ISN 43565

PD-AAS-755
XD-AAS-755-A

CLASSIFICATION

PROJECT EVALUATION SUMMARY (PES) – PART I

Report Control Symbol U-447

1. PROJECT TITLE	2. PROJECT NUMBER	3. MISSION/AID/W OFFICE
RURAL ACCESS ROADS AND BRIDGES	505-0007	MISSION 802310

4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) 505-0007-85-[illegible]

☒ REGULAR EVALUATION ☐ SPECIAL EVALUATION

5. KEY PROJECT IMPLEMENTATION DATES			6. ESTIMATED PROJECT FUNDING	7. PERIOD COVERED BY EVALUATION
A. First PRO-AG or Equivalent FY 1983	B. Final Obligation Expected FY 1985	C. Final Input Delivery FY 1987	A. Total $10,680,000 B. U.S. $ 6,150,000	From (month/yr.) September, 1983 To (month/yr.) August, 1985 Date of Evaluation Review August 19-30, 1985

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
1. Project PACD extended to June 30, 1987.	ADO	12/31/85
2. A formal training plan and an associated schedule should be implemented for equipment maintenance.	ADO	1/30/86
3. Allocation of project equipment and tools procured for district workshop should be completed.	ADO	1/15/86
4. More effective participation in the Management Improvement Component by the MOW Management Personnel should be sought.	ADO	Ongoing
5. Bridge sets should be moved to an inland storage site and properly sorted and painted.	ADO	1/1/86
6. More emphasis should be placed on road maintenance training and MOW road maintenance scheduling to institute capable follow-up on roads already rehabilitated.	ADO	Ongoing
7. Personnel operational changes as recommended in the body of the PES should be instituted.	ADO	2/15/86
8. Additional tires should be purchased for project equipment.	ADO	12/31/85
9. Analysis on present financial situation and financial implications of Evaluation Recommendations should be done to assess future financial needs if any.	ADO	3/1/86

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

- ☐ Project Paper
- ☒ Financial Plan
- ☐ Logical Framework
- ☒ Project Agreement
- ☒ Implementation Plan e.g., CPI Network
- ☐ PIO/T
- ☐ PIO/C
- ☐ PIO/P
- ☐ Other (Specify) _____
- ☐ Other (Specify) _____

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

- A. ☐ Continue Project Without Change
- B. ☐ Change Project Design and/or ☒ Change Implementation Plan
- C. ☐ Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)

Charles R. Jenkins, ADO, USAID/Belize

Eustace Usher, Permanent Secretary, Ministry of Works

12. Mission/AID/W Office Director Approval

Signature

Typed Name Nehoysha R. Drashich

Date November 29, 1985

AID 1330-15 (3-78)

1

TABLE OF CONTENTS

	Page
13. Summary	1
14. Evaluation Methodology	2
15. External Factors	3
16. Inputs	3
17. Outputs	6
18. Purpose	8
19. Goal	9
20. Beneficiaries	9
21. Unplanned Effects	12
22. Lessons Learned	12
23. Special Comments or Remarks	12
Evaluation Report	Annex 1

13. SUMMARY

The Rural Access Roads and Bridges Project has evolved beyond "start-up" activities and steady progress is being made towards achieving the Project's purpose and goal. The equipment and technical assistance personnel arrived and became established in-country as promptly as could be expected and road rehabilitation began in August 1984. The Project Paper (PP) implementation schedule was optimistic in expecting road rehabilitation to begin in March 1984 and consequently the Project is approximately six months behind the PP schedule. Considering the above average rainfall during several months in the 1984-85 rainy season, and the longer than anticipated haul to access adequate road material on a number of road segments, it is doubtful that this six month lag can be recovered. The project PACD should therefore be extended at least six months if the target 300 miles of rehabilitated roads is to be attained.

On the roads already rehabilitated to the PP specifications in the Belize and Cayo Districts, very little follow-up maintenance if any is being done. The intensity and distribution of rainfall, flooding borrow pits, and in general contributing to difficult working conditions, have been a continuous problem with both rehabilitation and follow-up maintenance activities. Road maintenance is a critical issue as severe deterioration may soon result and major reconstruction would be required. The Project supplied equipment spread for rural road maintenance is in place in each district but more emphasis needs to be placed on maintenance training and MOW road maintenance scheduling to institute effective follow-up action.

In the Equipment Maintenance Component, allocation of project purchased equipment and tools to the district workshops is not complete with some being held back at the central shop in Belompan. This needs to be rectified. The equipment specialist has been engaged in activities other than equipment maintenance training and has been unable to follow a continuous schedule. Implementation of a more formal training plan is recommended.

Effective participation in the management improvement component by the MOW is not very evident. The management specialist has gathered enough data to formulate a "first iteration" of a planning system and much progress has yet to be made before an effective planning system is on-line.

Best Available Document

The majority of the bridge sets are still in storage under unsuitable conditions at the Belize Port. Bridge sets arrived in fair condition, except for the small items, such as nuts and bolts, which were stored in boxes. Many of the boxes were broken and their contents rusted. A few spans contained some rust. The storage area at the Port is small and not easily accessible and subject to flooding and corrosive sea air. Recommendation is made to move these sets to some adequate facility inland.

The quantity, inventory control, and storage conditions of spare parts to support project equipment appears adequate at present. Tire usage was severely underestimated and additional tires should be purchased.

Although the overall capability of the project personnel is considered very good certain operational changes are recommended and presented in the body of this PES. One proposal is the phasing of the bridge specialist into maintenance training as maintenance is a critical factor and a major thrust of the Project.

In general, Project progress is satisfactory considering the problems encountered. To achieve maximum benefit however, the MOW will have to participate more effectively, especially in the bridge, management improvement, and roads maintenance components.

14. EVALUATION METHODOLOGY

The Rural Access Roads and Bridges Evaluation was conducted primarily to assess progress of "start-up" activities especially those related to meeting the Project's implementation schedule. Where variances were observed identification of the cause of the variation was undertaken, e.g. planned outputs and timings. Other tasks included assessment of changes in project setting, clarification of project design, and identification of unexpected effects.

The evaluation was conducted during a two week period starting August 19, 1985. Participants included Mr. Rod MacDonald, P.E., LAC Bureau, Chief Engineer; Mr. James Gardner P.E., Consultant; Dr. Gilbert H. Canton Ph.D., Agriculture Projects Manager, USAID/Belize; Mr. Alex Powers, Rural Access Roads and Bridges Project Manager, and Mr. James Robinson, Head of Roads, Ministry of Works, Belmopan. An itinerary was drawn up which included:

(1) a meeting of the Project Evaluation Team with the Minister of Works and Chief Engineer;

(2) visits were made to the following: Central Workshop in Belmopan; the management office in Belmopan; all six district shops; roads already rehabilitated and to be rehabilitated; the road rehabilitation crews (view construction techniques and materials); Belize port (view condition of bridges in storage); and, the spare parts storage at Belize Cemcol and MOW's Unallocated Stores.

(3) interviews with A.I.D., GOB, PSC personnel, and others.

Notes were taken during visits and interim meetings were held by the Evaluation Team to discuss issues, draw conclusions, and make recommendations.The outcome of these discussions between the Evaluation Team and the Mission are the basis of the Project Evaluation Summary. The Evaluation Report prepared by Mr. Rod MacDonald and Mr. James Gardner is attached as Annex 1.

15. EXTERNAL FACTORS

At present there are no significant changes in project settings that would result in a major impact on the Project. This conclusion is drawn, even though in December 1984 there was a change of Government in Belize. The Project is still relevant and no adjustments in its design are needed to coincide with current host country and A.I.D. policies and priorities. In fact, additional emphasis is being placed on the expansion of the agricultural sector, thus the Project's relevance is enhanced.

16. INPUTS

Component I: Construction/Rehabiliation Training Unit (CRTU)

Equipment - The road CRTU is very dependent on procuring the appropriate spread of equipment, and the timeliness of their arrival in-country. The type of equipment procured appears appropriate for performance in local conditions. The constitution of each spread of equipment (2 spreads), particularly the number of dump trucks, were projected on a short (3 miles) haul to adequate road material sites. This was often not the case and may be a factor in the completion of scheduled rehabilitated mileage at PACD. One potential minor drawback is the compaction equipment. A farm tractor (possibly from the Maintenance Training Unit (MTU) or purchased) should be used to pull the compactor. The delivery of the construction/rehabiliation equipment was scheduled to be

completed by March 1984. Actual completion of delivery was not until November 1984. Road work began by mid-August 1984, without a full complement of equipment, however conformity to project implementation schedule may never be resumed. Recommendation: The PACD should be extended to June 30, 1987.

Construction Materials - A concern regarding the quantity of culverts pruchased surfaced during the evaluation. The Evaluation Team believes that 3,000 linear feet may not be enough and additional culverts will be needed. Proper road drainage for prolonged road life is essential during the rainy season. Recommendation: As additional culvert requirement cannot be readily predicted, purchasing local culverts, which are of satisfactory quality, would be expedient.

Technical Assistance - The road specialists (technical assistance) have the experience and knowledge to effectively carry out the CRTU component of the Project.

Component II - Equipment Maintenance

Equipment - Equipment and tools purchased by the Project are adequate and will advance the district shops to a first echelon repair capability once these are properly distributed and personnel trained in their use. The distribution of project purchased equipment and tools is not complete. Some districts have not received their full complement which is being held back at the Central Shop in Belmopan. Adequacy of shop layout and condition of buildings (security) may be a consideration. Recommendation: Project equipment and tools were not intended for the Central Shop and should be distributed to PP specifications.

Technical Assistance - No on-the-job training was observed during evaluation visits. The equipment specialist has been engaged in other activities and has not followed a continuous schedule of equipment maintenance training in the districts. Recommendation: This situation should be remedied by the implementation of a training plan with an associated schedule to be adhered to included. Shop efficiency may further be increased through the purchase of few other minor tools. Repair manuals on project equipment should also be sent to district shops.

Component III - Management Improvement

Effective MOW participation in the management improvement component is not evident. At the district level, some of the officers in charge see the need for a management plan; however,

the majority of MOW personnel seem to by-pass the plan even at the upper management level. For an effective planning system, commitment at all levels is required. The management specialist has been able to accomplish a "first iteration" of a planning system, but at present this management tool is not being effectivly used.
Recommendation: This management tool must be rendered more effective and in conformance with GOB's funding realities or the management specialist's activity will have to be terminated.

Component IV - Bridge Erection and Installation

Bridge sets - In the Bridge Erection and Installation Component, the bridges are appropriate for proposed sites. Bridge sets arrived in fair condition, except for the small items such as nuts and bolts, which were stored in boxes. Many of the boxes were broken and the contents rusted and intermixed. A few of the spans contained some rust. Due to the lack of non-aggressiveness in contracting construction contractors, the majority of the bridges is still haphazardly stored at the Belize Port in a very unsuitable environment. The bridges are stacked haphazardly in a very small and not easily accessible area and are subject to flooding and corrosive sea air. Recommendation: Bridge sets should be moved to an in-land central storage site before further deterioration takes place. They should be sorted out, painted, and released to contractors at the storage site when a contract is awarded. Movement from Port to a suitable alternate storage site (e.g. MOW shop in Hattieville) should be contracted as there is no specified project equipment for this purpose. The bridge specialist has the experience required to sort out the jumble of parts in the shipment and advise on the superstructure erection.

Component V - Maintenance Training Unit

The equipment purchased (one spread per district) seems adequate. However, very little actual maintenance is being done on the roads completed by the CRTU. The intensity and distribution of rainfall, flooding borrow pits, and in general contributing to difficult working conditions, have been a continuous problem. Road maintenance is a critical issue as severe deterioration may soon result and major reconstruction would be required.
Recommendation: This issue needs to be addressed immediately and more emphasis placed on training and MOW management capability if an effective maintenance function is to be established.

7

OTHER INPUTS

Financial - Given the changing nature of the Project it is difficult to determine if adequate funding is provided. The financial implications of the evaluation recommendations would have to be assessed to determine financial sufficiency.
Recommendation: Analysis should be done on present project financial position and also financial implications of the evaluation recommendations to determine future financial requirements if any in order to complete the Project.

Personnel - Although the overall capability of the PSC personnel is considered good, certain operational changes are recommended.
Recommendation: A formal organization chart and delegation of responsibility should be instituted. The Project Manager should delegate minutia and spend more time with his counterparts.The title of "Deputy Project Manager" should be amended to "Executive Assistant" and the role should encompass the coordination of the bridge program. This change with its inherent responsibilities would relieve the present Equipment Maintenance Specialist of his miscellaneous duties. The Bridge Specialist should be phased into maintenance training. A training plan should be designed and implemented.

Spare parts - the quantity of spare parts to support project equipment appears adequate at present, but it is difficult to predict total usage with any certainty. The method of inventory control and storage conditions are adequate.

Tire usage was severely underestimated, possibly due to physical conditions in the Cayo District.
Recommendation: These aberrations should be expected and additional tires should be purchased.

17. OUTPUTS

1. Rehabilitated rural access roads (magnitude: 300 miles rebuilt). If broken down by spread of equipment and by district over the Project's life, total mileage to be rehabilitated could translate into approximately five miles per spread per month. Therefore, projections to June 30, 1985 would require that 140 miles of roads should have been rehabilitated. However, actual mileage completed was 80.8 miles. This discrepancy is attributed to late start-up (August 1984 vs. March 1984) and greater than normal rainfall inhibiting road rehabiliation. Based upon normal rain projections and no major unanticipated setbacks, the Project should be able to complete approximately 260 miles by January

1987. Results: To achieve the 300 miles by PACD, Project should be extended by six months.

2. Rural Access Roads maintained at lower costs (magnitude: Maintenance costs reduced to $2000.00 per mile). Any decrease in rural road maintenance cost will be beneficial. However, it is difficult to say whether road maintenance costs are approaching the target of $2,000.00/mile as little maintenance on already completed project roads has been done to date. Training of the Maintenance Unit has been sporadic as road specialists have been concentrating on road rehabilitation. Results: More emphasis needs to be placed on training and a maintenance schedule implemented if maintenance costs are to be reduced.

3. Rural Access Roads constructed at lower costs (magnitude: Costs reduced). Any reduction in construction costs would be beneficial. Construction costs vary from location to location along with numerous other variables. Major cost factors include proper and effective use of equipment and proper construction techniques.
Results: Given the experienced supervision of the technical specialists of the District MOW staff on road construction techniques and equipment handling, significant reduction in road construction costs should result. However, actual cost figures have not been analyzed to verify this assumption.

4. Permanent National System of Maintenance (magnitude: District plans and maintenance units in place). The complete spread of maintenance equipment has been delivered to each district and is now operating. District plans are being drawn up by District offices, sent to headquarters in Belmopan, and a modified work plan issued to the districts.
Results: Actual use of plan varies from district to district and the plan usually does not reflect actual budget appropriations. The budget, and therefore the plan, are subject to emergency response and political requests. More effective participation of MOW management personnel is required.

5. Office of Planning and Budget (magnitued: MOW five year plan/budget in place). The Office of Planning and Budget has been established and is staffed by the project funded technical advisor and two MOW personnel.
Results: A five year plan has been developed. However, an effective five year plan may be inappropriate at this time. It is essential that an effective one year plan be in place and functional before a meaningful five year plan can be instituted.

6. Training for Maintenance and,

7. Training for Reconstruction (magnitude: Two spreads of equipment operating in all districts of Belize, and all-weather river crossings on the 300 miles of reconstructed roads). With the present level and direction of the technical assistance input, i.e. both road construction specialists must concentrate their full efforts in pushing forward the road construction/rehabilitation component, very little effort can be directed to the Road Maintenance Units. There is no question that MOW personnel will receive valuable on-the-job training, especially in reconstruction. Formal training is a full-time job in itself and is not possible under this Project, except by involving private equipment suppliers such as Caterpillar. As virtually all the training is on-the-job, training individual operators or drivers cannot be comparatively evaluated to determine the impact of the training received.

Results: The Project needs to focus more directly on training especially in the road maintenance area. This will be accomplished by phasing the bridge specialist into road maintenace training (i.e. working with the district maintenance units). Also, some mechanism will be developed to hold more seminars on equipment handling by private dealers such as Caterpillar. (Some seminars have already been held).

18. PURPOSE

Approved Project Purpose: Increase the capability of the GOB to build, maintain, and protect its rural access road infrastructure through training, technical assistance, and equipment procurement.

End of Project Status (EOPS): Condition and progress towards each EOPS.

