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UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D. C. 20523

GUATEMELA

PROJECT PAPER

FARM-TO-MARKET ROADS

AID/LAC/P-230

Loan Number:520-T-040
Project Number:520-0332

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AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE: A (A = Add, C = Change, D = Delete) — Amendment Number: ____ — DOCUMENT CODE: 3

2. COUNTRY/ENTITY: Guatemala

3. PROJECT NUMBER: 520-0332

4. BUREAU/OFFICE: LAC / 05

5. PROJECT TITLE *(maximum 40 characters)*: Farm-To-Market Roads

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 12 DD 31 YY 89

7. ESTIMATED DATE OF OBLIGATION *(Under "B." below, enter 1, 2, 3, or 4)*: A. Initial FY 85 B. Quarter 2 C. Final FY 85

8. COSTS ($000 OR EQUIVALENT $1 =)

A. FUNDING SOURCE	FIRST FY 85 B. FX	C. L/C	D. Total	LIFE OF PROJECT E. FX	F. L/C	G. Total
AID Appropriated Total	2,558	2,324	4,872	3,887	6,113	10,000
(Grant)	(55)	(290)	(335)	(165)	(835)	(1,000)
(Loan)	(2,503)	(2,034)	(4,537)	(3,722)	(5,278)	(9,000)
Other U.S. 1.	--	--	--	--	--	--
Other U.S. 2.	--	--	--	--	--	--
Host Country	--	1,824	1,824	--	11,485	11,485
Other Donor(s)	--	--	--	--	--	--
TOTALS	2,558	4,148	6,696	3,887	17,598	21,485

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	2. Loan	D. OBLIGATIONS TO DATE 1. Grant	2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	2. Loan	F. LIFE OF PROJECT 1. Grant	2. Loan
(1) FN	200	061	061	--	--	1,000	9,000	1,000	9,000
(2)									
(3)									
(4)									
TOTALS						1,000	9,000	1,000	9,000

10. SECONDARY TECHNICAL CODES *(maximum 6 codes of 3 positions each)*: 245 251 011 012 019

11. SECONDARY PURPOSE COD: 264

12. SPECIAL CONCERNS CODES *(maximum 7 codes of 4 positions each)*

A. Code	BR	BL	BS				
B. Amount							

13. PROJECT PURPOSE *(maximum 480 characters)*

To expand the network of all-weather farm-to-market roads in the Guatemalan Highlands and to institutionalize a national program to construct and maintain these roads using low-cost, labor-intensive methods.

14. SCHEDULED EVALUATIONS: Interim MM 12 YY 87 — Final MM 12 YY 89

15. SOURCE/ORIGIN OF GOODS AND SERVICES: [X] 000 [X] 941 [X] Local [X] Other *(Specify)* CACM

16. AMENDMENTS/NATURE OF CHANGE PROPOSED *(This is page 1 of a ____ page PP Amendment.)*

Controller
USAID/Guatemala

17. APPROVED BY — Signature: [signature] — Title: Director, USAID/Guatemala — Date Signed: MM 03 DD 20 YY 85

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM DD YY

AID 1330-4 (8-79)

Project Authorization

Name of Country: Guatemala

Name of Project: Farm-to-Market Roads

Number of Project: 520-0332

Loan Number: 520-T-040

1. Pursuant to Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Farm-to-Market Roads Project Amendment for Guatemala involving planned obligations of not to exceed NINE MILLION UNITED STATES DOLLARS IN LOAN FUNDS ("Loan") and ONE MILLION UNITED STATES DOLLARS IN GRANT FUNDS ("Grant") over a one year period from date of authorization, subject to the availability of funds in accordance with the A.I.D. OYB allotment process, to help in financing foreign exchange and local currency costs for the Project. The planned life of the Farm-To-Market Roads Project is five years from the date of initial obligation.

2. The Project ("Project") consists of assistance to expand the network of all weather Farm-To-Market Roads in the Guatemalan Highlands and to institutionalize a national program to construct and maintain these roads using low-cost, labor-intensive methods. The Project will achieve this purpose by financing the construction of about 800 kilometers of access roads benefiting about 150,000 highland inhabitants.

3. The Project Agreement, which may be negotiated and executed by the officer to whom such authority is delegated in accordance with A.I.D. regulations and delegations of authority, shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate.

A. Interest Rate and Terms of Repayment:

The Government of Guatemala (GOG) shall repay the Loan to A.I.D. in U.S. Dollars within twenty-five (25) years from the date of first disbursement of the Loan, including a grace period of not to exceed ten (10) years. The GOG shall repay to A.I.D. in U.S. Dollars interest from the date of first disbursement of the Loan at the rate of (i) two percent (2%) per annum during the first ten (10) years, and (ii) three percent (3%) per annum thereafter, on the outstanding disbursed balance of the Loan and on any due and unpaid interest accrued thereon.

B. Source and Origin of Goods and Services (Loan):

Goods and services, except for ocean shipping, financed by A.I.D. under the Loan shall have their source and origin in the United States, in countries included in A.I.D. Geographic Code 941, and Central American Common Market countries including Guatemala, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the Loan shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States, or of countries that are members of the Central American Common Market including Guatemala, or countries included in A.I.D. Geographic Code 941.

C. Source and Origin of Goods and Services (Grant):

Goods and services, except for ocean shipping, financed by A.I.D. under the Grant shall have their source and origin in the United States, (A.I.D. Geographic Code 000) or in countries that are members of the Central American Common Market, including Guatemala, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the Grant shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.

D. Conditions Precedent to Disbursements (Grant):

Prior to any disbursement, or the issuance of any commitment documents under the Project for any purpose other than technical assistance, the Cooperating Country shall furnish to A.I.D., in form and substance satisfactory to A.I.D., a detailed implementation plan and schedule for the life of the Project, covering Loan, Grant and GOG financed Project activities.

E. Covenants (Grant):

(i) The Cooperating Country shall covenant that, unless A.I.D. otherwise agrees in writing, it will annually update its Life of Project Implementation Plan and Schedule, and have such update completed and available to support the Ministry of Communications, Transportation and Public Works's budget submission to the Ministry of Finance by May of each year.

F. Condition Precedent to Disbursements (Loan):

Prior to the first disbursement under the Loan, or to the issuance by AID of documentation pursuant to which disbursement will be made, the Borrower will, except as the Parties may otherwise agree in writing, furnish to AID in form and substance satisfactory to A.I.D. the following:

i) an opinion of the Ministerio Público acceptable to AID that the Agreement has been duly authorized or ratified by, and executed on behalf of the Borrower, and that it constitutes a valid and legally binding obligation of the Borrower in accordance with all of its terms;

ii) a statement of the name of the person holding or acting in the office of the Borrower and of any additional representatives, together with a specimen signature of each person specified in such statement.

iii) A detailed time phased Project Implementation Plan showing project activities beginning 120 days from the signing of the Project through the end of calendar year 1986.

G. Convenants (Loan):

i) The cooperating country shall convenant that for each year of the Project that the implementing entity will complete or up-date Project implementation plans by the end of May of each year.

ii) The cooperating country shall convenant to provide coordination between the Ministry of Public Works and the Ministry of Agriculture in the selection of roads to be constructed such that:

a) roads will be constructed in areas where AID financed agricultural projects have been completed or are planned, or

b) roads will be constructed in areas which have other agricultural projects, in place or planned, which enhance small farmer production.

H. The $9.0 million Loan and the $1.0 million Grant are applicable to costs incurred subsequent to January 1, 1985 needed to finance project activities.

Charles E. Costello
Director
USAID/Guatemala

DATE: March 19, 1985

0332 Farm-To-Market Roads Project Paper

Executive Summary

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Executive Summary

The goal of the Project is to improve income, productivity, and the quality of life of Guatemala's small farmers. During the four year life of the Project, an estimated $10.0 million will be spent in the construction or rehabilitation of 800 kilometers of farm-to-market roads in the mountainous highlands of Guatemala. The construction of these roads will use significant amounts of unskilled labor provided by the rural communities participating in this program. By the end of the Project more than 150,000 rural inhabitants will enjoy all-weather access to marketing centers. This will provide incentive to increase the production of high value crops. There will also be improved access to health, educational, and agricultural extension services which will result in a better standard of living. In addition, the participating rural farm families will earn more than $8.6 million in direct payment for the approximately 162,000 man-months of unskilled labor required for the construction or rehabilitation of these roads.

The Project has a dual purpose: to expand the network of all-weather farm-to-market roads and to institutionalize a national program to continue the low cost, labor-intensive construction of these roads throughout Guatemala's mountainous regions . In order to achieve these purposes, the Government of Guatemala's current labor-intensive access roads program financed under a prior AID financed pilot effort will be expanded to guarantee a continued level of effort and effective use of resources in the selection, reconstruction, reconditioning, and maintenance of access roads. The proper selection of roads through areas with high agricultural potential or increased farm production as a result of AID financed agricultural improvements, coupled with an efficient, low-cost process to construct these roads, will ensure their economic viability and, thereby, justify a continued Guatemalan commitment to this kind of program.

The maintenance of the 800 kilometers of roads will be undertaken by the AID financed Highland Agricultural Development Project 520-0274 which has been designed to incorporate 200 kilometers of new farm-to-market roads into its program on an annual basis.

The financial resources necessary to carry out the Program are given in the Illustrative Budget below:

TABLE 1 ($000)

	Activity	Loan	Grant	GOG
1.	Unskilled Labor	4,141	--	4,473
2.	Heavy Equipment and Construction Materials	4,278	--	3,412
3.	Regional Centers Construction	250	--	232
4.	Administration Overhead	--	--	3,368
5.	Construction Supervision	--	400	--
6.	Environmental Training	--	100	--
7.	Training/Promotion	--	150	--
8.	Access Roads Inventory	--	150	--
9.	Evaluations, Audits	--	150	--
10.	Contingencies	331	50	--
	TOTAL	9,000	1,000	11,485

GRAND TOTAL $21,485

4440C

0332 - Farm to Market Roads

I. PROGRAM FACTORS

A. Conformity with Recipient Country Strategy/Programs

The Government of Guatemala 1984-1986 National Development Plan 1/ has, as one of its primary objectives, the general development of the rural population especially in the Highland areas, including agricultural production increases and productivity improvement. Another objective of the plan is the reduction of unemployment and underemployment in the rural areas.

In order to achieve these objectives, one of the basic strategies envisioned by the plan is to improve the infrastructure that supports agricultural production. The construction and maintenance of rural feeder roads has a high priority in the plan. For the transportation sector, the plan includes the construction of these rural access roads with community participation using labor intensive procedures.

On November 9, 1984, the General Directorate of Roads (Dirección General de Caminos - DGC) presented a two hour overview and synopsis of the ongoing labor-intensive access roads program to the Economic Planning Council, the highest GOG economic planning authority. As a result of the presentation, the Planning Council encouraged the DGC to continue the program and expand it to a national level. The construction of rural access roads is viewed by the Planning Council and the GOG as one of the most important means of increasing rural Guatemalan farmers' access to the national economy, and as an efficient mechanism to provide employment opportunities to economically depressed rural populations.

In order to expand the rural access roads program, as well as maintain the current level of agency activities, additional foreign exchange will be required to replace heavy equipment purchased in 1978 to support labor-intensive construction and to purchase additional equipment to keep pace with the expanding program.

B. Relationship to the CDSS

The CDSS maintains three basic problems as the primary obstacles to broad based economic growth with equity in Guatemala: (1) inadequate economic growth levels and highly skewed participation in the benefits of growth; (2) rapid population growth; (3) financial instability and balance of payments deficits. The strategy to address the inadequate level of economic

1/ Plan Nacional de Desarrollo 1984-1986, Secretaría del Consejo Nacional de Planificación Económica.

growth, and spread the benefits of growth, is intended to improve rural incomes and productivity. Improvements in agriculture, the primary source of employment and income, will be the most important means of achieving this objective. The strategy seeks to improve the existing resource base in rural areas, increase efficiency in the use of available resources, and improve the agribusiness system. Improved rural access roads is a major condition for improvement of agriculture in rural areas. The expansion of the rural roads network will provide small rural farmers with access to the national transportation system, improve their access to markets, agricultural inputs, and technical support services of government agencies. The construction of new access roads will contribute to maximizing the use of existing primary roads, accelerating rural development, and increasing agricultural productivity.

Under previous and current AID projects, agricultural areas in the Highlands have benefited from small-scale irrigation and soil conservation measures. As a result, small farmers in these areas have been able to double or triple yields. Poor farm-to-market transportation, however, has sometimes hindered the timely marketing of this increased production at favorable prices. Although the Mission has supported the construcion of rural access roads through the Small Farmer Development Project (520-0233) and its amendment (520-0233A), and is financing the maintenance of these roads through the Highlands Agricultural Development Project (520-0274), the problem of providing the small farmer with adequate access to markets has not been solved. Therefore, to improve market linkages for small farmer production, the proposed Project will concentrate on construction and rehabilitation of additional rural access roads .

In addition to direct benefits to small farmers, the Project will support the Mission strategy of improving the agribusiness system. The current agribusiness system is characterized by: (1) fragmented small producer marketing efforts; (2) poor linkages between growers and processors, and (3) high product losses. To overcome these weaknesses, USAID is carrying out programs to support cooperative production efforts, improve market linkages, provide financing for private sector agribusiness investments, and improve related infrastructure such as rural roads. The rural road network, which is in very poor condition, is a critical element in providing market access and reducing product losses.

The proposed Project will give priority to those areas already benefiting from AID financed crop diversification, small scale irrigation, soil conservation activities, as well as areas to be developed or improved under the Agribusiness Project (520-0276). The Project also responds to the Mission strategy of increasing rural income, since the construction of the access roads will be labor-intensive, providing much needed employment opportunities in the benefited areas.

C. Other Donor Activities

Although various international donors have assisted the Government of Guatemala in expanding, improving, or maintaining its national

road network system, only AID has provided financial assistance for a labor-intensive access roads program.

