center of Lyallpur and a two-mile access road to Shakhot); the Sheikhupura-Sargodha road (about 90 miles); and a major bridge across the Chenab River at Talibwala;
- (b) a Transport Coordination Study designed to provide recommendations for the formulation of policies and programs for the coordination and development of various transport modes in West Pakistan;
- (c) reorganization and training of the staff of the Highways Department, with the assistance of general consultants, for a period of three years, particularly in planning, design, supervision of construction, and maintenance;

- (d) revision of the feasibility studies for the 500-mile road between Hyderabad and Multan, including detailed design of high priority sections of this road totalling about 250 miles, and a feasibility study for the 200-mile trunk road between Lahore and Rawalpindi;
- (e) a three-year maintenance program providing for: procurement of equipment for the maintenance of the Karachi-Hyderabad Highway, procurement of workshop equipment, spare parts and provision of workshop and warehouse space for the regional and divisional workshops, and introduction of a pilot maintenance scheme;

III. Implementation of the First Highway Project

3.01 The implementation of both the First and the Second Highway Projects was affected by a number of events of "force majeure", which should be taken into consideration with regard to delays and overruns. In 1965, a ten-day war occurred between Pakistan and India, during which, inter alia, Pakistanbound cargoes with construction equipment were impounded by India. In July 1970, West Pakistan was partitioned into four provinces, which produced a period of administrative turmoil and caused delays in the reorganization of the Highways Department; through 1973, exchanges of personnel were allowed among provincial governments, so that individuals could return to their home provinces. Then, in 1971, a civil war broke out and subsequently war recurred between Pakistan and India, which resulted in the separation of East Pakistan and the formation of Bangladesh. By 1971, in view of budgetary pressures and political developments, the Government became more cautious about local expenditures. Finally, in 1972, a new government was formed in Pakistan, and a constitution was prepared and ratified in 1973.

Contracts

3.02 In October 1964, the Government of West Pakistan sent letters to consulting firms inviting proposals for the final design, bid analysis and construction supervision of the Karachi-Hyderabad Highway. Proposals from six firms (one Pakistani and five foreign) were received in November 1964. The Government's first choice was Noon, Qayum & Co. (Pakistan) and its second choice, Frederick R. Harris, Inc. (USA). Noon, Qayum & Co. had no former experience in highway design, although it was in the process of becoming associated to a qualified European consulting firm. Consequently, IDA disqualified Noon, Qayum & Co. and the Government signed a contract with Frederick R. Harris in early 1965. The detailed engineering of the Karachi-Hyderabad Highway was completed in March 1966, i.e. with a delay of about nine months beyond the original estimate of one year from loan signing.

3.03 Regarding construction, 23 firms were prequalified, but only two tenders were received, in September 1966, both by Italian firms, amounting to US\$23.74 million and US\$25.24 million. As tenders were higher than expected, they were rejected by the Government, with IDA's approval. Subsequently, the previously prequalified firms were again invited to submit tenders in January 1967. The general conditions of the bidding documents were altered to make them more attractive to potential bidders. Three tenders were received, the lowest one being that of Cogefar-Astaldi (Italy) which had also bid the first time. However, their new tender amounted to US\$19.57 million, i.e., 22% less than before, because they were completing another project elsewhere in Pakistan and planned to utilize much of the same equipment, personnel and facilities. This tender was accepted in March 1967.

3.04 During IDA's supervision mission in December 1967, all the consultants connected with the project complained about the Government's contracting procedures, in particular about the Government preoccupation with price to the exclusion of all other considerations; the long delays in negotiating and approving contracts, and the failure to pay fees promptly when due. These problems had already delayed project execution by at least six months; they were attributed by IDA to the Governments' cumbersome administrative machinery and unfamiliarity with negotiating and contracting procedures. On the other hand, however, the consultants were not without fault, particularly Frederick R. Harris, who had attempted to alter, during negotiations, some of the terms offered in their proposals.

3.05 The detailed engineering of the three bridges included in the project was prepared by the Directorate of Bridges of C&W, and reviewed by consultants. The process suffered several delays due to difficulties in the appointment of consultants, diversion of consultants to other assignments, need to redesign one of the bridges and, in one case, the need to coordinate with city planning of Lahore. Tenders were called in October 1964 for the Jhelum Bridge, mid-1965 for the Sutlej Bridge and only July 1967 for the Ravi Bridge. One of the main difficulties in the process required until contracts were finally awarded was the fact that neither the road access to the Jhelum Bridge, nor the guide banks had been included in the contract, an omission that was not in line with former understandings reached between Pakistan and IDA. After discussion, tenders for the additional works, under international competitive bidding, were called in June 1965. Contracts were awarded to an Italian firm in the case of the Jhelum Bridge and to a Pakistani firm for the approach roads, a Pakistani subsidiary of a British firm for the Sutlej Bridge and a Pakistani firm for the approach roads. The Ravi Bridge was built by a Pakistani subsidiary of Volkervann (Germany) and the approach roads by force account.

3.06 The location studies of the Karachi-Hyderabad Highway terminal sections were assigned to the general consultants, Howard, Needles, Tammen and Bergendoff (HNTB). The problem of access at the Hyderabad end of the highway was solved in principle in 1966; the feasibility study involved a realignment of the terminal section which entailed savings amounting to about US\$1 million. The study of the access to Karachi progressed at a slower pace due to difficulties in the coordination with urban planning authorities and because of the more complex nature of the alternatives under consideration; the study was completed in mid-1969.

Costs and Delays

3.07 Total actual costs, at US\$38 million, were 7% over the appraisal estimate (Annex 6). This small overrun is primarily attributable to a 39% cost overrun in bridge construction (32% of total investment). Highway construction (57% of total investment), on the contrary, experienced a 4% cost underrun. Consulting services as a whole (11% of total investment) underwent a cost overrun of 5%, while the allocation for laboratory facilities and training (about .5% of total investment) was decreased by 60% mainly because expenditures did not fully materialize. The credit was closed 8-1/2 years after the Credit Agreement instead of 5-1/2 years, i.e., a delay of about 55%. However, construction works were 95% complete on the original closing date.

3.08 The cost underrun in highway construction (Annex 6) resulted from the lower-than-expected bid (see para. 3.02) and the improved alignment near Hyderabad (see para. 3.06). These savings outweighed the effects of price escalation and procurement delays. The cost overrun in bridge construction was primarily caused by an underestimation of prices and quantities in the original designs prepared by the Directorate of Bridges. Upon review of design, the engineering consultants indicated that the costs would be about 24% higher than the original estimate. In fact, the actual cost was an additional 12% higher than the revised estimate; this was primarily due to contractors' claims based on equipment losses and procurement delays as a result of the Pakistan-India War, and minor design changes, including the addition of toll facilities.

3.09 Because of the delays involved in the rebidding process, the construction of the Karachi-Hyderabad started only in March 1967. The initial phase of construction was slowed down for about three months due to the closure of the Suez Canal, which delayed the arrival of the construction equipment. Upon arrival of equipment, the contractor proceeded at a satisfactory pace and tried to make up for lost time by supplying additional equipment and double shift for earthwork. IDA's supervision missions acknowledged the good quality of both construction by contractor and supervision by consultant. The highway was completed in March 1970, three months after the original contract completion date. The major part of the delay was caused by the slow start described above.

3.10 Associated with the Karachi-Hyderabad Highway, there were a number of claims by both the consultant (Frederick R. Harris) and the contractor (Cogefar-Astaldi). During early construction, the consultant requested that the Government approve additional domestic personnel for supervision and that the man-month rates for expatriates be increased; the first request was granted, whereas the latter was not. The contractor's claims originated as a request to the Government that compensation be paid for the price increase of basic commodities and for the additional ocean freight resulting from the closure of the Suez Canal. The Government was slow in dealing with the claims, largely because of delays in providing the necessary authorizations, since there was great concern among government officials about being charged with favoring particular parties. In March 1971, fifteen months after the original completion date, the outstanding claims had increased to US\$3.5 million, which included delayed payment of fees and the release of the retention funds corresponding to the one-year maintenance period. These claims were finally settled in 1972.

3.11 Several and difficult contractors' claims on the Government are probably the main characteristic of bridge construction under this project. The construction of the Jhelum Bridge was the first physical work started under Credit 54-PAK. In September 1965, part of the construction equipment was impounded by India in Bombay as a result of the war with Pakistan. This equipment, valued at US\$10,000-US\$15,000 was for two years the object of international administrative procedures and gave rise to the contractor's claims on the Government. The bridge structure was completed earlier than expected, in March 1968; and it was opened in August 1968. In late 1968, since direct settlement with the Government was not progressing fast enough, the bridge contractor took this and other claims to international arbitration, which were put under Danish administration in mid-1969. Early in 1970, the bridge contractor appealed to the International Chamber of Commerce for the settlement of claims mainly related to delayed payment of fees, amounting to US\$307,000; they were finally resolved in favor of the contractor by mid-1972. Then in October 1970, the access road contractor, whose lack of cooperation with the bridge contractor had been a source of delays, also filed claims against the Government, amounting to US\$619,000. All these claims were handled and processed by the consultant, who in turn claimed that such additional work was not included in its contract; as a result. the consultant also filed a claim requesting that additional fees be paid by the Government in compensation for the additional services.

3.12 The Sutlej Bridge was satisfactorily completed on time and opened to traffic in November 1968. The quality of the works was good. As of December 31, 1972, the final closing date, claims by the bridge and road access contractors, mainly related to price escalation and delayed payment of fees, were still not settled and were not expected to be in the near future. In addition, Donovan Lee and Partners, supervision consultants for both the Jhelum and Sutlej Bridges, submitted claims for an increase in fees because full supervision was required by IDA instead of the partial supervision that was agreed upon in their original contract with C&W; and because increased expenditures had been made in processing contractors' claims which had not initially been considered part of their responsibilities.

