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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT PERFORMANCE AUDIT REPORT

ON

HONDURAS WESTERN HIGHWAY PAVING PROJECT (LOAN 495-HO)

March 27, 1975

Operations Evaluation Department

PREFACE

The project which the Bank helped finance in Honduras with Loan 495-HO of May 26, 1967, included reconstruction and paving of the Western Highway and feasibility studies for feeder roads and a trunk highway. The loan was fully disbursed in October 1973. The purpose of this performance audit is to assess the extent to which the original project objectives were met and to analyze the role of the Bank in meeting these objectives.

The audit is based on Bank correspondence and supervision reports, the quarterly construction progress reports prepared by the consultants, a draft completion report prepared in July 1974 by the Latin America and Caribbean Regional Office, the comparative highway evaluation study prepared by the Operations Evaluation Department, and discussions with Bank staff.

No visit to Honduras was made in connection with this audit.

Currency Equivalents: Honduras Lempira (L)

L 2.00 = US\$1.00

PROJECT DATA

Loan Amount	US\$8.6 million
Amount Disbursed	US\$8.6 million
Date of Loan Agreement	May 26, 1967
Date of Effectiveness	September 15, 1967
Original Closing Date	December 31, 1971
Final Closing Date	September 28, 1973
Date of Final Withdrawal	October 15, 1973
First Supervision Report	August 1967
Final Supervision Report	June 1973

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SUMMARY

In May, 1967, the Bank made a US\$8.6 million loan to Honduras to cover the foreign exchange component of a US\$12.6 million equivalent highway project. This was the fifth highway development project partially financed by the Bank Group in Honduras.

The project included improvements on the Western Highway between Chamelecon and Santa Rosa, paving its entire length from Chamelecon to the border with El Salvador, and feasibility studies of feeder roads in the Western Region and of the Tegucigalpa-Juticalpa Highway. The improvements on the Western Highway were expected to promote development in the Western Region, a densely populated but undeveloped area, and to help integrate the area with the rest of Honduras. The increased trade with El Salvador, within the Central American Common Market, was also given as a justification for the improved road. The rate of return, based on road user savings, was estimated to be between 11% and 25% depending on the road section. The two feasibility studies were intended to provide the basis for the next highway project. The feeder roads study was also supposed to define a program for the development of feeder roads in the Western Region.

The works on the Western Highway were completed a year behind schedule. The main reasons for the delay were the slowness in hiring the supervision consultants, a hurricane and severe rains which caused extensive damage. In spite of these problems, the quality of the works was very good as a result of adequate supervision by the consultants and of the contractors' satisfactory performance.

The final cost of the project exceeded the original estimate by 5%, with the construction portion (including supervision) exceeding estimates by only 3% but with a more than 100% overrun on the feasibility studies. An upgrading in the pavement design standards, delays and the additional works necessitated by weather damage were the main factors explaining the increase in construction costs, despite inclusion in the original estimates of substantial contingency allowances, while a substantial underestimation of the foreign exchange component of the feasibility studies costs led to the overrun in this item.

The new estimate of the rate of return for the two sections of the Western Highway north of Santa Rosa (149 km) is satisfactory (15% and 20% as against 11% and 25%), but it is only 4% for the sections south of Santa Rosa (98 km) as against 13% calculated at appraisal time. The main reason for the low return south of Santa Rosa was the decline in traffic due to the closing of the border in mid-1969 following a conflict between Honduras and El Salvador, and the overestimation during appraisal of the region's potential for development, a fact that was aggravated by the failure of the Government to undertake complementary investments.

The substantial reduction in traffic took place in mid-1969, well before the first pavement on the Western Highway was laid, and before any pre-paving work was begun on the border sections. At the same time, the preliminary findings of the feeder roads study in the Western Region indicated that the potential for development in the area had perhaps been overestimated. In light of this new situation, the Bank should have appraised the expected costs and benefits associated with postponing the pavement works. The key variables in such an analysis would be the number of years the border was expected to remain closed and the possible increment in construction costs arising from postponing the pavement. In retrospect, it is difficult to speculate how long the border might have been expected to remain closed in 1969. However, the analysis of this subject made in this audit, which assumes that there was sufficient evidence at the time to expect that relations with El Salvador would be resumed shortly, probably in one to three years, suggests that continuing with the pavement works was probably the correct decision at the time since a very slight cost increase of 5% would have made postponement unjustified in economic terms.