(1) Reduced per mile costs for rural road construction: no MOW analyses were obtained for quantitative comparisons. However, given the apparent acceptance of MOW personnel working with the road specialists of proper construction techniques and equipment handling, significant road construction cost reduction should result.

(2) Reduced per mile costs for rural access road maintenance: as mentioned previously, very little maintenance on completed roads has been done to date. Therefore, appropriate MOW analyses were unavailable.

(3) Better planning and budgeting of MOW resources: a first iteration of a planning document has been accomplished. However, much refinement is necessary before it becomes an effective planning tool.

(4) Proportionately fewer pieces of equipment on "deadline": No situation reports were reviewed, but the Evaluation Team observed through interviews and visits that with the project procured shop equipment and tools in place at the district shops fewer pieces of MOW district road maintenance equipment were "deadlined" because of lack of maintenance. Equipment was "deadlined" primarily because of shortage of spare parts. Impact of training could not be assessed as there appears to be very little training accomplished to date.

(5) Reducing the annual maintenance cost of bridges for rural access roads - verified by inspection of bridges: to date none of the bridges provided by the Project have been erected. Therefore, little can be said about the maintenance cost except as it relates to maintenance instorage costs.

19. GOAL

To increase Belize's agricultural production through the rehabiliation and maintenance of all-weather rural access roads and bridges (Indicator - increased national agricultural output by 10% in real terms between 1984 and 1990).

National agricultural output has decreased from 26.3 (Million BZ$, 1973 prices) in 1983 to 25.4 (Million BZ$, 1973 prices) in 1984 and no figures are available presently for 1985. This decrease is primarily a function of a decrease in export sugar earnings, sugar accounted for 28% of agricultural output in 1983. Earnings in other agricultural commodities such as bananas and citrus increased somewhat.

The specific impact that the Project has had on agricultural output cannot be readily assessed at present given recent project start-up.

20. BENEFICIARIES

The target population for this Project is distinct in each district of the country. In the northern Corozal and Orange Walk Districts, most rural people are Mayan-descended Mestizos, who once practiced milpa farming at a subsistence level, and

11

are now heavily involved in the mono-crop production of sugarcane.

Belize District, in the central area around Belize City, is mainly populated by Creoles who practice small scale subsistence farming and produce fruits and vegetables for the Belize City market. Some cattle ranching is done on larger holdings.

In Cayo District, cattle ranching and mixed farming predominate with most settlements concentrated along the fertile strip of land in the Belize River Valley. Recent immigrants from El Salvador and indigenous Mayas coexist with Spanish speaking Mestizos.

Stann Creek District has a very mixed population of Creoles, with minorities of Mestizos, Mayas and Caribs (the latter concentrated in coastal fishing villages). Outside of the major citrus area in the Stann Creek valley and bananas in the south, most farmers practice milpa subsistence farming. In the last few years, a number of new villages have been formed by Mayan farmers from Toledo District in small pockets of arable land along the southern highway.

The far southern Toledo District is the least developed area of the country, with a population of Mopan and Kekchi Maya in the inland areas, and East Indians and Caribs closer to the coast. In the southern part of the district are 11 Kekchi villages accessible only by footpaths, though the MOW is currently planning to construct roads with the assistance from the UK. Population is concentrated around the Mopan village of San Antonio (pop. 1067), and these milpa farmers produce the majority of the country's rice, hogs, and beans despite the poor quality of feeder roads.

Table 1 details the distribution of rural population.

Table 1. Distribution of Rural Population

	Population					
	Villages		Other Rural*		Mean Village Size	
District	1970	1980	1970	1980	1970	1980
Corozal	10[illegible]8	15775	631	228	341.3	508.9 +
Orange Walk	99[illegible]9	14260	1553	191	432.6	528.2 +
Belize	7449	10492	2856	538	266.0	291.4 +
Cayo	8065	11092	3309	31[illegible]	310.2	277.3 -

Table Cont'd

District	Population: Villages 1970	Villages 1980	Other Rural* 1970	Other Rural* 1980	Mean Village Size 1970	Mean Village Size 1980
Stann Creek	3273	7180	2783	340	251.8	224.4 -
Toledo	5377	8381	1481	985	199.2	190.5 -
Total	44351	67180	12613	5476	301.7	319.9 +

* Includes unrecognized communities and those with less than 50 persons. Changes reflect new census practices.

The above figures refer to the total rural population. The proportion of the farm population which is presently served by inadequate roads is shown on Table 2 to be 28,355, or 39% of the total rural population. Table 2 breaks down the target group by district, and shows how many people are presently served by poor roads. In addition to these rural farmers, urban based merchants and wholesalers, as well as rural truckers and merchants will benefit from increased flow of commodities engendered by road improvement.

Table 2. Villages on Poor Roads

District	Number of Villages	Population	Total Poor Road Miles	Persons/ mile
Corozal	9	4864	117.0	41.9
Orange Walk	14	9172	72.0	128.3
Belize	18	3061	73.0	42.5
Cayo	21	3849	69.0	56.6
Stann Creek	12	2811	64.0	44.6
Toledo	15	4590	45.0	104.5
Total	89	28355	440.0	66.0

In the districts where road reconstruction has already occurred, short-term benefits are apparent. Villages have easier access to major agriculture product markets, buying centers for agricultural inputs, etc., hospitals, secondary schools, etc. Although it is too early to assess long-term impact such as agricultural development, some tangible evidence such as more land along rehabilitated roads undergoing clearing and developing, is emerging.

21. UNPLANNED EFFECTS

To date, no identifiable unplanned effects have surfaced.

22. LESSONS LEARNED

Essential in designing and implementing a development project, especially in infrastructure (such as roads), is the mutual unsolicited approval and subsequent demonstrated commitment by both the host and the donor agencies. Host country capacity has to be prevalent in design considerations. In this Project, USAID is increasing the capability of the GOB to build, maintain, and protect rural access road inventory through training, technical assistance, and equipment procurement in order to achieve an increase in agricultural output. The implementing agency for the GOB is the Ministry of Works (MOW). In a Project of this nature, if MOW does not cooperate fully then the impact on their ability to build, maintain, and protect rural access roads will be severely lessened. More emphasis should be placed on ways of ensuring greater interaction among project participants.

23. SPECIAL COMMENTS OR REMARKS

a. Annex 1 - Evaluation Report by Messrs. Rod MacDonald and James Gardner.

AID 1010-23 (1-72)
SUPPLEMENT 1

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Rural Access Roads & Bridges 505-0007

Life of Project: From FY 83 to
Total U.S. Funding $
Date Prepared:

PAG

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSU
Project Outputs: (C-1)	Magnitude of Outputs: (C-2)	(C-3)	Assumptions for achieving ou
1) Rehabilitated rural access roads 2) Rural access roads maintained at lower costs. 3) Rural access roads constructed lower costs. 4) Permanent national system of maintenance 5) Office of planning and budget. 6) Training for maintenance. 7) Training for reconstruction	1) 300 miles rebuilt 2) Maintenance costs reduced to $2000 per mile 3) Costs reduced 4) District plans and maintenance units in place 5) MOW five year plan/budget in place 6) Two spreads of equipment operating in all Districts of Belize 7) All-weather river crossing on the 300 miles of reconstructed roads.	1) Field inspections 2) Cost accounting 3) Cost accounting 4) Document review and MOW organizational chart 5) Plan/budget in place and use for forward operations planning 6) Field inspections 7) Field inspections 8) Field inspection	1) MOW counterpart employees, and ope tions in place by March 1984 2) Equipment procur per project plan 3) MOW office of pl ing and budget est blished. 4) MOW supports descrete maintenan operation 5) MOW maintenance plan developed

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

(INSTRUCTION: THIS IS AN OFFICIAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.)

Project Title & Number: Rural Access Roads & Bridges 505-0007

Life of Project: From FY 83 to FY 87
Total U.S. Funding $5,400,000
Date Prepared: 12 Sept 83

PAGE

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: (A-1)	Measures of Goal Achievement: (A-2)	(A-3)	Assumptions for achieving goal targets: (A-4)
To increase Belize's agricultural production through the rehabilitation and maintenance of all-weather rural access roads and bridges.	Increased natl. agricultural output by 10% in real terms between 1984 and 1990.	National accounts data	Agricultural development continues to be sector priority of GOB.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project: From FY 83 to FY 87
Total U.S. Funding $5,400,000
Date Prepared: [illegible] 83

[illegible] Title & Number: Rural Access Roads & Bridges 505-0007

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
[illegible]ct Purpose: (B-1)	Conditions that will indicate purpose has been achieved: End-of-Project status. (B-2)	(B-3)	Assumptions for achieving purpose: (B-4)
[illegible]crease the c[illegible]bilit[illegible] of th[illegible] [illegible] build, maintain and protect [illegible]ral access road inv[illegible]tory [illegible]h training, technical [illegible]tance and equipment procure-	1) Reduced per mile costs for rural road construction. 2) Reduced per mile costs for rural access road maintenance 3) Better planning and budgeting of MOW resources. 4) Proportionately fewer pieces of equipment on "deadline." 5) Reduce the annual maintenance cost of bridges for rural access roads.	1) MOW cost analyses 2) MOW cost analyses 3) Existence of a comprehensive MOW planning, program- 4) MOW equipment situation reports. 5) Inspection of rural access roads and bridges.	1) MOW will assign maintenance operations to a discreet district-level maintenance unit. 2) MOW will create an office of planning and budgeting. 3) MOW will commit its operations to guidance by modern management techniques and planning methods. 4) MOW will develop an equipment management and maintenance system aimed at reduced costs and improved utilization efficiency.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Rural Access Roads & Bridges 505-0007

Life of Project: From FY 83 to FY 86
Total U.S. Funding $5,400,000
Date Prepared: 12 [illegible]

PAGE

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Inputs: (D-1)	Implementation Target (Type and Quantity) (D-2)	(D-3)	Assumptions for providing inputs (D-4)
	(US$ x 1,000)	Review of project financed records, vouchers, etc.	Inputs are provided in a timely manner, no unanticipated delays in meeting CPs set forth in project agreement
Technical Assistance	$1,437,130.00		
Equipment	2,430,752.00		
Spare Parts	347,310.00		
Fuel/Lubricants	400,000.00		
Shop Tools	200,000.00		
Shipping/Transport	1,096,080.00		
Local Labor Costs	850,000.00		
Construction Materials	424,647.00		
Contract Construction Cost	3,000,000.00		
Contingency	87,890.00		
Inflation	68,521.00		
Administrative Expenses	137,670.00		
Total	$10,430,000.00		

Annex 1

XD-AAS-755-A

ISN 43564

U.S.A.I.D. / BELIZE

RURAL ACCESS ROADS & BRIDGES PROJECT

EVALUATION REPORT

AUGUST, 1985.

5050007

TABLE OF CONTENTS

I. Definition of Terms/Acronyms..... ii

II. Executive Summary..... 1

III. Project Description..... 3

IV. Evaluation Results..... 16

1. Project Changes..... 16
2. Project Administration and Personnel..... 16
3. Construction and Rehabilitation Unit..... 20
4. Management Improvement Component..... 22
5. Equipment Maintenance Component..... 24
6. Bridge Erection/Installation.Component..... 26
7. Equipment and Spare Parts..... 27
8. Road Maintenance Training Component..... 30
9. Construction Progress and Project PACD..... 31
10. Project Financing..... 32

V. Conclusions and Recommendations 34

VI. Appendix:

A1. Evaluation Team/Interviews..... 40
A2. Evaluation Itinerary..... 42
A3. Road Selection Criteria..... 44
A4. Baseline Data..... 46
A5. Estimates of Tires Needed for Project Completion (PACD 7/1/87)..... 49
A6. Project Budget..... 53
A7. Logical Framework..... 54
A8. Modified Minimum US Standard Two-Lane Gravel Surface Road..... 58
A9. Project Implementation Milestones..... 59
A10. Powers to Puga Letter Dated July 11,1985 re Road Maintenance..... 60

20

I. ACRONYMS

AADT	Average Amount of Daily Traffic
AID	Agency for International Development
BEIC	Bridge Erection/Installation Component
BZE	Belize
CAEP	Caribbean Agricultural Extension Project
CRTU	Construction and Rehabiliation Training Unit
DAEC	Development Assistance Evaluation Committee
DPM	Deputy Project Manager
EMC	Equipment Maintenance Component
EOPC	End of Project Status
GOB	Government of Belize
LAC	Latin American/Caribbean
LPE	Licensed Professional Engineer
MIC	Management Improvement Component
MNR	Ministry of Natural Resources
MOW	Ministry of Works
MTU	Maintenance Training Unit
OJT	On-The-Job Training
PA	Project Agreement
PACD	Project Agreement Completion Date
PET	Project Evaluation Team
PP	Project Paper
PSC	Personal Service Contractor
RMTU	Road Maintenance Training Unit
RPC	Road Priority Committee
RR&B	Rural Access Roads & Bridges Project
UK	United Kingdom
USAID	United States Agency for International Development

21

II. EXECUTIVE SUMMARY

Progress is considered very good on this project when measured against similar projects in other AID activities around the world. The equipment arrived in a timely fashion, the technical assistance personnel arrived at an appropriate time and the project commenced when these two elements were organized into construction units. The PP schedule was unrealistically optimistic and therefore the project is approximately six months behind that schedule. Given the weather conditions in Belize, it is doubtful that this six-month period can be made up. Therefore, funding has been adjusted for a six-month operating period after the existing PACD.

The Government of Belize seems not to be effectively engaged in the project except at the district maintenance center level. The project calls for the central engineering organization to take an active role in road design and in evaluation. Little evidence was observed that they expect to be collaborative or operational during the life of the project. If a functioning organization is to be left when the project is completed, the central Belmopan organization must take part in the project.

A major thrust, and perhaps major thrust, as projected by the PP was for training in maintenance and construction. As staffed, the project can accomplish on-the-job training only. In evaluation, evaluators should not look for formalized training plans and centralized training activities. The project is not staffed to carry out this function, and therefore training accomplished will be OJT, which is of great value but is different in makeup from that inferred in reading the project paper.

The overall austerity budgeting now in place by the GOB can have lasting effects on the ability of the Ministry to effectively maintain their road system. Efforts should be made and, to a certain extent are being made, through the planning system to adequately request financing for the maintenance activity. An effort should be made by the Mission staff to encourage that as additional roads are rehabilitated, adequate budget allocation is forthcoming to protect this investment.

It is suggested that the project should be considered for an additional six-months operating period. A further evaluation of progress should be made in approximately one year, but at the present time it appears that a five-man extension for a period of six months will be required in order to complete the major portion of the road rehabilitation section of the project. It is also suggested that the equipment maintenance training continue over this extended six-month period.

The proposed reallocation of funds remaining in the project is included in the project evaluation. Most of the remaining funds have been placed in a contingency category to allow flexibility for funding equipment repair and replacement parts and other needs as they develop during the project. The budget for tires and spare parts is an estimate and may or may not be accurate for the remaining life of the project. Project personnel should have flexibility in utilizing the remaining project budget to carry through the project activities in the most economic and effective fashion possible. It appears that the budget is sufficient to complete project activities.

III. PROJECT DESCRIPTION

I. BACKGROUND

Belize is a Central American country of about 23,000 square kilometers (5.7 million acres), with a very low population density. The population of 160,000 is evenly split between rural and urban areas, with more than a quarter of the population living in Belize City. While this city retains its British Colonial heritage and is predominantely English-speaking, the rest of the the country is ethnically diverse, and a majority of the rural population speaks Spanish as a first language.

During early Colonial times Belize's economy was based on export-oriented extractive industry, with forestry dominant. Rural infrastructure and interest in agriculture remained underdeveloped until quite recently, and the population has depended heavily on food imports. With no mineral resources or other basis for heavy industry, and limited potential for light industry, agriculture offers the greatest potential for both import substitution and export diversification.

Boosted by sugar exports, the Belizean economy performed well in the 1970's, with an annual average growth rate of five percent. Decline or stagnation in world prices for major export commodities has led to a sharp decrease in the rate of economic growth since 1980, with only a one percent growth in GNP in 1981. All of the major export crops - sugar, citrus, and bananas - face serious production and marketing problems, while still accounting for about 60% of total exports. At the same time, foodstuffs account for 27% of the total import bill.