3.13 The most expeditious construction was that of the Ravi Bridge. The engineering and supervision consultant redid a sizable part of the design made by the Directorate of Bridges. Construction was of good quality, the supervision was very good, and the works progressed satisfactorily. The structural work was completed in March 1968 and opened to the public in mid-1968. The construction forces of the C&W were successful in building the approaches and the toll facilities.

3.14 The original credit closing date was December 31, 1969. By the end of 1968, all three bridges had been completed and opened to the public. The construction of the Karachi-Hyderabad Highway was still not complete, its termination being scheduled for March 31, 1970. In early December 1969 the Government requested a further postponement of the closing date until March 31, 1971, in order to allow for the settlement of contractors' claims and for the possibility of retaining payments for maintenance of the Karachi-Hyderabad Highway which were provided for in the construction contract, amounting to 5% of the contract value (about US\$1 million), as a one-year guarantee after physical completion; and for continuation of staff training abroad. IDA agreed to the postponement primarily so that a settlement of contractors' claims could be reached. In early 1971, little progress had been made towards claim settlement. Thus, the Government requested a second postponement of the closing date until March 31, 1972. However, not even at the end of the extended period had all claims been settled. In particular, the arbitration of the claim pressed by the highway contractor, Cogefar-Astaldi (about US\$1.2 million) was still pending solution. At the request of the above-mentioned contractor, IDA reluctantly agreed to a further 9-month extension until the contractor claims were finally settled. After the final credit closing date the undisbursed balance amounted to US\$0.773 million which, due to late confirmation by the Government, was not cancelled until June 27, 1973.

IV. Implementation of the Highway Engineering Project and the Second Highway Project

4.01 The Highway Engineering Project provided for detailed engineering, bidding documents and bid analysis for the roads and bridges whose construction would be included in the Second Highway Project. Due to the necessary chronological precedence of the engineering over the construction, the delays incurred in the former impeded the timely start of the latter. In fact, construction under the Second Highway Project never materialized.

4.02 On the whole, the Highway Engineering Project progressed very slowly: instead of 15 months, as estimated at appraisal, it took about 50 months and two postponements of the Credit closing date. A major part of the delay is directly attributable to the Directorate of Bridges and to the poor performance of the Government machinery as is described in the following paragraphs. The final cost of the Highway Engineering Project was, however, about US\$123,000 less than the US\$1 million forecasted at appraisal; this 12% underrun is attributable to the deletion from the project of review of the design of the Jhelum Bridge on the Sargodha-Khushab road. The undisbursed balance was cancelled on January 18, 1971.

4.03 The project was three months delayed in starting because of Pakistan's slowness in sending the draft contracts to IDA for approval. In November 1966, by means of letters of intent, the detailed engineering of the Lahore-Sheikhupura-Lyallpur road and the Sheikhupura-Sargodha-Khushab road was unofficially assigned by the Government to Sir William Halcrow and Partners (UK)/Incorporated Consulting Engineers (Pakistan), and to Pacific Consultants K.K. (Japan)/Zafor and Associates (Pakistan), respectively. Work started in December 1966, and the contractors were signed in February 1967 with IDA approval. In late 1967, slightly behind schedule, the consultants submitted feasibility studies which updated and amended traffic and cost data from former feasibility studies made by Louis Berger. The performance of the consultants was rated satisfactory by IDA.

4.04 In their revised feasibility study, the consultants were very much in favor of the construction of a four-lane divided highway between Lahore and Sheikhupura. The appraisal mission of the Second Highway Project (March/April 1968) did not agree, however, with this opinion on economic grounds. The consultants also made special efforts during preparation of design to reduce construction costs by introducing a less costly type of subbase and by performing investigations which ultimately led to a reduction in pavement thickness. The studies on the Sheikhupura-Sargodha-Khushab road advanced more slowly due to language difficulties of the Japanese consultants, which caused a number of misunderstandings with the C&W, and to initial appointment of insufficient staff by the consultants. These two shortcomings were, however, quickly corrected. The consultants completed the detailed engineering of these two roads in mid-1968. At that point in time the construction of the Sargodha-Khushab section and the Jhelum Bridge had already been deleted from the project description due to lack of IDA funds.

4.05 In the meantime, the appraisal of the Second Highway Project was being carried out. In order to accelerate its future implementation, the Government published an advance notice of intent to invite tenders for the construction of the two roads and the Chenab Bridge. Prequalification of contractors for the Lahore-Sheikhupura-Lyallpur road was being completed in January 1969, i.e., a month after the delayed signing of the Second Highway Project; nine contractors from eight different countries were found acceptable. Prequalifications for the Sheikhupura-Sargodha road resulted in seven contractors from six different countries being prequalified. The bidding documents for both roads were completed by the corresponding consultants in mid-1969, and submitted to IDA for approval. IDA objected only to a clause concerning Pakistani arbitration and proposed replacing it with a clause which had been formerly used under Credit 54-PAK. However, six months elapsed before the Government finally approved the change, in February 1970.

4.06 The detailed engineering of the Chenab Bridge at Talibwala was entrusted to the Directorate of Bridges of the C&W, in view of the satisfactory bridge design they had performed under Credit 54-PAK. In March 1967, an IDA supervision mission reported substantial completion of the design; it was further estimated that, after vetting of design by consultants, bridge construction could start in October 1967. However, the hydraulic model studies were completed only in late 1967, and the design was finally reported complete in June 1968 (about double the appraisal time estimate). Subsequently, this bridge was included in the advance notice of intent to tender published by the Government in August 1968. Shortly after its completion, the design was handed over to Pacific Consultants K.K. to perform the review. However, the negotiations between the Directorate and the consultants over the review contract dragged on for over a year. About five modified proposals were required by the Directorate from Pacific Consultants K.K.; although more difficult negotiations with these consultants on other assignments were completed in a week's time, the Director of Bridges continued to request minor changes in this case. At this point in time the main delay in the execution of the Highway Engineering Project was directly related to the work of the Directorate of Bridges. An IDA mission reported that it was impossible to find good reasons why their work was not completed earlier. In mid-1969, still no contract had been signed with the consultants, and the Directorate was, on the contrary, interested in inviting proposals from other consulting firms. However, in August 1969, a letter of intent was issued to Pacific Consultants K.K. Since no appreciable progress was being made to reach a final contractual agreement with the consultants, which was delaying implementation of the Second Highway Project, the Bank decided, perhaps too late, to exert extreme pressure. Consequently, in April 1970, the Bank communicated to the Government of Pakistan that, if the contract was not awarded promptly, the Sheikhupura-Sargodha road, where the bridge was located, would be excluded from the Second Highway Project. Subsequently, the contract was signed in mid-1970, with Dr. Fritz Leonhardt acting as subcontractor; almost simultaneously, the Director of Bridges was changed in August 1970 as a result of the administrative partition of West Pakistan. Dr. Leonhardt submitted a preliminary report in November 1970, proposing design alternations, resulting in a 20% cheaper construction than the original US\$7 million estimate.

The detailed engineering of the Jhelum Bridge at Khushab was also 4.07 assigned to the Directorate of Bridges of the C&W. The design progressed even slower than that of the Chenab Bridge. In February 1969, shortly after the signing of Loan 578-PAK, the design of the bridge was discontinued by the Directorate because its construction had not been included in the Second Highway Project. Work was, however, resumed in March 1969, when Pakistan was informed by the Bank that its construction would otherwise be indefinitely delayed, as no consideration would be given to it in the then forthcoming Third Highway Project. In mid-1969, the design had to undergo major revision in order to comply with official requirements on flood control; the further delay thus caused was attributed by IDA to insufficient prior coordination between the Directorate of Bridges and the Flood Control Authority. The design was finally completed in late 1969. But in December 1970 the Government requested, and IDA agreed, to delete the revision of the design from the Highway Engineering Credit.

4.08 The original closing date of Credit S-1 PAK was September 30, 1968. The Government requested a first postponement of the closing date until March 31, 1969, to which IDA reluctantly agreed to allow for the review of bridge design to be financed under the credit. However, such review was not undertaken, as previously mentioned. The Government requested a second extension of the closing date until March 31, 1970, on grounds that the Jhelum Bridge was being redesigned by the Directorate of Bridges. IDA agreed most reluctantly to this extension, on condition that significant progress would be made in awarding the contract to the vetting consultants. However, the contract was awarded only after the expiration of the second extension, in mid-1970. At this time, the Government requested a third extension of the closing date until December 31, 1970, in order to finish the revision of the Chenab Bridge. This time IDA did not agree. While allowing for small disbursements to be made after the final closing date, on June 29, 1970, IDA decided to cancel US\$95,000 -- including the cost of the revision of the Jhelum Bridge and the advance payment for the revision of the Chenab Bridge. On February 4, 1971, the undisbursed balance of US\$27,000 was also cancelled.

4.09 The construction components under the Second Highway Project had a slow start, primarily caused by the delays inherited from the Highway Engineering Credit. The initial delays were compounded by implementation delays which finally precluded the timely execution of the civil works, and brought about the cancellation of almost the entire project.

4.10 Shortly after the bidding documents for the Lahore-Sheikhupura-Lyallpur and Sheikhupura-Sargodha roads were ready in February 1970, bids were called for construction of the two roads. However, acceptance of bids for the Sheikhupura-Sargodha road was postponed, as review of the Chenab Bridge had not yet been undertaken, and because the supplementary letter on procurement stated that bids for both bridge and road should be called simultaneously in order to gain the potential advantages of joint tendering.