The Inter-American Development Bank (IDB) recently completed a $25.0 million Earthquake Road Reconstruction Program. The International Bank for Reconstruction and Development (IBRD) is implementing a $17.0 million loan for major highway maintenance scheduled for completion in December 1985. Both efforts involve the provision of equipment for mechanized construction and improvement of larger volume, paved, all-weather roads. Recently the IDB has provided $570,000 to fund technical assistance that will study the feasibility of financing the construction of 500 kilometers of secondary and tertiary roads using heavy equipment and labor. Currently the GOG is obtaining offers from various consulting firms to provide the assistance. Based on the results of the study, the IDB may provide loan funds to finance such construction in the future.

Since the projects financed by the other donors are focusing on the national transportation system (i.e. main highways and paved secondary roads), the AID financed access roads program complements these efforts by providing access to small farm production areas.

II. PROJECT DESCRIPTION

A. Perceived Problem

The 1981 census indicated that 64 percent of Guatemala's population lives in rural areas and that 65 percent of Guatemala's work force is engaged in agriculture.

One of the main constraints to improving the income and productivity of this large rural population has been the lack of an adequate transportation system. In most rural areas, especially in the Highlands, small farmers are often unable to obtain agricultural inputs or market their products because transportation is often not available. When available, it is both expensive and unreliable.

Guatemala has invested in the development of a large and complex transportation network, including primary international highways (such as the Pan American Highway, the parallel South Coast Highway, and highways to ports on both the Atlantic and Pacific) and paved secondary roads that connect the main population centers. However, this network is not supported by a sufficient tertiary and farm-to-market feeder road system. As a result, the majority of small Guatemalan farmers still lack reliable year-around access to markets and agricultural inputs.

Although these small farmers have the potential to increase farm yields, they do not have the incentive to do so; they must still rely on human or pack animal transport over poor foot trails to get their products to market. Poor roads also increase vehicle maintenance costs and lengthen transport time for buses and trucks using the roads. These costs also reduce

truckers' frequency of service and raise freight prices to the small farmer. The rural inhabitants' perception of their own problems fully coincides with the facts mentioned above.

In order to alleviate this problem, the GOG with the assistance of AID, initiated a low-cost pilot, labor-intensive access roads construction program (Project 520-0233) in 1978 to provide small Highland farmers year-round access to the national transportation network. Since its initiation, the program has built more than 707 kilometers of access roads using manual labor supplied by the rural beneficiaries. AID support was increased through a $3.0 million Project Paper Amendment in 1983. In addition, the GOG, with the support of the Highlands Agricultural Development Project (Project No. 520-0274), initiated a national maintenance program to maintain these access roads utilizing the same labor-intensive process developed during the construction phase.

In spite of these initial efforts, most of Guatemala's rural areas are still not serviced by adequate roads. In 1976, it was estimated that at least 15,000 kilometers of foot paths and seasonable trails or roads needed to be upgraded to all-weather access roads to provide adequate transportation to all of the rural population. If this is compared to the 707 kilometers of access roads built between 1978 and 1984, the need for additional investment is evident. Unless a program for constructing, reconditioning, and maintaining low-cost, labor-intensive rural access roads is institutionalized, most of Guatemala's small farmers will remain outside the country's economic mainstream.

B. Project Goal and Purpose

1. Goal

The goal of the Project is to improve the income, productivity, and quality of life of Guatemala's small farmers.

The Project will contribute to the accomplishment of this goal by providing small farmers with all-weather access to marketing centers, agricultural inputs, and technical services. Quality of life will be upgraded by improved access to health, education, and agricultural extension services. Other effects include increased production of high value crops and improved regional mobility of excess rural labor resources leading to more productive utilization of the farm labor force.

In addition, short-term employment opportunities and cash incomes for rural inhabitants will be increased by the use of labor-intensive methods.

2. Purpose

The proposed Project has a dual purpose: 1) the expansion of the network of all-weather farm-to-market roads in the target area, 2)

institutionalization of a national program to construct and maintain low-cost, labor-intensive rural farm-to-market roads.

In order to achieve these purposes, the DGC's current labor-intensive access roads program will be expanded to guarantee a continued Government of Guatemala level of effort and effective use of resources in the selection, construction, reconditioning, and maintenance of access roads.

The proper selection of roads through rural areas that have high agricultural potential or increased farm production through AID-financed agricultural improvements will ensure their economic viability.

C. Expected Achievements/Accomplishments

The Project purposes will be achieved during the four years of Project life by means of the following outputs:

a. construction or upgrading of 650 kilometers of high priority rural access roads,

b. rehabilitation of 150 kilometers of high priority rural access roads,

c. institutionalization of the Government of Guatemala's capacity to execute a continuous labor-intensive access roads program in the mountainous areas of the country.

Since labor-intensive methods will be used for road construction and rehabilitation, approximately $8.6 million in AID and GOG funds will be paid to rural workers for their participation in the construction or rehabilitation of 800 kilometers of roads.

As the roads are completed, they will be included in the labor-intensive access roads maintenance program financed under the Highlands Agricultural Development Project (520-0274).

Achievement of the Project purposes is to be measured by a final evaluation, which besides measuring the completion of construction targets, will review DGC's capability to efficiently continue the access roads program, and determine if the beneficiaries are indeed obtaining the projected economic benefits.

D. Project Outline and How It Will Work

The Project will construct or improve 650 kilometers of access roads and rehabilitate an additional 150 kilometers of access roads that will benefit 150,000 small Guatemalan farmers. The Project will also upgrade the Dirección General de Caminos' capacity to continue this kind of program beyond the life of the Project.

A combination of AID and GOG funds will be used to finance the elements necessary to complete the 800 kilometers of road. The costs include: 1) the purchase, operation, and maintenance of a small pool of heavy equipment, 2) payment of village supplied unskilled local labor, 3) hand tools and construction materials, 4) project administration, and 5) construction of regional facilities.

The mix of AID and GOG funds is intended so that a large portion of the AID funds will be used to purchase heavy equipment, construct six new regional offices, and to cover a portion of the costs for rural labor, local construction materials, spare parts, tires, and tubes. The GOG will assume all administrative and heavy equipment operating costs, as well as an increasing portion of the cost of rural labor, construction materials, spare parts, tires, and tubes, thereby providing a smooth transition to a totally GOG funded program. The 200 kilometers of roads constructed and rehabilitated annually over the 4 year active life of the Project will be included in a labor-intensive maintenance program financed within the Highlands Agricultural Development Project 520-0274.

Complementing the project, $1.0 million in grant funds will be used for technical and supervisory assistance, training in environmental concerns, a baseline survey and final evaluation, as well as for in-country and international seminars and invitational travel. The various elements of the Project are more fully described below.

1. Access Roads Construction and Rehabilitation

For those few road sections that were initially built under the pilot program that have not yet entered into the maintenance program because significant repairs are first required, a small rehabilitation program to recondition these road sections will be undertaken during the first 3 years of the project. The processes for labor-intensive access roads construction and labor-intensive access roads rehabilitation are similar, except that because of the partial savings in the work completed with the original investment, the cost per kilometer of reconditioning is approximately one half the cost of new construction. The technical analysis given in Annex 3 indicates the costs of access roads construction to be $22,000 per kilometer and rehabilitation to be $10,500 per kilometer.

a. Heavy Equipment

Under the planned rate of construction, approximately 200 kilometers of roads will be constructed or rehabilitated each year, for a total of 800 kilometers in four years of project implementation. In order to maintain this rate of construction, heavy equipment with a total value of $1,968,000 will be purchased during the first year to: 1) replace equipment originally purchased in 1978 under the pilot AID loan project (520-0233) to cover six regions, and 2) to purchase additional heavy equipment required for the program to expand into the six regions. During the third year, an

additional smaller purchase of heavy equipment for $576,000 will be required to replace equipment that is currently usable, but will be completely worn out by at that time. Table 1 below provides a summary of the equipment to be purchased based on the technical analysis given in Annex 3.

In addition to the $2.5 million in loan funds for heavy equipment, the GOG will provide $1.4 million for operation and maintenance of this equipment. Spare parts, tires, and tubes for the equipment will be financed by a mix of loan and GOG funds. (See Table 1, Annex 5.)

b. Rural Community Labor

Roughly 58 percent of the cost of constructing the proposed access roads is related to manual labor, 51 percent is for payment to community workers for their unskilled labor and 7 percent is for skilled labor contracted by the DGC. The organization of the unskilled labor provided by communities will be similar to previous construction projects. Construction committees are formed by the benefiting communities providing the required labor force for both construction and maintenance of the selected roads. The villagers receive monetary compensation for the day worked, based on the type of work performed. Table 4, Annex 3, provides the labor rates for various construction activities. On the average, however, a daily rate of roughly 2.70 quetzales* per day will be paid to each worker to compensate him for the potential or partial loss of earned income were he to dedicate his time to other economic activities. Although the wages paid are less than the official minimum wage of 3.20 quetzales per day, the difference is considered to constitute the community contribution to the project. Such a wage scale has been proven to be acceptable to participating unskilled laborers in previous projects. On the average, participating workers have gained about 180 quetzales per year per worker during road construction, a significant addition to their average annual income of about 480 quetzales per year.

The community construction committee is responsible for providing all unskilled labor required by the program and for equitably distributing the workload to members of the communities. Although women and children are not normally part of the paid work force, they play an important active role by providing work crews with food and logistical support.

Approximately 232 man-months of unskilled labor is required to construct one kilometer of access roads, and 123 man-months to rehabilitate a kilometer of road. In total, about 137,000 man-months of community supplied hand labor will be required to construct 650 kms. of roads. About 25,000 man-months will be required to rehabilitate an additional 150 kilometers. This level of work effort, provided by the communities, will cost a total of $8.6 million. Of that, AID loan funds will finance $4.1 million and GOG counterpart funds the remaining $4.5 million. However, on an annual basis,

*One quetzal = one dollar.

Table 1
Heavy Equipment
(to be purchased with loan funds)

Equipment	First Purchase		Second Purchase	
	No.	Amount	No.	Amount
Crawler Tractors TD8E	-	-	3	230,400
Crawler Tractors JD850	3	403,200	--	--
Motorgraders 570A	4	352,000	--	--
Front End Loaders 444	3	261,000	--	--
1/3 C.Y Concrete Mixer	6	27,600	--	--
Compressor	2	34,000	--	--
Electrical Welders	3	13,500	--	--
Autogenous Welders	6	2,100	--	--
Grease Equipment	2	16,900	--	--
Water Pumps	6	5,700	--	--
Grain Saws	2	1,560	--	--
Concrete Vibrators	4	4,320	--	--
Dump Truck (3 1/2 Cubic Yards)	12	288,000	12	345,600
1-Ton. Pick-Up Trucks	8	112,000	--	--
6-Ton. Stake Trucks	2	50,000	--	--
Water Trucks	4	92,000	--	--
Double-Wheel Pick-Up Trucks	2	34,000	--	--
Tractor with Short Platform	1	150,000	--	--
3-Ton. Stake Trucks	6	120,000	--	--
TOTAL		1,967,880	--	576,000

the percentage of loan funds used to finance this element will be reduced by 20 percent a year, with a corresponding increase in GOG counterpart contribution (see Table 1, Annex 5). The gradual, yet significant, increase in GOG financial participation provides the basis for sufficient GOG future year funding levels to continue the program after loan funds have been exhausted.

c. Hand Tools and Construction Materials

The rural labor force will be supplied with hand tools to complete the required labor-intensive portions of road construction. In accordance with Table 3 in the Technical Analysis, Annex 3, approximately $665,000 of the funds will be used to procure hand tools. These will be purchased locally by the DGC with a mix of GOG counterpart funds and loan funds. They will be purchased annually and stored at the six regional warehouses.

In addition to hand tools, work crews will be provided with construction materials, such as cement, culverts, reinforcing steel bars, and lumber; for a total amount in loan and GOG funds of about $1.8 million. At the same time, the various communities will supply local construction materials, such as sand, gravel, rock, and water. Construction materials not provided locally will be purchased by the DGC and distributed to construction sites as needed. Table 1, Annex 5, shows how present financing will be available on a sliding scale to purchase both tools and construction materials.

d. Project Administration

As indicated in the Technical Analysis, Annex 3, approximately 12 percent of the cost per kilometer to construct access roads is related to administrative and supervisory activities. The organization chart given in the Administrative Analysis, Annex 4, indicates that the Access Roads Department of the DGC currently employees about 438 people at the central office and six regional offices. This includes, among others, engineers, accountants, personnel officers, heavy equipment operators, drivers, social workers, construction foremen, and some skilled laborers (see list on Tables 4 and 5 of Administrative Analysis). The proposed project will utilize the existing GOG personnel to implement the four year construction and rehabilitation project. The only additional personnel anticipated at this time are 10 drivers, 11 heavy equipment operators, and 11 helpers needed to operate new equipment purchased with loan funds. In total, the GOG will provide $1.2 million to pay salaries and per diem of these GOG project employees.

At the present time access roads employees are located at either the central office in Guatemala within the DGC compound, or in rented office space, warehouses, and repair shops in the six different operating regions. Approximately $25,200 ($350/month x 6 regions x 12 months) is spent annually for rent. In the process of

instit ılizing this program, it will be more cost effective for the Access ı Department to own their own regional headquarters, theref :he GOG will acquire the necessary land, and $250,000 in loan funds ıe utilized to construct and equip new regional offices, wareho and mechanic shops. The illustration given in the Technical Analys ınex 3, provides a typical design for each center. The DGC will c ıct these centers by force account and will be reimbursed with loan fı ın a FAR basis.

The program described above does not anticipate an expansion to additional regions in order to increase the number of kilometers of access roads constructed per year. However Annex 3, Section K provides an estimate of the additional financing required if at some future time the Government of Guatemala chooses to incorporate an additional construction and maintenance region. An additional construction region could be established to build 35 kilometers of roads per year for an initial investment of about 649,000 and an annual operating budget of $3.3 million. An additional maintenance region could be established to maintain the additional roads at an initial cost of $383,000 and an annual operating cost of about $578,000 per year. At the present time neither the DGC nor AID have sufficient economic resources to undertake this expansion.