A number of factors make agriculture a priority sector for further development. The large import of food means that there is a potentially large domestic market available. Many of the rural Spanish-speaking, Mayan, and Mennonite people have a long tradition of agriculture, already own land, and are eager to increase their income. A small sector of rural entrepreneurs, already involved in wholesaling and transport, is poised for expansion. The government of Belize has made agriculture a priority, and is currently involved in infrastructure development, including a revamping of the extension service under a plan developed by the Caribbean Agricultural Extension Program (CAEP). USAID is implementing a livestock development project, with swine, beef and dairy components, and has targeted agricultural diversification and the development of new export crops as future priorities.

As mentioned previously, production of the major export crops of sugar, citrus and bananas has stagnated or declined in recent years due to management problems, lack of capital, and soft world markets, also production of livestock and foodstuffs for domestic consumption has been hampered by inefficient management of the government marketing board (which handles the corn, rice, and bean crops as well as feeds and agro-chemicals), lack of modern farm inputs and shortage of capital. The population remains dispersed over a large area, poorly served by transport and communication networks, causing problems both for the flow of agricultural products out of rural areas, and the flow of market information, training, credit, seed and chemicals to the farmers. With unreliable markets, and sporadic access to improved technology and crop inputs, most Belizean farmers outside of the sugar and citrus areas continue to produce largely for their own subsistence, with some surplus for sale. For many, farming is a part-time occupation, providing food to complement cash earnings from wage labor.

Even with all-weather roads agricultural production will still be constrained if wet-season (seven months of the year) access is periodically impeded by flooding of river crossings. Poor roads lead to high transport costs, but low-water river crossings create an element of risk in agriculture which is unacceptable for market-oriented farmers.

The primary problems caused by inadequate river crossings relate to the interrupted flow of crop inputs from market centers and of crops to markets. Investment in capital-intensive farming methods is unlikely if the farmers cannot be assured of the necessary fertilizer, seed and agrochemicals at the times when they are needed. Capital equipment can be tied up for long periods if crops cannot be hauled to market, and the production of delicate crops (vegetables, fruits) is discouraged. Even if a river crossing is impassable for only a few weeks during the year, the effects can be highly disruptive. The risk of being caught at or away from the farm without access militates against intensive market-oriented farming.

Slash-and-Burn farming (the milpa system) is the predominant cropping system, with fallow periods ranging from 5 to 15 years. As long as the farmer has abundant land available, this method provides high yields with little labor input. Most of the corn, beans and rice grown in the country come from milpas. While this method is highly productive and can be used on hilly terrain and marginal land, it can support only very low population densities, because most of the land must lie fallow at any one time. Milpa farmers therefore tend to

disperse in small villages, hard to reach with roads, and expensive to support with social services. Milperos are reluctant to adopt capital intensive mechanized farming techniques, and tend to remain just above subsistence level.

The GOB has indirectly encouraged milpa farmers to expand into new areas of land and continue their way of life, through its lands policies and by building new roads to serve milpa farming villages. Landholders with large undeveloped tracts often rent plots to milperos for a nominal fee, and leases on small areas of government land are easy to obtain. Squatting is also common. By continuing to build crop roads into new milpa areas, the government is in effect practicing its own form of "shifting cultivation"; prompting farmers to clear and plant new areas of forest through the construction of new (and temporary) roads and then (by failing to provide necessary road maintenance) allowing those roads to deteriorate to impassibility) prompting farmers to move on to new areas when new areas are opened by still more new and temporary roads. The result is destructive to the remaining areas of virgin forest, and is a constant strain on government services and the ability of the Ministry of Works (MOW) to provide minimum standard road service to the nation.

If Belizean farmers are to adopt more intensive modern farming methods and are to produce for the market and not for subsistence alone, milpa farming must be discouraged, and investment in land improvement must be promoted. This has already happened in several areas of the country, and the main cause has been the construction of high-quality all-weather roads. A good all-weather road provides a number of incentives for farmers to settle down and intensify their farming efforts; most important are access to markets for produce, improved education, health services, and technical inputs. A complete all-weather rural access road must include all-weather, reliable river crossings via permanent bridges. Rises in land values along good roads also promote stability of settlement and land improvement. Where GOB has built major highways and adequate all-weather feeder roads, population has increased and cash crop production has risen markedly during the last ten years (as in Cayo, Orange Walk, and Corozal Districts). Where roads remain inadequate, and passable only during the dry season, population remains dispersed and at subsistence level. Table 1 shows that during the last ten years the population of villages with adequate roads has increased rapidly, while those served by poor roads or foot-paths has increased at a much slower rate. The farmers' response to road improvement is clear cut.

Table 1
Change in Population and Settlement by Road Quality

	Population 1970	1980	Change
Villages served by main highways	15,796	26,790	41.0
Villages served by high-quality feeder roads	5,926	8,848	33.0
Villages served by inadequate feeder roads	20,142	28,355	29.0
Villages without roads	2,231	2,912	23.4

It is often said that Belize's main agricultural resource is its huge area of untapped arable land. While it is true that large areas of forest remain, much of this land is rugged and of marginal fertility, and can only be developed at high cost. A large portion of the large areas of level fertile land have already been settled (having been sought out by milperos), but remain underpopulated and inadequately developed because of poor road access.

It must be remembered that the Belizean agricultural population is very small and thinly scattered. The high costs of providing services to scattered rural settlements has been prohibitive. From a long-term land use planning perspective, government should pursue a policy which encourages more intensive use of areas already settled, rather than opening up new marginal lands to milperos. The improvement of the existing rural road system will be a crucial step in this development, while the construction of many new roads would retard progress in this direction.

A major factor in unpredictable transport is the poor state of existing bridges and river crossings. Most bridges, even on highways across major drainages, are low-water crossings. The present strategy by MOW is to construct these bridges cheaply from perishable materials (rough lumber), and to replace them at frequent intervals when they are washed out by floods. Especially in the southern and central sections of the country, rivers have a highly variable flow rate during the year, and most crossings are flooded and impassable for at least a few weeks at unpredictable intervals. On many rural access roads

drainages are crossed only by fords (paved or unpaved), and the roads are therefore useless for up to five months each year. The wet season is a crucial time in the agricultural cycle, and production is impeded.

No adequate inventory of the country's bridges presently exists, but the number may reach a thousand. The reconstruction of bridges is a constant drain on the resources of the MOW. As long as low-water perishable crossings are used, maintenance costs will continue to be unacceptably high. Provision of high-level permanent structures will allow MOW to apply its resources to road maintenance.

The MOW has not developed a coherent policy or program for the construction and maintenance of Belize's road network. The present system, according to MOW figures, includes 272 miles of primary paved road which connect Belize City with four district towns, the capital city (Belmopan), and international borders with Mexico and Guatemala. Major improvements to these roads in the last ten years have been funded by the UK. More than 40% of the rural Belizean farming population lives on, or close by these paved roads, which are used for farm transport.

MOW also lists 898 miles of gravel and marl roads, including the Southern Highway to the Toledo District, as well as access roads connecting villages to primary roads, and a number of farm roads. There is also a large, but unmeasured mileage of publically and privately built unimproved tracts, bulldozer passes and logging roads, which are seasonally passable at best. Maintenance on unpaved roads varies considerably, with the most attention paid to the Southern Highway and village access routes in the sugar districts of the North. Conditions vary seasonally, with many roads only intermittently usable during the rainy season (June to September), and passable only at slow speeds the rest of the year. Rather than operating on regular maintenance schedules, the MOW performs mostly emergency maintenance, when a road becomes totally impassable; or a local political representative calls attention to problems. Transport in rural areas therefore remains above all unpredictable, and farmers cannot operate in the sure knowledge that crops can be brought to market, or seed carried to farms.

For the purposes of this project, the Project Development Team, aided by MOW District Road Superintendents, classified Belize's existing road network into three categories (as per Table 2).

First are 'Highways'; major paved or unpaved arteries which are reasonably well maintained and heavily used. 'Existing Good' roads are rural access roads which are maintained to adequate standards, are passable throughout the year, and do not require

major reconstruction in order to be maintained according to technical standards. The last category, 'poor' roads, includes rural access roads which connect villages to highways, existing good roads, or other villages on a route to the highway. Roads in the 'poor' category are candidates for rehabilitation under this project. (Farm access roads were not included in the listing in Table 2; only roads which serve settlements of more than 50 people were included).

Table 2
Road Quality and Mileage by District

District	Highway	Existing Good	Poor
Corozal	46.0	12.5	116.0
Orange Walk	58.0	15.5	71.0
Belize	47.0	16.0	72.0
Cayo	84.0	24.5	68.0
Stann Creek	92.0	17.0	63.0
Toledo	53.0	7.0	44.0
Total	380.0	92.0	440.0

The MOW currently employs about 450 managerial, professional, and field personnel. Major administrative offices are in Belmopan, as is the major maintenance yard for equipment. Each district has a MOW office and equipment pool, which varies in quantity and quality from district to district. Minor equipment maintenance is done at the district level, while major jobs must be sent to Belmopan. While MOW has recently attempted to decentralize its management, Belmopan and local political representatives still have a major influence on weekly work schedules and procedures at the district level.

MOW has historically placed greater emphasis on new road construction than on maintenance of existing roads. Recently, private contracts have been granted for some new road construction, but maintenance still lags, and is largely ineffective due to poor planning, lack of trained personnel and suitable equipment, and the necessity for 'emergency patching' rather than regularly scheduled activity. Essentially, field personnel are rushed from problem to problem, with no time for preventative maintenance. The existing MOW strategy seems to be one of returning the road to passability each time an emergency maintenance activity is done. This is a very

expensive and inefficient way to manage the road inventory. The result is that most existing rural access roads have deteriorated to the point where total reconstruction is needed and routine maintenance operations are impossible.

MOW has underway several activities with other international donor agencies. They are currently working with resources from the United Kingdom and the World Bank primarily on construction, rehabilitation and maintenance of the country's primary road system. The current U.K. project includes:

- Construction of a Northern Highway alternate route;
- Supplemental funding for primary roads maintenance;
- resealing thirty-three (33) miles of pavement on the Western Highway.
- delivery of eighty pieces of equipment used on the Northern Highway project and rebuilt with British Development Division financing; and
- the rebuilding of portions of the Southern Highway.

The recently signed loan agreement with the World Bank will provide for added resources to finance the rehabilitation and maintenance of primary roads which have deteriorated to the point where routine maintenance is no longer effective. It includes:

- the rehabilitation of about forty-three miles of paved roads;
- drainage improvements to sixty-five miles of the Southern Highway;
- rehabilitation of eleven bridges; and
- financing certain preliminary improvements to the MOW's road maintenance management system, totalling US $350,000, for technical assistance for primary road rehabilitation, parts for disabled MOW equipment, and the establishment of a system of reporting and data collection at the Ministry level.

2. PROJECT RATIONALE

The rural access road inventory of the Belizean MOW is, by and large, deteriorating to a degree and at such a rate that it presents an obstacle (not an asset) to rural development

initiatives. Improperly built and not properly maintained key road segments wash out during the rainy season and must join a long queue of other roads, including the country's primary roads, which need immediate, emergency priority attention.

The MOW does not practice any routine, scheduled maintenance on its rural road network. There are no offices, divisions, branches, or any other organization entities responsible for such work. The MOW is in a vicious cycle of trying to provide emergency repairs, on a holding action basis, to the nation's inventory of deteriorating rural access roads. Virtually all the resources of the MOW Roads Department are working on emergency road repairs on a full-time basis. Further, the Project Development Team, having visited five of six MOW District offices, did not find any operating plan, budget, or timetable related to rural road maintenance. Current practice for the MOW is to build rural roads upon request, infrequently perform minimum surface dressing of the roadway and occasional brush removal either by hand or "bush hog". (No routine ditch cleaning or culvert clearing is attempted.) As the condition of the roadway deteriorates to the point of impassability, crews with trucks, loaders, and graders are dispatched to essentially rebuild those portions of the road which are impassable. All-weather transit of even such adequate rural roads as exist is impeded by inadequate river crossings. A large number of bridges and ferries on existing good-quality feeder roads, and a larger number of bridges and fords on poor-quality rural roads are in immediate need of upgrading to all-weather status. At present MOW constructs and maintains its stock of bridges on a haphazard and piecemeal basis, often rebuilding the same bridge year after year. The problems are compounded by the fact that the new bridges and crossings which are constructed require a high yearly maintenance input because they are built of perishable materials.

The MOW often has difficulty responding to even emergency work requirements because of equipment failures. Each District has a long list of equipment that is deadlined because of their inability to get replacement parts, equipment abuse by poorly trained operators, inadequately trained mechanics, age of the equipment and "cannabilization" for parts for other equipment.

The proposed Project will improve MOW's management of its limited equipment and manpower resources through improved operations planning and budgeting, technical training for its personnel, improved road construction practices, and improved road and equipment maintenance processes. Without these inputs, the MOW will continue to maintain and repair its ageing equipment fleet on a haphazard basis at high cost to the GOB. It will continue to provide high cost emergency repair services

to rural access roads, and it will never be able, with its limited resources, to stay abreast of the problem of maintaining the rural access road inventory, a capital resource that should be an asset to the GOB's plans for rural and agricultural development. Without assistance in construction of new, high-level permanent river crossings on rural access roads, the country will continue to be plagued by poor access to farms and towns during the rainy season. Emergency bridge work will continue to drain MOW's resources.

3. PROJECT GOAL AND PURPOSE

Goal: To increase Belize's agricultural production through the rehabilitation and maintenance of all-weather rural access roads and and the provision of all-weather bridges.

Purpose: To increase the capability of the GOB to build, maintain and protect its rural access road infrastructure through training, technical assistance and equipment procurement.

4. PROJECT OBJECTIVES

In order to fulfill the goal and purpose given above, this project has set a number of objectives to be achieved through implementation of this Project. They include:

- Rehabilitation of 300 miles (or 27%) of Belize's rural roads.
- Reduced costs per mile for rural road maintenance by 33%.
- Reduced costs per mile for rural road construction by 50%.
- Training of over 150 foremen, equipment operators and labourers in rural road construction and rehabilitation.
- Training of 100 road maintenance workers.
- Training of 75 equipment shop mechanics and allied tradesmen.
- Establishment of an improved internal management and control system for the MOW.
- Establishment of a permanent, national system for the maintenance of Belize's rural road system.
- Preparation of a national rural access road inventory.

- Construction of 54 new all-weather river crossings using 103 bridge sets.

- Increase the size and viability of the existing private-sector contracting capability through involvement in bridge construction.

5. PROJECT COMPONENTS

The Project will be comprised of components whose collective purpose is the improvement of the MOW's capability to construct and maintain Belize's rural access roads. The components are as follows:

A. Construction/Rehabilitation Training Unit (CRTU)

This project element will combine a training program for rural road construction and rehabilitation through on-the-job experience for MOW foremen, equipment operators, technicians, and laborers. While the training process moves forward over the life of the project, approximately 300 miles (or 27%) of rural access roads in all six Districts of Belize will be rebuilt to standards such that they can be effectively and economically maintained for all-weather use. Two units (or "spreads") of equipment equipped to undertake sustained road construction and rehabilitation activities will be procured by project funds. MOW operators, laborers and foremen, accompanied by a AID-financed PSC road specialist, will "man" the spreads.

Each spread of equipment will be equipped with four dump trucks, two road graders, a roller/compacter, one bulldozer, and miscellaneous support vehicles. Directed by a Grant-funded Road Specialist and an MOW Road Construction Foreman, the spread will be staffed in all positions by existing employees of the MOW, including equipment operators, laborers and drivers.

Roads for reconstruction will be selected on the basis of criteria which will assure that the highest priority for reconstruction treatment will be given to those roads which connect existing communities with paved or otherwise "primary" roads or market places, and roads which serve areas with good general agricultural potential. Selection of the actual roads to be reconstructed will be made on the basis of these and other criteria and in consultation with the AID Representative to Belize and the Minister of Works. The spreads will be used for training in and for each of the six Districts.

River crossings will be upgraded using US excess property bridge sets (freight and acquisition costs paid by USAID). MOW

will use its annual bridge construction budget to contract within the private sector for the construction of abutments. Bridge construction will be coordinated with road rehabilitation, and project personnel will assist MOW in developing the capability to let and supervise construction contracts. An estimated 75% of the 54 crossings sites will be completed during the three year CRTU project.
At the end of the Project and through the process of rebuilding these roads, MOW personnel will be exposed to and have learned proper operating routines, construction standards and practices, equipment maintenance routines and effective job-site management.

B. Road Maintenance Training Unit (MTU)

The MTU will address the MOW's inability to effectively maintain rural access roads. It will institute a regularized approach to District-level rural access road maintenance through reorganization, planning, budgeting, road maintenance equipment procurement, and technical assistance.