4.11 In June 1970, tenders for construction of the Lahore-Sheikhupura-Lyallpur road were received from only three out of nine prequalified contractors. The tenders were about three times the original cost estimates prepared by Sir William Halcrow and Partners (US\$72-US\$78 million versus US\$25 million) and included conditions which would have further increased the total cost. Halcrow came to the conclusion that the cost increase stemmed from substantial inflation in construction costs, from contractors' fears of continuing inflation, from the risky and unstable political situation, and from the poor reputation that the Government had acquired under former credits for the payment of bills and settlements of claims. Since, according to Halcrow, inflation could account for an increase of only 30% of the original estimate, the major factor had to be the combination of prevailing risks and political instability. The case for this latter argument was reinforced by the fact that the contractor who was expected to be the lowest bidder, Cogefar-Astaldi (Italy), did not submit a bid, despite being near completion of their works under Credit 54-PAK. In July 1970, upon the recommendation of Halcrow and Partners, the general consultants and the Bank, the Government rejected the bids.

4.12 Further investigations by the Bank, in cooperation with the consultants, the Government and the lowest bidder, Zueblin/Strabag (Germany), shed additional light on the subject. It was finally concluded that the high cost level encountered could not be attributed to any single reason (such as political disturbances), but to a cumulative pattern of cost increases reflecting the complexity of estimating construction costs. In summary, it was concluded that inflationary pressure did account for a cost increase of more than 30% of the original estimate, but that if tenders were called a second time, bids from foreign contractors would be about twice the original estimate, provided that competition was good, bidding documents were clarified and some risks were eliminated. Moreover, if enough local contractors were prequalified, their bids might range between 150-200% of the original estimate, provided that longer contract periods were permitted. Subsequently, a study was undertaken by the general consultants about the technical and financial situation of the local contractors in a revised project based upon contracting procedures suitable to local conditions. This study, however, was seemingly discontinued as a revised project failed to materialize.

In addition to the sharp increase in construction costs for the 4.13 Lahore-Sheikhupura-Lyallpur road, other events resulted in a decrease of projected benefits. First, traffic had grown at a much lower rate than expected, e.g. 5% p.a. during 1968-70 on the Lahore-Sheikhupura section, instead of the expected 15% p.a. Second, the daily traffic pattern had changed in that the traffic was more spread during the day, and the peak hourly volume decreased from 10% of ADT (1967) to 8% of ADT (1970), thus rendering congestion problems less frequent, and modifying the premises on which the number of lanes had been chosen. Third, the Government, at its own expense, and due to political pressures for creation of employment, had carried out, without consulting or informing the Bank, the widening of the Sheikhupura-Lyallpur section, and was upgrading another road between Lahore and Lyallpur, thus rendering the benefits from a new alternative road less significant; and finally, a central reason was that the drilling of large numbers of tube wells in the area between Lahore and Lyallpur had lowered the water table sufficiently to reduce surface flooding and to eliminate waterlogging of the roads, thus reducing the cost of maintaining the existing roads. As a result, the Lahore-Sheikhupura-Lyallpur road was no longer justified on economic grounds. A rough study reported that the rate of return for the Lahore Sheikhupura section would be 2%-3% (instead of 14%), that for the Sheikhupura-Lyallpur section 11%-12% (instead of 21%), and that their combined return would be 4%-8% (instead of 19%).

4.14 Similar investigations were carried out for the Sheikhupura-Sargodha road by applying the same cost level found for Lahore-Lyallpur. Here too, traffic had grown at a lower rate than expected. Under the new conditions, the rate of return would be 7%-8%, instead of 16%. Moreover, the general consultants concluded that, under the traffic projections available at the time, the improvement of the existing road would be a better investment than the construction of a new one. It was also found that the appraisal rate of return had been computed on the basis of overestimated benefits.

4.15 In late 1970, the general consultants, in coordination with the Bank, prepared an alternative revised project, largely based upon the studies of reconnaissance and economic analysis carried out by the general consultants during the second half of 1970. The tentative revised project included the following: (i) construction (26 miles) and improvement (79 miles) of the Lahore-Sheikhupura-Sargodha road, including construction of the Chenab Bridge; (ii) completion of the Transport Coordination Study; (iii) consulting services to help in the preparation of a number of feasibility and engineering studies, and to further help in the reorganization of the Highways Department, particularly at the new provincial offices created after the administrative partition; and (iv) completion of detailed engineering of (i). The revised project was meant to encourage the participation of local contractors, whose prequalification was being conducted. It was assumed that after final revision of the project, opening of bids would take place in eight months, construction could be started by the end of 1971 and completed by the end of 1975. The cost of the proposed revised project was set at US\$35 million, of which US\$6 million could be covered by the revised loan.

4.16 In early 1971, cancellation of the major part of the loan was seriously considered, in view of the fact that it was costing Pakistan 3/4% commitment charge per year; the rates of return on the various construction items of the revised project were likely to be, at best, marginal; and there was better alternative use of the loan proceeds in other sectors or projects. In Febuary/March 1971, a supervision mission visited Pakistan, which recommended the deletion of all construction works from the project. On July 28, 1971, the Government of Pakistan and the Bank agreed to cancel the uncommited balance of US\$33.9 million.

V. Institutional Achievements

Reorganization of the Transport Administration

The Buildings and Roads Branch (B&R) of the Communications and 5.01 Works Department (C&W) was the agency responsible for the construction and maintenance of all but municipal and village roads in Pakistan. As early as 1961 a mission to the country identified some basic deficiencies in transport administration, construction and maintenance practices. Such findings were subsequently confirmed in 1962 by the TCI Transportation Survey (see para. 2.03). By 1964, the Government was already considering both the separation of the buildings and roads functions, and the reorganization of the administration of road works. Simultaneously the Government was becoming increasingly aware that an adequate maintenance organization, separate from construction, was indispensable before undertaking the construction of new roads. The IDA appraisal mission further diagnosed, inter alia, the following features of the B&R requiring corrective action: (a) lack of a chief engineer to direct, plan and coordinate all aspects of road works; (b) undue regionalization and dispersion of all sector functions, except for the design and supervision of bridges (Directorate of Bridges); (c) excessive centralization in Lahore of resources for the repair of maintenance equipment; and (d) underutilization of the Central Laboratory at Lahore, coupled with virtual nonexistence of field laboratories.

5.02 Consequently, IDA recommended that the services of general consultants for three years be included in the First Highway Project. The consultants were to study organization and administration of the B&R, particularly on the separation of functions, the simplification of administrative procedures, the planning and design techniques, and the field supervision practices, and assist in the implementation of the recommendations of their study. In addition, they were expected to prepare reports on highway maintenance operations, with adequate recommendations for its improvement, and on the Central Laboratory at Lahore.

5.03 In December 1964, a three-year contract was signed between the Government and HNTB, USA. The team of consultants was composed of a project manager, bridge design engineer, maintenance engineer, highway planning specialist, soils and materials expert, and a management expert who was engaged under a subcontract with Booz, Allen and Hamilton, Inc. (USA). During 1965, the general consultants progressed in the study of the present organization of the B&R. They were also required by the B&R to review a number of feasibility studies prepared by other consultants to be included in the proposed Highway Engineering Credit, and to coordinate the operations of the other consultants involved in the First Highway Project, including bid analysis and selection.

5.04 From the beginning of their work in Pakistan, the general consultants detected some passive resistance, and lack of cooperation on the part of some officials of the C&W; they further reported having been moved out of the C&W to a separate house in the suburbs of Lahore, which made communication with the B&R even more difficult. At that time it was the opinion of both IDA and HNTB that most of the problems could be attributed to C&W's unfamiliarity with administering a large program, and a smoother operation was expected in the near future. In June 1965, HNTB reported to the Bank that, although the consulting team had not been able to establish a close rapport with the C&W, considerable progress was actually being made. Simultaneously, IDA felt that the performance of HNTB was satisfactory in so far as they were permitted to operate. However, the difficulties did not disappear, as exemplified by the fact that in late 1965, the HNTB complained to the C&W about the endless justifications repeatedly required for the payment of their claims.

5.05 In October 1965, HNTB submitted to the Government their report, "Organization and Management Control of Roads and Highway Operations," which included the following recommendations: the separation of highway/bridge operations from other activities; the centralization of planning, design and supervision of construction of major highway projects in the head office; the organization of traffic counts and origin-destination surveys; and improved administrative arrangements for contractor's working conditions. The Government, however, delayed any decision concerning the report, seemingly because of slow decision-making and difficulties in coordinating the proposed new Highways Department with other government agencies. Besides these reasons, a source of delay was also considered to be prejudice against the consultants whom some officials considered as an expensive but necessary burden in order to obtain IDA assistance.

5.06 In March 1966, HNTB pointed out to IDA that, although many indications and statements by high public officials were made that the reorganization was to be adopted, nothing concrete was being done. HNTB felt the continued delay in proceeding with the reorganization was diluting substantially the effectiveness of their work, which was meant to be primarily linked to the C&W reorganization. They further suggested that a global reexamination of the situation and methods seemed desirable. In mid-1966, during negotiations on the proposed Highway Engineering Project, the Government, at IDA's request, promised to obtain the Council of Ministers' approval of the reorganization by October 1, 1966, and to start the implementation of the recommendations by January 1, 1967. This promise was given in a supplementary letter which was attached to Credit S-1 PAK in August 1966.