2. Program Support or Improvement

During the life of the project, grant funds will be used to contract an engineering consulting firm to provide supervisory services for the complete program, including construction, rehabilitation, and maintenance. Approximately $400,000 is budgeted to support this supervisory service. Technical assistance related to planning and administering a labor intensive access roads construction and maintenance program will be provided under the Highland Agricultural Development Project (520-0274). This technical assistance began working with the DGC in January 1985.

No significant environmental effects have been identified in previous projects, however, in order to mitigate possible problems in the future, an environmental awareness within the DGC's Access Roads Department and within the communities receiving benefits from the new roads will be promoted. Grant funds will be used to contract short term technical assistance to conduct seminars at each regional center for the DGC technical staff providing them with environmental criteria for road selection, construction, and maintenance. In addition, this technical assistance will assist the DGC social workers to update and expand their community roads promotional campaign to include information on potential environmental hazards of the new roads (i.e. possible deforestation, erosion). To complement the environmental and promotional activities, grant funds will also be used to assist the environmental expert to develop environmental messages for distribution through local newsletters and over the radio within an interdisciplinary non-formal

education program (Project No. 520-0281) currently being financed with AID funds.

It is anticipated that the technical assistance for this purpose will initially be required for up to 4 months with annual two-week visits thereafter. A total of $100,000 is budgeted for the assistance plus the development and distribution of environmental information.

Grant funds will also finance a socio-economic baseline survey in a few typical communities. These communities will be observed throughout the life of the project to establish how improved access changes their life style. The initial survey is budgeted at $50,000 and the final evaluation at $50,000. Annual independent audits at $10,000 each will also be financed with grant funds.

In order to exchange information with other countries about labor-intensive access roads programs, approximately $50,000 in grant funds will be used for in-country seminars and invitational travel to other countries that have similar access roads programs. An additional $100,000 in grant funds will finance the cost of an access roads promotion and information campaign through the Non-Formal Education Project (520-0281).

The Grant will also provide $150,000 to increase the financing of a national access roads inventory initiated with the funding originally provided by the Highlands Agricultural Development Project 520-0274. The additional funds will be used to further break down road selection criteria based not only on agricultural potential, but also on the proximity to other AID financed rural development activities. This will provide the information base to overlap development projects, thereby creating a higher use efficiency of economic investments.

E. Estimated Costs and Methods of Financing

A summary Illustrative Budget, based on analyses given in Annex 3, Technical Analysis, and Annex 5, Financial Analysis, is given below.

Table 2
Financial Inputs
(000)

Activity	USAID		GOG	Total
	Loan	Grant		
Heavy Equipment	2,544	0	0	2,544
Operating Cost	0	0	1,415	1,415
Labor (unskilled community hand)	4,141	0	4,473	8,614
Tools	308	0	357	665

Continued on next page

Activity	USAID Loan	USAID Grant	GOG	Total
Construction Materials	838	0	974	1,812
Administrative Overhead	0	0	1,519	1,519
Preliminary Work	0	0	693	693
Skilled Labor	0	0	1,156	1,156
Regional Centers	250	0	232	482
Spare Parts	416	0	471	887
Tires and Tubes	172	0	195	367
Supervision	0	400	0	400
Environment training and information	0	100	0	100
Baseline Survey	0	50	0	50
Final Evaluation	0	50	0	50
Seminar, Travel, Promotion	0	150	0	150
Access Roads Inventory	0	150	0	150
Audits	0	50	0	50
Contingencies	331	50	0	381
TOTAL	9,000	1,000	11,485	21,485

III. FACTORS AFFECTING PROJECT SELECTION AND FURTHER DEVELOPMENT

A. Social Considerations

1. Socio-Cultural Context

The access roads construction program is geographically limited to highland mountainous areas of Guatemala. Within these regions live a predominantly rural, agricultural population of mostly Indians and rural Ladinos (see Social Soundness Analysis, Annex 7, for definition of Indian and Ladinos). The high population density has resulted in a pattern of over utilized inaccessible mountainside agriculture. Although many small farmers have the potential to increase their crop yields, there is little incentive to do so, since poor transportation greatly restricts their access to markets.

2. Beneficiaries

The beneficiaries will be those people living within the area of influence of each access road. During the four years of Project execution, 800 kilometers of roads will be constructed or reconditioned, benefiting directly about 150,000 rural inhabitants.

3. Participation

The initiation of the access roads program at any specific site begins with a village or rural community request to the Government of Guatemala for the construction or improvement of an access road. Once the road section is selected by the DGC for inclusion in their annual construction plans, the communities must form construction committees that will provide the required unskilled manual labor. Upon completion of construction, the communities actively participate in the maintenance of their new access roads. In short, significant community participation is required to initiate, construct, and maintain the individual road projects.

4. Socio-Cultural Feasibility

The proposed Project follows a highly successful pilot AID/GOG effort in this field. Rural farmers interviewed during various evaluations of the previous project have indicated their interest in participating in the program, since they themselves reap the benefits of improved access. All sectors of Guatemala's public and private areas have encouraged an institutionalization and expansion of this pilot effort.

5. Impacts

During project design efforts, rural farmers who had participated in the pilot effort indicated that rural access roads have indeed facilitated the export of their agricultural produce and reduced farm-to-market transportation costs. These farmers also emphasized their greater access to numerous government services in health, education, and agriculture extension.

The above impacts are anticipated to occur as well for the 150,000 beneficiaries of the proposed follow-on project. In addition, during the project life, Q8,614,000 will be paid to rural communities for almost 179,290 man-months of work.

B. Economic Considerations

1. Introduction

Both the original project (520-T-026) (1976) and its amendment (520-T-026A) (1983) judged the construction of labor-intensive rural roads to be economically feasible. Not only were substantial economic benefits predicted in the form of increased agricultural production and reduced transport outlays, but also the economic costs of construction were shown to be low because of heavy reliance on rural unskilled labor.

2. Anticipated Project Impacts

The short-run benefits of labor-intensive rural road construction lie large[ly] in the creation of jobs for rural laborers during

slack agricultural periods. The Farm-to-Market Roads Project anticipates providing 172,290 man-months of employment. Positive impacts to the communities will be felt not only through increased income, but also in the local acquisition of road-building skills. The practical knowledge of road construction techniques will be invaluable, as communities will be responsible for carrying out minor maintenance.

Rather than summarizing a textbook discussion of the medium to long-run economic benefits of rural road construction, is more useful to examine the impacts of the Mission's own projects. Two current evaluations of road projects were undertaken by the Mission. In addition, socio-economic evaluations of a number of subprojects have been recently completed by DGC social workers. The conclusions of these reports are compiled in Table 1, Annex 6.

The major impacts stem from increased agricultural production. In many communities, the only means of moving crops to market was on foot or horseback. Transport was time-consuming and represented a strong constraint on increased production of marketable surplus. For other communities, nearly inaccessible roads meant that few middlemen would venture into remote areas. The absence of competition resulted in very low prices for their crops. In either case, the poor condition of roads prohibited the production of higher value crops that are more likely to be perishable or easily bruised.

Access roads also serve to increase crop production on the input side. Communities have noted easier access to "modern" inputs, such as improved seed and fertilizer as well as lower prices. In addition, with transportation more convenient, extension agents in many subproject areas are now able to provide higher level assistance to small farmers.

Most communities reported greater access to government services. In many cases roads were a precondition for electrification, school construction, and installation of water systems. In some communities it was noted that more reliable transport enabled residents to take advantage of health facilities in nearby towns. In one subproject area school attendance has increased.

Rural access roads have served to spur non-agricultural economic activities. While some communities increased their production of handicrafts, others now sell firewood and charcoal. New roadside businesses have opened, and outside companies have started competing for local passenger and commodity transport.

Overall, the positive economic impacts of the Mission's activities in labor-intensive rural road construction appear to be substantial, furthermore, the majority of the project benefits directly improve the incomes and well-being of rural community residents.

3. Economic Analysis

In anticipation of the requirements of a project paper, a benefit-cost analysis of one of the completed rural road subprojects has been undertaken to verify the high rates of return predicted in earlier economic appraisals. This analysis has been completed and is included as Annex 6 to this PID. Comparison of baseline with current information has enabled the quantification of subproject benefits. Community employment gains are incorporated in the cost calculations as the underemployment among rural unskilled laborers translates into economic costs that are much less than financial outlays. The analysis given in Annex 6 indicates a positive cost-benefit ratio of 1.27.

C. Relevant Experience with Similar Projects:

On April 8, 1976 USAID/Guatemala signed a $13.0 million loan to finance the Small Farmer Development Project with the Government of Guatemala Of the total amount, $4.9 million was assigned to the Ministry of Communications, Transportation and Public Works to initiate a pilot program for the construction of low cost access roads using labor-intensive methods. The Ministry's dependency, Dirección General de Caminos (DGC), established the Department of Access Roads (DCR) within its construction division to manage the program. This department built roads selected by the Ministry of Agriculture using labor provided by the rural beneficiaries of the program and supported by AID-financed heavy equipment, engineering, technical assistance, and construction supervision. As originally programmed, approximately 280 kilometers (about 50 road sections varying in length from 2 to 23 kilometers) were to be constructed in the Highlands and Eastern Guatemala regions. The program initiated the construction of the first road section in January 1978. By the completion of the access roads component of the project in July 1982, a total of 325 kilometers (58 roads) had been constructed with a slight increase in budgeted GOG funds. Of the $4.9 million in loan funds, just over $2.0 million was used for the purchase of heavy equipment to support the labor-intensive construction effort: approximately $2.5 million for village labor, hand tools, and local materials, and $330,000 for engineering services. The GOG financing of $3.4 million supported labor-intensive construction, administration, and engineering. The average cost for each kilometer of road constructed was $20,000 (57% labor, 19% administration, 13% construction materials, 9% heavy equipment, and 2% handtools).

On June 13, 1983 AID/Guatemala signed a loan agreement amendment to the Small Farmer Development Project to add $3.0 million in loan funds and $3.8 million in GOG funds to build an additional 145 kilometers of access roads. By December 1984 the $3.0 million had been expended for the direct cost portions of construction. A total of 206 kilometers was constructed, 61 kilometers more than originally planned.

In addition, from the time of the termination of the original AID portion of funds in July 1982 through the present, the Department of

Access Roads has constructed an additional 176 kilometers of access roads using the labor-intensive approach developed by the program.

In total, the program has constructed 707 kilometers of access roads in the seven years since its initiation at an average cost of 22,000 per kilometer (labor 60%, tools and national local materials 10%, heavy equipment operating and depreciation 10%, indirect costs including supervision and administration 20%).

Based on a study carried out by an AID contractor[1/] in March/April 1983, it was observed that the routine maintenance of these roads was minimal, and that the coordination of the Department of Access Roads and community organized maintenance committees required reinforcement. As a result, a component was included in the Highlands Agricultural Development Project (No.520-0274) to initiate an access roads maintenance program for the new roads with the same labor-intensive process. Approximately $3.7 million in loan funds and $4.0 million in counterpart funds were to be used to maintain up to 1,300 kilometers per year by the end of the five year project, with an initial yearly maintenance of 500 kilometers of roads. AID funds were programmed to purchase the necessary heavy equipment support as well as a declining portion of manual labor costs, while the GOG was to finance all administrative costs and a gradual increase of manual labor costs. However, because of severe AID/W funding constraints, only $2.5 million was allotted to the total project during FY-83. Of that, only $818,000 was assigned to the maintenance program. Because of restrictive language given in the continuing resolution in FY-84, no funds were allotted to the project. As a result, the first six months of the project's life were spent reprogramming the available funds to initiate a limited pilot maintenance effort using manual labor without heavy equipment support. By the end of calendar year 1984 the first 500 kilometers were selected for entrance into the maintenance program once additional funding became available. It is anticipated that with additional FY-84 supplemental funds, the program will increase its level of effort and will initiate an effective maintenance program in 1985. With these funds the first 500 kilometers will be maintained and 200 additional kilometers will enter into the maintenance program on an annual basis thereafter.

In February and March of 1983 the Mission contracted a socio-economic and environmental analysis of the initial project. This study showed the need for more coordination between various GOG developmental agencies and the Dirección General de Caminos to increase the economic and social impact of the access roads program. Furthermore, the environmental analysis indicated that the roads themselves presented no direct impact on the surrounding environment.

1/ Francisco Perez y Perez. Pilot Plan for Maintenance of Rural Roads and Preliminary Plan for Maintenance of Heavy Equipment. April 1983.

D. Proposed Borrower/Grantee or Implementing Agency

This project will be implemented through a formal bilateral project agreement with the Government of Guatemala (Borrower/Grantee). Within the Government of Guatemala's Ministry of Communications, Transportation and Public Works (MCTOP), the Dirección General de Caminos (DGC) is responsible for the construction and maintenance of all national public roads. Among other activities, the DGC has a program for the labor-intensive construction of access roads. The General Coordinator for this program is located in the DGC's Department of Construction and oversees a central and regional staff of 438 employees, 18 at the central office and 70 employees at each of the six regional offices.

In 1984 the Government of Guatemala budget for this program was almost 4.0 million quetzales (Q1.0 quetzales equals $1.0 dollars).

The proposed project is an extension of the DGC's ongoing program and is entirely within both their budgetary and human resources capacity to implement. Annex 4 provides a detailed analysis of the implementation unit that fully supports this conclusion.

E. AID Support Requirements and Capability

The three man engineering section of the Mission's Project Development & Support Office currently implements the $3.0 million Small Farmer Development Project 520-0233A add-on for access roads construction as they did for the $4.9 million access component of the completed $13.0 million Small Farmer Development Project. The engineering staff also implements the $3.8 million access roads maintenance portion of the Highlands Agricultural Development Project 520-0274. In addition to these road projects, the engineering section is currently responsible for implementing the $10.6 million Rural Electrification Project 520-0248, the $4.5 million potable water systems construction portion of the $5.8 million Community Based Health and Nutrition Systems Project 520-0251, as well as a $500,000 OPG to construct additional rural water systems.