The MTU will begin with technical assistance to the Districts and MOW headquarters to lay out a plan for rural road maintenance. This plan, to be linked with the World Bank-funded primary road maintenance training program, will include the identification of roads to be maintained, personnel to be assigned to the MTU, budgetary requirements for operations, equipment needs for the Unit, and official establishment of a road maintenance function within the MOW. Following planning activities, equipment will be procured to outfit the training unit to established requirements. The two Road Specialists from the technical assistance team will provide managerial oversight, technical assistance, and training.

Each of the six District MTUs will have a complement of equipment including one Grant-funded maintenance grader, one Grant-funded small tractor with brush clearing/mowing attachment, one Grant-funded dump truck, and one light truck. Each Unit will also have a roster of MOW personnel including a crew chief, truck drivers, tractor and grader operators, five laborers, and assorted hand tools provided by the MOW District Office;

The MTU will follow an operating program and calendar which will specify the location and amount of roads to be maintained. Personnel and equipment will be dedicated to maintenance activities. Ancillary equipment not directly attached to the MTU including tankers, loaders and bulldozers will be provided on an as-needed basis from MOW District shops.

At the end of the Project, all Districts will have road maintenance units that are fully equipped, trained and experienced in routine rural access road maintenance activities. Equally important, the MOW will gain a valuable institutional experience in planning, budgeting for, and managing a scheduled, comprehensive road maintenance service.

C. Management Improvement Component (MIC)

This Project component will provide the MOW with technical assistance to aid them in developing an operations programming and budget planning capability. A Management Specialist, working with the Project Manager, Deputy Project Manager, the MOW Minister, Permanent Secretary, Works Superintendent, Chief Engineer, and a newly created MOW office of planning and budget, will with a five year projection of capital and operating costs. With this information base, the MOW will be better able to make decisions concerning road development plans, equipment repair and replacement, manpower requirements, and costs of operations.

Work to be accomplished includes the definition of a planning framework appropriate for the MOW, training in reporting and data analysis processes, and preparation of the first and second iterations of the Plan. Planning activities would be fully coordinated with the management-focused activities of the World Bank project, which address those aspects of management that are more oriented toward weekly and monthly operations. In addition, the MIC will prepare a national inventory of rural access roads which will aid in the preparation of the operating plans of the District road maintenance training units.

The Grant-funded Management Specialist will work for a period of two years to design and implement the new management systems, organize the new office of planning and budget, train MOW personnel in data base management, data analysis, planning, programming, and budgeting. As counterpart to the AID technical assistance, the MOW will establish, staff and finance the office of planning and budgeting. With a staff of three professionals and para-professionals, this new office will be made a permanent function within the Ministry's organizational structure. It will house the World Bank-financed microcomputer and take on the responsibilities of data collection and reporting financed initially under that project, thereby assuring a continuing MOW capacity for maintaining an ongoing reporting, programming, budgeting and control capability.

D. Equipment Maintenance Component (EMC)

The EMC will provide MOW District workshops with technical assistance and training to enable them to improve

District-level equipment maintenance and repair operations. A Grant-funded Equipment Maintenance Specialist will work with District workshop mechanics and allied tradesmen to develop and implement a preventive maintenance schedule for equipment, train mechanics and operators in first and limited second eschelon repairs, and help to organize the Districts' toolrooms. These activities will help to improve workshop effectiveness, lower repair costs, reduce time spent by equipment on "deadline", and reduce the frequency of equipment "cannabalization".

In addition to technical assistance and training, the EMC will provide for the procurement of a small amount of shop tools and equipment, such as master mechanic sets, welding equipment, hoists, air compressors and the like to supplement the Districts' limited inventories. Where necessary, training in shop equipment use will be provided

E. Bridge Erection and Installation Component (BEIC)

This component was added to the project in Amendment Number two to the Project Agreement and is dated May 24, 1984. The Bridge Erection and Installation Component, as addressed in the CRTU section, will provide bridging material for the construction of some 54 high-level all-weather river crossings on roads selected for rehabilitation. MOW using funds from its Annual budget allocation for bridge maintenance and repair will contract with local qualified, private construction contractors to build the requisite 108 bridge abutments and 42 center piers.

IV. EVALUATION RESULTS

1. PROJECT CHANGES

Since the Project was approved by the Administrator on September 29, 1983 there have been three amendments to the Project Grant Agreement.

Amendment number one (12/19/83) corrected an error in the Project Agreement.

Amendment number two (5/24/84) increased the A.I.D. grant by $550,000 and the Host Country contribution by $970,000 to revised totals of $5,950,000 and $3,020,000 respectively. The purpose of this amendment was to provide materials and services for the construction of fifty-four (54) high-level all weather bridges. The material consisted of excess U.S. military property bridge sets which were transported from Germany to Belize. The Host Country contribution would be used primarily for contracting with local private contractors for bridge construction. The U.S. Government contribution would fund excess property material and transportation costs and in addition, twenty-four (24) person-months for the services of a rural sociologist to assist the Government of Belize in road selection, developing base line data and evaluating the impact of the project.

Amendment number three (11/20/84) increased the A.I.D. grant by $200,000 and the Host Country contribution by $1,510,000 to revised totals of $6,150,000 and $4,530,000 respectively. The U.S. Government contribution provided the necessary funds for the services of a bridge engineer to assist in identifying, assembling and transporting within country, of the excess property bridge sets and providing technical assistance in the erection and installation of said bridges. The Host Country contribution provided additional funds for bridge construction costs.

2. PROJECT ADMINISTRATION AND PERSONNEL

A. Project Change Impact

During the early stages of project implementation it was determined that bridge construction should have been an integral part of the original project. The opportunity was available to acquire bridging material through excess property at a very low cost. Therefore, the project was amended to include over one hundred spans of bridging and to include coordination for the installation under the project management.

One additional person was added to the project team to handle logistics and coordination on the bridge construction. No additional equipment was provided to the project equipment fleet to carry out this work.

The impact on the overall project personnel and their ability to carry out their assigned responsibilities was major. It appears that adjustments are possible within the existing staffing to carry out this portion of the project and meet most of the project targets, excluding road maintenance training. The position-by-position evaluation follows below.

B. Organizational Structure

The Project Evaluation Team (PET) feels that a formal organization chart and delegation of responsibility should be instituted. Presently job descriptions for all individuals in the project show them reporting to "the USAID Representative or designee". We recommend that all project personnel report through the project manager. A proposed organizational chart follows in this section of the report. This proposed organizational chart reflects certain changes in assignments to project personnel as recommended by the evaluation team.

C. Position Evaluation

a. Project Manager

The overall performance of the project manager is considered good. Certain operational changes are recommended. It is also recommended that the project manager have more flexibility to utilize the resources within the project without approval from Mission management. It appears that the PM is spending a disproportionate amount of time on details of line item expenditures and obtaining approval for minor purchases which should be within his realm of authority. (Note that the financial section points out the need for miscellaneous purchase authority and budget to meet day-to-day small purchase requirements.)

It is further recommended that the project manager delegate a succinct portion of project responsibility and hold project team members responsible for performance, but not maintain control of day-to-day routine activities. This would allow the project manager more time to work with his counterparts in Belize and to help plan for contracting bridge work, evaluating district shop training and other critical items within the project.

b. Deputy Project Manager

In the past there has been some confusion as to the exact responsibilities/authorities of the DPM. In retrospect, the PET feels that the incumbent should have been assigned to an "Executive Assistant" position rather than being assigned as Deputy Project Manager. Regardless of the name of the position, we feel that the incumbent can be assigned definitive work units within the project and be held responsible for his performance on those specific assignments. It is also felt that his responsibilities could be broadened beyond those clearly assigned to him up to this point in the project. It is also our opinion that the project need not have a DPM in its organization; it needs an Executive Assistant. The project manager can control the functions of his personnel without having a full deputy between himself and the other personnel. The exception would be the management specialist who could report, and it is recommended that he should report, through the Executive Assistant.

When the project manager is away from post, he could then delegate his responsibilities to an appropriate member of the team.

We feel that Mr. Cushing can take on the responsibility of recordkeeping within the project. It appears he has a good grasp of budget and reporting on the project at the present time and that he can carry out the quarterly reporting responsibilities for the project. At present he is assigned responsibility for coordinating with the project management specialist and he should continue to carry out this role, and carry it out in a more aggressive manner than in the past.

In addition we feel that Mr. Cushing could take on the responsibility for assigning bridges to sites selected by the project manager and should maintain an inventory of existing bridge parts and coordinate the allocation of these bridge parts to sites selected for bridge construction.

As noted elsewhere, we recommend that all bridging materials be moved to Belmopan and that they be stored in a systematic way so that they can be protected and selection of bridge sets can be carried out in an organized fashion. We feel that this responsibility should be assigned to Mr. Cushing and that an orderly phase out of Mr. Lynch be instigated, making Mr. Lynch's services available to district maintenance shop training. This is noted elsewhere in the report.

c. Road Specialists

The overall performance of the two road construction specialists is considered good. In spite of certain problems that have arisen, production has been acceptable. Given the weather difficulties in Belize and the effect this has had on continuing construction efforts, we feel that the work carried out under these two specialists is fully acceptable. Anomalies in difficulty of building the road segments should be taken under consideration in evaluating production of the two construction units. Some sections of construction have been extremely difficult and required additional effort in the way of time and financial resources. In spite of this, the project evaluation team considers performance fully acceptable.

d. Management Specialist

Mr. Lawrence has provided a plan for the district operations on road maintenance. A new plan is now being put together for the upcoming budget cycle. Under a separate portion of this report, the evaluations are given as to the effectiveness of that management system now in place.

Mr. Lawrence, working independently of the project team, has provided a system for collecting data from the district shops and presenting it to MOW management. Additional feedback and inputs are required from those in the operational side, i.e., the district road construction and maintenance offices, and also from management in order to adjust this plan and make it more usable.

We feel given the cooperation and recommendations from various levels of management, Mr. Lawrence can adjust the management system to make it a more useful tool. He should continue this effort through the completion of his assignment. At that time it is felt that the Ministry through their own personnel should be able to carry out the activities under this portion of the project.

f. Bridge Specialist

The Bridge Specialist, working under extremely difficult work conditions continues to make good progress in sorting out the bridging material and dispatching it to bridge sites. It would appear at the present time that he has a system put together which could be picked up by Mr. Cushing. Mr. Lynch would still be available to assist when problems arose, but we consider his services would be better utilized in training district maintenance shops in carrying out their work. When bridging materials are moved to Belmopan, Mr. Lynch could then be assigned other activities within the project area.

His performance has been good and Mr. Lynch could continue to assist in the bridge material assignment. However, on construction of the bridges the inspection work should be carried out by GOB engineers with Mr. Lynch backstopping by advising on the erection of superstructures and interpreting the army installation manuals.

g. Equipment Training Specialist

Up to this time the incumbent, Mr. Cerny, has been utilized in coordinating movement of project materials to project sites. He has had little opportunity to carry out his responsibility in district shop maintenance training. If our recommendations are accepted with regard to moving bridging material to Belmopan and holding construction contractors responsibility for receiving and moving from that point to the bridge locations, Mr. Cerny would be available to carry out hands-on training of district shop maintenance personnel. If our further recommendation is followed to move Mr. Lynch into the equipment maintenance shop training, Mr. Cerny should be assigned to assist and report to Mr. Lynch in carrying out these activities.

D. Overall Project Staffing

The overall project staffing seems to be adequate for the activities projected for completion, excepting road maintenance training. Mr. Lawrence could be terminated at the end of his present contract. Mr. Lynch should be utilized to concentrate on district shop training and possibly on training with the maintenance training units. He should be assisted in this endeavor by Mr. Cerny. If the operation goes well, consideration might be given later in the project to reducing the project's staff by one member. At the present time the balance of overall staffing versus work to be carried out appears to be appropriate. (See table 1).

3. CONSTRUCTION AND REHABILITATION UNIT

The roads constructed/rehabilitated are being constructed to recognized road construction standards (see Appendix A8) for all-weather rural roads (no general specifications are mentioned in the Project Paper). Depending upon the traffic, the wearing surface of the roads were occassionally reduced in width from the normal twenty-three feet not including shoulders and lateral drainage ditches. Cross drainage consists of asphalt coated corrugated metal pipe culverts placed where needed appeared adequate. Selected base and wearing surface material were excavated from borrow pits some of which involved considerable hauling distances to the road site. Usually 12 to 24 inches of selected base and stabilization material was placed and compacted where needed. Where in situ material was

acceptable little base material was needed. Selected wearing surface material of six inches in thickness was placed and compacted over the base course. Most roads observed had an adequate crown of approximately five percent, however, some require reshaping to attain this requirement. No asphalt surface treatment, asphalt pavement, or concrete pavement is contemplated at this time.

The road construction/rehabilitation component commencement was dependent upon the delivery of construction equipment which was scheduled to be completed by March, 1984. Each CRTU spread consists of one bulldozer, two graders, one loader, four dump trucks, one water tanker, one fuel tanker, one compaction roller and one pickup truck. Actual completion of delivery was not until November, 1984. Road work did begin - albeit without a full equipment component - by mid-August, however, by this time the project was in the middle of the rainy season and little progress (17.42 miles by 12/31/85) was made. The Project Implementation Milestones (see Appendix A9) anticipated that eighty miles would be completed by this date. It appears that the project has never been able to recapture the lost time because of the unusually long rainy season and is still about six months behind schedule.

The quality of the work that has been completed is acceptable. One road observed had gone through an entire year without any maintenance and no base failure or deterioration was observed. The rains had merely washed out the fines. This attests to the quality of the materials selected and the quality of construction. However, it is recommended that routine maintenance begin immediately on completed roads to prevent later unwarranted repairs.

Except for about thirteen miles of road in the Cayo District, work is completed in the Belize and Cayo Districts. One equipment spread is in the process of moving to the Stann Creek District and upon completion of the remaining work in the Cayo District the other will move to the Punta Gorda District. This will leave the last two districts, Corozal and Orange Walk, to be done in mid-1986.

It is recommended that the MOW assign personnel knowledgeable of the area of a road which is to be constructed to determine potential borrow pit areas. This will also require the use of a core sampling rig or backhoe to assist in these determination.

One concern the PET has is the quantity of culverts that the project has purchased. Only 3,000 lineal feet were purchased which at an average of 30 LF per crossing equates to 100 crossings, or one crossing for every three miles of roads. This is an extremely small average and the project (or MOW) may have to buy additional culverts, if this is the case and time

is a factor, we recommend the purchase of locally made precast concrete culverts or the construction of concrete dips.

The concerns that the project has for the protection of archaeological sites is commendable and the PET feels that this should continue under the guidance of Mr. Cushing.

Road selection criteria is provided in appendix A3. Road selection is done by segment and not by network within each district. This could present a problem, but with the limited road networks to be addressed, has not done so to date. Road selection at present is acceptable to both the Mission and the Ministry of Works. The PET recommend that in future, selection of road networks be considered as opposed to individual road segments within a network. This would present a rehabilitated road segment dangling at the end of a network that has a comparatively poor condition, and would raise in priority the segment in a network connecting the main road to the rest of the network.

4. MANAGEMENT IMPROVEMENT COMPONENT

The effects of the management system designed and in place for the first fiscal year of operation is being received with mixed feelings. This is not unexpected, since operational units are historically resistent to changes in their operational systems. In fact, approximately one half of the districts feel that they would like to continue with the planning system. This we feel is an open receptive response from the field units.

Talking to each of the district maintenance supervisors, we have the impression that at least two or, possibly three, are willing and able to work toward making the management system an effective field tool.

The major constraint to having an effective planning and implementation system is the impact of policital direction being given at the districts. The elected political officers in each district are effectively directing the efforts of the district maintenance organizations. One district supervisor claimed that this has a minor affect on his operations, others admit that this political direction is having a very major effect on their operations. At one district we were shown letters from elected officials which were kept in a separate file. These directions were effectively adjusting workplans on a day to day and week to week basis. Until the district officers-in-charge of the maintenance operations are directed not to respond to political expediences, meaningful plans can not be implemented at the district level. Unless the district officers are directed that they are not allowed to change their plans even when ordered to do so, by political officers, little

can be expected. Political request should be received at, and acted on, by the Belmopan management. Field officers should be insulated from these request, and changes in the overall plan only made at the Belmopan ministerial level

The overall planning effort carried out by the planning division is certainly a commendable start, unfortunately, final budget figures were never fed back in the first years operational plan so that progress could be measured against actual budget figures. The overall evaluation must reflect actual budget allocations to the districts. It is the PET's understanding that the next iteration of the plan will reflect actual budget allocations.