5.07 The Government did not comply with the agreed schedule. In November 1966, the Government decided that there would be no extension or expansion of the consultants' contract and that HNTB should curtail all nonproductive activities during the year remaining on the contract. The principal reason given by the Government for this decision was the estimation that, contrary to the aforementioned agreement with IDA, the decision on the C&W reorganization was expected to be delayed until July 1, 1967, or later. Under protest from IDA, the Government withdrew its decision concerning HNTB and further confirmed early approval of the reorganization. Finally, in May 1967, the recommendations for the reorganization of the B&R were approved by the Government, in principle. Then, the Government and IDA agreed, as a temporary measure, to extend the consultants' contract for about seven months, until June 30, 1968, to help implement the reorganization.

5.08 On October 1, 1967, separate departments were created, one for highways and another for buildings. The Highways Department (see Annex 5) was organized into five decentralized regions under the guidance of a strong central headquarters headed by a Director General. Both central headquarters and the regional offices were organized primarily along functional lines; at lower levels in the regional structures, the field staffs were organized geographically. Construction was separated from maintenance work. Planning and design were recognized as key specialized activities both at central and regional levels. All these features were consistent with the recommendations of the general consultants.

5.09 Although the appointed Director General was a competent and cooperative official, the new department had a slow start, due primarily to the delays in carrying out the separation of physical assets, the lack of experienced staff (aggravated by the lack of inducements to retain or attract qualified personnel), the reluctance of some subordinate personnel to cooperate, and the fact that the department staff and its general consultants were located in several houses scattered around Lahore. On the other side, the new HNTB project manager who was appointed in January 1967, did not display as much initiative as was needed. This project manager remained in office for about two years.

Although the general consultants were not able to make any sub-5.10 stantial improvement in the day-to-day operations of the existing B&R, because they were not allowed to participate in these activities, they were particularly involved in carrying out studies related to the projects under the Credits 54-PAK and S-1 PAK, as described before. They also prepared a number of reports, manuals, informational guides and standard drawings on technical subjects. In addition, about 20 assigned Pakistani technical personnel were trained by the consultants to form a nucleus for the long awaited new highway organization. The consultants also prepared a report on the Central Laboratory at Lahore, and presented recommendations concerning the procurement of laboratory equipment and the training of technical staff. Based on these recommendations, 11 staff members received 12 months' practical training in fields such as general materials testing, bitumen technology, construction and maintenance of flexible pavements, physical and chemical testing of soils, and maintenance and operation of road construction equipment. This training program, and the services of an expert from the United Kingdom Road Research Laboratory, contributed to improved laboratory practices. However, the recommended 18-month academic training for seven Pakistani engineers never took place because the Government did not select the candidates in time.

5.11 In June 1968, as the extended contract was drawing near its end, the Government confirmed its request, during the negotiations for the second loan, that a new three-year contract with HNTB be signed to be financed under that loan. In order to help speed up the matter within the Government, the Bank made such a contract a condition for signing the proposed project. The Bank felt that the uninterrupted continuation of the general consultant's services was extremely important to assure continuity of the tasks related to the organization and the establishment of the Highways Department. When the proposed credit operation was postponed because of the delayed replenishment of IDA funds, the Government, at IDA's request, agreed to sign an "interim" contract with the consultants, under the provision that the proposed Second Highway Project would finance the relevant foreign exchange component retroactively as of July 1, 1968. The Loan Agreement for Loan 578-PAK established that the consultants assistance for reorganization of the department and training of the staff would be particularly directed to planning, design, supervision of construction and maintenance of the road system and bridges. Furthermore, the Loan Agreement included a timetable for the establishment of the five provincial headquarters of the department (see Annex 5), the provision of adequate measures to retain qualified personnel, and the complete separation of the Buildings Department and the Highways Department.

5.12 Under the new project manager appointed in early 1969, cooperation between the department and the consultants improved substantially. In mid-1969, a Bank supervision mission reported satisfaction with the consultants' performance. Moreover, the department staff increased its demands on the consultants to an unprecedented level. The consultants felt that their skills were very much appreciated and expanded accordingly, reaching the number of 7 expatriates plus 77 Pakistanis. Only the Bridge Division remained reluctant to request the help of the consultants for major matters. However, in December 1969, 300 Pakistani Class I Officers from all parts of the Government, including the Director General (Highways), were suspended from service and were charged with various degrees of negligence and/or corruption. The loss of the Director General was an unfortunate setback for the reorganization. Subsequently, decisions were made at a slower pace, and the actions were delayed to such an extent that the Bank had to consider progress in reorganization as a condition for the Third Highway Project, which was being prepared at that time.

5.13 After the administrative partition of West Pakistan into four provinces (July 1970), the highway administration was again reorganized and the organization depicted in Annex 5 replaced with provincial departments; the services of HNTB were virtually monopolized by the Punjab Department, to the detriment of the Sind Department, which was badly in need of their assistance. In early 1971, there was apparently a clearer understanding of the usefulness of consultants, and Chief Engineers of both Punjab and Sind made requests to their Governments that the general consultant's contracts be extended after June 30, 1971. However, the Government of Punjab did not desire an extension; although the Government of Sind did want one, it never materialized, for the Loan 578-PAK was cancelled on July 28, 1971.

During the audit, it was difficult to assess the quality of the 5.14 general consultants' efforts because of the substantial changes which had occurred in the meantime in the Highways Department, particularly in its staff. Government officials tended to question and minimize the consultants' impact. Especially in the early years they suffered from the staff having only very limited prior experience in developing countries and from the Pakistani authorities' reluctance to accept their advice. For instance they prepared a manual on maintenance standards which was practically a translation of manuals used in Europe, without adaptation to the circumstances prevailing in Pakistan. The pamphlet on contractor prequalification and selection which they prepared was based upon practices not used in Pakistan, including, as a condition for prequalification, use of a cost accounting system not employed by any Pakistani contractor. Even towards the end of their contract IDA supervision missions were complaining that they had not been able to develop the expertise in local conditions which would reasonably be expected after $6-\frac{1}{2}$ years of service, as illustrated by their inability to give constructive suggestions regarding the crucial problem of road construction versus road improvement during the discussion following the high bids for the Lahore-Sheikhupura road in 1970. But IDA staff now stress that they were judging the consultants against high standards of adaptation and adjustment to local conditions and that, in many respects, they did respond, even in the difficult environment of initial poor acceptance and later political uncertainties, to encouragement and advice

stressing the need to adapt. They played an important role in preparing the Highway Engineering and Second Highway projects, and they contributed valuably in training and preparation of technical manuals and in highway planning (setting up routine traffic counting). Many of the systems and approaches they introduced continued to be used by the Highways Department and by Pakistani engineering consultant firms. Perhaps the main lesson is that, even with a very good firm, development of a team with the right background and disposition, and with sufficient familiarity with local conditions, to be fully effective in the correct directions can be a long process.

Maintenance Under the Second Highway Project

Since no significant progress was made in maintenance practices 5.15 under the First Highway Project, a three-year maintenance program was included in the Second Highway Project (see para. 2.24). However, this program had a slow start due to the delay incurred by HNTB in recruiting a highway maintenance expert. Upon his arrival in Pakistan in May 1969, the HNTB expert prepared a list detailing the equipment requirements for the maintenance of the Karachi-Hyderabad Highway, and for the demonstration of modern maintenance practices; and new workshop equipment and tools. Only late in 1969 was the procurement list approved by IDA and the Government. Because of further delays in procurement, the pilot maintenance program did not start before March 1970, i.e., 18 months behind schedule, and did not progress satisfactorily thereafter due to a lack of strong official support. After the administrative partition in July 1970, the provincial Government of Punjab decided not to purchase equipment for workshop improvement, both because it was already getting some equipment under a barter agreement with the U.S.S.R., and because there had been a shift in maintenance policy in that the Government preferred to award the repair works to nongovernmental workshops. In early 1971, the provincial Government of Sind, which had originally had the same position as Punjab, decided to purchase maintenance equipment under the loan, for an amount of US\$0.85 million. This purchase, however, never materialized, as the loan was cancelled.

Transport Coordination Study

5.16 The Transport Coordination Study was provided for by the Second Highway Project, in order to make recommendations for continued planning in the sector, and for formulating policies and programs for the coordination and development of the various modes of transportation. The study was entrusted to the Central Government, which in turn assigned it to the Transportation Planning and Development Cell of the West Pakistan Planning and Development Department. The Cell decided to employ individual experts instead of a consulting firm, and an agreement was reached in 1969 with the Harvard Development Advisory Service to provide the Cell with recruiting and administrative services. By mid-1969, the Cell had already accomplished considerable work, and by late 1969, four foreign experts on roads, railways, ports and transport economics were providing services. The extent of the study was somewhat enlarged to include an analysis of short-term investment requirements and guidelines for long-term investment priorities. After loan cancellation in mid-1971, the study proceeded and came to an end by late 1971. A major recommendation of the study was that existing roads should be improved rather

than new ones constructed. As a whole, the study provided a framework for transportation planning in West Pakistan and also recommended the creation of a permanent transport planning agency in Pakistan. The Bank reported satisfaction with the work of the experts, although the study has not yet had a noticeable impact on the country's transport policies. The total foreign exchange cost was US\$200,000.