Both feasibility studies were successfully completed. The Tegucigalpa-Juticalpa study was the basis for a subsequent Bank project, and the feeder roads study helped to avoid low priority investments in the Western Region.

During appraisal and implementation of this project, the Bank continued to press for better road maintenance and for the enforcement of axle-load regulations. The loan agreement included several covenants on these subjects. Progress was slow, but the quality of maintenance in the country improved noticeably during the implementation period.

PROJECT PERFORMANCE AUDIT REPORT

HONDURAS WESTERN HIGHWAY PAVING PROJECT (LOAN 495-HO)

Introduction

In 1966, when the Western Highway Paving Project was appraised, the Bank had already made four loans to Honduras for highway development totalling US\$28.2 million. Two of these loans helped finance improvements on the Western Highway. The first commitment (Loan 195-HO of 1958, for US\$5.5 million) helped finance improvements on the section between Chamelecon and Santa Rosa to transform it into an all-weather road by adding bridges and culverts. The second commitment (Credit 1-HO of 1961, for US\$9.0 million) helped to extend the highway about 100 km southward from Santa Rosa to the border with El Salvador.

The purpose of these projects was to stimulate economic growth in the Western Region. This region was one of the most densely populated of Honduras, and produced a large percentage of the country's exports, mainly tobacco, sugar, coffee and rice. The lack of adequate connections with the rest of the country had kept it virtually isolated. The Government anticipated that a road would stimulate agriculture by making markets more accessible, enable resources such as lumber to be exploited and help fuse the region to the Honduran economic community.

In April 1966 the Government requested the Bank's assistance in financing further improvements and bituminous pavement on the Western Highway. The economic feasibility analysis for improvements on sections between Chamelecon and Santa Rosa, and the traffic studies, soil investigations and design analyses for the paving, had been undertaken by Brown & Root, S.A., highway consultants to the Government. These studies were submitted to the Bank in May 1966. The following month, a Bank appraisal mission visited Honduras to assess the proposed project. The mission concluded that paving was justified because the considerable traffic at the time (due in large part to the Treaty for Central American Integration) exceeded the capacity of the road as it was built under the earlier improvements. However, in discussions with the consultants it was agreed that further technical investigations were needed before the appropriate paving design was decided upon and that additional traffic counts should be taken to determine if paving the total length of the highway was justified. This supplementary information was submitted to the Bank toward the end of 1966. Presumably, the decision to go ahead with the paving of the entire highway with a 2.5 cm surface was based on this supplementary information.

The appraisal mission also agreed with the Government to include a study of feeder road requirements in the Western Region, and a feasibility study of the Tegucigalpa-Juticalpa road. Negotiations were held

in March 1967 and the loan was signed on May 26, 1967. Special covenants of the loan agreement included a requirement for revising the pavement design standards as the project progressed, commitments by the Government to update the road development program, revise vehicle axle-load regulations and establish a system to collect highway data. The Government also undertook to increase road user charges by half so that charges would cover a higher proportion of road expenditures, and to assist the Bank in a Central American study of road user charges. If the Bank's study did not materialize, the Government agreed to conduct the study within the country and implement its conclusions. The loan agreement also contained a number of covenants included in the agreement for the previous highway project, such as continuing Government support for highway maintenance (by increasing the maintenance budget, and ensuring that equipment and work crews for maintenance were available), and for highway administration (by establishing and equipping a highway patrol; posting traffic signs; installing safety devices; and intensifying traffic counting).

The Project

Loan 495-HO for US\$8.6 million was to help finance a US\$12.6 million equivalent project which included reconstruction and paving of the Western Highway and two feasibility studies which were expected to serve as a basis for the next highway project.