With the completion of road construction activities by December 31, 1984 within the Small Farmer Development Project add-on, the engineering section will have the capacity to pick up the implementation of the proposed project in 1985. It is, therefore, not anticipated that additional AID support personnel will be required to monitor the Project.

As with past road construction projects, AID loan and grant funds have been used to contract technical assistance, engineering supervisory services, and purchase heavy equipment. Most of these goods and services were obtained through direct AID contracts. It is expected that the majority of the contracts to be entered into within the proposed Project will continue to be AID direct contracts. The Mission foresees no additional workload constraints to goods and services as a result of these contracts, nor does it

anticipate problems in providing support to contractors within the service contracts.

F. Recommended Environmental Threshold Decision

In accordance with 22 CFR, part 216, environmental procedures, AID financed road construction activities normally require environment assessments prior to project approval. The proposed access roads project is part of a larger labor-intensive access roads program covering various AID/GOG continuous and terminating projects. Annex 2 provides an update of the Environmental Assessment for the larger program undertaken in 1983. Therefore no further environmental examination is recommended.

G. Gray Amendment Opportunities

The principal Gray Amendment service opportunities under the Project will be for minority firms to provide short-term project assistance in the areas of evaluation, external audits, a base line study, and environmental training, totaling approximately $250,000. Given past experience in the area of engineering supervision, the $400,000 set aside for engineering services is to finance a Guatemala firm rather than an international firm. The Mission has found that in Guatemala there exists a large number of highly qualified engineering firms that can provide both professional and semi-professional field staff who come from and, therefore, can work well in the rural areas.

The proposed Project also contemplates an international purchase of over $2.5 million in heavy equipment as well as almost $700,000 in spare parts and tires and tubes. Gray Amendment firms which are interested in supplying these goods should submit bids when appropriate. Mission will request identification of such firms through the asset program. All other commodities will be purchased locally in Guatemala.

ANNEX 1
LOGICAL FRAMEWORK MATRIX
FARM-TO-MARKET ROAD 520-0332

	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
GOAL: To improve the income, productivity, and quality of life of Guatemala's small farmers.	MEASURE OF GOAL ACHIEVEMENT: 1) Improved access to markets 2) Improved access to farming inputs. 3) Improved access to Government health, education, and extension services.	Baseline studies Evaluations	The AID-financed access road maintenance program will maintain these roads in order to insure that the target population will receive the potential long-term benefits derived from improved access.
PURPOSE: 1) To expand the network of all-weather farm-to-market roads in the target area. 2) To institutionalize the national program to construct and maintain low-cost labor intensive rural farm-to-market roads.	END OF PROJECT STATUS: 1) Construction or upgrading of 650 Kms. of rural access roads. 2) Rehabilitation of 150 Kms. of rural access roads. 3) Institutionalization of the GOG's capacity to execute a continuous labor-intensive access roads program in mountainous areas of the country.	Site visits, GOG budgets Evaluations	Upon completion of AID-financed portion of the access roads program this type of activity will still have a high priority within the GOG which will enable it to continue in the future.
OUTPUTS: 1) 650 Kms. of access roads constructed or improved. 2) 150 Kms. of access roads rehabilitated. 3) 6 regional offices constructed and functioning	1) Kilometers of roads. 2) Buildings	Site visits	Excessive inflation will not cause a reduction in the number of each type output.
INPUT: 1) Tech. Assistance - Grant $ 400 2) Commodities - Loan 4,278 3) Training - Grant 150 4) Other Costs - Loan 4,722 - Grant 450 TOTAL - Loan 9,000 - Grant 1,000	Disbursement of Loan and Grant funds.	Vouchers, bills	

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON D C 20523

ANNEX 2

LAC/DR-IEE-85-21

ENVIRONMENTAL THRESHOLD DECISION

Project Location	:	Guatemala
Project Title	:	Farm-to-Market Roads
and Number	:	520-0332
Funding	:	$1,000,000 (G), $9,000,000 (L)
Life of Project	:	Five years
IEE Prepared by	:	Lawrence Odle, MEO USAID/Guatemala
Recommended Threshold Decision	:	Negative Determination
Bureau Threshold Decision	:	Concur with Recommendation
Comments	:	None
Copy to	:	Charles Costello, Director USAID/Guatemala
Copy to	:	Lawrence Odle, USAID/Guatemala
Copy to	:	Lars Klassen, LAC/DR/CEN
Copy to	:	IEE File

James S. Hester Date FEB 19 19

James S. Hester
Chief Environmental Officer
Bureau for Latin America
and the Caribbean

ANNEX 2

INITIAL ENVIRONMENTAL EXAMINATION

Project Location:	Mountainous Regions of Guatemala
Project Title:	Farm-To-Market Roads
Project Number:	520-0332
Life of Project:	Five Years
IEE Prepared by:	Lawrence Odle Mission Environmental Officer
Date Prepared:	January 28, 1985
Action Recommended:	Negative Determination

Concurrence:

Charles E. Costello
Director
USAID/Guatemala

2-12-85
Date

LABOR INTENSIVE ACCESS ROADS ENVIRONMENTAL ASSESSMENT AMENDMENT

The goal of the proposed project is to improve the income, productivity, and quality of life of Guatemala's small farmers. To achieve this goal, the Project's purpose is to expand the network of all-weather farm-to-market roads in the target area and to institutionalize the national program to construct and maintain these low cost, labor-intensive rural roads. This institutionalization will ensure that the original program, initiated with AID financing in 1976 with additional add-on funds in 1983, and the initiation of an improved maintenance program for these roads in 1984, will continue to function efficiently and with sufficient host country funding once AID project funds are exhausted. The physical outputs of the proposed project (i.e. additional access roads constructed, reconstructed, and maintained) are no different than those achieved or anticipated within prior or ongoing AID financed access road projects in Guatemala. In fact the selected roads will be located within the same socio-economic and physical environment. In summary, the environmental impacts associated with the achievement of the proposed physical outputs should be very similar to possible impacts caused by the initial AID financed access roads projects.

In April 1983 an environmental assessment of the AID financed access roads program was undertaken and is attached to this document. The assessment included 12 specific recommendations to make more efficient use of scarce resources. Since that time an additional 206 kilometers of access roads have been constructed or upgraded within the Small Farmer Development Project add-on 520-0233A, and an access roads maintenance program, an access roads inventory, and an inter-agency access roads promotional campaign have been initiated within the Highlands Agricultural Development Project 520-0274 thereby addressing most of the concerns raised in the assessment.

The proposed project further addresses these concerns by establishing a road selection criteria that emphasizes the construction of roads within the socio-economic sphere of influence of projects that have been or will be financed within other AID-financed projects. Secondly the implementing agency's social promotion campaign will be strengthened to provide both benefiting communities and project employees a better understanding of environmental problems and the linkage between potential environmental impacts. Annual visits by environmental technical assistance for GOG project personnel will also provide guidance for improved road selection. In addition the informal education net established within the AID financed Non-Formal Education Project 520-0281 will be tapped to provide both radio broadcasts and written literature to be distributed within the project area to further emphasize environmental aspects of rural road construction in Guatemala. Finally, the initial baseline study to be undertaken on a few typical road sections will allow the GOG and the Mission to evaluate at a later date the validity of the 1983 assessment and update it if required. Should adjustments be required, necessary interventions will be included in adjusted annual implementation plans required by the project.

4413C

ENVIRONMENTAL ANALYSIS

RURAL ACCESS ROAD PROJECT

(520-0233)

by

Marko Ehrlich

Prepared for the United States

Agency for International Development

Guatemala City, Guatemala, C. A.

April 1983

Summary Assessment

This environmental analysis refers to rural access road projects in the Western Highlands of Guatemala. In this region, the need for improved access, better infrastructure and incentives for increased agricultural productivity is paramount. Land settlement patterns are resource use methods typical of this mountainous areas have been studied in order to evaluate the long term effect of rural road improvement. It is a strong belief of the analyst that the cause-effect relationship between access roads and patterns of resource exploitation produces the greatest environmental impact as well as the most significant social and economic impact.

Within this framework, given the socio-economic conditions of the highland region of Guatemala and the likelihood that changes in land use practices will eventually be directed towards conservation of the resource base and sustainable resource exploitation methods, the environmental analysis concludes that:

1. Rural access roads (as specified in the Project Paper) be built using labor intensive methods and applying reasonable safeguards to protect the engineering works as well as the vegetative cover along the road corridor.
2. Coordination be achieved at the project level (e.g. Region I-DIGESA) by means of simple cartographic tehnics in order to realize the synergetic effect of combined project implementation.

3. Integration of complementary development projects (e.g., soil conservation, small irrigation, rural roads and agricultural diversification) be achieved at the planning and design stages (USAID) and made effective by means of adequate project management (on-site supervision and coordination).

4. Specifically, the technical assistance coordinator for Project 520-0255) based in Quetzaltenango should attempt to integrate to the greatest extent possible, the agricultural diversification aspects of the project with the soil conservation, small irrigation and rural roads development projecs located in the same region.

5 Eventually, it would be extremely appropriate to establish a forest resource management project (e.g., watershed protection, fuel wood production, agro-forestry) to be closely linked with the above mentioned projects in order to achieve gradually an integrated small-scale farming system in the highlands of Guatemala. Such a farming system should effectively integrate within the same unit of production crop cultivation (food and cash crops), animal husbandry (Milk and meat) and forest product extraction (fuelwood, timber and wildlife).

6 For this purpose, the analyst strongly recommends that the GOG institutions in charge of forest resource (INAFOR) and renewable natural resource (DIRENARE) receive support on a pilot project basis aimed at strengthening their capacity to design and implement forest resource management methods appropriate to the ecologic, socio-cultural and economic conditions of the Altiplano of Guatemala.

CHAPTER I

Background

This environmental assessment refers specifically to an amendment to the on-going Small Farmer Development Project (520-0233). This Project consists of four components: 1) New Lands Settlement, 2) Human Resources Development, 3) Labor Intensive Access Roads and 4) Land Resources Improvement. The amendment however, will provide $ 3.0 million in additional loan funds only to the Labor intensive Access Road component of the above mentioned Project.

With these funds approximately 130 kilometers of access roads, mostly in the Western Altiplano of Guatemala are to be built. The roads to be built follow old horse trails or disabled tertiary roads, therefore major land clearing for road construction will not be required. Moreover, given the labor intensive method applied in the reconstruction of these roads, earth movement and changes in road allignment will be kept to a minimum.

This environmental assessment is based upon the analyst's field work during his stay in Guatemala (see Appendix A) and upon extensive discussion with technicians and administrators involved in the project.

Conceptual Framework

Environmental analysis of rural development projects is not meant to oppose or complicate social and economic development of rural areas. It is instead designed to increase the feasibility, durability and effectiveness of specific development efforts by exposing the interactions and

interdependencies that link social, economic and ecologic elements of the rural system upon which development is to be based. Increased awareness of the interactions that characterize the rural system enable the targeting of development efforts to acnieve the greatest development impact, to sustain it over time and to use each unit of development investment in the most efficient way.

Rural System and Rural Economy

It must be noted that the concept of rural system is here closely linked with that of rural economy and by definition, with rural development. The rural system is in fact understood as the interaction between the natural resources of rural areas (i.e., soils, water, forests) and the rural population, within a complex system regulated by ecologic, socio-cultural and economic processes. The environmental impact of rural roads is therefore understood as the effect of the road upon the combined ecologic, socio-cultural and economic processes of rural areas. Consequently, if rural development is understood as the improvement of the well being of the rural population by means of improving the rural economy (e.g. better infrastructure, increased productivity, etc.) then the development process has to take into consideration the rural system upon which the rural economy ultimately depends.

In fact, the development of rural areas depends upon the sustained utilization (management) of such natural resources as soils, water and forests. If a road affects the existence of such resources by for example promoting deforestation and erosion, or by altering the processes that regulate the ecologic system (ecologic processes), then the road has an impact upon the viability and sustainability of the economic system of rural areas as well.

A road that comes as an isolated investment in rural infrastructure and is not supported by complementary development efforts such as agricultura extension, credit and appropriate resource use methods will most likely accelerate the deterioration of the resource base by means of inadequate land use practices and undermine the development potential of rural areas

Integrated Approach

The issue of the environmental impact of rural roads is a complex one. In most cases the problem lies not in what the road does, but in what it doesn't. It is the absence of complementary development projects that enables inadequate resource exploitation patterns to have a detrimental impact upon the environment, and ultimately upon the rural economy.

The road is a critical rural development input and figuratively, it is the road upon which goods and services travel to eventually improve living standards in rural areas. If production of goods and services is based upon inadequate resource utilization methods then, increased production will probably result in short-term gains, but long-term loss of agricultural productivity and depletion of the natural resources of the area.

Instead if increased production does not occur at the expense of the natural resources of an area and not at the expense of ecologic processes critical for sustained production (i.e., hydrological and nutrient cycles), then the road upon which production travels is certainly a vehicle for resource-based development.

However, in order to be able to minimize detrimental effects of increased agricultural activity (including timber extraction, fuelwood gathering and grazing) the road must become a vehicle for agricultural extension and used to implement sustainable farming systems, adequate forest management practices and apropriate livestock management technologies.

Environmental Impacts of Rural Roads

In general rural roads have direct, indirect, short-term and long-term impact upon the rural environment.

Direct environmental impacts are those directly originating from construction activities such as earth-movements, longitudinal and transversal drainages, clearing of the vegetative cover, temporary and traffic-related pollution, etc.

Indirect environmental impacts are those that result from economic activities, land use patterns and resource exploitation methods that are affected by improved access into rural areas. These types of impacts include the effects upon the natural environment resulting from increased economic activity (i.e., farming, grazing, fuelwood gathering spurred by more efficient access to markets, improved educational and health service and agricultural credit. Although not all of these changes might take place, improved access to markets (i.e., lower transportation costs, reduced produce spoilage) usually by itself triggers increased farming, grazing and wood gathering activities.