Attempts and meaningful five year plans cannot be effectively carried out until the one year plans have been made effective as a field operational tool, and as a management tool. As noted above, political adjustments of the longer term plans must be, to the extent possible, removed from the operational level.

It is recommended that the second budgetery cycle be carried through and that when actual budget amounts are known the district operational plans be rerun so that the district supervisors have realistic work schedules based on real budgets. Given an edict to work within the overall plan the district would have an opportunity to prove their operational ability.

Another problem in carrying out a district's work, is that sometimes, emergencies are met by the Ministry by reducing the district budgets. In any particular month the districts might find that their projected budget for that month has been cut to meet an emergency existing somewhere in Belize. There may or may not be an emergency existing within that district. Whether contingencies could be held at the Ministry to meet probable emergency situations depends on how the Ministry decides to utilized their year's budget. But in any event, the district officers-in-charge should have some firm budget for the year that they can depend upon, be responsible for, and be evaluated against.

There seems to be some question as to whether management within the Ministry wants an overall planning system which would allow them to trace the effectiveness of all their financial budgets. This would take the ad hoc flexibility away from the Ministry. They may or may not wish to lose the flexibility which now exists. It would seem appropriate for the Mission management to discuss with the Ministry where we are in the planning system and determine whether the Ministry prefers to pursue it to its reasonable conclusion; a strict controlling of district and other Ministry funding, and an evaluation of

performance at all levels of the Ministry. If they do have the desire to carry the plan through, ajustments will be required as noted above, if not a planning system is of little value and probably should be scrapped.

The road inventory has been made but does not reflect a normal system planning and numbering system. The Ministry should set up an overall system numbering which would follow a more classic model than now being used, e.g., a main road through a district might carry a master number such as 204. Secondary roads leading from the system should carry the 204 numbering with a sub numbering such as .25 which might be the terminal mileage where the secondary road branches from the main road unit. Feeder roads terminating on a secondary system would carry 204 .25 number with a sub number such as 204 .25 .05 indicating the milage that road takes off of the secondary system. The MOW engineers should select a more usable planning format. We do not like the method now being used, a (sequential numbering system). We recommend that one of the planning engineers develop a more meaningful inventory numbering system.

As recommended elsewhere, we feel that Mr. Lawrence should fininsh his tour, and at that point the Ministry of planning should carry out adjustments and fine tuning of the management system. If the Ministry management has the fortitude to carry out a management system the existing people assigned to the planning bureau should be able to carry out the technical details of adjusting the plan.

5. EQUIPMENT MAINTENANCE COMPONENT

The project, as designed, projected a substantial improvement in the performance of the district shops. In order to realize this improvement, technical assistance and tool support was funded under the Project. Each of these is evaluated below. An additional input is required in order to realize targets. Of most urgent need is the improvement of the Cayo and Punta Gorda shops. Neither of the existing shops provide acceptable work space. The G.O.B. should provide good shop space for each of these districts. To do otherwise is to waste resources and waste the opportunity for proper utilization of project inputs.

The distribution of A.I.D. supplied tools is not complete. Some district shops are short major items of their proposed shop tool upgrading. For instance, two shops, Cayo and Orange Walk has not been allocated its master tool set. Belize District has been allocated a smaller tool set which is missing more than thirty pieces Five master tool sets must be at the central shop. Belize District has not received their steam

cleaning unit. A complete follow-up should be instigated to assure that all tools are sent to the district shops, and not short-stopped by the Belmopan shop.

PET evaluation of both the proag and the project paper clearly indicate that tools for equipment maintenance were to be procured for the district shops and that the technical assistance to be provided under the project was to support the district shops. It appears, that both the project manager and the Ministry feel that the district shops are entitled to certain project tools which were supplied for, and intended to be delivered to the district shops. By withholding tools from certain shops the project not only loses the opportunity to do maintenance training with equally equipped district shops, but there is also a strong probability that the attitude of those district shops that were shorted in the supply process, might be less receptive to producing and competing with the production of other district shops.

The Ministry should assign tools purchased on an equitable basis to the district shops. If additional tools are required to support the central shop and if the A.I.D. mission staff considers it a worthy cause an agreement between USAID and the GOB should be formalized. Maintenance training and Maintenance Training Assistance should address district needs which will fully employ their efforts. Should the project decide to impact on the capabilities of the central shop the staffing needs of the project should be reviewed and appropriately adjusted to meet these additional technical assistance requirements.

The Mission will have to address the problem of tools distribution with the Ministry at the highest levels since it appears, that those at the working level have been given their instructions as to how the tools will be or will not be distributed.

One or two field sets of mechanic tools should be ordered for each district shop. This will assure that the complete master set is available for shop work, and at the same time provide field mechanics with a set of tools for field use without pre-selection check out of individual tools for each job. The field sets could be checked out and returned to the tool room as a unit, preventing the "Proverbial Plumber" arriving without the proper tools. Consideration should also be given to purchasing a mechanical tire changing unit for each shop if financing can be made available.

We observed no on-the-job training being accomplished by Project Personnel. The equipment specialist has been engaged in other activities such as moving bridges, spare parts, project equipment, and doing handy man jobs. This is not going

to result in any shop training. He, Mr. Cerny, is now working on a continuous schedule of shop support visits. It remains to be seen whether he can and will perform the hands on, and "dirty hands" training required to get this project element accomplished. As recommended elsewhere we believe Mr. Lynch should be assigned prime reponsibility for this work. He is an excellent trainer. We feel Mr. Cushing could take over the bridge inventory - issuing responsibility - and allow Mr. Lynch to organize and carry out the shop training activity. Mr. Cerny should work under Mr. Lynch's direct supervision to assist in this shop training activity.

6. BRIDGE ERECTION/INSTALLATION COMPONENT

At the present time the Project has very limited control of implementation on this element of the project. True, the project controls the bridging materials, however, the bridge construction itself is controlled by the G.O.B. Unless the G.O.B. moves aggressively toward implementing this element the project will show little performance by the PACD. At best this program will have to continue after the current project has been completed.

It is our opinion that no additional bridges should be moved to bridge sites until there is evidence that contracts will be awarded and construction is imminent, the bridge steel should be systematically stockpiled at a central yard - probably Belmopan. To further distribute materials at this time would place materials where they cannot be secured, and may detericrate.

The present site at the port is not acceptable. Materials are not stacked so that they can be dispatched easily. Painting and protection is difficult, and condition surveys of the pieces is nearly impossible. The corrosive exposure, especially for those pieces in areas which do not freely drain, dictates that action be taken now to quickly move all bridging to Belmopan or other central storage. It should be stored on cribbing segregated by unit type or by bridge sets. We recommend sorting by unit type. Some equipment rental will be required for this effort.

Contracts for construction of the bridges should call for the contractor to receive bridge units when needed and move the units to the site. This provides better control of the materials until they are given to the contractor. It also prevents arguments about lost components.

Mission management should press the G.O.B. to move forward with the bridge construction effort. From what we observed no decisive action is taking place now. Not having the time to

explore the constraints to moving ahead with contracting, we are assuming that the G.O.B. is capable of handling those aspects. Mr. Lynch does not have the background to help with design or inspection of the substructure construction. He is very capable of sorting out the jumble of parts in the shipment, and advising on superstructure errection. He has done a very good job of that. Now it is time for others to move the installation phase of the project.

The MOW prior to final Bridge location should assign engineering and survey personnel to evaluate various alternate locations along the river bank to determine which is the most cost effective location in relation to length of span required, abutment and/or pier costs, and alternate road alignment required.

7. EQUIPMENT AND SPARE PARTS

The major pieces of equipment purchased under the project consisted of the following:

Description	Quantity
Caterpillar D-7G Bulldozer	2
Caterpillar 130 Road Grader	4
Caterpillar 120G Road Grader	6
Caterpillar 130 Front End Loader	2
Ford FT8000 Dump Truck	14
Ford F150 Pickup	11
Ford Bronco Wagon	2
Ford Tractors with Bush Cutters	6
USG Excess Property	
Tractor and Low Bed Trailer, 25T	1
Fuel Tanker Truck	2
Water Tanker Truck	1
Rubber Tired Roller (Compactor)	2
Electric Generator, Trailer Mounted	2
Tanker, Trailer Mounted	4

The cost of the above equipment landed in-country was US$2,304,836. In addition to the above list, spare parts and tires amounting to $256,384, and US$107,383 respectively, were purchased to support the above equipment for the life of the project. A rule of thumb for ordering spare parts is ten percent of the value of new equipment and 20 percent or more for excess property equipment as it is used equipment. In the project case the spare parts amount to 11 percent of the value of the equipment. Spare parts usage to date appear normal but

with less than one-third of the projected 300 miles of roads to be constructed/rehabilitated acutally completed, it is difficult to predict total useage with any certainty.

These spare parts are located at the local Belize City caterpillar dealer - CEMCOL - who maintains, controlls and dispenses these parts. The rationale for placing these parts with CEMCOL is that the Mission felt MOW did not have adequate controls and procedures to insure that the spare parts would be properly maintained and available when needed. CEMCOL was charged with ordering the parts, clearing them through customs once they arrived in Belize, transporting them to their facility, placing them in bins, setting up a dispensing and inventory control system and submitting a monthly inventory computer printout to A.I.D. on the status of the spare parts. The spare parts stored at CEMCOL include parts for all equipment, not just caterpillar. CEMCOL charged a small percent of the value of the parts for this service. The only alternative to this was to have the project rent a warehouse, build storage bins, hire a staff to disperse the parts, do the necessary accounting and reporting, and guard the facility. This was felt to be a more costly procedure and the PET is in agreement with the method now in place.

Due to the large quantity of spare parts there was not sufficient space in CEMCOL to build separate bins for the project parts. CEMCOL therefore co-mingled the project caterpillar spare parts with their own caterpillar spare parts. The Ford and other spare parts are however, segregated in one corner of the facility. The co-mingled caterpillar spare parts are identical but are precisely controlled as to quantity purchased issued and quantity on hand by CEMCOL's data processing equipment. The PET made a few cursory checks of the computer printout versus actual parts in the bins and were found to be identical. The PET feels that CEMCOL maintains adequate control of both the co-mingled and segregated spare parts.

Tires are shown under the spare parts budget line item but like fuel, oil and lubricants are expendable property and the PET recommends that it be shown as such. There appears to be an anomaly in the useage of the 10.00 x 20 dump truck tires. The Cayo District CRTU used 121 of these tires while the Belize District CRTU used only 16. Although the Cayo CRTU constructed a lesser quantity of roads than the Belize CRTU, the PET examined the road material that the dump trucks in each equipment spread were hauling over and found that in Cayo's case they were running over a rock that easily split into sharp flinty fragments which are very damaging to tires. The dump trucks have an average of about 25,000 miles on them. Each truck takes ten tires we calculated an approximately 8,000 miles of useage per tire charge.

The PET subsequently spoke to John Roberson of Belize Timber Limited who is cutting and hauling timber over similar material in the Cayo District and he stated that he gets 80 to 90 days from a set of tires. In that period his trucks clock 8,000 to 10,000 miles. The project trucks haul in borrow pits and over haul roads which require more tighten turns than timber trucks and therefore have heavier usage. The PET also inspected the carcasses of about 40 of the discarded dump truck tires and these tires were used to the maximum amount possible and as a matter of fact, exceeded the point where they should have been changed.

In conclusion, the PET weighed all the factors and feel that the heavy tire usage in the Cayo District is an aberration which often happens on construction projects. It appears that the material in the Stann Creek and Toledo Districts where the equipment spreads will be moving to next is less harsh and tire usage should decrease.

However, there will be a significant shortfall in the 10.00 x 20 dump truck tires and the 13.00 x 24 grader tires and a slight shortfall in the other tires. Therefore the present stock of tires is insufficient to complete the project. The PET recommends that the project determine the quantities that will be needed to complete the project and immediately purchase what is needed.

The equipment purchased for the construction and maintenance units appears to be appropriate. On certain road segments with longer haul requirements for borrow material it would have been more effective to have additional dump trucks available. However, given the variation in the road rehabilitation program, we feel the overall equipment is appropriate with the exception of the compaction equipment. Each construction unit should have available to it a tractor to pull the roller. Turning this equipment with longer hauling units requires so much space that in most areas it is not possible to compact with the equipment available on site. Consideration should be given to utilizing the farm tractor supplied with the mowing unit by taking off the mowing attachments during the period of time the construction unit is in the district and assigning that tractor to the construction effort. If this is not possible, the Ministry should provide a farm tractor to be utilized on each unit when embanking material or placing select surfacing.

The Bridge Erection Specialist is greatly hampered by the lack of lifting and hauling equipment assigned specifically to him. He has been using the project's low-bed trailer and tractor which was originally procured to haul CRTU equipment from various road sites throughout Belize. However, when the scope

of the project was expanded to include 103 bridge sets to be hauled to 55 different river crossings the low-bed's role increased dramatically. To date, the low-bed has been involved in project hauling be it construction equipment or materials, some 25,000 miles.

Unfortunately, the advent of the project bridges has forced the low-bed into "double duty" and has caused logistic bottlenecks due to high demand for its services. With less than 15 percent of the total bridges delivered on site and both CRTU spreads involved in District relocations the demand for the low-bed is not expected to slacken.

The size of the bridge steel and components require the use of a crane or other lifting equipment to place them on the trailer and to remove them at the destination. However, no lifting equipment has been bought by the project or assigned to it on a full-time basis by MOW. The Bridge Erection Specialist has been making do by borrowing the Port handling equipment whenever they have slack time but this is not efficient.

There is not enough time to purchase this equipment from the U.S. and the PET recommends that a flat bed truck or another low-boy trailer and tractor and two cranes be rented. With the continued use of the project trailer plus the rental truck the bridge parts can be moved quickly to Belmopan. With a crane at each end to load and unload the material, the Bridge Erection Specialist can be used most effectively and later released for training duties.

8. ROAD MAINTENANCE TRAINING UNIT

This project component is designed to assist the MOW through reorganization, planning, budgeting, road maintenance, equipment procurement, and technical assistance. Training will be provided for one hundred road maintenance workers and will established a permanent national system for the maintenance of Belize's rural road system. This training will assist the MOW to reduce per mile, rural road maintenance costs by thirty-three percent.

The MOW has reorganized and fully accepted the RMTU concept and is a working entity in each of the six districts. The present austerity budget allocations to the MOW - as well as all the other Ministries - for its activities - will make it difficult to maintain Belize's road network. Any decrease in per mile road maintenance cost will be beneficial. The PET determined that the quality of construction was better than that of prior or even present other road construction. Whether or not it will reduce present costs by thirty-three percent is impossible to predict at this time, as little maintenance on already completed project roads has been done to date.

Inspection by the PET of completed roads in the Cayo and Belize Districts revealed significant deterioration of a few roads - for example, the Crooked Tree Road and the Nago Bank Road - which require immediate maintenance by the MOW. The Project has notified the MOW of the roads that need to be mainteined in the Belize District (see Appendix A10) and this should be followed up on, as well as notifiying them of the roads that need maintenance on in the Cayo District.

The PET feels very strongly that the project has been overly ambitious in starting the training aspect of both road construction/rehabilitation as well as road maintenance. There is no question that workers will receive valuable on-the-job training, but with the present level and direction of the technical assistance imput, both road construction specialists must concentrate their full efforts in pushing the road construction/rehabilitation component. That is a full time job in itself and except for private equipment suppliers such as Caterpillar, no formal training is possible. As virtually, all the training is therefore OJT, individual operators or drivers cannot be comparatively evaluated to determine the efficacy of the training. Neither is there any periodic training reinforcement or upgrading of project personnel.

The PET feels that at least as far as the present direction of the project is concerned this is a road and Bridge construction/rehabilitation and equipment maintenance project with the secondary benefit of on-the-job training of MOW personnel. To have a serious training component would involve a considerable increase in technical assistance and funding. It does appear that the Project is attempting a formal approach in training of equipment mechanics. This will be discussed more fully in the equipment maintenance section of the evaluation.