Works on the Western Highway allowed for stage construction so that pavement could be strengthened as traffic grew. The first part of the works entailed reconstruction of 37 km between Chamelecon and La Entrada, a section which had not been improved before. The second part provided paving of the entire Western Highway from Chamelecon to the border of El Salvador, about 247 km. The pavement thickness (2.5 cm) was designed assuming that axle-weight regulations would be revised and adequately enforced. The consultants were to recheck the pavement design as construction proceeded and the pavement thickness could be changed on the basis of additional soil strength analyses.

The feeder road study in the Western Region was expected to assess the economic justification of constructing 10 feeder roads totalling 144 km for which detailed design was already available, and to prepare technical and economic feasibility studies on another 100 km of feeder roads. The study would help define a program for the development of a feeder road system in the Western Region. Inclusion of the preparation of preliminary engineering for the improvement of the 190 km Tegucigalpa-Juticalpa Highway was considered important at the time because the road provided the only link between the capital and the east-central region of the country (Olancho Department), an area of high potential.

Because of the scarcity of IDA funds at the time, the Bank Group's contribution was on conventional terms even though Honduras was eligible for concessional terms. The loan represented 70% of projects costs, covering all of the foreign exchange component estimated at 68%. The remaining local currency costs were to be supplied by the Government.

Project Implementation

1) Western Highway Reconstruction and Paving

Works on the Western Highway were scheduled to begin in early 1968 and to be completed in mid-1971, but were ready a year behind schedule. The delay represents 28% of the estimated construction time and is attributable to slowness in engaging the consultants, to repair work required after a hurricane, and to heavy rainfall which slowed progress.

In the first instance, the delay was caused by the lengthy time it took to engage the consultants, Brown & Root, S.A. The Government took five months in submitting the draft contract and terms of reference to the Bank, after which the Bank took two months to reply, raising question over the firm's qualifications and eligibility as a foreign firm in spite of the fact that the consultants were already engaged in an ongoing Bank project in Honduras, and their performance had been considered to be good. This delay in securing consultant services postponed the call for bids, the selection of contractors and consequently commencement of construction works by about a year.

The project was divided into three contracts, all of which were awarded to Sociedad Anónima de Obras Públicas y Marítimas from Venezuela (SAOPIM) and work began in early 1969. The contractors made excellent progress in the first months, but in mid-1969 a hurricane and heavy rains caused extensive damage to about 16 km of road near Santa Rosa, obstructing drainage structures and causing the road to collapse under heavy landslides. SAOPIM had not taken possession of this part of the road and before it could, extensive repairs had to be made which were clearly beyond the capacity of the road maintenance organization. In view of this development, the Government requested that SAOPIM's contract be revised to include the repair work and that the Bank cover the additional cost. The contract was revised and the additional cost was covered from uncommitted contingency funds. The Government agreed to cover any further costs itself. After further suspension of works due to weather, the paving works were completed in August 1972.

The construction supervision provided by Brown & Root was satisfactory and the performance of SAOPIM was exceedingly good. In spite of the inconveniences created by inclement weather, the pavement work was so

good that the surface treatment provided for in the project was not necessary and the corresponding allocation was used instead for slide removal, erosion control and safety devices. This additional work was accomplished after the paving and was completed in August 1973.

A major issue which arose during implementation was that of paving design standards. Toward the end of 1968, when SAOPIM's contract was being negotiated, the consultants submitted a report evaluating different pavement thicknesses and recommending the entire road be paved with 5.0 cm as opposed to the 2.5 cm approved in the loan agreement. The contractors were able to offer an unusually attractive price which exceeded the cost of the approved 2.5 cm surface by less than one million dollars. The Bank nonetheless considered the recommendation premature, insisted that the contract with SAOPIM provide for a 2.5 cm surface, and requested that further technical and economic analyses be undertaken by the consultants.

The final study was presented in May 1969. Although the Bank disagreed with part of the methodology used in the analyses, it concurred with the economic justification for a 5.0 cm surface, and the change was approved in June 1969. The first pavement was placed at the northern end of the highway in December 1969.