Short-term environmental impacts are those that only last a short time (usually during road construction) and that cease after some time or

evolve into long-term environmental impacts. Such effects include erosion of slopes exposed by road construction, noise and air pollution during construction, siltation of small strems near the construction site , etc. Usually such environmental effects can be minimized effectively by applying appropriate engineering measures (i.e., revegetation of slopes, check-dams on silt-laden streams).

Long-term environmental impacts are those that result from changes in the economic activities in the road influence areas and changes in land use and settlement patterns. These effects include deforestation as a result of expansion of agricultural activities, erosion as a result of more intensive farming practices, loss of habitat and deterioration of ecologic processes (nutrient cycle, hydrological cycle) resulting from removal of natural vegetative cover for farming, grazing or wood gathering.

Given the extreme need to conserve the remaining natural resource of Guatemala and in order to retain and protect rural development options, this environmental analysis will emphasize indirect and long-term environmental impacts of rural road construction.

It cannot be overstated that rural roads are just one of the many inputs in the rural development process. The developmental impact of rural roads is not however, automatic, but dependent upon complementary inputs such as agricultural extension and credit, (to improve productivity and profitability), health and educational facilities (to improve the human resource potential).

Unless supporting and complementary development programs and strategies are forcefully implemented in the areas served by the new roads, socio-economic expectations (i.e., investments, rural employment, improved productivity) may be frustrated.

CHAPTER II

In this Chapter, based upon the conceptural framework presented earlier an Environment/Road Development Strategy (ERDS) will be developed. Such a strategy in turn represents the framework within which specific recommendations will be presented in Chapter III

Environment / Road Development Strategy (ERDS)

Consistent with the conceptural framework presented in Chapter I, the Project Paper (520-0233) specifically calls for the coordination and integrated implementation of all components of the Small Farmer Development Project. Most importantly, the Small Irrigation Systems and Soil Conservation Practices (subcomponents of Land Resources Improvement) are considered key complementary projects of the Rural Road Component. The environmental strategy developed in this report will specifically explore the linkage between rural roads and small irrigation and soil conservation projects. Such an enviromental strategy arises from the analysis of the events that follow the improvement of access roads into rural areas. Improved access in most cases generates two kinds of exploitative pressures upon the natural resource of rural areas:

a) expansion of agricultural activities (e.g., farming, grazing, fuelwood gathering) into areas previously not exploited, and

b) intensification of agricultural practices on lands previously used for farming, ranching or forestry activities.

The direction and intensity of these exploitative pressures is determined by the ecologic, socio-cultural and economic variables that are characteristic of the rural system affected by the road project. For example, topographic and climatic limitations can lead towards intensification of land use practices rather than development of new lands previously forested or undeveloped.

Factors that are external to the rural system can also determine the direction and intensity of exploitative pressures in rural areas. Such factors include for example, the introduction of appropriate technologies (e.g. new crops, irrigation), the improvement of traditional land use practices (through agricultural and forest extension service) and adequate health and educational infrastructure that raise living standards in rural areas. These and other factors can directly determine the course and intensity of resource exploitation patterns in a way as to assure their sustainability and their effectiveness in improving the well being of the rural population.

According to this framework, improved access into rural areas, does not by itself determine the direction nor the intensity of exploitative pressures upon the resources of rural areas which are instead affected primarily by factors intrinsic to the rural system and secondarily, by factors external to it. (e.g., complementary development investments).

In reality, land use practices in rural areas of the tropics are based upon the exploitation of the soil productivity of previously forested lands and upon the regeneration of soil fertility by the forest vegetation. This establishes slash-and-burn-cultivation and fallow cycle typical of many region of the tropics where nutrients are stored in the vegetive cover rather

than in the soil. Where soil is more fertile (e.g. volcanic ashes) land use practices are more intensive because such soils are intrinsically nutrient-rich. Yet, where population pressure is great, land tenure patterns limit farm size and the topography is rugged (as in the Altiplano of Guatemala), land use practices that deplete the resource base (through deforestation and erosion) cannot be offset by more fertile soils. We can therefore assume (and observations in the field support the assumption) that unless factors external to the rural system affected are geared at protecting the resource base of rural areas, road improvement leads toward gradual deterioration of the resources base and its eventual depletion.

CHAPTER III

The need to support road development projects with complementary development efforts is very evident. However, means to achieve such an objective are multiple and often very complex. In the following recommendations practical suggestions will be made in order to realize integrated project development and interinstitutional coordination at the regional and local levels.

Recommendations

Regional Level

1. Map proposed road improvement, projects (to be built under the Loan Amendment 520-T-026.
2. Map proposed small irrigation and soil conservation projects (to be built under 520-0255).
3. Overlay above maps and identify areas of project concentration and establish priorities according to degree of concentration.
4. Select road projects (to be built) according to priorities established by map overlay.
5. Mapping of these projects can be performed on various scales depending on the detail desired.
6. Map sensitive natural areas of Guatemala and overlay with proposed road project map. Data for sensitive area map can be obtained from GOG Institutions such as INAFOR and DIRENARE and from NGO's involved in nature conservation activities (e.g. Centro de Estudios Conservacionistas).

7. Develop criteria for road construction in areas ecologically more sensitive (e.g., operational linkages between road and resource conservation projects)

8. Implement operational linkages to support road development and prevent depletion of the resources of rural areas (through deforestation and erosion).

9. Establish coordinating mechanisms (using for example, simple cartographic techniques) between complementary projects such as the Soil Conservation, Small Irrigation and Farm Diversification Projects to realize the synergetic effect of their combined impact upon the rural economy.

10. Implement in first priority those projects where more than one of the above mentioned components coincide.

11. Apply such a strategy in areas where previous implementation of projects has been successful (Region I of DIGESA, Quetzaltenango).

12. Set up evaluation procedure by studying development impact and implementation costs.

FARM TO MARKET ROADS PP

TECHNICAL ANALYSIS

A. Introduction

The roads to be built under the proposed Project will connect rural areas of high agricultural potential to secondary or primary roads leading to marketing and processing centers. Most of the roads will be constructed near the alignments of existing roads or rural trails that are currently the only means of transportation in the benefited areas.

To provide employment opportunities in the target areas, the roads will be built using labor-intensive methods. These methods have been successfully used in a previous GOG and AID financed project. The procedures for community organization, and the technologies for labor-intensive road construction are well known by DGC personnel. Small farmers affected by the roads will provide most of the unskilled labor for road construction; therefore, the income derived from the construction will help the small farmers increase their capital base, which will help them increase farm production.

For the purposes of the Project, the following definitions are used:

1. All-Weather Rural Access Road

Road meeting the minimum design standards established by DGC for this kind of road. The width of the road will be 6 meters including shoulders. The road bed will be 4 meters in width covered with either river gravel or other free drainage material.

2. Rehabilitation

This Project rehabilitation will include the following activities: construction or reconstruction of drainage and ditches; construction of new cross drainage and culverts; cleaning and repairing of existing culverts; excavation, grading, and compaction of surfaces, and new gravel surfacing; repair of bridges and semi-circular arch masonry culverts, low water fords; and cut-out or fill as required to meet maximum grade standards on rural roads.

B. Design Standards

Based on pilot design standards used in the previous project 520-0233, the GOG has established simple, acceptable, low-cost, all-weather design standards. These standards were selected to minimize cost and still satisfy

the minimum standards for all-weather roads of the Guatemalan Directorate of Roads. Specific dimensions and specifications are contained in Exhibits 1 and 2 of this Annex.

The standards call for a 6-8 mts. right of way on which a 4.00 meter one-lane all-weather roadbed will be laid over an improved subgrade. The extra right of way width is required for shoulders, drainage ditches, and switches. Semicircular arch culverts constructed with local materials will be used whenever possible. Bridges will be limited to 5-15 meters in length. Concrete or metal pipes and fords will be constructed to conduct drainage transversely. Box culverts will be used to accommodate projected storm drainage run-off from side ditches. Cuts and fills will be held to a minimum. The final thickness of the road-wearing surface will vary between 15 and 20 cms. depending on the condition of the underlying soils. Longitudinal drainage will be provided by side ditches with frequent ditch turnouts.

C. Construction Methods

Given the GOG's success in using labor-intensive road construction methods by force account in the previous AID financed project, the DGC will continue to construct roads financed by the farm-to-market project using the same process. This process includes the utilization of local unskilled labor and construction materials to the maximum extent possible for the following tasks:

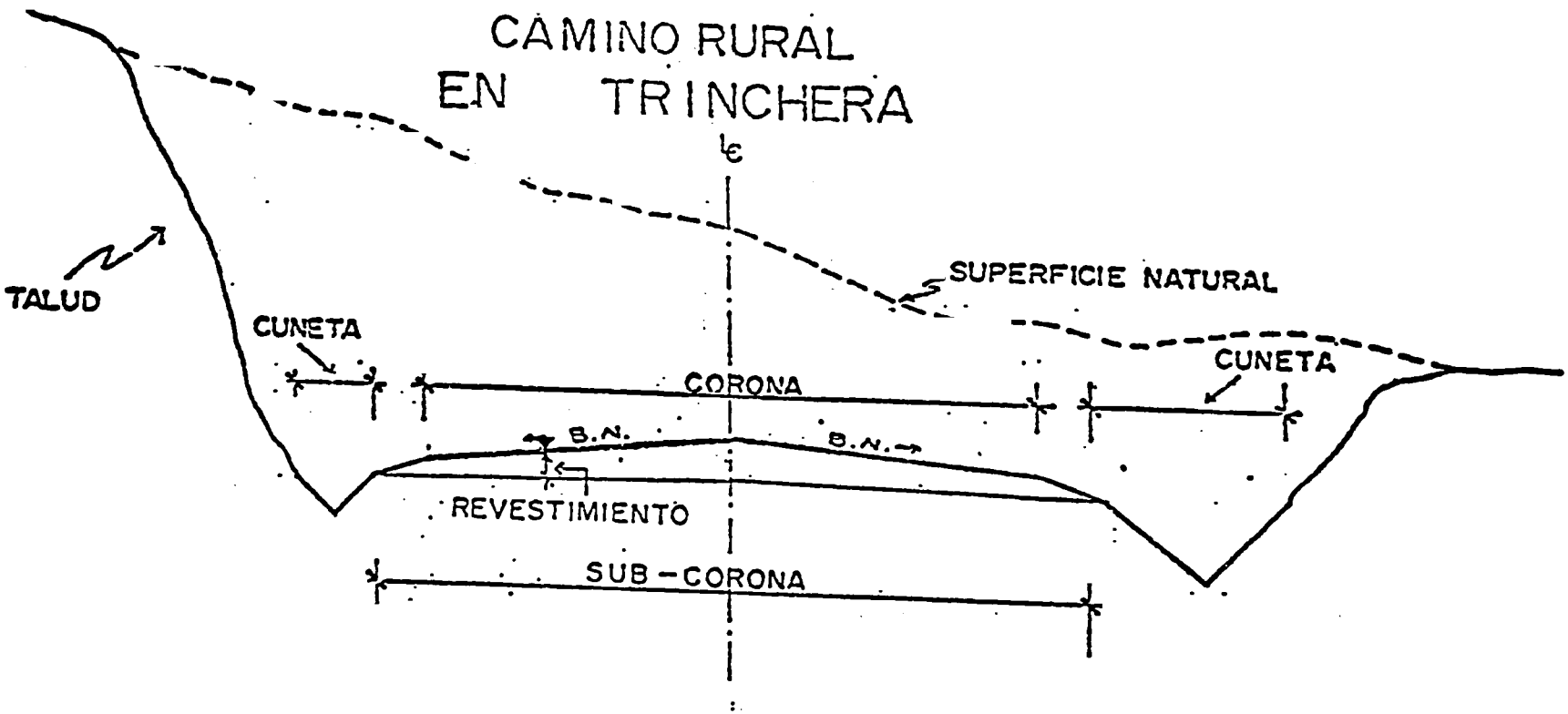
- Clearing and grubbing.
- Earthwork of less than 4,000 cub. mts. per Km. in soft soils.
- Shaping of side ditches cut rough by heavy equipment in hard soils.
- Excavation for culvert installation.
- Compacting
- Installation of culverts.
- Construction of culvert headwalls made of masonry and cyclopean concrete.
- Building masonry fords.
- Building small bridges.

Complementing this effort, heavy equipment will perform major earth movement in sections with hard soils and in difficult or steep hillsides as well as grade, scrape, and surface. Compaction will be performed by hand, with self-propelled compactors, and loaded dump trucks.