VI. Economic Justification

6.01 Under the First Highway Project, the proportion of the individual construction components in the total construction investment and a comparison of the individual rates of return estimated at audit and at appraisal are:

	Proportion of Total		Rates of Return		
	Construct Investme	ion ent	Audit Estimate %	Appraisal Estimate	
Karachi-Hyderabad Highway	65	<u>/a</u>	12) \/b	8-11 <u>/b /с</u>	
Jhelum Bridge	13)	12)	10 <u>/Ъ</u>	
Ravi Bridge	11) <u>/a</u>	25 <u>/e</u>	<u>/f</u>	
Sutlej Bridge	11)	38 <u>/b</u>	<u>/f</u>	
Total	100				

- /a Including detailed engineering.
- <u>/b</u> Economic rate of return. The rate of return estimated at audit would rise by approximately one percentage point if current petroleum prices were taken into account.
- <u>/c</u> The range of the rate of return resulted from alternative assumptions about traffic growth.
- /d Including review of designs and construction supervision.
- /e Financial rate of return.
- $\frac{f}{f}$ An economic rate of return was not presented in the Appraisal Report because of the difficulty in estimating benefits.

6.02 The main reason for the higher economic rate of return at audit than at appraisal for the Karachi-Hyderabad Highway was the favorable interaction of the lower than expected actual construction cost (4%) (Annex 6) and higher than expected traffic volume (Annex 8). In 1962, Average Daily Traffic (ADT) on the old Karachi-Hyderabad road was 570 through vehicles

(Annex 8). These vehicles represented 90% of the ADT using the road and were expected to divert to the new, shorter road. If this diverted traffic grew at only 2% per year, savings in distance and vehicle operating costs on the higher standard highway were expected to be sufficient to produce a rate of return of 8%, discounted over the life of the road, after maintenance costs. If this diverted traffic grew as expected at 7% per year, however, the rate of return would increase to over 11%. Recent traffic information (Annex 8) suggests that traffic actually grew more rapidly on the new highway than expected and in 1974 actual traffic was 65% more than expected. Several factors contributed to this situation. One was the restriction on industrial development in Karachi and location of new industry in Hyderabad. Another was the more rapid than expected development of the Indus Valley east of Hyderabad. The last factor was the large diversion of through traffic from the old road to the new highway to avoid considerable delays at vehicle check points, established in 1974 on the old road. Ostensibly, the check points had been placed on the old road to verify vehicle and driver licensing. Actually, the checking seriously inhibited vehicle flow and resulted in diversion to the new highway where no checks were imposed, thus resulting in a considerable revenue increase from the tolls on the new highway.

6.03 This higher than expected growth in traffic also has important implications for the design of the highway, as it implies that the practical capacity will be reached earlier than anticipated. If future traffic were to increase 10% per year, the actual rate between 1970 and 1974, the design capacity (6,500 ADT) would be reached in 1983. Traffic increases beyond this capacity would require construction of two additional lanes, which were allowed for in the original design.

6.04 In the case of the Jhelum Bridge, the higher than expected rate of return is explained by the growth in truck traffic (Annex 9) which more than offset the 24% cost overrun. At appraisal, benefits were estimated only in relation to truck traffic, under the conservative assumption that this traffic would remain constant. As it turned out, truck traffic grew at an average rate of 9.4% per year between 1969 (the year when the bridge was opened) and 1974. The audit rate of return is still an underestimation of the actual return because only the benefits related to trucks were included.

VII. The Bank's Role

7.01 It is very hard to assess the Bank's contribution to the highway sector of West Pakistan in light of the political and administrative difficulties that marred the planning and implementation of both highway projects. What can be said is that in the early 1960s the country had arrived at a point in its development at which it was necessary to modernize and upgrade its highway system and organization, and the Bank proposed, in the course of preparing the First Highway Project, several measures that, in retrospect, were appropriate, such as the need to clearly separate the highway function from other construction activities within the Ministry; the reorganization of highway construction and maintenance; better planning and improved quality of feasibility studies; clearly defined design standards which would allow for international competitive bidding and improved and systematic maintenance. In addition, it tried to promote a sector view of transport problems through the preparation of a study designed to guide policy and policy implementation. The way in which the Bank tried to pursue these objectives also had several positive aspects, among them, the use of the Highway Engineering Project (a plus that remains in spite of the exogenous factors that led to the project cancellation); its participation in the settlement of contractors' and consultants' claims, and the pressure that many times was put on the Government to speed up matters.

7.02 The main criticism of the Bank's participation is that it probably attempted too much in the institutional field. Some actions were clearly necessary, such as the improvement in maintenance standards, but in retrospect it does not appear that the general reorganization of the road function in Pakistan was possible within the targets set in the two projects. The difficulties were then greatly compounded by the country's internal difficulties. It is likely that a more thorough review of the institutional objectives during appraisal of the second project would have resulted in a more realistic schedule for the achievement of these objectives.

7.03 Hindsight also suggests that the second project might have been reconstituted after it was concluded that the investments in the original program were not economically feasible. There was no doubt that certain additional investments, such as maintenance equipment, training and a few road sections, were of high priority. The Bank Group did try to continue its support in the highway sector, and IDA suggested a US\$15 million credit to help finance some of the high priority items. However, the country's internal difficulties at the time and serious problems in the general relations between Pakistan and the Bank made the reconstitution of the project highly unlikely during that period.

7.04 More generally, the major internal problems in the country are probably the main reason for the implementation difficulties faced by these projects. In spite of these difficulties, it seems that the Bank was not forceful enough in impressing upon the Government the negative effects of some of the delays, especially in settling contractors' and consultants' claims. In retrospect, the problems were so serious that at times they probably warranted the suspension of disbursements or the refusal to extend the loan/credit closing dates. These negative effects were reflected in part in the unexpectedly high bids for the second project.

7.05 Two issues could not be adequately covered in this audit. One refers to secondary and feeder roads. It seems that these roads had as high a priority as the primary highways included in the project, and a very possible thesis is that a better investment strategy for the Bank to support would have been to have improved the trunk highways instead of building new ones and to have used the surplus funds for the improvement of secondary roads and construction of feeder roads. The Bank was aware of this issue at the outset but somehow it fell into the background in later years, possibly because of the difficulties in implementing the first project and preparing the second. It seems that highway investments in the country have been unbalanced in this respect and the need for secondary and feeder roads is still pressing. The second issue is toll charges on the main highways, particularly the main Karachi-Hyderabad road. We have not been able to obtain information or clear impressions about the rationale and economic impact of these tolls. The Bank's position at the time was that it did not support tolls but would not insist that the Government should not levy them.

VIII. Conclusions

8.01 The construction components of the First Highway Project were successfully implemented with relatively minor difficulties and the investments have turned out to have had higher returns than expected. The cancellation of the Second Highway Project, in view of the changes that took place after appraisal, was economically sound and it is unlikely that the project could have been reconstituted in light of the country's internal difficulties and the problems in the general relations between Pakistan and the Bank during that period.

8.02 Less success has been achieved on the institution-building objectives of these two projects than on the investment actually accomplished. A highway department was indeed created, which is an improvement, but it is still weak in its operations. It is likely that the Bank's objectives in this area were too ambitious, particularly in view of the political and administrative difficulties faced by Pakistan during the relevant period. More success could perhaps have been achieved with a mid-course revision that would have lowered these targets related to institutional improvement.

FIRST HIGHWAY PROJECT: DETAILED DESCRIPTION

A. Detailed Engineering and Construction of Karachi-Hyderabad Highway

1. The Karachi-Hyderabad Highway was to be the first section (89 mi) of the proposed West Pakistan National Highway between the port city of Karachi, the capital of Lahore, and the city of Peshawar. It was to permit accelerated agricultural and industrial development, to introduce modern standards of design and construction, and to serve as a model for expansion of the highway network.

2. The old Karachi-Hyderabad Road (124 mi), mainly a single lane, bituminous surfaced facility, was inadequate to serve current or future traffic. A significant portion was in waterlogged areas and for this reason pavement failures were frequent and repairs short-lived, thus wasting maintenance funds. In addition, traffic delays and congestion were extensive.

3. The Government and its consultants for the feasibility study, Ammann &Whitney International Limited (US), decided to keep the old, unimproved road in service and to construct a new, parallel road on a 40% shorter alignment avoiding waterlogged areas. Design standards provided for immediate construction of a two-lane roadway and right-of-way surfaced with asphaltic concrete sufficiently wide to allow future construction of two additional lanes separated by a median strip. The standards were considered adequate for the traffic and terrain involved. Access was to be limited so that ribbon development would be minimized and slow-moving traffic, such as camels, bullock carts, and tongas, eliminated.

4. Tolls were to be collected by private collectors, in return for a fixed annual fee, thus enabling the Government to recover some of its investment and to more easily control and record traffic.

5. Consultants were to prepare final plans, specifications, and contract documents, to assist in bid analysis, and to supervise construction.

B. Feasibility Study of Access to Karachi and Hyderabad

6. As the terms of reference for the feasibility study of the Karachi-Hyderabad Highway had not included access to the centers of the cities or to the port of Karachi, only possible approaches had been investigated. Technical considerations and questions of acquisition of right-of-way, access to the port, and connections with existing and proposed roads had to be resolved by the Government after which it required consultants' services for feasibility studies of alternative approaches.

Ν

C. Review of Designs, Construction, and Construction Supervision of Jhelum, Ravi and Sutlej Bridges

7. The Jhelum, Ravi, and Sutlej Bridges, named after the rivers they crossed, were to be located on the main north-south highway. The old Jhelum Birdge, built in 1872 near the center of the city, was a road-rail structure without sidewalks and with only a 14ft pavement for motor vehicles, pedestrians, and animals. Traffic was restricted to one direction at a time. Bullock carts, travelling about 3 mph to 4 mph and taking up to 20 minutes to cross, limited traffic to a crawl. In addition, breakdowns of heavily loaded trucks or buses travelling in low gear caused blockages for up to four hours. The old bridge was to continue to serve heavy pedestrian, bullock cart, and other local traffic, while the new bridge was primarily to serve fast moving through and local traffic.