In mid-1969, when the pavement thickness was revised, the border with El Salvador was closed following a conflict with that country; the border has remained closed ever since. This development considerably reduced traffic and lessened the benefits anticipated from the project. The conflict is not mentioned in Bank records until a year after its occurrence, at which time some discussions were taking place on altering the pavement design in the vicinity of Santa Rosa by applying a surface treatment to help reduce slides. There is no evidence that further study of pavement design standards in view of reduced traffic was contemplated, and the entire road was paved to the 5.0 cm standard.

2) Feasibility Studies

The contract for the two feasibility studies was awarded to Howard, Humphreys, Keeble and Partners (HHK&P) of Great Britain in late 1968. Studies of both the Tegucigalpa-Juticalpa Highway and the Western Region feeder roads were to be completed within 18 months of signature. The final reports were submitted in January 1971, about six months behind schedule. The delays were mainly a consequence of the Government's slowness in transmitting its comments on the draft reports, which were submitted on schedule, and to a lesser extent to a change in the scope of the Tegucigalpa-Juticalpa Highway study.

The feeder road study concluded that under conditions existing at the time there were few opportunities to construct new roads of good standards

which would be economically viable in terms of their agricultural potential. Construction of feeder roads should therefore be preceded by an integrated study of agriculture, transportation, conservation and colonization and accompanied by investments in agricultural extension and marketing services. As a result of this study, the Bank has not helped finance feeder roads in this region.

The preliminary engineering of the Tegucigalpa-Juticalpa Highway was expanded to include alternate alignments around the site of a proposed dam, thus delaying the final report slightly. The construction of the Tegucigalpa-Talanga section of that highway was included in a subsequent Bank project (Loan 896-HO of 1973).

3) Loan Covenants

The Government met most of its commitments under the loan covenants. Vehicle load regulations were revised to adapt them to international traffic, as other Central American countries used Honduran roads. The Government participated in the Central American road user charges study which was conducted by the Bank, but did not increase road user charges by half. The road development program contained in the 1965-1969 Five Year Development Plan was reviewed and updated in 1967, and a Planning Unit was established within the Ministry of Communications and Public Works to collect data for highway planning. However, due to shortage of personnel the Unit has not been able to fulfil its functions adequately.

The Government did not satisfy all of the highway maintenance covenants but made progress in this area. The maintenance budget was increased and revised to contain a special rotating fund for financing equipment. Brown & Root managed the fund and the IDB supported it. It is difficult to ascertain whether the Government supplied work crews and equipment and oversaw their proper use as planned. However, it is likely that this aspect of maintenance improved since the Highway Maintenance Department was established as an independent division of the Ministry of Communications and Public Works. Establishment of the highway patrol was at first delayed but was later set up with the assistance of USAID, which financed the acquisition of four portable weighing scales. The enforcement of vehicle-load regulations by the patrol had not been successful by the time the project was completed in 1972, but interest in this area is being reactivated with the assistance of the IDB.

Project Costs

The actual cost of the project, US\$13.2 million, represents a 5% increase over the appraisal estimate of US\$12.6 million. Construction costs, including supervision and a 15% contingency for increases in quantities, increased by 12%, whereas engineering costs more than doubled (Table 1).

The increase in construction costs from US\$9.3 million (before contingencies) to US\$11.3 million and of supervision costs from US\$600,000 to US\$1.5 million can be partially explained by the additional works required after the 1969 hurricane. Other factors were the increase in pavement thickness and the delays which arose during implementation.

The cost increases for feasibility studies, from US\$200,000 to US\$500,000, were due to underestimation of expenses at appraisal time and underestimation of the foreign exchange component, at 50%, which was low in view of the high proportion of expatriate consultants finally employed. The original estimate was apparently made by Brown & Root and approved by the Bank. The overrun was noted in September 1968, when the contract with the consultants was signed for US\$239,464 over the amount budgeted in the appraisal report, but because the overall costs were still within the original estimate no action was taken to revise the List of Goods.