ANNEX 3

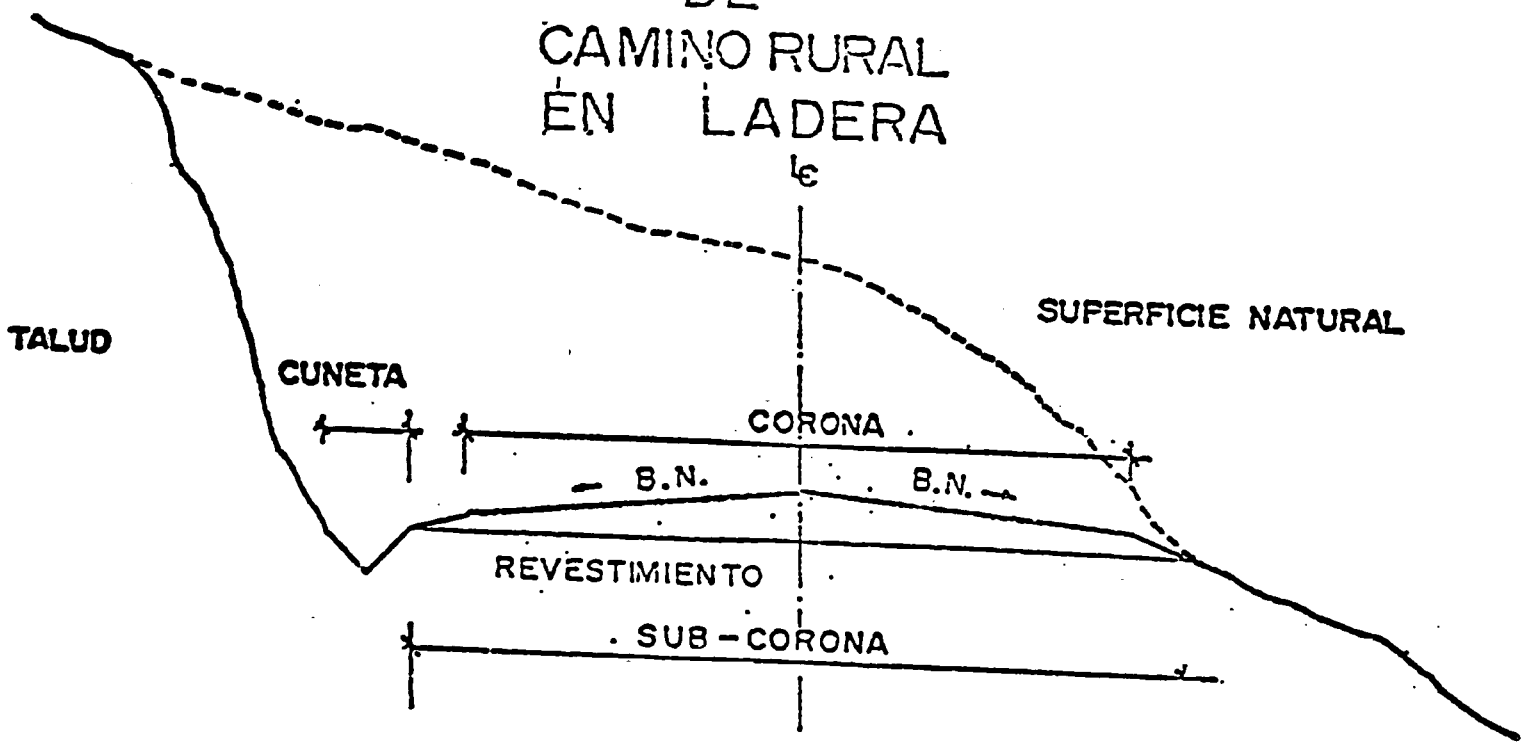
EXHIBIT 1

SECCION TIPICA DE CAMINO RURAL EN TRINCHERA



ANCHO DE CORONA:	4.00 m.
SUB-CORONA:	4.60 m.
CUNETAS:	0.80 m. promedio
BOMBEO NORMAL	3% mínimo
	5% máximo
REVESTIMIENTO	de 15 a 20 cm. de espesor

SECCION TIPICA DE CAMINO RURAL EN LADERA



ANCHO DE CORONA :	4.00 m.
SUB-CORONA:	4.60 m.
CUNETAS :	0.80 m. promedio
BOMBEO NORMAL :	3% mínimo
	5% máximo
REVESTIMIENTO :	de 15 a 20 cm. de espesor

SECCION TIPICA DE CAMINO RURAL.

D. Construction Costs

Based on the construction of 707 kilometers of roads previously executed under the 520-0233, 520-0233A, and GOG financed portions of the program, the DGC calculates that the average construction cost of each kilometer of road is $22,000 broken down in the following manner: Unskilled-skilled labor, 60 per cent; hand-tools and outside materials, 10 percent; fuels, lubricants, and depreciation, 10 per cent; administration and supervision, 20 per cent.

The proposed Project will use the same labor intensive techniques, supported by heavy equipment, that the prior projects mentioned above utilized. Based on this previous experience, the cost percentages have been analyzed by Mission technicians jointly with DGC's engineering staff, with minor modifications were found satisfactory for purposes of this project analysis. A further breakdown of the average cost to be used for project analysis purposes is given in Table 1.

The elements that make up the total cost are the following:

1. Preliminary Works: include the work performed by the regional technical and social work staff from the time a request for road construction is received at the regional office until the road has been selected for construction, and budgeted. This cost includes the regional and central level administrative costs.

2. Administration: includes the administrative work performed by the central and regional offices from the time the road construction starts until the road is completed and received by the beneficiary communities.

3. Unskilled labor: corresponds to the costs paid to small farmers within the influence area of the road based on work performed, in accordance with the tasks as indicated in Section C., "Construction Methods".

4. Skilled labor: includes the cost paid to skilled personnel (masons mainly) hired or contracted by DGC under payroll or contract to construct the road infrastructure such as bridges, culverts, and fords with the support of unskilled labor.

5. Hand Tools: corresponds to the costs of handtools utilized by unskilled and skilled labor based on the 5 man crew system and its useful life as described in Section H. of Annex 3, "Hand Tools Requirements".

6. Construction Materials: corresponds to the costs of those construction materials (cement, lime, steel reinforced bars, corrugated metal or concrete pipes) needed to build the road infrastructure and drainage.

7. Fuels and Lubricants: includes the costs of gasoline, diesel, oil, grease needed for the operation and maintenance of heavy equipment, dump trucks, pick-up trucks, and other light equipment.

8. Heavy Equipment Depreciation: includes an estimated annual depreciation cost of each piece of equipment associated with the construction of access roads.

9. Spare Parts: corresponds to the costs of the spare parts purchased to provide preventive and corrective maintenance to heavy equipment, dump trucks, pick-up trucks and light equipment.

10. Tires and Tubes: Corresponds to the costs of tires and tubes for heavy equipment, dump trucks, and vehicles.

E. Rehabilitation Costs

Rehabilitation works will be performed in the roads listed below. These roads have been inspected and accepted by the access roads program engineers for inclusion in the Project. The rehabilitation cost is 48 per cent of the unit cost per kilometer constructed. The breakdown of the rehabilitation cost per kilometer is given in Table 2 of this Annex.

The access roads constructed under AID project 520-0233 to be considered for rehabilitation under the proposed Project are the following:

1. Arenal-Sashico
2. Sashico-Sansurutate
3. Sansurutate-Los Izotes
4. Los Izotes-El Carrizal
5. El Rodeo-Entronque (Sashico-Sansurutate)
6. El Progreso-Tierra Blanca
7. Volcán-Talquezal
8. Tierra Blanca-Los Morales
9. El Duraznal-San Francisco
10. Sanyuyo-Sampaquisoy
11. Laquneta-Duraznito
12. La Toma-El Mirador
13. Sashico-Sanyuyo
14. Palo Verde-Laqunilla
15. El Mirador-Araizapo

A summary table including both construction and rehabilitation costs is given in Table 3 of this Annex.

TABLE 1

I. CONSTRUCTION COSTS TABLE

		%	Construction Cost per Km.	No. of Km. to be Constructed per Year	1st. Year	2nd. Year	3rd. Year	Kms. to be Const. During 4th. Yr.	4th.* Year	Total
A.	Indirect Costs (Costos Indirectos)									
	1. Preliminary Works (Trabajos Preliminares)	4.35	22,000	150 1/	143,550	143,550	143,500	200	191,400	622,050
	2. Administration (Administration)	7.61	22,000	150	251,130	251,130	251,130	200	334,840	1,088,230
B.	Direct Costs (Direct Costs)									
	1. Unskilled Labor (Mano de Obra a Destajo)	51.03	22,000	150	1,683,990	1,683,990	1,683,990	200	2,245,320	7,297,290
	2. Skilled Labor (Mano de Obra Especializada)	6.78	22,000	150	223,740	223,740	223,740	200	298,320	969,540
	3. Handtools (Herramientas)	3.82	22,000	150	126,060	126,060	126,060	200	168,080	546,260
	4. Construction Materials (Materiales de Construcción)	10.39	22,000	150	342,870	342,870	342,870	200	457,160	1,485,770
	5. Fuels & Lubricants (Combustibles y Lubricantes)	7.35	22,000	150	242,550	242,550	242,550	200	323,400	1,051,050

		%	Construction Cost per Km.	No. of Km. to be Constructed per Year	1st. Year	2nd. Year	3rd. Year	Kms. to be Const. During 4th. Yr.	4th. Year	Total
6.	Heavy Equipment Depreciation (Depreciación de Equipo Pesado)	1.84	22,000	150	60,720	60,720	60,720	200	80,960	263,120
7.	Spare Parts (Repuestos)	4.83	22,000	150	159,390	159,390	159,390	200	212,520	690,690
8.	Tires and Tubes (Llantas y Neumáticos)	2.00	22,000	150	66,000	66,000	66,000	200	88,000	286,000
9.	Inflation	-	-	-	-	99,759	439,735	-	670,443	1,209,937
TOTAL		100.00			3,300,000	3,399,759	3,739,735		5,070,443	15,509,937

1/ 150 Kms. will be constructed during the first three years complemented with rehabilitation works.

* 4th year = % X 22,000 X 200

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TABLE 2

REHABILITATION COSTS TABLE

	Percent 1/	Construction Cost per Km.	No. Km./yr. to be Constructed in 3 Years	1st. Year 4/	2nd. Year	3rd. Year	Total
A. Indirect Costs (Costos Indirectos)							
1. Preliminary Works (Trabajos Preliminares)	1.09	22,000	50	11,990	11,990	11,990	35,970
2. Administration (Administración)	2.54	22,000	50	27,940	27,940	27,940	83,820
B. Direct Costs (Costos Directos)							
1. Unskilled Labor (Mano de Obra a Destajo)	27.08	22,000	50	297,880	297,880	297,880	893,640
2. Skilled Labor (Mano de Obra Especializada)	3.93	22,000	50	43,230	43,230	43,230	129,690
3. Handtools (Herramientas)	0.91	22,000	50	10,010	10,010	10,010	30,030
4. Construction Materials (Materiales de Construcción)	2.60	22,000	50	28,600	28,600	28,600	85,800
5. Fuels and Lubricants (Combustibles y Lubricantes)	5.51	22,000	50	60,610	60,610	60,610	181,830

		Percent 1/	Construction Cost per Km.	No. Km./yr. to be Constructed in 3 Years	1st. Year 4/	2nd. Year	3rd. Year	Total
6.	Heavy Equipment Depreciation (Depreciación de Equipo Pesado)	0.92	22,000	50	10,120	10,120	10,120	30,360
7.	Spare Parts (Repuestos)	2.42	22,000	50	26,620	26,620	26,620	78,860
8.	Tires and Tubes (Llantas y Neumáticos)	1.00	22,000	50	11,000	11,000	11,000	33,000
9.	Inflation	-	-		-	14,696	68,965	83,661
TOTAL		48.00			528,000	542,696	596,965	1,667,661

1/ Percentages for rehabilitation are related to construction cost/Km.

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TABLE 3.
SUMMARY OF CONSTRUCTION AND REHABILITATION COSTS

	1st. Year	2nd. Year	3rd. Year	4th. Year	Total 4 Years
A. Indirect Costs/Costos Indirectos					
1. Preliminary Work (GOG) (Trabajo Preliminar (GdeG)	155,540	155,540	155,540	191,400	658,020
2. Administrative Costs (Administración (GdeG)	279,070	279,070	279,070	334,840	1,172,050
3. Administrative Costs (additional) (Administración GdeG - adicional)	68,145	68,145	68,145	68,145	272,580
B. Direct Costs/Costos Directos					
1. Unskilled Labor (Mano de Obra a Destajo)	1,981,870	1,981,870	1,981,870	2,245,320	8,190,930
2. Skilled Labor (GOG) (Mano de Obra Especializada(GdeG)	266,970	266,970	266.970	298,320	1,099,230
3. Handtools (Herramientas)	136,070	136,070	136,070	168,080	576,290
4. Construction Materials (Materiales de Construcción)	371,470	371,470	371,470	457,160	1,571,570
5. Fuels and Lubricants (Combustibles y Lubricantes)	303,160	303,160	303,160	323,400	1,232,880
6. Heavy Equipment Depreciation (Depreciación del Equipo Pesado)	70,840	70,840	70,840	80,960	293,480
7. Spare Parts (Repuestos)	186,010	186,010	186,010	212,520	770,550
8. Tires and Tire Tubes (Llantas y Tubos para Llantas)	77,000	77,000	77,000	88,000	319,000
9. Inflation	-	114,455	515,515	677,258	1,307,228
TOTAL	3,896,145	4,010,600	4,411,660	5,145,403	17,463,808

F. Community Organization and Participation

Since the access roads construction is performed for the most part using unskilled labor provided by the benefited communities, its organization is one of the most important stages before construction starts.

Once a road has been selected for construction, the DGC's regional engineer and the social worker will hold several meetings with the community members to explain the Project's goals and how it functions. In these meetings community participation and collaboration are requested to provide labor for the construction activities, as well as to permit the use of local materials and provide the right of way for crossing their lands.

For the purpose of community organization, all community members in the influence area of the road elect seven members for a Road Construction Committee. This committee is responsible before the communities to resolve any local problem related to the road. The Road Construction Committee is also responsible for assuring that the majority of the community members participate in the road construction activities. Each participant must work a twenty-two day work cycle. To achieve this purpose, unskilled labor may not participate on a permanent basis; this allows the small farmers to attend to their agricultural works and provides a greater number of farmers the opportunity to enter into the program.

Foremen selected by the Road Committee coordinate the work crews and record workers' attendance and work performed. This information is then reported weekly to the assistant of the resident engineer who requests the regional payrollman to process bi-weekly payment claims based on unit price of work and work performed. Table No. 4 below shows unit prices for unskilled and skilled labor work in access roads construction activities. Due to their agricultural activities, it has been estimated that each worker will participate approximately three months per year in road construction activities. Using the criteria that each laborer will supply 22 days per month of work, and that previous DGC's experience has identified 4634 man-days per kilometer constructed under the labor intensive use program, the Project will provide 136,914 (4634/22 x 650) man-months for construction and 25,036, (634/22 x 28.08/51.03 x 232) man-months for rehabilitation. Taking into account that the average daily earning reported by DGC is 2.70 Quetzales for unskilled labor, each worker involved in the program can anticipate an additional annual income of 178 Quetzales (3 months times 22 days times Q2.70/day).