9. CONSTRUCTION PROGRESS AND PROJECT PACD

As of June 30, 1985 almost eighty-one miles of road had been constructed/rehabilitated plus an additional ten miles in July. The total number of miles to be completed by the end of project is three hundred. The number of miles completed is lower than projected (80 miles by January, 1985) and can be attributed to the greater than normal rainfall which exceeded historical averages in most areas of the country. Although Construction and Rehabilitation Unit was fully staffed and equipped by November, 1984, the project was able to complete only 80.8 miles by June 30, 1985. Given the November, 1984 start it would be unrealistic to expect an eighty mile completion in any event. During the dry months each of the two CRTU equipment spreads are capable of construction/rehabilitation eight miles of road per month but only 2 1/2 miles during

the average rainy months. Normally, December through April are relatively dry with the rains commencing in May and tapering off in November. Based upon normal rain projections, the project should be able to construct approximately 260 miles by the end of the project - January 1, 1987-. However, the rainfall in 1985 has been very eratic and projections based upon historical data should be viewed with caution. For example, for the quarter ending March 31, 1985 - a normally dry period - the project was only able to construct/rehabilitate 17.5 miles, yet the following quarter - a normally heavy rainfall period - the project completed 45.9 miles. Another factor which must be taken into consideration is the degree of difficulty and the areas that the project will be moving into. The four remaining districts that the project has yet to begin operations in are relatively easier than the Cayo District which has impeded overall progress. They are also normally drier areas. It may be possible to complete road construction/rehabilitation by the PACD but is too speculative at this date. The PET feels that the project is about six months behind schedule and a reasonable PACD is projected at July 1, 1987.

Bridge construction which is the responsibility of the MOW has yet to begin except for the excavation for the abutments of one bridge in the Stann Creek District. All bridge construction will be let on competitive bids which entails the preparation of designs by the MOW, advertising for bids, bid evaluation, award, contracting, etc. Even though bridges will be grouped in packages, it is a time consuming process. There are only six to eight contractors in Belize which are capable of constructing bridges and it is doubtful that foreign contractors would be willing to set up operations in Belize for such a small undertaking. No projection can be made at this time as to when all fifty-four (54) bridges will be completed except to say that it will be impossible to accomplish by the PACD. However, this will not greatly affect the utilization of the completed roads as these bridge sites have either an existing bridge, ford, or a by-pass.

It is therefore recommended that project progress be evaluated by the Mission in June, 1986 when a more meaningful projection can be made based upon actual construction.

10. PROJECT FINANCING

Some concern has been expressed as to the adequacy of the initial planning with regard to such items as tire use on the equipment. It should be noted that each geologic area carries with it operational risks such as tire damage. The Cayo District is an example of an area where not only construction equipment of the project but other heavy equipment have

experienced high tire wear. Other districts within Belize may also have areas where high tire abuse will be experienced. We have projected tire needs to the best of our ability given the data that exists now. These estimates may or may not reflect true condition of the terrain where project roads will be constructed, but have attempted to take into account learning experiences to date.

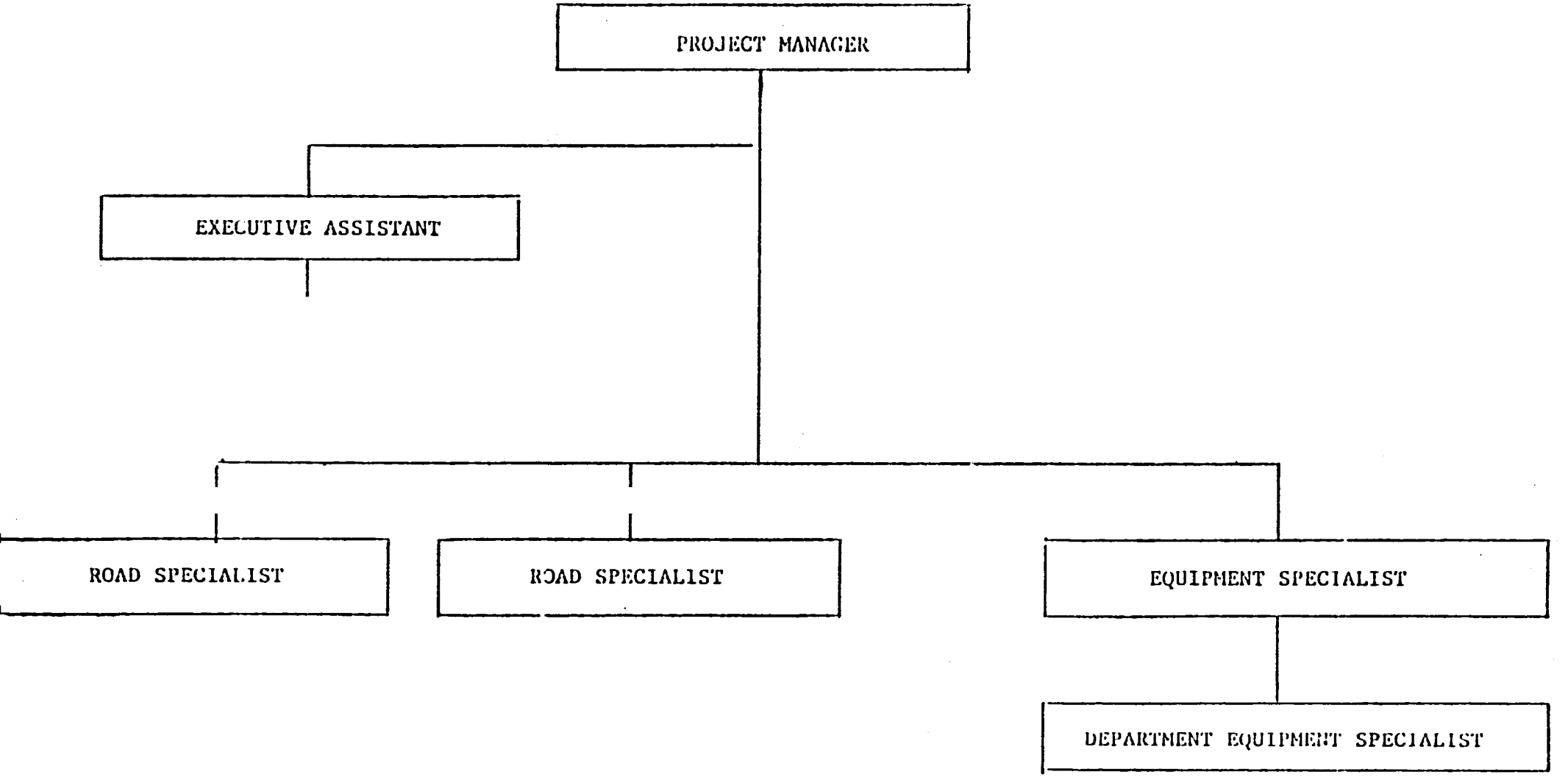
Spare parts projection through July of 1987 again is an estimate of what might be expected over the rest of the project life. Equipment condition appears excellent; however, a major breakdown could occur which would require engine rebuild on a vital piece of construction equipment. This is not expected but could be encountered during the remaining life of the project.

For the above reasons, a major block of remaining project funding has been moved into a contingency line item. Surprises will occur during the rest of the project and the contingency in the project is there to address surprises as they occur. It appears that adequate financing is available to complete the projected work. The recommendations contained items of cost which we recommend be incurred. Minor tool procurement, equipment rental to move bridging, possible rental or purchase of tow vehicles for the rollers and additional culverting are items of expense which may have to be funded from the contingency fund. It appears unwise to have line item budgets for these items. It also would seem unwise to segregate the money by line item budget and remove the flexibility that is intended to support a project of this type through contingency funding. Project personnel and Mission management are commended for the control of project. More flexibility and fast response is recommended in the future.

Below is a budget to reallocate remaining project funds now that major expenses have been disbursed. The project should be given delegation to make purchases for the local economy for day-to-day needs. A local bank account could be established and disbursements accounted for with replenishments made from time to time. Only major purchases should be elevated to Mission management for approval. Too many miscellaneous procurement activities would inundate Mission staff if present approval requirements are continued.

One item of possible large expense may be a requirement for additional cross drainage. Some of the existing completed road sections are not adequately drained. A survey of proposed routes may show a need for additional culverts and a mix of sizes.

Table 1


PROJECT MANAGER
EXECUTIVE ASSISTANT
ROAD SPECIALIST
ROAD SPECIALIST
EQUIPMENT SPECIALIST
DEPARTMENT EQUIPMENT SPECIALIST

BALANCE AS OF 7/31/85	RECOM. ADJ. TO LINE ITEMS	AVAILABLE BUDGET AS OF 9/1/85	ADJUSTED PROJECT BUDGET
28,600	+136,517	165,117**	1,773,647
125,916	-125,916	-0-	2,304,836
(16,457)	+76,457	60,000	423,767
673	-673	-0-	199,327
334,188	-334,188	-0-	561,892
(30,573)	+30,573	-0-	455,220
40,890	+168,861	209,751	209,751
35,521	-35,521	-0-	-0-
41,756	-36,621	5,135**	101,049
-0-	+120,511	120,511	120,511***
560,514		560,514	6,150,000

of Five Persons to 7/1/87
ter of $107,383 was charged against spare parts
for project is therefore $227,894.

V. CONCLUSIONS AND RECOMMENDATION

The overall conclusion of the project Evaluation Team (PET) is that the project is basically well conceived, progressing as well as can be expected and the quality of work is good. This does not mean that the project is without any flaws, however, they are correctable at this point in time.

First we would to address the training aspect of the project. When reviewing the project inputs the PET feels that any training that the Maintenance or Construction/Rehabilitation personnel get will be no more than they would get on any force account construction project. The advisors are, and will be, so busy running the construction/rehabilitation teams that it is impossible for them to provide any meaningful formal training. This is not meant to denigrate on-the-job training which is invaluable and, is how most construction people start their training. What we are saying is that the two major elements are not Construction/Rehabilitation Training Units and Road Maintenance Training Units which implies that the focus is on training. Rather, they are Construction/Rehabilitation Units and Maintenance Units which provide the Ministry of Works (MOW) personnel through on-the-job training.

This may seem to be a fine distinction but is an important one and should be recognized as such. If the Mission and the MOW feel that formal training is a vital component of the project then additional advisors in these areas must be brought in. If not, then the Project Agreement should be amended accordingly. However, the training of the MOW district workshop personnel (Equipment Maintenance Component (EMC)) within the existing advisory team can be effected with no additional personnel.

Although the project is behind the Project Paper (PP) schedule, the PET feels that the schedule was overly optimistic. This was also pointed out at the DAEC Project Paper review and it is remarkable that the project got off the ground as quickly as it did. Not considering the Bridge Erection/Installation Component (BEIC) which is completely dependent upon the MOW and its contracting procedures, the project is about six months behind schedule. This is due primarily to extremely erratic rains which probably should have been allowed for as a contingency time element of the planning schedule.

Recommendation: Conduct a Mission in-house evaluation of the project in July, 1986 to determine a realistic PACD based upon progress at that time.

In the area of project administration the PET felt that although the advisory team project manager was responsible for the success or failure of the project he lacked authority in certain areas.

Recommendation: Individual advisory contracts be amended to reflect that advisors report directly to the advisory team project manager.

Recommendation: The advisory team project manager be delegated the authority to purchase day-to-day items that are stipulated in the approved budget. Possible, some sort of revolving fund or reasonable dollar top limit could be established.

Recommendation: The adivsory team project manager should delegate a succinct portion of his responsibility to project personnel to enable him to have more time with his counterparts and other meaningful tasks rather than be bogged done with project minutiae.

There are other administrative and personnel changes within the advisory team which PET feel would improve the effectiveness of this project component.

Recommendation: The title "Deputy Project Manager" is a misnomer as duties are that of an "Executive Assistant". The job description and title should be changed as such. He should also be delegated the responsibility for assigning bridges selected by the advisory team project manager, maintain an inventory of the bridge sets and parts, assist the Bridge Erection Advisor in the movement of the bridge sets to Belmopan, and coordinate the allocation of these bridge sets to sites selected for construction.

Recommendation: Phase out Mr. Lynch's services as the Bridge Erection Advisor when practical, in order that he be made available for district equipment maintenance personnel training.

Recommendation: If the other PET recommendations concerning Mr. Cushing and Mr. Lynch are implemented, the present Equipment Training Specialist (Mr. Cerny) will be completely free of his present other miscellaneous duties. He then should be assigned to assist and report to Mr. Lynch who will have overall responsibility for district shop equipment maintenance personnel training.

The quality and construction progress given the delays due to the unusual rain pattern is acceptable and within the guidelines of the PP. The lack of prompt acceptance in some

instance for maintenance of the completed roads by the MOW, although just beginning, should be brought to the immediate attention of the MOW before it becomes a serious problem.

Recommendation: The AID Representative should address this in a letter to the MOW stressing the importance of immediate maintenance of all roads in the rainy season, together with a list of those roads requiring immediate action.

The criteria and process by which roads are evaluated and selected are quite good except that feeder roads are evaluated on an individual basis rather than as a road network. This can result in a very high priority road "dangling" at the end of a very low-priority road, and could result in a road being contructed/rehabilitated but the road leading into it being in poor condition.

Recommendation: Examine the process and revise the criteria so that roads are evaluated on a network basis.

While the overall work planning by MOW management is certainly commendable if for no other reason than that it is their first real attempt, it is not a management tool as yet. At this stage the computer program is merely a shopping list of work to be done and does not reflect the actual budget allocated to the MOW by the GOB. An affective program would show management what work can and is being done with the actual funds allocated. The districts can then be evaluated on the effectiveness of their personnel and use of equipment.

Recommendation: Between now and the end of his contract the Management Specialist should concentrate his efforts on reviewing and updating his computer management program to make it a meaningful management tool not only for the MOW central office, but the district field personnel as well.

Recommendation: Working with the Management Specialist and the district personnel, revise the program to reflect the actual budget allocations actually received so that performance can be measured against actual work performed.

The present MOW road inventory system does not follow generally accepted criteria. The result is that in essence, one must memorized the entire road members or continually refer to a master road plan.

Recommendation: The MOW planning engineers should establish a road numbering plan which follows a generally accepted system.

While equipment maintenance capability has improved, there are serious defects which must be corrected before there can be an uniform substantial improvement in the performance of the district maintenance facilities. The existing work shops in Cayo and Punta Gorda are so small and run down that it is almost impossible to do any effective maintenance. It appears that the central shop at Belmopan filled their own needs first before they issued the AID supplied tools and equipment to the district shops. This is contrary to the PP and the Project Agreement (PA) which stated that the tools and shop equipment were to be procured to support the district equipment repair shop.

Recommendation: The Mission should request that the MOW submit to AID the exact allocation of the tools and shop equipment. Any tools and shop equipment that were directed to the central facility be redistributed to the district equipment maintenance shops. If the Mission feels that the support of the MOW central shop is vital to the project, then the tools and shop equipment which are required for this support should be purchased and the PA amended accordingly

The present bridge storage site at the Belize City Port is unacceptable. Material are not stacked and segregated so that they can be identified and easily dispatched. Some of the steel is lying only a few feet from the ocean and is subject to salt water which is very corrosive. There is already evidence of major corrosion on some bridge parts. The Bridge Erection Advisor has done an excellent job in sorting and shipping out what amounts to be a giant jigsaw puzzle. He is greatly hampered by the lack of lifting and transporting equipment. Some bridge sets have been moved to their eventual erection sites but the PET found them already partly overgrown with vegetation and small parts moved to form benches, resting places, etc. The MOW is moving very slowly with the abutment design and bridge erection contracting process which is their complete responsibility.

In one specific case, (the Big Creek Bridge at mile ten, Stann Creek District) there is an expatriate engineer little bridge experience and we understand that he is not a licensed professional engineer. He has apparently erroneously advised the MOW that bridge piling is necessary when in the opinion of the PET (two of which are Licensed Professional Engineer's) a spread footing is all that is required. This bridge is already two months behind schedule with little or no action being taken.

Recommendation: Cease moving the bridge sets to their sites. Immediately move them all to the Belmopan Central Bridge yard

where they can be sorted and aggregrated in bid packages. This will allow precise inventory control and prevent further unnecessary corrosion.

Recommendation: Rent, or otherwise secure two cranes (one at Belize City and the other in Belmopan) to lift and unload the bridge parts and an additional low-boy trailer or flat-bed truck to rapidly move the bridge sets to Belmopan.

Recommendation: As recommended earlier, assign Mr. Cushing to assist Mr. Lynch in the effort which will allow Mr. Lynch to soon transfer to new duties as an equipment maintenance training advisor.

Recommendation: Recommend to the MOW that when the bridge erection contracts are let, the winning contractor is reponsible for the movement of the bridge sets from Belmopan to the erection site.

Recommendation: That Bridge Erection be allowed to continue past the PACD as it is the sole responsibility of the MOW.