Economic Justification

The paving of the Western Highway was originally justified on the basis of reductions in vehicle operating costs between 22% and 28%. The estimated rate of return on the investment varied by road segment between 11% and 25%. The new calculation of the rate of return made in the course of this audit (Table 2) results in a considerably lower rate of 4% for the border sections (Section 3, Santa Rosa-La Labor and Section 4, La Labor-El Salvador) than the 13% anticipated at appraisal. The new rate of return for Section 2, north of Santa Rosa, was also lower at 20% compared with 25% projected at appraisal. Only for Section 1, Chamelecon-La Entrada, was the new estimate higher than that calculated at appraisal, being 15% instead of 11%.

The low return for the border sections is a consequence of the 36% cost overrun and a 177% overestimation of traffic. The traffic overestimation is a consequence of the closing of the border with El Salvador in mid-1969. Although traffic began to grow again in 1970, it remained below appraisal projections for that year and it was in fact still 17% to 22% lower than the actual traffic in 1966 (Table 3). The rate of return for Section 2 is lower than expected because of the 33% overrun in costs and the 30% traffic overestimation. Finally, the new estimate of the return for Section 1 is higher than expected because although traffic was overestimated by 30%, the section was improved for less than the anticipated cost.

Apart from the direct benefits of the project, the paving was supposed to promote development in the Western Region and contribute to the integration of the area with the rest of Honduras. Until appraisal (1966), the most rapid development had occurred at the northern end of

the road near San Pedro Sula, the country's main industrial center; the border area south of Santa Rosa was only beginning to show important economic and social changes. After paving, this northern area continued to develop but the border area did not expand economically as expected in spite of its better integration with other parts of Honduras. This slower than expected development in the border area seems to have been a consequence of three factors: (a) the overestimation of the region's potential, mainly because adequate agricultural soil surveys had not been undertaken, (b) the closing of the border with El Salvador, and (c) failure on the part of the Government to follow through with complementary investments. However, it has not been possible to ascertain the relative importance of each of these factors.

Role of the Bank

The Bank's participation in this project had a positive effect on the development of the highway sector in Honduras. The Bank made a useful contribution to the preparation and design of the project, and adequately supervised implementation. Supervision missions averaged one every seven months. The Bank also contributed to the improvement of highway maintenance through the inclusion of loan covenants on the subject and a continuous monitoring of the problem. Some of the covenants were not fully adhered to, but considerable progress has been made in the maintenance field, the highway authorities are now fully aware of the problem and, in view of Honduras' institutional problems, the progress that has taken place can be considered satisfactory.

The one issue on which the Bank's participation could usefully have been different was in assessing the impact on the project of the conflict with El Salvador. Although the Bank could not have anticipated that the border would remain closed for so many years, it should have reappraised the paving of the border sections bearing in mind the expected costs and benefits of a postponement. An additional reason for reappraising the situation was the fact that the preliminary findings of the feeder roads study in the Western Region suggested that the potential for development in the area had perhaps been overestimated. The additional costs expected from a postponement would be the compensation fees to the contractor for the work cancelled, price increases, including remobilization, and the loss of reductions in vehicle operating costs arising from the use of a paved road. The benefits of a postponement would be the social rate of return of the alternative investment made with the funds which were going to be used for the paving.

To obtain a rough estimation of the maximum percentage increase in costs that would have made the postponing of the paving worthwhile, the present value of the benefits and the costs were compared under different hypotheses in relation to the number of years the border was assumed to be closed. The results are:

<u>Number of years during which the border would remain closed</u>	<u>Maximum percentage increase in construction costs which would make postponement unjustified</u>
2	3%
3	5%
5	16%
6	20%

In retrospect, it is difficult to speculate how long the border might have been expected to remain closed in 1969. However, the analysis of this subject made in this audit, which assumes that there was sufficient evidence at the time to expect that relations with El Salvador would be resumed shortly, probably in one to three years, suggests that continuing with the pavement works was probably the correct course of action since a very slight cost increase of 5% would have made the postponement unjustified in economic terms. From the information available, however, it does not appear that the Bank considered a reassessment of the situation in 1969.