TABLE No. 4

UNIT PRICES FOR UNSKILLED AND SKILLED LABOR
IN ACCESS ROADS CONSTRUCTION ACTIVITIES

CONCEPT	UNIT	UNIT PRICE
UNSKILLED LABOR		
Clearing	Ha.	Q.550.00
Earth Moving		
Soft material	M3	" 0.91
Semi-hard material	M3	" 1.21
Hard material	M3	" 1.89
Rock	M3	" 2.65
Lateral Borrows and Borrow Pits		
Soft material	M3	Q. 1.13
Hard material	M3	" 1.69
Rock	M3	" 2.65
Compacted Fillings		
Ditch Excavation	M3	Q. 2.06
Soft material	M3	Q. 0.91
Semi-hard material	M3	" 1.21
Hard material	M3	" 1.39
Rock	M3	" 2.65
Sliding removal	M3	Q 0.30
Structural filling	M3	" 0.40
Transportation of Lateral Borrowed Materials		
0 - 20m	M3	Q. 0.85
0 - 40m	M3	" 1.30
Grass covering of road lateral slopes	M2	Q. 0.40
Masonry wall	M3	" 3.15

CONCEPT	UNIT		UNIT PRICE
Structural Excavation			
Dry			
Soft material	M3	Q.	1.00
Semi-hard material	M3	"	1.33
Hard material	M3	"	2.08
Rocky material	M3	"	2.92
Wet			
Hard material	M3	Q.	3.94
Rock	M3	"	5.91
Construction and Reconstruction of Drainage and Counter Drainage Ditches.			
Excavation			
Soft material	M.L.	Q.	0.11
Semi-hard material	M.L.	"	0.15
Hard material	M.L.	"	0.23
Rock	M.L.	"	0.32
Slope finishing	M.L.	"	0.05
SKILLED LABOR			
Excavation for Ford Construction			
Soft material	M3	Q.	0.91
Semi-hard material	M3	"	1.21
Hard material	M3	"	1.89
Stone paving with mortar	M2	"	1.27
Stone paving without mortar	M2	"	1.02
Wooden Forms	M2	Q.	4.73
Masonry			
Stone masonry with forms	M3	Q.	11.26
Stone masonry without forms	M3	"	15.00
Box culverts	M3	"	18.00
Semiarch masonry culverts	M3	"	20.00

CONCEPT	UNIT		UNIT PRICE
Roadbed			
Stone surface	M2	Q.	1.27
Balast	M3	"	0.62
Masonry drainage	M3	"	11.26

G. Road Selection Criteria

A two-phase process is currently used by the DGC's Rural Roads Programs for selecting access roads to be built under the Project: screening and priorization. Screening is a preliminary procedure performed by the Regional Office staff (Engineer and Social Worker) to eliminate those roads that do not satisfy certain basic criteria. Conditions for eligibility include the following:

1. The road must run through areas populated by small farmers with a high agricultural potential or significant agricultural production.

2. The road must run through areas where large infrastructure is not required.

3. The road must not serve special interest groups such as large farm owners.

4. The road must be part of a road network that provides access to markets and administrative or public services.

5. The road must link with a road of equal or higher category.

All five criteria must be satisfied to make a subproject eligible. With this project, the DGC will also incorporate a sixth item for road selection. The closeness to existing or planned A.I.D. financed rural infrastrucrure, improvement will also be considered.

Roads that pass the screening process are subject to a detailed technical and socio-economic analysis to calculate their benefit/cost ratio and the cost per inhabitant served. These indexes give the basis for a ranked priorization. The two ratios are obtained based on the field evaluations in accordance with forms included in Exhibit 3 of this Annex. The benefit/cost ratios are ranked for all roads selected by the screening process. The costs per inhabitant served are ranked for roads in each region. Both ranks are then weighed so that a larger benefit/cost corresponds to a lower cost per inhabitant served. The addition of the two values gives the priorization rank per region. Only those access roads with higher value are included within the annual GOG budget.

H. Hand Tool Requirements

DGC's experience with labor-intensive road construction under the previous AID project No. 520-0233 indicates that the most effective use of unskilled labor is obtained by 5-men crews working in sections of 20 mts. each. Each section or crew will require a mix of 9 handtools as indicated in the table below. The handtools' useful life is estimated to be 500 mts. per set. At a level of construction and rehabilitation of 200 Kms. per year, 400 sets (200,000 mts./500 mts./set = 400) will be required per year. The total quantity of handtools required per year and life of the project is indicated in Table No. 5 below. Handtools will be procured locally.

I. Heavy Equipment

The previous project No. 520-0233 was considered as a pilot program with emphasis on labor-intensive work supported by a heavy equipment fleet. As indicated in the Institutional Analysis, since 1977 the access roads program has been expanded from one to six regional offices as shown on Map 1 of this Annex. The equipment purchased under the pilot project was programmed to be used in six work fronts. However, this equipment has been insufficient to adequately support the project in the six regions where it is currently working, and DGC has been providing, when possible, additional equipment in an effort to accomplish the project's targets.

Therefore, complementary heavy equipment units will be needed. These units will maintain the current cost effectiveness per kilometer of road without affecting the use of labor. Additional units will be needed to replace part of the existing heavy equipment currently in fair and bad condition that will no longer be usable for the proposed Project.

This complementary and replacement equipment will allow DGC's Rural Road Program to maintain its roads construction level of effort at 200 Km./yr.

The list of the complementary and replacement equipment needed by DGC to support the six regional offices is the result of an analysis made by Mission officials and the General Coordinator of the Program, based on an inventory

TABLE 5
HANDTOOL REQUIREMENTS
(Requerimiento de Herramientas)

Handtools/ Herramientas	Quantity per crew/ Cantidad por Cuadrilla	Crew per Year/ Cuadrilla por Año	Quantity/ Cantidad	Annual Replacement Factor/ Factor Renovación por Año	Handtools per Year/ Herramientas por Año	Total Handtools LOP*/ Total Herramientas Durante Vigencia Proyecto
Shovels/Palas	5	400	2,000	1.2	2,400	9,600
Mattocks/Piochas	3	400	1,200	1.5	1,800	7,200
Picks/Zapapico	2	400	800	1.5	1,200	4,800
Bars/Barretas	1	400	400	1.2	480	1,920
Wedges/Puntas	2	400	800	1.2	960	3,840
Machetes/Machetes	1	400	400	1.2	480	1,920
Hoes/Azadones	3	400	1,200	1.5	1,800	7,200
Hammers/Almadanas	1	400	400	1.2	480	1,920
Wheelbarrows/ Carretillas	2	400	800	1.2	960	3,840
Mason Handtools/ Herramientas para Albañil	--	--	36	1.5	54	216

* 4-year life of Project/4 años de duración del Proyecto.

made by the regional offices. The equipment that will be purchased is the following:

-3 bulldozers	2 chainsaws
-4 small motorgraders	4 concrete vibrators
-3 front end loaders	8 1-ton pick-up trucks
-12 3-1/2 C. Y. dump trucks	6 3-ton stake trucks
-6 concrete mixers	4 small water trucks
-3 electric welders	2 double rear tire vechicles with grease equipment
-6 autogenous welders	1 tractor with short platform
-2 compressors and compressor pistol equipment	2 6-ton stake trucks
-6 water pumps	

Three main activities for access roads construction were identified that will be implemented through a coordinated and appropriate combination of labor and heavy equipment: (a) earthwork, (b) drainage, and (c) surfacing.

The use of the equipment is generally determined by the construction needs and the distance between the work fronts of each region. The technology that the DGC's Access Roads Program has established requires a small bulldozer to support the labor during the earthwork activity in those places where the road grade requires cuts greater than 4,000 cubic meters per kilometer, where the volume of earth to be moved includes loose rock in a volume greater than 10%, or where the ground is hard or rocky. A second bulldozer is necessary for cutting materials in the borrow pit. The front end loader and dump trucks will load and transport the materials being used for surfacing the road section that has been previously graded and adjusted by the motorgrader.

Generally, each region has an average of five roads under construction, sometimes at a distance between 50-100 kilometers from each other. Therefore, the required equipment is only complementary to the labor intensive technology supported by the existing heavy equipment of DGC's Rural Roads Program. The mobilization of technical personnel and materials to the work fronts in each region, as well as the supplying of materials to the different work regions, and the maintenance of the equipment by the General Coordinator Office justifies the use of stake-body and pick-up trucks.

The compacting activity requires two water trucks per region as well as portable rollers that will complement the compacting made by labor and through the crossing of the dump trucks loaded with materials. The rest of the equipment (mixers, welders, compressors, chainsaws, vibrators, water pumps) will support the specialized labor in carrying out the infrastructure

construction activities of the main and secondary drainages. It is considered necessary to renew this equipment on a timely basis in order to achieve the established targets.

Table No. 6 details the unit costs of the equipment to be acquired divided into two purchases for a four-year implementation program, that will permit DGC to continue the program with a established capacity of heavy and light equipment that will support the labor.

The first purchase of equipment includes complementary heavy equipment to the equipment originally acquired under the pilot project, as well as replacement of old units based on their useful life and the estimated purchase date during the second year of project implementation.

J. Construction of Building Facilities

The building component of this Project has been included to provide the regional offices of the program with permanent building facilities and workshops for preventive and minor corrective heavy equipment maintenance. Currently the regional offices are located in rented buildings, sometimes separated from the workshops and warehouses. The building and workshop construction will be implemented through DGC's force account system with a FAR system for Mission disbursements. The construction of the facilities will be initiated during the first year of the Project on sites provided by the local municipalities. It is estimated that four buildings will be completed in the first year with the remaining two finished in the second year. The sites will be near main departmental or municipal cities where adequate supply of construction materials and sufficient skilled and unskilled labor will be available during construction.

The regional offices will be built with prefabricated steel joist structures covered with asbestos cement roofing, non-bearing block walls, and cement tile floor. Windows will be framed with aluminum sections glass and wire mesh. The doors will be metal for the exterior and wooden for the interior. Public services such as water and electricity are closely available to the sites and appropriate connections will be made to each of these buildings. In addition, workshop equipment and furniture for the office buildings will be provided by the Project.

The construction costs of these facilities were calculated based on current unit prices for construction, taking into account increases due to inflation. The detailed construction costs are given in Table 7 below.

K. Posible Expansion of Program into Additional Regions

Currently the labor intensive access roads construction and maintenance program is being implemented in six regions and is able to construct about 200 kilometers a year. These 200 kilometers automatically enter into the maintenance program which is designed to accept 200 kilometers of additional access roads per year. If the program were to expand into additional regions

then additional funds would be required to finance: 1) start up costs, 2) on-going construction, administrative and operating costs, and 3) increased maintenance costs. Approximate costs to incorporate a new construction and maintenance region is on the order to $1.0 million ($649,000 for construction, $383,000 for maintenance). The annual cost to operate an expanded construction and maintenance program is on the order of $3.9 million in 1985 dollars with the majority, or $3.3 million going to the construction component. The Tables 8 and 9 provide further information for such an expansion.

TABLE 6

FARM TO MARKET ROADS PID (520-0332)
EQUIPMENT REQUIREMENTS

Equipment*	Equipment				Year of Purchase	Useful life of Equipment	First purchase of Equipment (Amount)	Unit Price	Total Cost First Purchase	Second purchase of Equipment	Total Cost** Second Purchase
	Present Equipment	Good Condition	Fair Condition	Bad Condition							
Crawler Tractors TD8E I.H.	6	3	3	—	1979	3-4 years	—	64,000	—	3	192,000
Crawler Tractors JD850 J.D.	3	3	—	—	1980	4 years	3	134,400	403,200	—	—
Motorgraders 570 A J.D.	2	2	—	—	1979	4 years	4	88,000	352,000	—	—
Front End Loaders 444 J.D.	3	3	—	—	1979	3 years	3	87,000	261,000	—	—
Agricultural Tractor 401 B J.D.	2	1	—	1	1979	4 years	—	—	—	—	—
Raygo Vibrator Rollers	2	2	—	—	1979	4 years	—	—	—	—	—
Sheepfoot Dynapac Rollers	2	2	—	—	1979	4 years	—	—	—	—	—
Boma Portable Roller Graders	8	6	2	—	1979	3-4 years	—	—	—	—	—
1/3 C.Y. Concrete Mixer	6	3	3	—	1979	2 years	6	4,600	27,600	—	—
David Compressor	3	1	2	—	1979	3 years	2	17,000	34,000	—	—
Miller Electrical Welders	3	3	—	—	1980	2 years	3	4,500	13,500	—	—
Autogenous Welders	-	-	-	-	-	-	6	350	2,100	—	—
Aro Grease Equipment	2	2	—	—	1982	3 years	2	8,450	16,900	—	—
Econo Water Pump	4	—	4	—	1980	2 years	6	950	5,700	—	—
McCullock Chainsaws	4	2	2	—	1980	2 years	2	780	1,560	—	—

Equipment	Equipment: Present Equipment	Good Condition	Fair Condition	Bad Condition	Year of Purchase	Useful life of Equipment	First purchase of Equipment (Amount)	Unit Price	Total Cost First Purchase	Second purchase of Equipment	Total Cost Second Purchase
o Concrete Vibrators	2	2	—	—	1980	2 years	4	1,080	4,320	—	—
/2 C.Y. Dump Trucks	24	12	9	3	16-1979 8-1980	3-4 years	12	24,000	288,000	12	288,000
on. Pick Up Trucks	13	5	5	3	9-1979 4-1980	2-3 years	8	14,000	112,000	—	—
lon Wagons	1	1	—	—	1980	4 years	—	15,000	—	—	—
on. Stake Trucks	2	1	1	—	1979	2 years	2	25,000	50,000	—	—
er Trucks	2	1	1	—	1979	2 years	4	23,000	92,000	—	—
le Wheel Pick-Up Trucks	2	2	—	—	1981	2 years	2	17,000	34,000	—	—
tor with Short Platform	—	—	—	—	—	—	1	150,000	150,000	—	—
on. Stake Trucks	—	—	—	—	—	—	6	20,000	120,000	—	—
Subtotal	-	-	-	-	—	—	-	-	1,967,880	—	480,000
ation	—	—	—	—	—	—	—	—	-	-	96,000
TOTAL									1,967,880		576,000

Brand names are used for illustrative purposes only.
percent inflation is included in the second purchase.