Recommendation: Advise the MOW of the findings of the PET concerning the Big Creek Bridge. Suggest that the engineer be given other duties outside the realm of this project.

The type, amount and usage of the construction equipment appear appropriate except for a few minor exceptions for the road construction/rehabilitation and maintenance activities designated in the project. Repairs and spare parts have kept the equipment in excellent condition with little or no down time. Spare parts control and storage are fully adequate. As the equipment is only one year old and is in excellent condition, it is hard to estimate the spare parts requirement at this time. Tire useage is heavier than programmed but the initial estimate was based on an educated guess of what type of material would be encountered. This was their best judgement at that time which the PET cannot fault. Now that almost one third of the roads have been constructed/rehabilitated a more accurate estimate has been made (see appendix A5) based upon actual useage.

Recommendation: Utilize the project farm tractor which was a supplier with the moving unit to pull the compaction roller or have the MOW supply another farm tractor to each equipment spread for this purpose.

Recommendation: Repair manuals for each piece of AID supplied equipment should be sent to each district shop and each CRTU.

Recommendation: Purchase the additional tires as shown in appendix A5. Tires, if any, left over at the end of the project should be aportioned to each of the districts.

Very little maintenance has been done on the completed project roads to date. As the project is in the middle of the rainny season some project roads have seriously suffered from a lack of early preventive maintenance. As mentioned earlier in this section, the PET feels strongly that the Road Maintenance Training Unit title is misleading. It is infact, a Road Maintenance Unit Component which has the secondary benefit of on-the-job training of MOW personnel and should be evaluated as such. Whether or not it will reduce maintenance costs by one/third will be difficult to prove one way or the other as the base data is tenuous at best and also because prior maintenance was obviously insufficient.

Recommendation: As recommended earlier, either change the design of the project to reflect the reality of the Road Maintenance Unit or add sufficient training personnel to effect a true training component.

Recommendation: Also as recommended earlier, inform MOW of the necessity of prompt road maintenance specifying those roads which require immediate attention.

Recommendation: The PET feels that the Advisory team earned the incremental salary raise as allowed in their contracts. This should be effective retroactive to the first anniversary (March, 1985) of this contract. This is vital to the morale of the staff, especially so in view of the stated policy of the U.S. Government employees in 1986. The salary increment should be the same as AID employees in 1985 which was three and a half percent.

Recommendation: Prior to the construction/rehabilitation of a particular road. The MOW should assign qualified personnel knowledgable of that area to determine potential borrow pit areas for selected base and wearing surface material. This will require the assignment of a core sampling rig or backhoe to assist in locating proper material.

Recommendation: The MOW, prior to final bridge determination should assign engineering and surveying personnel to evaluate various alternative location along each river bank to identify the most reasonable location.

APPENDIX
A1

Evaluation Team

The evaluation team was comprised of the following members:

- Mr. Rod MacDonald, P.E., LAC Bureau, Chief Engineer
- Mr. James Gardner, P.E., Consultant
- Gilbert H. Canton, Ph.D., Agriculture Project Manager, USAID/Belize
- Mr. Alex M. Powers, Roads & Bridges Project Manager,USAID/Belize.
- Mr. James Robinson, Head of Roads, Ministry of Works, Belmopan.

Interviews

Interviews were held with the following persons by the evaluation team:

PERSON	POSITION	DATE
Mr. Charles Jenkins	Acting AID Representative	8/19/85
Mr. Alex Powers	Project Manager,RR&B.	8/20/85 8/31/85
Mr. Lennox Sutherland	MOW Superintendant-Belize District	8/19/85
Mr. John Mellen	Caterpillar Dealer	8/19/85
Hon. Charles Wagner	Minister of Works-MOW	8/20/85
Mr. Edgar Puga	Chief Engineer-MOW	8/20/85
Mr. Carl Lawrence	PSC, Management Improvement Component-RR&B.	8/20/85
Mr. Ben Pascascio	Belmopan Workshop Supervisor, MOW	8/20/85
Mr. James Robinson	Head of Roads-MOW	8/20/85
Mr. James Mizelle	PSC, CRTU-RR&B.	8/20/85

Mr. Earl Brooks	MOW Superintendent Stann Creek District	8/20/85
Mr. Gansford Ottley	MOW Superintendent Toledo District	8/21/85
Mr. Edmond Parham	Shop Supervisor Toledo District	8/21/85
Mr. James Cerny	PSC, EMC-RR&B.	8/21/85
Mr. James Blackburn	PSC,CRTU-RR&B.	8/22/85
Mr. Carmen Tabio	MOW Superintendent Cayo District	8/22/85
Mr. Richard Lynch	PSC, BEC-RR&B.	8/23/85
Mr. Mike Usher	Head of Unallocated Stores MOW	8/23/85
Mr. Douglas Cushing	Deputy Project Manager-RR&B.	8/23/85
Mr. John Roberson	Owner - Belize Timber Ltd.	8/26/85
Mr. Carlos Manzanilla	Officer-in-Charge, MOW Orange Walk District	8/27/85
Mr. Eric Flowers	Officer-in-Charge, MOW Corozal District	8/27/85

APPENDIX
A2

EVALUATION ITINERARY
RURAL ACCESS ROADS AND BRIDGES
PROJECT EVALUATION TEAM

DATE	TIME	ACTIVITY
8/19/85	0930	Arrive at Mission, gather project data, meet Acting USAID Representative.
8/19/85	1330	Visit MOW HQ, Belize District. Discussion with district superintendent.
8/19/85	1515	Visit Caterpillar dealer, examine inventory, etc., of spare parts.
8/20/85	0900	MOW HQ, Belmopan. Meeting with Minister of Works and Chief Engineer. Discussion with MIC PSC, Carl Lawrence, visit Belmopan workshop.
8/20/85	1430	Visit CRTU at site on Mullins River road. Also see first bridge site.
8/20/85	1600	MOW HQ, Stann Creek District. Discussion with District Superintendent. Visit district workshop.
8/21/85	0800	Proceed to Toledo District.
8/21/85	1000	Visit proposed project CRTU roads in Toledo.
8/21/85	1045	Visit Toledo District workshop.
8/21/85	1130	MOW HQ, Toledo District. Discussion with District Superintendent.
8/21/85	1430	Fly back to Belize City. Work on Evaluation Report.
8/22/85	0730	Proceed to Cayo District. Visit roads rehabilitated on the way.
8/22/85	0930	MOW HQ, Cayo District. Visit workshop. Visit Cristo Rey Road. Discussion with District Superintendent.

8/22/85	1300	Visit Barton Creek Road where CRTU is presently working. Discussion with PSC Blackburn. Return to Belize City.
8/23/85	0800	Visit Belize port, site of bridge storage. Discussion with PSC R. Lynch.
8/23/85	0945	MOW unallocated stores. Discussion with Mike Usher, Storekeeper.
8/23/85	1300	Work on first draft of Project Evaluation Report. Impression discussion with Acting AID Representative.
8/26/85	1430	Visit workshop, Belize District.
8/26/85	0800	Work on first draft of Project Evaluation Report.
8/27/85	0800	Proceed to Orange Walk and Corozal Districts. Visiting Crooked Tree rehabilitated road on the way.
8/27/85	1000	MOW HQ, Orange Walk District. Discussion with District Superintendent. Visit workshop.
8/27/85	1130	MOW HQ, Corozal District. Discussion with District Superintendent. Visit workshop.
8/27/85	1300	Proceed to Belize City along Old Northern Highway, visiting roads rehabilitated in Belize District.
8/28/85	0800	Work on first draft of Project Evaluation Report. Conduct interviews with PSCs on Project.
8/29/85	0800	Finalize first draft of Project Evaluation Report. Conduct final interviews. Visit road network Bermudian Landing, Rancho Dolores, Lemonal and Bridge Sites therein.
8/30/85		Leave Belize.

APPENDIX
A3

Road Selection Criteria

The Project addresses Belize's Rural Access Roads, which serve existing farm communities. The focus is directed on upgrading these existing roads to all-weather status consequently improving the rural standard of living. The project is not concerned with constructing new roads, except in the special case where an old road needs re-alignment.

In the road selection process, roads to be rehabilitated are nominated for selection in consultation with District MOW personnel if the following nomination criteria are met:

1. The nominated road segment must connect an agricultural settlement to all-weather main roads (e.g., Northern Highway, Southern Highway, Western Highway, and the Hummingbird Highway), or to existing all-weather community access roads.

2. No road segments can be nominated which pass through environmentally sensitive areas, including forest preserves, national parks, or nature preserves. Transit can be permitted in these areas only when a completed protection plan, drawn up in cooperation with MNR is presented to the Road Priority Committee and subsequently accepted.

3. Roads must serve agricultural areas in which small family farms are already established or where government-owned or private farms permanently employ a substantial number of resident workers.

Once the roads which meet the nomination requirements are depicted, each road is then surveyed and basic economic and social information gathered in each relevant community by the Road Priority Committee. This information is combined with agricultural and land tenure data obtained from MNR and utilized in the procedure for prioritizing the nominated road on a point basis.

The following table lists the ranking criteria and their relative weights.

Category	Measure	Value	Scale	Weight
Economic	Road Cost/ Farm Population	Low	100	20
		Medium	66	
		High	33	
		V.High	0	

	Potential Agriculture Benefit / Cost	High	100	10
		Medium	66	
		Low	33	
		V.Low	0	
	Complemementary Economic and Agriculture Activities	Ongoing	100	10
		Planned	50	
		None	0	
Social	Existing Access to Basic Services	Poor	100	15
		Fair	60	
		Good	10	
	Improvement Expected in Access	High	100	15
		Medium	60	
		Low	10	
	Proportions of Small Farms in Area	High	100	20
		Medium	60	
		Low	10	

The scores obtained for each road segment consequently reflect a 50/50 balance of economic and social considerations. They are based on comparisons of each road segment with the other candidates in a single district, i.e., scores are not compared between districts. This ranked list is then sent to the Project Manager and Project Officer for technical evaluation before it is reviewed by the A.I.D. Representative and the Minister of Works.

To complete the project's objective of three hundred miles of rehabilitated rural access roads, fifty miles were attributed to each district. Therefore, from the ranked road list, the roads with the highest scores that cumulatively add up to approximately fifty miles are selected to be worked. This list is then presented to the A.I.D. Representative and Minister of Works for review and final approval. These roads are then grouped by geographical proximity and the project manager selects the order in which the CRTU will work on the groups.

An example of an approved road selection is provided as follows:

ROAD PRIORITY COMMITTEE

ROAD SELECTIONS FOR TOLEDO DISTRICT

After visiting and evaluating the roads in the Toledo District which met the basic nominiation criteria outlined in the project paper and project agreement, the Roads Priority Committee recommends the following roads to be rehabilitated. Roads are also grouped based on their physical location. Bridges will be placed where appropriate. It is recognized that the engineers on the scene will decide the best order to follow within the confines of this list.

ROAD SEGEMENT	MILES	POP	BRIDGES	POINTS	GROUP
Blue Creek to Aguacate	3.9	157	1?	8900	5
Highway to Laguna	2.8	205	None	8060	1
San Antonio - Crique Jute - San Jose	9.1	763	2	7600	4
San Antonio to Santa Cruz	4.4	349	1	7420	4
Blue Creek to Jordan	3.5	56	?	7350	5
Santa Elena to Pueblo Viejo	2.6	346	1	6970	4
Dump - Mafredi - San Antonio	7.2	1216	None	6810	3
Santa Cruz Rd - Crique Lagarto	1.5	60	None	6600	4
Santa Cruz - Santa Elena	2.4	177	1	5920	4
Southern Highway - San Marcos	1.6	70	None	5850	1
Southern Highway - San Felipe	3.0	134	None	5510	1
Mafredi to Blue Creek	7.4	145	1?	4410	5
	49.4	3678			

Through the ranking analysis the Committee believes that these roads are the best initial choices from a social, economic, and engineering viewpoint.

G.H. CANTON - ROAD PRIORITY COMMITTEE

APPROVAL - HON. CHARLES WAGNER
MINISTER OF WORKS

APPROVAL - MR. CHARLES JENKINS
ACTING A.I.D. REPRESENTATIVE

APPENDIX
A4

BASELINE DATA

As mentioned in the Amplified Project Description, Annex 1 of the Project Agreement, the ultimate goal of this project is to increase Belize's agricultural production through the rehabilitation and maintenance of all-weather rural access roads and bridges. Its purpose is to increase the capability of the GOB to build, maintain and protect its rural access road inventory through training, technical assistance and equipment procurement. By the end of the project, it will have assisted in substantially improving the all-weather access of Belizean farmers to markets, sources of necessary agricultural inputs, and basic human services; thereby enhancing the prospect of expansion of the agricultural sector in Belize. This necessitated the compilation of relevant baseline data to measure project accomplishment against goals and also assist in the social and economic manipulations in the road selection process for each district.

The following data was gathered by the Road Priority Committee at the onset of the project.

1. An inventory of farm roads as compiled by the MOW Roads Division. Included was road length, surface type and width, average amount of daily traffic (AADT) and primary function.

2. An agricultural potential survey conducted by the Extension Department of the MNR for each of the farm roads in all districts depicted by MOW inventory in (1) above. The Extension Department ranked these roads according to their perceived agricultural potential.

3. A road priority data form for each road segment, which includes:

   a. length;

   b. number of bridges;

   c. number of communities served;

   d. total population and number of households served;

   e. road condition (impassable, dry-weather only, all-weather);

f. date of last major maintenance and when the road was constructed;

g. type and frequency of public transport, and number of vehicles in each community;

h. transport costs to market for passengers as well as cargo;

i. location of and travel time to the nearest hospital, agricultural station, post office, primary and secondary schools, police station, agricultural market, health clinic, agricultural extension office, bank and legal services.

j. number of stores along road segment;

k. when the village was founded;

l. existing or planned development projects in the area;

m. location, if any, of nearby forest preserves or other fragile areas;

n. breakdown of activities of the population, e.g., % farmers, % logging, % fishing, etc.;

o. form of land tenure (own, lease, etc.);

p. breakdown of land into largeholdings, smallholdings, undeveloped land, etc.;

q. land classification in general terms as to agricultural potential, e.g., good, fair, poor, unusable.

r. present agricultural usage, i.e. subsistence and cash crops, milpa versus mechanized, etc.

4. In conjunction with the data collected in (3) above, the RPC also compiled a list of complementary field notes where appropriate.

5. Miscellaneous backup data such as population census, land tenure and complete road inventories as availability permitted.

6. Road cost estimates for each road segment, provided by the Project contractor.

In order to fulfill the goal and purpose, this Project has set a number of objectives to be achieved through implemenation of this Project. They include:

1. Rehabilitation of 300 miles (or 27%) of Belize's rural roads.

2. Reduced costs per mile for rual road maintenance by 33%.

3. Reduced costs per mile for rural road construction by 50%.

4. Training of over 150 foremen, equipment operators and laborers in rural road construction and rehabilitation.

5. Training of 100 road maintenance workers.

6. Training of 75 equipment shop mechanics and allied tradesmen.

7. Establishment of an improved internal management and control system for the MOW.

8. Establishment of a permanent, national system for the maintenance of Belize's rural road system.

9. Preparation of a national rural access road inventory.

To evaluate the project progress in accomplishing these objectives, additional baseline data is required. However, data concerning rural road construction and maintenance cost from MOW prior to project implementation was sketchy, thus shadowing its reliability. As part of the project management improvement component, this data was to be compiled from historical records. Again, the value of the source information that the unit cost data is to be compiled from is questionable.

Baseline data on skill of the road constructior and maintenance crews as well as the management and control systems prior to the project implementation was not officially compiled, but is addressed in the Project Rationale Section of the Project Paper.

APPENDIX
A5

ESTIMATES OF TIRES NEEDED FOR PROJECT COMPLETION (PACD 7/1/87)

1. Dump Truck Tires - 10.00 x 20

A. Assume each of the District RMTU's will have two additional tire changes over the remaining life of Project. Suggest that they be limited to that.

6 Districts x 2 Changes x 10 Tires/Truck	120

B. Assume each CRTU's will have two changes of tires per truck per year and that project will last two more years.

2 Spreads x 2 Changes x 2 years x 10 Tyres/ Truck x 4 Trucks/Spreads	320
C. Less on Hand	-58
Total required to Purchase	382

11. Grader Tires - 13.00 x 24

A. Assume each of the District RMTU's will have two additional tire change over the remaining life of the project. Suggest that they be limited to that.