Conclusions

In spite of severe weather problems, the upgrading and paving of the Western Highway proceeded well, and the quality of the works was good. However, the closing of the border with El Salvador resulted in an important decline in traffic. This development, together with cost overruns, reduced the rate of return of the project considerably, particularly of the works on the section south of Santa Rosa. In retrospect, these works do not appear justified but given the information available in 1969, continuing with the pavement was probably right. The impact of the project on the development of the Western Region was also lower than expected, but the improved road did help to integrate the region, particularly the area south of Santa Rosa, with the rest of the country.

The feasibility studies under the project were successfully completed and have had a positive impact. A section of the Tegucigalpa-Juticalpa road was included in a subsequent highway project which the Bank helped finance, and the feeder roads study of the Western Region helped to avoid investments in a low-priority area.

Table 1

Honduras Loan 495-HO

Forecast and Actual Project Costs
(US\$'000)

	<u>Appraisal Estimate</u>	<u>Final Project Costs</u>
<u>Western Highway Improvement and Paving</u>		
(i) Improvement of 37 km between Chamelecon and La Entrada	1.50	<u>a/</u>
(ii) Paving of 247 km between Chamélecon and the El Salvador border	7.75	<u>a/</u>
Total	<u>9.25</u>	<u>11.25</u>
<u>Consultant Services</u>		
(i) Preparation of tender documents for, and supervision of construction	0.60	1.48
(ii) Feasibility studies	0.20	0.50
Total	<u>0.80</u>	<u>1.98</u>
<u>Contingencies</u>		
(i) Work quantity (15% of construction costs)	1.40	-
(ii) Price increases (10% on all costs)	1.15	-
Total contingencies	<u>2.55</u>	<u>-</u>
GRAND TOTAL	<u>12.60</u>	<u>13.23</u>

a/ No breakdown available

Table 2

Western Highway: Costs, Traffic and Rate of Return, by Section

<u>Section</u>	<u>Proportion of Total Investment</u>	<u>Cost Overrun /1</u>	<u>Traffic Overestimation 1973 /2</u>	<u>Rate of Return</u>	
				<u>Appraisal Estimate</u>	<u>Audit Estimate</u>
1. Chamelecon-La Entrada /3	41%	-25%	30%	11%	15%
2. La Entrada-Santa Rosa	18%	33%	30%	25%	20%
3. & 4. Santa Rosa-La Labor- El Salvador border	41%	36%	177%	13%	4%

/1 Based on construction costs, contingencies and consultant services.

/2 It is calculated as $\frac{\text{Estimated Traffic}}{\text{Actual Traffic}} - 1$.

/3 The rate of return increased from 11% to 15% even though the cost increase in percentage terms is similar to the traffic overestimation because a large proportion of this overestimation refers to generated traffic, and the benefits that were attributed to that traffic at appraisal time accounted for only 10% of total benefits.

Table 3

Traffic Counts on the Western Highway, 1966-1973
(Average vehicles per day converted into truck
unit equivalent) /1

<u>Section /2</u>	<u>1966</u>	<u>1968</u>		<u>1970</u>		<u>1973</u>	
	<u>Actual</u>	<u>Estimated</u>	<u>Actual</u>	<u>Estimated</u>	<u>Actual</u>	<u>Estimated</u>	<u>Actual</u>
1. Chamelecon-La Entrada	250	330	322	440	416	780 <u>/3</u>	602 <u>/3</u>
2. La Entrada-Santa Rosa	190	251	305	330	374	564	434
3. Santa Rosa-La Labor	107	141	137	190	87	338	122
4. La Labor-El Salvador border	102	134	137	190	87	338	122

/1 Conversion ratio: 3 passenger cars to one truck

/2 Counts for road sections 1-4 in 1968, 1970 and 1973 were taken at the following stations:

1. Chamelecon-La Entrada: Quimistán station
2. La Entrada-Santa Rosa: Santa Rosa station
3. Santa Rosa-La Labor: Santa Lucía station
4. La Labor-El Salvador border: Santa Lucía station

/3 1972 traffic

Source: Appraisal Report and traffic counts taken by Brown & Root, S.A.