8. Although the old Ravi Bridge, built in 1915, was in better structural condition than the Jhelum Bridge, it was a major bottleneck because of the 18ft pavement for two-way traffic. Located on the outskirts of Lahore, which had almost doubled in population between 1953 and 1964 and become an important industrial and marketing center, the bridge produced traffic jams backing up into the city of peak periods. The new bridge was to relieve the congestion.

9. Heavy goods vehicles avoided the old Sutlej pontoon bridge by detouring some 60 mi from the main road. As a result, the bridge was mainly used by local bus and automobile traffic. The permanent bridge was to eliminate this detour, significantly shortening the truck route between Karachi and the north, and improve access to the agricultural area between the east bank of the Sutlej River and the Indian border.

10. Designs of the bridges were to be similar because river bed and topographic conditions were about the same of the three sites. The bridges were to range from 1,500ft to 3,300ft long, and consist of simply supported spans of about 150ft each. The superstructures were to be reinforced concrete with prestressed girders and were to be supported on caissons sunk deep into the river bed. The decks of the Jhelum and Sutlej Bridges were to provide for two lanes of traffic and the deck of the Ravi Bridge for four lanes.

11. Final plans, specifications, and contract documents for the bridges were to be prepared by the Bridge Department of B & R, which was well experienced in bridge design and construction. But B & R had built only one or two prestressed concrete structures similar to those in the project. As the project bridges were to be longer both in span and in total length than any prestressed bridges previously built in Pakistan, consultants were to review the designs and to supervise construction.

D. Services of Management Consultants

12. B & R had problems of organization, administration, construction, and maintenance. In addition, the highway system for which it was responsible had serious deficiencies. With construction of the first modern highway in the country about to begin and feasibility studies of additional roads being undertaken, a competent, modern highway organization, capable of efficient maintenance, was required. Therefore, management consultants were to be employed to:

- (a) study the organization and administration of B & R, with particular reference to the desirability of separating the building and roads functions, and assist in implementing the recommendations of that study;
- (b) report on highway maintenance operations, with recommendations on necessary changes and improvements; and
- (c) report on the condition of the central laboratory at Lahore, with recommendations as to the proposed expansion and need for field laboratories.

Under the first item the consultants were to:

- (a) appraise the adequacy of the B & R organization and recommend the necessary specific changes to modernize, streamline, and simplify the organization so it could carry out its expanding responsibilities with increased efficiency and better control;
- (b) assist in the establishment and operation of a planning section and a modern design office; and
- (c) assist in the selection of contractors and introduce modern field inspection techniques of road construction.

The consultants were to submit a comprehensive report on their findings and, after approval of the report, assist both the B & R and IDA in implementing its recommendations.

13. The second item called for a thorough study of maintenance operations to determine the capability of the organization and the changes needed in the light of plans to expand the provincial road system. Emphasis was to be placed on determining how much maintenance operations should be mechanized on both new and existing roads, with due consideration to economy and efficiency, good workmanship, and availability and skill of local labor. 14. The third item concerned the appraisal of central laboratory facilities at Lahore, which B & R proposed to expand. The consultants were to:

- (a) examine and comment on the proposed expansion and assist in implementation;
- (b) study the desirability of using field laboratories and, if needed, assist in establishing them; and
- (c) provide for the training of local staff to operate the existing and any new facilities, if required.

15. Implementation of any recommendations made by the consultants involving large-scale expenditure, particularly on maintenance, would have to be left to a later stage, as it was not possible to anticipate the expenditure involved.

16. The reports on administration, maintenance, and laboratory facilities were to be completed within one year, after which the consultants were to concentrate fro two years on assisting of seven B & R in implementing the recommendations. The consultants' team was to consist of seven or eight experts in all phases of highway operations, including administration, accounting, design, materials, construction and maintenance. Selection of equipment for the road research laboratory was to be based on the recommendations of the consultants, who also were to be responsible for insuring proper installation and for training local personnel to use it.

HIGHWAY ENGINEERING PROJECT: DETAILED DESCRIPTION

A. Lahore-Sheikhupura-Lyallpur Road

1. Lahore, the capital of West Pakistan, and Lyallpur, a major industrial center, were connected by two roads. The older, or southern, road (87 mi) followed the poor alignment of a historical trade route, and, during the early 1930s, was surfaced as a single-lane road. Construction of a new two-lane road to Sheikhupura, 20 mi west was justified by the early 1950s on the basis of traffic generated as a result of the rapid growth of Lyallpur. The road was built to low standards and traversed waterlogged areas. Traffic increased steadily, including heavier, faster vehicles, and the condition of the road deteriorated rapidly.

2. Faced with the need for a modern, all-weather link between Lahore and Lyallpur, the Government invited the consultants, Louis Berger, Inc. (US) to carry out a feasibility study and preliminary engineering. The consultants proposed a new, shorter alignment located between the existing roads. At the request of IDA, however, the Government and its consultants, Howard, Needles, Tammen and Bergendoff (US), under the First Highway Project (Credit 54-PAK of 1964 for US\$17 million) reviewed possible alignments. At the request of IDA, however, the Government and its consultants, Howard, Needles, Tammen and Bergendoff US\$17 million) reviewed possible alignments. At the request of IDA, however, the Government and its consultants, Howard, Needles, Tammen and Bergendoff US\$17 million) reviewed possible alignments. As a result, the alignment was modified, and a four-lane road between Lahore and Sheikhupura (18 mi) and a two-lane road from Sheikhupura to Lyallpur were proposed.

B. Sheikhupura-Sargodha-Khushab Road

3. The existing road was located in the area of historical trade routes between Afghanistan and India. As to the new road, the Lahore-Sheikhupura section was to be part of the new Lahore-Lyallpur Road. From Sheikhupura, a section was to be constructed to Sargodha, the largest agricultural market in the area. The new section was to be 21 mi shorter than the existing one, which was partly single lane and which lacked suitable river crossings and adequate all-weather transport facilities. From Sargodha, a section was to be constructed to Khusab, a regional market where roads from the north and west joint.

4. Two main bridges crossing the Chenab and Jhelum Rivers were required. These were to be designed by the Bridge & Roads Department, which was performing the same services satisfactorily for similar bridges under the First Highway Project. The Department's design was to be reviewed by consultants. C. Tasks and Services Required fir the Lahore-Lyallpur and Lahore-Sheikhupura-Sargodha-Khushab Roads

5. Tasks and services to be undertaken by the Government and consultants before issuing invitations to bid for roadworks and bridgeworks comprised:

- (a) For Roadworks by Consultants and for Bridgeworks by Government, as Appropriate:
 - (i) site investigations, final alignment, hydraulic aspects of waterways, soils, etc.;
 - (ii) topographic surveys;
 - (iii) detailed engineering of new roads, relocated or new access roads, and structures as well as river training works;
 - (iv) right-of-way plans for new roads and associated access roads;
 - (v) specifications, bills of quantities, and all other bidding documents;
 - (vi) cost estimates and schedules of construction work; and
 - (vii) a supplementary report covering the revised scope of roadworks as well as technical and economic justification.
- (b) For Roadworks and Bridgeworks by Government:
 - (i) initiation of land acquisition and access thereto; and
 - (ii) prequalification of contractors (with the assistance of consultants).
- (c) For Bridgeworks by Consultants
 - (i) review of and recommendations on structural computations, designs, and cost estimates, as well as preparation of bidding documents.

SECOND HIGHWAY PROJECT: DETAILED DESCRIPTION

A. Construction of the Lahore-Lyallpur and Sheikhupura-Sargodha Roads

1. The old roads from Lahore to Lyallpur and Lahore to Sargodha had been built to low standards. Pavement and shoulders were inadequate in width and strength, and the low profile and infrequent drainage structures resulted in periodic flooding. Feasibility studies for new roads had been completed in 1964, and detailed engineering had been carried out under the Highway Engineering Project (Credit S-1-PAK of 1966 for US\$1 million).

2. Both of the new roads were to follow closely the alignments of the existing raods through flat or rolling agricultural land, with some departures to avoid built-up areas, meet prescribed design standards, and avoid areas of expensive embankment and drainage construction. Their designs provided two 12ft lanes for motorized traffic (except motorized rickshaws) and a separate road for animal, cart, and local motor traffic, comprised primarily of the existing road. Access was to be limited, grade crossings were to be permitted at designated points, and grade separations were to be permitted at designated points, and grade separations were to be provided through bridges or culverts. In addition, tolls were to be collected.

3. Right-of-way plans were complete, and the Government had started land acquisition by the time of IBRD approval. All right-of-way was to be acquired before January 1969, about three months before construction was to begin.

Lahore-Lyallpur Road

4. The new road (about 80 mi) was to extend from the Ravi River Bridge at Lahore to Lyallpur via Sheikhupura, including an 8 mi link to the center of Lyallpur and a 2 mi access road to Shahkot. Although the road was to cross waterlogged areas, irrigation canals, and seasonal flood areas of the river, the pavement was to be above known flood levels and adequate drainage structures were to be provided.

5. Initially, two lanes were to be constructed between Lahore and Sheikhupura. When justified by traffic, four more lanes were to be added from Lahore to Sheikhupura and two more from Sheikhupura to Lyallpur. Sufficient right-of-way for such expansion was to be included in initial land acquisition.

Sheikhupura-Sargodha Road

6. The new road (about 90 mi) was to include a link to the center of Sargodha and a bridge across the Chenab River. Only a few waterlogged areas

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were expected to be encountered. Although seasonal flood areas were to be met along main rivers, adequate free board was to be maintained above known flood levels.