6 Districts x 2 Changes x 1 Grader/Dist x 6 Tires/Grader	72

B. Assume each CRTU's will use nine tires per grader per year and that project will last two more years.

2 Spreads x 2 Graders x 2 years x 9 tires/year	72
C. Less on hand	-18
Total required to purchase	126

111. Loader Tires - 17.50 x 25 - (CRTU's only)

A. Assume each loader will have one tire change per year and that the project will last two more years.

2 Loaders x 4 Tires/Loader x 2 Years	16

B. Less on Hand -2

Total required to Purchase 14

IV. Pickup Tires - R235 (75R15)

A. Assume each advisor will have one tire change per year over the next two years except for DPM who will have one change over life of project, and management advisor who do not require additional tires.

2 years x 1 Change/Year x 5 ADV's x 4 Tires/PV 40
2 years x 1/2 Change/year x 1 ADV's x 4 Tires/PV 4

Total require to purchase 44

B. Assume each of the district RMTU pickups will have one tire change per year over the next two years.

6 PU's x 4 Tires/PU x 2 years 48

C. Less on Hand -81

Total need to Purchase 11

V. Cost

Tire Size	Quantity	Unit Price US$	Total
10.00 x 20 plus tube	382	215.00	82,130
13.00 x 24 plus tube	126	255.15	32,149
17.50 x 25 plus tube	14	414.15	5,798
R235(75R15)	11	39.47	434
	Total		120,511

Alternative Tire Requirement Based upon a PACD of 1/1/87

A.	Dump Truck Tires - 10.00 x 20	
	6 Districts x 1 1/2 Changes x 10 Tires/Truck	90
	2 Spreads x 2 Changes x 1 1/2 years x 10 Tire/Truck x 4 Trucks/Spread	240
	Less on Hand	-58
	Total required to Purchase	272
B.	Grader Tires - 13.00 x 24	
	6 Districts x 1 1/2 Changes x 1 Grader 6 Tires/Grader	54
	2 Spreads x 2 Graders x 1 1/2 years x 9 Tires/year	54
	Less on Hand	-18
	Total required to Purchase	90
C.	Loader Tires - 17.50 x 25	
	2 Loaders x 4 Tires/Loader x 1 1/2 years	12
	Less on Hand	2
	Total required to Purchase	10
D.	Pickup Tires - R235/75	
	1 1/2 years x 1 Change/ year x 5 Advis. x 4 Tires/PU	30
	1 1/2 years x 1/2 Change/year x 1 Advis. x 4 Tires/PU	3
	6 PU's x 4 Tires/PU x 1 1/2 years	36
	Less on Hand	-81
	Total Surplus	12
	Total required to Purchase	0

E. Cost

10.00 x 20:	272 x $215.00	58,480
13.00 x 24:	90 x $255.15	22,963
17.50 x 25:	10 x $414.15	4,142
R235 (75R15)	0 x $39.47	-0-
Total		85,585

	BALANCE AS OF 7/31/85	RECOM. ADJ. TO LINE ITEMS	AVAILABLE BUDGET AS OF 9/1/85	ADJUSTED PROJECT BUDGET
	28,600	+136,517	165,117**	1,773,647
	125,916	-125,916	-0-	2,304,836
	(16,457)	+76,457	60,000	423,767
	673	-673	-0-	199,327
	334,188	-334,188	-0-	561,892
	(30,573)	+30,573	-0-	455,220
	40,890	+168,861	209,751	209,751
	35,521	-35,521	-0-	-0-
	41,756	-36,621	5,135**	101,049
	-0-	+120,511	120,511	120,511***
	560,514		560,514	6,150,000

of Five Persons to 7/1/87
er of $107,[illegible] was charged against spare parts
or project is therefore $227,894.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Rural Access Roads & Bridges 505-0007

DISPLAYED ON THIS OFFICIAL FORM WHICH CAN BE USED AS AND TO ORGANIZE DATA FOR THE PAR BELOW. IT NEED NOT BE RETAINED OR SUBMITTED

Life of Project: From FY 83 to FY 8
Total U.S. Funding $5,600
Date Prepared: [illegible]

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: (A-1)	Measures of Goal Achievement: (A-2)	(A-3)	Assumptions for achieving goal targets
To increase Belize's agricultural production through the rehabilitation and maintenance of all-weather rural access roads and bridges.	Increased natl. agricultural output by 10% in real terms between 1984 and 1990.	National accounts data	Agricultural developme continues to be sector priority of GOB.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Rural Access Roads & Bridges 505-0007

Life of Project: From FY ___ to ___
Total U.S. Funding: ___
Date Prepared: ___

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Outputs: (C-1)	Magnitude of Outputs: (C-2)	(C-3)	Assumptions for achiev
1) Rehabilitated rural access roads 2) Rural access roads maintained at lower costs. 3) Rural access roads constructed lower costs. 4) Permanent national system of maintenance 5) Office of planning and budget. 6) Training for maintenance. 7) Training for reconstruction	1) 300 miles rebuilt 2) Maintenance costs reduced to $2000 per mile 3) Costs reduced 4) District plans and maintenance units in place 5) MCW five year plan/budget in place 6) Two spreads of equipment operating in all Districts of Belize 7) All-weather river crossing on the 300 miles of reconstructed roads.	1) Field inspections 2) Cost accounting 3) Cost accounting 4) Document review and MCW organizational chart 5) Plan/budget in place and use for forward operations planning 6) Field inspections 7) Field inspections 8) Field inspection	1) MCW counter employees, and tions in place March 1984 2) Equipment pr per project pla 3) MCW office o ing and budget blished. 4) MCW supports descrete maint operation 5) MCW maintena plan developed

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: Rural Access Roads & Bridges 505-0007

Life of Project: From FY 83 to FY 87
Total U.S. Funding: $5,700,000
Date Prepared: [illegible]

PAGE

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Purpose (B-1)	Conditions that will indicate purpose has been achieved: End-of-Project status. (B-2)	(B-3)	Assumptions for achieving purpose: (B-4)
...crease the capability of the ... build, maintain and protect ...ral access road inventory ...h training, technical ...tance and equipment procure-	1) Reduced per mile costs for rural road construction. 2) Reduced per mile costs for rural access road maintenance 3) Better planning and budgeting of MOW resources. 4) Proportionately fewer pieces of equipment on "deadline." 5) Reduce the annual maintenance cost of bridges for rural access roads.	1) MOW cost analyses 2) MOW cost analyses 3) Existence of a comprehensive MOW planning, program- 4) MOW equipment situation reports. 5) Inspection of rural access roads and bridges.	1) MOW will assign maintenance operations to a discreet district-level maintenance unit. 2) MOW will create an office of planning and budgeting. 3) MOW will commit its operations to guidance by modern management techniques and planning methods. 4) MOW will develop an equipment management and maintenance system aimed at reduced costs and improved utilization efficiency.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

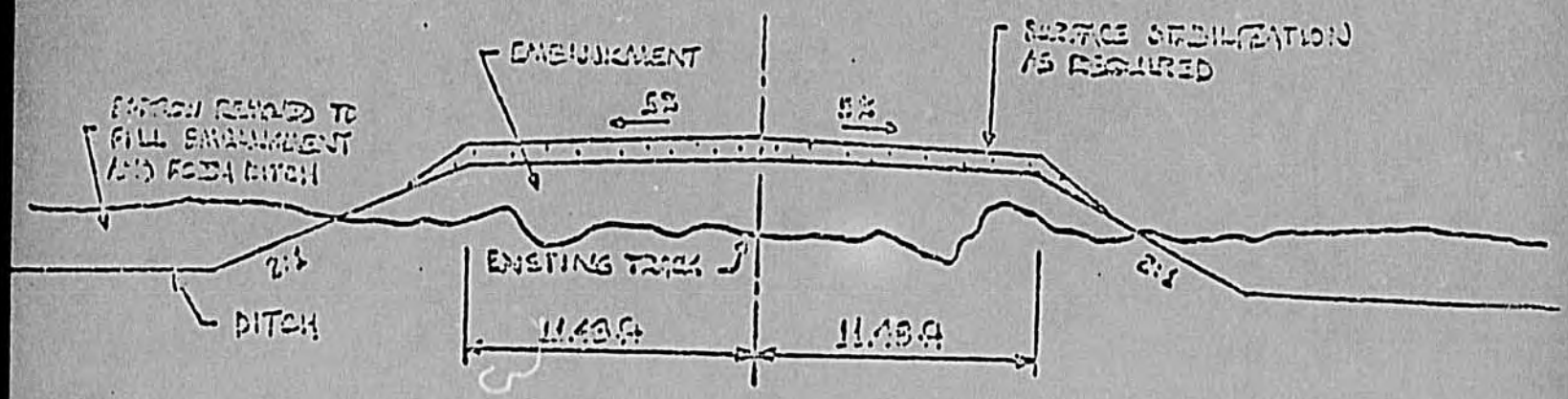
Project Title & Number: Rural Access Roads & Bridges 505-0007

Life of Project: From FY 81 to FY 87
Total U.S. Funding $5,400,000
Date Prepared: 17 Sept. 19

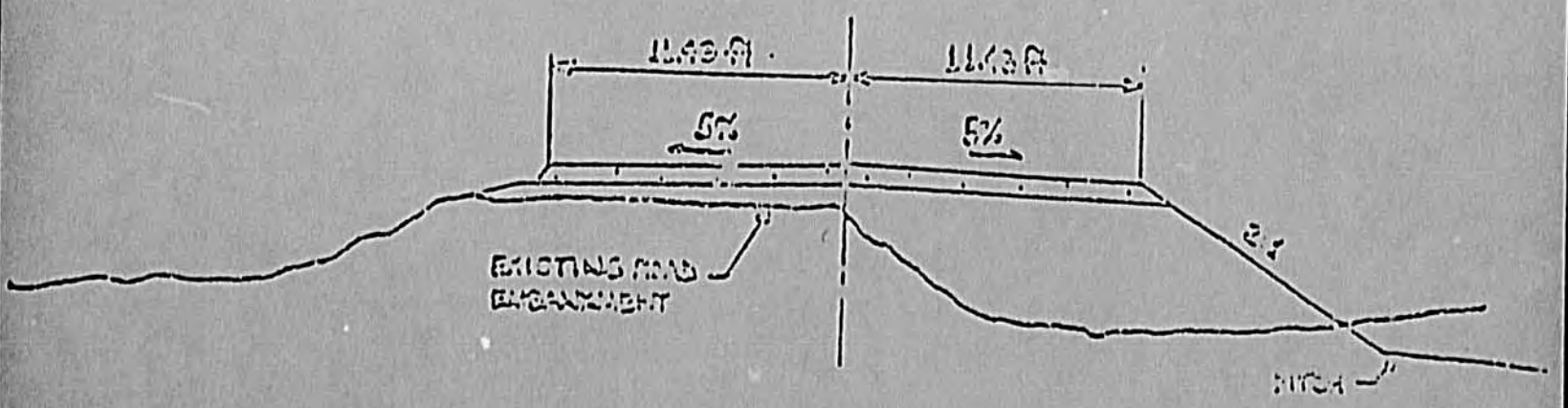
NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Inputs: (D-1)	Implementation Target (Type and Quantity) (D-2)	(D-3)	Assumptions for providing inputs (D-4)
	(95% x 1,000)	Review of project financed records, vouchers, etc.	Inputs are provided in timely manner, no unanticipated delays in meeting CPs set forth in project agreement
Technical Assistance	$1,437,130.00		
Equipment	2,430,752.00		
Spare Parts	347,310.00		
Fuel/Lubricants	400,000.00		
Shop Tools	200,000.00		
Shipping/Transport	1,096,080.00		
Local Labor Costs	850,000.00		
Construction Materials	424,647.00		
Contract Construction Cost	3,000,000.00		
Contingency	87,890.00		
Inflation	68,521.00		
Administrative Expenses	137,670.00		
Total	$10,480,000.00		

APPENDIX A8

MODIFIED MINIMUM U.S. STANDARD
TWO LANE GRAVEL SURFACE ROAD



TYPICAL SECTION OVER OLD TRACK IN FLAT TERRAIN



TYPICAL EMBANKMENT FILL SECTION IN FLAT TERRAIN

APPENDIX A9

Project Implementation Milestones

Item	Date
--- Establishment of Central and District Maintenance Functions.	November 1983
--- Determination of Order and Priority of Districts and Roads for Reconstruction.	January 1984
--- Rural Access Road Maintenance Training Operations Begins at the District Level.	March 1984
--- Maintenance Superintendent Begins to Operate at District Level Improving District Maintenance Operations.	March 1984
--- Beginning of Rehabilitation Training for Rural Access Roads.	April 1984
--- First 80 miles of Rural Access Road Rehabilitation Training Completed.	January 1985
--- First Iteration of MOW Plan Completed	January 1985
--- Cumulative Total of 200 miles of Rural Access Road Reconstruction Training Completed.	January 1986
--- Cumulative Total of 300 miles of Rural Access Road Reconstruction Training Completed.	December 1986
--- Control of Equipment Turned Over to MOW	December 1986
--- Project Activity Completion Date.	January 1, [illegible]

AGENCY FOR INTERNATIONAL DEVELOPMENT
UNITED STATES A. I. D. MISSION TO BELIZE
EMBASSY OF THE UNITED STATES OF AMERICA
BELIZE CITY, BELIZE, CENTRAL AMERICA

July 11, 1985.

Mr. E. Puga
Chief Engineer
Ministry of Works
Belmopan
BELIZE, C.A.

Dear Mr. Puga,

The purpose of this letter is to request that you take necessary action to insure that proper "on going" road maintenance is periodically accomplished, particularly on the roads that have recently been rehabilitated under the Ministry of Works, Roads and Bridges Project.

These are specifically, in Belize District, as follows:-

1. Old Northern Highway to Corozalito
2. Old Northern Highway to Bomba plus causeway to Bomba Village
3. Old Northern Highway to Nargo Bank
4. Northern Highway to Crooked Tree Causeway
5. Burrell Boom to Bermuda Landing
6. Bermuda Landing to Rancho Dolores
7. Bermuda Landing to Lemonal Village
8. Northern Highway to Burrell Boom, where applicable
9. Access haul roads to various aggregate sources servicing above listed roads should also be maintained.

I am well aware that you are familiar with the provisions of the project agreement No.505-0007 which deals with the construction of rural access roads and bridges, however, I would like to include in this letter a few principal references, relating to the general considerations of road maintenance.

<u>Conditions Precedent</u> (Par. 6,(ii) a & c)

a) "District level maintenance office operations - assures the continued maintenance of the roads and bridges repaired, rehabilitated, reconstructed or maintained during the course of the project."

c) and - "Identifies the financial resources and equipment allocated for the implementation of the project."

Covenants

2) "The Government of Belize, after the completion of the project provide adequate funding levels for the district level maintenance offices to continue to carry out maintenance operations".

Par.iii,c,2 of Project Paper, Belize Rural Access Roads and Bridges.

"Each of the six districts, road Maintenance Training Unit. will have a complement of equipment including one grant funded maintenance grader, one grant funded small tractor with brush clearing/mowing attachment, and one grant funded dump truck and one pickup truck"-

"The Maintenance Training Unit (MTU) will follow an operating program and calendar which will specify the location and amount of roads to be maintained."

In order to avoid losing the "New" roads, listed above, recently rehabilitated it is imperative that you again advise your MOW district superintendents of the importance of accomplishing proper road maintenance on the district roads.

My experience has indicated that in order to properly maintained gravel surface roads the following should be accomplished:-

Reshape, periodically, preferably while damp, using road grader or road drag. If surface develops corrugations, it should be scarified and reshaped.

Periodically add additional surfacing (gravel) to replace that worn and washed away.

Dust palliatives may be applied periodically as needed during dry season.

Further to make appropriate repairs to gravel surface roads the following action should be taken:-

- Soft Spots: Remove surface; correct base; subgrade or drainage difficulty; trim and square area; replace and compact surfacing.

AGENCY FOR INTERNATIONAL DEVELOPMENT
UNITED STATES A. I. D. MISSION TO BELIZE
EMBASSY OF THE UNITED STATES OF AMERICA
BELIZE CITY, BELIZE, CENTRAL AMERICA

Repair of soft spots may sometimes be made by adding new layer of surfacing, keeping it maintained while it is being compacted by traffic.

Please contact me if the U.S.A.I.D. roads project team can be of any assistance relating to the proper maintenance of district roads.

Sincerely,

Alex M. Powers, Project Manager,
Rural Access Roads & Bridges Project.

cc: Mr. N. Brashich
Mr. C. Jenkins