7. Detailed engineering had been prepared under the Highway Engineering Project for an extension from Sheikhupura to Khushab. However, sufficient IDA funds were not available to build the full length in addition to the other project components.

B. Management Consultants' Services

8. The Government was to negotiate a new three-year contract with Howard, Needles, Tammen and Bergendoff (US) to continue the management services provided under the First Highway Project (Credit 54-PAK of 1964 for US\$17 million). One subcontract with Booz, Allen & Hamilton Inc. (US) was to provide for management advice on the organization and operation of the Highway Department, and another with a local firm of management consultants was to provide for augmentation of the staff of the expatriate firm.

9. A three-year program for improvements in highway administration, planning, design, construction and maintenance, conceived by the Government and consultants, was to be the basis for the additional services. The program was to emphasize training by work on actual projects, with the consultants acting as advisors.

10. The services to be performed by the consultants covered:

- (a) Administration Implementation and evaluation of the new Highway Department organization and preparation of a management control system, with support for installation and expansion, was to be continued. The Government agreed to the following improvements:
 - provision of joint accommodations based on functional assignments for departmental staff and the consultants, and continuation of efforts to provide a suitable departmental headquarters building by June 30, 1970;
 - (ii) establishment and staffing of headquarters sections by January 1, 1969;
 - (iii) establishment, by April 1, 1969, of appropriate measures to recruit and retain qualified headquarters staff;
 - (iv) complete separation, by June 30, 1970, of the cadre of the previous Buildings and Roads Branch between buildings and highways; and

- (v) provision of the Department Director with adequate authority to implement technical and budgetary matters of approved projects and programs.
- (b) Planning A separate headquarters planning section was to be established and proper planning and traffic analysis techniques were to be initiated for new projects. Work on development of a master highway plan was to be continued in close cooperation with the Planning and Development Department and other planning agencies. Training was to be expanded through demonstration projects, and regional sections were to be established as soon as trained staff became available.
- (c) <u>Design</u> Initially, work was to involve strengthening the review and advisory capacity of the central bridge design section and establishing a central highway design section. Emphasis was to be on training through demonstration projects, and modern standards and design techniques were to be introduced. Regional sections were to be strengthened, and appropriate projects undertaken as soon as practicable.
- (d) Construction A construction section was to be established at headquarters and trained in modern testing, construction control and record keeping, primarily through field work. As trained staff became available, regional sections were to be formed and divorced from maintenance operations as quickly as possible. Standard specifications, contract forms, and contractor prequalification requirements were to be introduced concurrently with the formation and training of all construction sections.
- (e) Maintenance A three-year maintenance program was to be organized and carried out (see subsequent Section D).
- (f) Laboratory Facilities A full time expatriate advisor, provided under the Colombo Plan, was assigned to the Central Laboratory in Lahore for about three years. He was to assist in modernizing and equipping the central laboratory and training staff through work in support of actual design and construction projects. Regional field laboratories were to be planned and put into operation when justified by workload and as trained staff and equipment became available. The consultants were to coordinate this work with the development of other headquarters and regional sections, and were to provide additional expatriate staff if required.

C. Other Consultants' Service

Transport Coordination Study for West Pakistan

11. Improved transport coordination was needed and, accordingly, a study was included in the project. The purpose was to provide the Government with recommendations for formulation of policies and programs to efficiently coordinate and develop transport modes.

12. The study was to include a broad analysis of:

- (a) present and anticipated transport demand;
- (b) economic and financial costs involved in different transport modes;
- (c) appropriate economic and technical criteria for investment decisions; and
- (d) policies for taxation, regulation, and organization of the transport sector.

The study was to take into account existing studies, investment plans and policies, and to assess the effects of its recommendations on them. It also was to indicate investment requirements (including exchange) through 1975. But it was to exclude preparation of detailed investment programs for transport development.

Feasibility Study and Detailed Engineering for the Main Trunk Road Between Hyderabad and Multan

13. The Karachi-Hyderabad-Multan-Lahore-Rawal pindi-Peshawar-Torkham (Afghan border) Road was the backbone of the West Pakistan road network. USAID had supported feasibility studies of the Karachi-Lahore section, and detailed engineering of the Multan-Lahore section. Also, the First Highway Project had supported detailed engineering and construction of the Karachi-Hyderabad section.

14. The Hyderabad-Multan section (about 510 mi) required immediate improvement because the Hyderabad-Reti section (270 mi) had only one paved lane (12 ft) for about 190 mi and two adequately paved lanes (22 ft-24 ft) for not more than 4 mi. The section to be constructed was to be about 40 mi shorter than the existing route. Due to its length and cost construction was to be in two stages. The project included: (a) updating earlier feasibility studies (about 500 mi) and selecting priority sections for detailed engineering; and (b) preparing detailed engineering for priority sections (about 250 mi). Consultants were to carry out this work and to assist the Highway Department in planning short-term improvements of the remaining sections. Maintenance

- 15. A feasibility study, including preliminary engineering, was to:
 - (a) establish proper maintenance for the Karachi-Hyderabad Highway;
 - (b) improve workshop facilities in the Central, Eastern, and Southern Regions; and
 - (c) introduce in the Central Region a pilot scheme for routine maintenance and improvement of roads to modern standards.

16. This was to be the first stage of a more comprehensive and longterm program for all roads administered by the Highway Department. Consultants were to assist the Department in implementing the maintenance program, in particular to:

- (a) improve organization and management, including detailed records of maintenance costs;
- (b) train personnel;
- (c) select types and numbers of equipment, vehicles, spare parts, and tools to be procured;
- (d) prepare bidding documents for these procurements and select the most favorable bids;
- (e) install workshop equipment and assignmobile equipment for suitable field operation; and
- (f) demonstrate in the workshop and in the field a modern standard of performance.

Maintenance of the New Karachi-Hyderabad Highway

18. The new Karachi-Hyderabad Highway, supported by the First Highway Project, was to be open to traffic at the end of 1969 and preventive maintenance was required to keep the road in good condition. As suitable maintenance equipment was in short supply, the project included procurement of the required equipment. The equipment was to arrive in late 1969, when construction was scheduled to be completed. Other regional roads were also to be maintained with the equipment part of the time.

Improvement of Workshops

19. Existing maintenance equipment was underutilized because workshop repair facilities and stocks of spare parts were inadequate. The project provided for procurement of workshop equipment and tools to properly equip

three regional workshops and eight divisional workshops located along the (Karachi-Rawalpindi Road) as well as in the area of the highways to be constructed under the project. Procurement of spare parts to repair and maintain equipment assigned to the regional workshops also was included in the project.

Pilot Maintenance Scheme for Routine Road Maintenance and Improvement

20. The pilot maintenance scheme was to demonstrate the performance of all principal road maintenance operations as applicable to existing paved roads. It was to be carried out in the Central Region (Lahore) where the Highway Department and consultants could carry out close supervision. Existing equipment was to be used for the first stage and additional equipment was to be purchased as required. That equipment was to be imported on a staggered schedule, and IBRD approval was to be contingent on the ability of the maintenance organization to use it effectively. The project included several sets of equipment necessary to improve roads to acceptable standards and to provide routine maintenance.

E. Refunding of Credit S-1-PAK

21. The Highway Engineering Project was virtually complete, and provided the design and cost estimates on which the construction components of the Second Highway Project were based. Under the Second Project, the US\$1 million credit for the Engineering Project was to be refunded.

PAKISTAN FIRST AND SECOND HIGHWAY PROJECTS

(CREDITS 54-PAK AND S-1-PAK AND LOAN 578-PAK)

First Highway Project: Contractors and Consultants

Project Component Contractors and Consultants Construction Karachi-Hyderabad Highway Cogefar-Astaldi Bridges: Jhelum Mantelli Estero Bridge Structure Approach Roads Abad Khan Ravi Volkervam (Pak) Ltd. Bridge Structure Approach Roads B & R Branch of COMWORKS Sutlej Gammon (Pak) Ltd. Bridge Structure Mir Aslam Khan Approach Roads Consultants' Services Detailed Engineering of Frederic R. Harris, Inc. Karachi-Hyderabad Highway Ammann & Whitney International Limited Feasibility Studies of Access to Karachi and Hyderabad Review of Design and Construction Supervision of Bridges Donovan H. Lee & Partners Jhelum Leonhardt/Zafar Ravi Donovan H. Lee & Partners Sutlej Management Consultants Howard, Needles, Tammen, and

Bergendoff

STATUS OF HIGHWAY DEPARTMENT FUNCTIONS AT THE TIME OF THE SECOND HIGHWAY PROJECT

A. Administration and Planning

1. Before 1967, staff of the Buildings and Roads Branch (B & R) of the Communications and Works Department (Comworks) had been responsible for planning, design, construction, and maintenance of most roads and public buildings. Except for bridge design, soils and materials testing, and administration of foreign-aided highway works handled at headquarters in Lahore, road functions had been delegated to five regional organizations which, in turn, had been subdivided geographically.

2. The B & R organization had been outdated, unwieldy, inefficient, and disfunctional. Lack of planning had been a major weakness, and workable programs had not been established for collection of basic data, such as traffic volume and road inventories, which were fundamental to proper highway planning.

3. Management consultants retained under the First Highway Project (Credit 54-PAK of 1964 for US\$17 million) recommended separating B & R and creating a Highway Department along functional lines. The attached chart shows the new organizational structure for headquarters and a typical region, which the Government adopted in principal on October 1, 1967.

4. In addition, the consultants issued interim reports on the master plan for roads, which set up road classifications, established basic performance criteria for the various classes, and presented a tentative plan for a primary and secondary road system. They also established a traffic counting program, issued periodic traffic maps, started a road and bridge inventory, and undertook limited origin and destination surveys.

5. The management consultants were further required to assist in implementing the new organization, organizing the planning section, establishing needed administrative and budgetary controls as well as data collection and analysis programs, and training headquarters staff in administrative procedures and local staff in planning procedures.

B. Engineering and Construction

6. Bridge design had been concentrated at departmental headquarters and was fairly competent. But road design had been done in the regions, primarily in the field at levels well below regional headquarters, and little progress had been made in improving design practices and procedures. With

ANNEX 5 Page 2

few exceptions, roads had been constructed almost entirely with hand labor, equipment being limited to a few essential units such as rollers and trucks, and results often had been below acceptable standards. Modern construction methods had been used by international contractors on the Karachi-Hyderabad Highway and three major river bridges included in the First Highway Project. Only a few qualified and experienced local contractors had existed, and in most cases control and direction of construction had been left to departmental staff who often were not qualified for that work.

7. The management consultants had completed a code of practice for bridge design, and well-advanced drafts of manuals on design and plan preparation for roads and bridges. In addition, they had almost completed standard designs and drawings, design aids and typical plans, drafts of standard specifications and contract documents, and a manual on field supervision of construction. Further, they had issued reports covering an appraisal of the road research laboratory and detailed recommendations for additional equipment and personnel training. The Government had obtained some construction equipment from various sources and assigned departmental staff to assist in construction supervision on the Karachi-Hyderabad Highway and on the three major river bridges.

8. Further assistance from the management consultants was required to set up modern design sections and implement training in actual design and plan preparation. In addition, field training of laboratory personnel needed to be accelerated so that regional design support laboratories could become operational. Finally, the new construction sections at headquarters and in the regions needed to be organized and field training started.

C. Maintenance

9. Road maintenance had been and was to continue to be carried out by the regions. It had been badly managed and performed, and with few exceptions, routine maintenance and improvement was nonexistent. Improper design and construction practices and substantial traffic increases and presented maintenance forces with an almost impossible job.

10. Maintenance had been primarily by manual labor, and any equipment used was generally antiquated and improper. Assignment of maintenance labor on a "men per mile" basis with little consideration of road type and condition had produced badly unbalanced results. Maintenance funds had been allocated on the basis of reported road mileage and distributed equally by geographic areas. Total maintenance allocations over several years before 1968 had been inadequate both for routine maintenance and urgently needed improvement. In addition, regional and field workshops had not been developed effectively, spare parts had been in short supply, and parts inventories had been inadequate.

ANNEX 5 Page 3

11. The management consultants, had issued two reports analyzing past maintenance operations and giving detailed recommendations for reorganization as well as a basic manual covering maintenance practices. Also, working with departmental forces, they had completed inventories for maintenance equipment and machinery and for spare parts throughout West Pakistan.



PAKISTAN FIRST AND SECOND HIGHWAY PROJECTS

(CREDITS 54-PAK and S-1-PAK and LOAN 578-PAK)

First Highway Project: Estimated and Actual Costs (US\$ million)

Project Component	Appraisal Cost Estimate-	Actual Cost	% of Total <u>Cost</u>	Actual Cost as % of Estimated Cost
Construction				
Karachi-Hyderabad Highway	22.25	21.35	57	96
Bridges:				
Jhelum Ravi Sutlej Subtotal Consultants' Services	3.73 2.37 <u>2.66</u> 8.76	4.64 3.75 <u>3.75</u> <u>12.14</u>	32	124 158 <u>141</u> 139
Detailed Engineering of Karachi Hyderabad Highway Feasibility Studies of Access to Karachi and Hyderabad Review of Designs and Construc- tion Supervision of Bridges	1.66 0.12 0.35	$2.02^{\frac{2}{2}}$ $\frac{3}{2}$ $0.47\frac{2}{2}$		122 n.a. 134
Management Consultants Subtotal	$\frac{1.77}{3.90}$	$\frac{1.60}{4.09}^{2'}$	11	<u>90</u> 105
Laboratory Facilities and Trainin	g <u>0.59</u>	0.23	nil	39
Total	35.50	37.81	100	107

- 1/ Including contingencies
- 2/ The total cost figures presented include estimates of both local and foreign currency expenditures. The actual foreign currency costs were: Karachi-Hyderabad Highway, US\$1.01 million; Bridges, US\$0.31 million; Management Consultants, US\$0.96 million; and Laboratory Facilities and Training, US\$0.11 million.
- 3/ Feasibility studies for access to Karachi and Hyderabad were carried out by the Management Consultants.

PAKISTAN FIRST AND SECOND HIGHWAY PROJECTS

(CREDITS 54-PAK AND S-1-PAK AND LOAN 578-PAK)

Second Highway Project: Estimated Costs (US\$ million)

Project Component	Local	Foreign	Total
Trunk Road Construction			
Lahore-Lyallpu r Road Sheikhupura-Sargodha Road Chenab River Bridge Construction Supervision Contingencies	13.12 <u>/1</u> 11.27 <u>/1</u> 3.94 1.39 <u>4.32</u>	11.32 10.75 1.94 0.75 <u>3.93</u>	24.44 22.02 5.88 2.14 8.25
Subtotal	34.04	28.69	62.73
Management Consultants' Services			
Services and Equipment Contingencies	1.60 0.16	$1.34^{/2}$ 0.14	2.94 0.30
Subtotal	1.76	1.48	3.24
Other Consultants' Services			
Transport Study Studies for the Hyderabad-Multan Road Studies for the Lahore-Rawalpindi Road Contingencies Subtotal	0.27 1.40 0.20 0.19 2.06	0.45 1.40 0.20 0.21 2.26	0.72 2.80 0.40 0.40
Three-Year Maintenance Program			
Maintenance Equipment for Karachi-Hyderabad Road Improvement of Workshops Pilot Maintenance Scheme Contingencies	0.04 0.08 2.00 0.21	0.22 0.43 1.68 0.24	0.26 0.51 3.68 0.45
Subtotal	2.33	2.57	4.90
Refunding of Credit S-1-PAK	0	1.00	1.00
Total	40.19	36.00	<u>76.19</u>

/1 Includes right-of-way cost of US\$3.09 million for Lahore-Lyallpur road and US\$1.72 million for Sheikhupura-Sargodha road.

/2 Includes US\$50,000 for office and engineering equipment.

PAKISTAN FIRST AND SECOND HIGHWAY PROJECTS

(CREDITS 54-PAK AND S-1-PAK AND LOAN 578-PAK

First Highway Project: Average Daily Traffic on Karachi-Hyderabad Highway

	Avera	uge Daily	Traffic	(ADT)		Actual ADT
	Projected <u>/1</u>		Ac	tual		Projected
Year	<u>Total</u>	Cars	Buses	Trucks	<u>Total</u>	ADT
1962	n.a.	200	- 3	70	570	n.a.
1970	1,440	756	259	1,123	2,138	148
1971	1,550	n.a.	n.a.	n.a.	2,340	151
1972	1,700	n.a.	n.a.	n.a.	2,620	154
1973	1,850	n.a.	n.a.	n.a.	2,500	135
1974	2,060	821	339	2,246	3,406	165

/1 Source: Ammann & Whitney International Limited, Karachi-Hyderabad Highway Feasibility Study, January 1964.

PAKISTAN FIRST AND SECOND HIGHWAY PROJECTS

(CREDITS 54-PAK AND S-1-PAK AND LOAN 578-PAK)

First Highway Project: Average Daily Traffic on Jhelum, Ravi, and Sutlej Bridges

<u>Bridge</u>	<u>1962</u> /1	<u>_1969</u> /2	<u>1973</u> /3	% Average Annual Rate of Increase <u>196</u> 9-73
Jhelum				
Cars	880	723	890	
Buses	376	539	784	
Trucks	1,358	1,008	1,418	
Motorcycles and				
Bicycles	2,379			
Bullock Carts and				
Tongas <u>/4</u>	489			
Animals on the Hoof	<u>1,320</u>			
Total	6,802	<u>2,270</u>	<u>3,092</u>	8.1
Ravi				
Cars	810	1,959	3,911	
Buses	710	1,451	2,958	
Trucks	470	1,659	2,675	
Motorcycles and				
Bicycles	n.a.			
Bullock Carts and				
Tongas <u>74</u>	1,485			
Animals on the Hoof	<u>n.a.</u>			
Total	<u>3,475</u>	<u>5,069</u>	<u>9,544</u>	17.1
Sutlej				
Cars	5	131	133	
Buses	161	93	280	
Trucks	13	363	733	
Motorcycles and				
and Bicycles	14			
Bullock Carts and				
Tongas <u>/4</u>	7			
Animals on the Hoof Total	<u>n.a</u> . 200	<u></u> 587	1,146	18.2

<u>/1</u> Appraisal.
<u>/2</u> First year open to traffic.
<u>/3</u> Latest traffic count.
<u>/4</u> Horse-drawn carts.

PAKISTAN FIRST AND SECOND HIGHWAY PROJECTS

(CREDITS 54-PAK AND S-1-PAK AND LOAN 578-PAK)

First Highway Project: Revenues From Bridge Toll Collections (million PRs)

Year	Jhelum	Bridge <u>Ravi</u>	Sutlej
1968/69	0.52	1.59	0.39
1969/70	0.79	1.50	0.29
1970/71	0.88	1.50	0.30
1971/72	1.10	1 . 70	0.40
1972/73	2.36	5.76	1.01
1973/74	2.01	5.51	0.86

🖇 Average			
Annual Rate			
of Increase			
1968 /69-			
1973/74	31	28	20

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WEST PAKISTAN





JUNE 1968

MAP