TABLE 7
COST ESTIMATE

Item	Area/Sq. Mt.	$/Sq. Mt.	TOTAL
1. 6 Office Buildings	954	127	$121,158
2. 6 Workshops and Gas Pumps	1,260	68	85,680
3. 6 Control Gates 7 sq. mts. each	42	136	5,712
4. Equipment and Furniture for Six Offices			14,218
5. Utility Hook-ups and Landscaping for Six Regional Offices	5,220	9	46,980
6. Inflation			28,452
Subtotal			$302,200
6. Construction Contingencies 10%			30,220
TOTAL			$332,420

Loan funds will only be used to pay construction line items 1, 2, 3, and the equipment and furniture for the regional offices up to the total amount of $250,000 for the six regional facilities. Other line items will be GOG financed.

The sites will be enclosed with either a wall fence or concrete poles with galvanized wire mesh. Utilities will be installed by DGC with GOG resources.

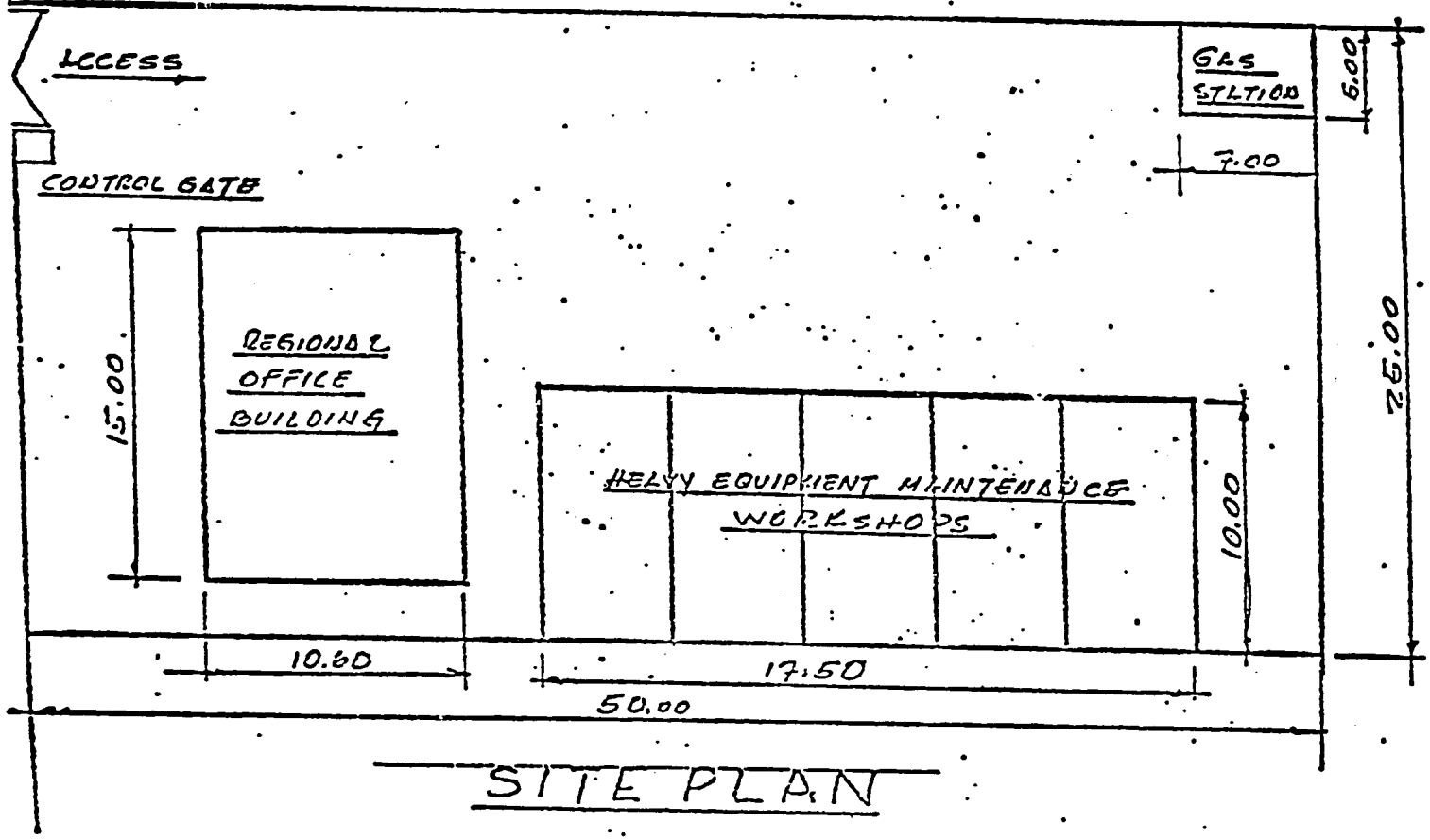
Table 8
Cost for a New Access Roads Construction Region

	Unit Price	Total
.I. Start-Up Costs		
A. Building Facilities and Equipment	56,000	56,000
B. Heavy Equipment		
1 TD8E	64,000	64,000
1 JD850JD	134,400	134,400
1 Motor Grader	88,000	88,000
1 Front End Loader	87,000	87,000
4 3-1/2 CY Dump Truck	24,000	96,000
2 Concrete Mixers	4,600	9,200
1 Compressor	17,000	17,000
1 Electric Welder	4,500	4,500
1 Autogenous Welder	350	350
1 WaterPump	5,700	5,700
1 Chain Saw	780	780
1 Concrete Vibrator	1,080	1,080
3 Ton Pick-Up Trucks	14,000	42,000
1 Water Truck	23,000	23,000
1 1-Ton Stake Truck	20,000	20,000
		649,010
II. Operating Costs and Expenses		
Administration		395,000
Unskilled Labor		1,700,000
Skilled Labor		224,000
Handtools		126,000
Construction Materiales		343,000
Fuels and Lubricants		243,000
Heavy Equipment Depreciation		61,000
Spare Parts		159,000
Tires and Tubes		66,000
		3,317,000

Each regional office has an average work force of 35 Km/year.

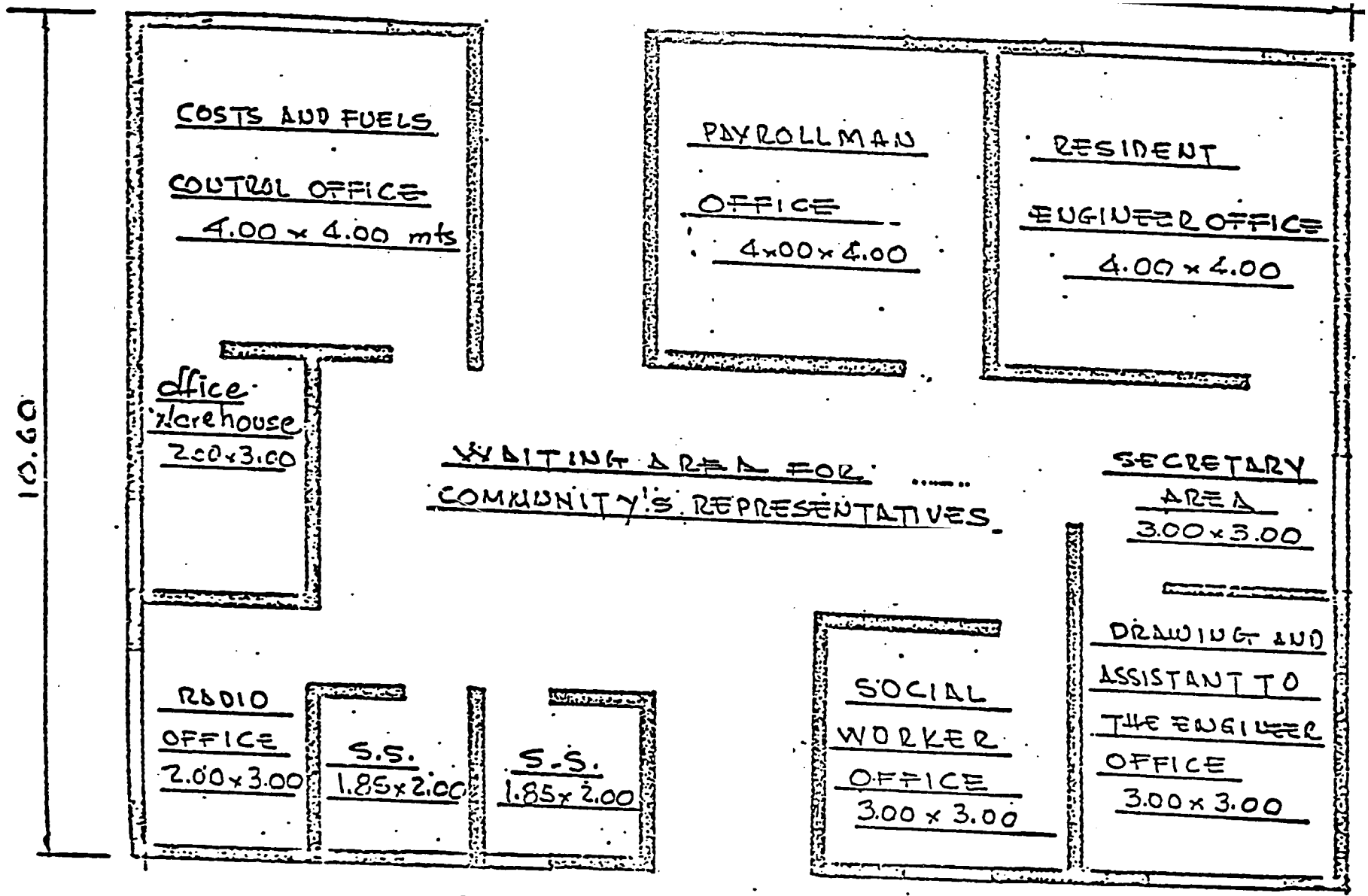
MAP 1
ACCESS ROADS PROGRAM
REGIONAL OFFICES

REGIONAL FACILITIES FOR THE ACCESS ROADS PROGRAM



SITE PLAN

ALL DIMENSIONS IN METERS



REGIONAL OFFICE FACILITY

FLOOR PLAN

IEASUREMENTS
N METERS.

ANNEX 4

Administrative Analysis

1. Ministry of Communications, Transportation and Public Works

The Ministry of Communications, Transportation and Public Works (MCTOP) is responsible for construction, operation, and maintenance of all airports, seaports, public buildings, post offices, telecommunications, highways, rural roads, and for the management and regulation of public transportation.

The Central Ministry Office makes general policy decisions, leaving day to day management to various general directorates.

The staffing of the Ministry and its Directorates is regulated by the GOG civil service system established in Guatemala since 1970. Job positions are granted by competition with the approval of the civil service. There are social security benefits for all employees which include payment for medical expenses and reimbursement of salary when the worker is sick or disabled.

2. General Directorate of Roads (DGC)

The General Directorate of Roads (Dirección General de Caminos - DGC) was created by Government Decree on May 28, 1930. It is a dependency of the MCTOP and is responsible for the planning, design, construction, and maintenance of all national roads and bridges. The DGC is presently divided into six departments: (1) Director's Office, (2) Design, (3) Construction, (4) Maintenance, (5) Finance, and (6) Administration. The Construction Department has the responsibility for supervising all construction projects by contract and force account. It employs 450 professionals and technicians besides the personnel associated with the access roads program.

To implement the previous pilot access roads program under AID Project 520-0233, the Construction Department was expanded to include an access roads section with additional personnel that is responsible for the execution of all activities related to labor-intensive access roads construction. (See organizational chart in Exhibit 1.) This section started implementing the project with one regional office which has expanded into six regional offices in different parts of Guatemala.

3. Rural Roads Program

Within the Construction Department, the access roads program has a General Coordinator who is responsible for supervising all aspects of the labor-intensive construction program. The program is implemented by the six regional access roads offices located at the different sites in the Highland regions of the country.

The General Coordinator is in charge of coordinating all administrative activities related to the program including the provision of logistical support for the supply of construction materials, hand tools, and other requirements of the regional offices. In conjunction with the regional offices, the General Coordinator also establishes the basis for the selection and priorization of access roads for annual implementation plans developed by all six regional offices. At the central level, the General Coordinator unit has 18 employees including professionals, technicians, drivers, and others as indicated in Table 4 of this Annex.

Six regional offices are responsible for the implementation of the access roads construction activities at the regional level. These activities are scheduled and budgeted in conjunction with the General Coordinator. The regional offices are also responsible for the preliminary screening for selection, technical feasibility studies, cost estimate, and socio-economic analysis of each candidate access road prior to the final selection by the General Coordinator.

Each regional office is headed by a resident civil engineer/ administrator who is responsible for the technical and administrative management of the program activities in the region. Each regional office is staffed by 70 employees (see Table 5) including technicians, operators, drivers, social worker, foremen, and helpers. For the six regions the total staff reaches 420 employees. In Region V, 58 additional employees are responsible for carrying out the access and urbanization of new settlements being implemented with a separate GOG budget. The summary of yearly assigned budgets from 1977 through 1984 is given in Table 1 below. The budgets for the additional activities in Region V are indicated separately.

The basic technical and administrative structure for the Farm-to-Market Project is currently in place, therefore, no increase in professional or administrative personnel is expected to implement the proposed Project, except for heavy equipment operators and drivers needed to operate the complementary heavy equipment mentioned in the Technical Analysis indicated below in Table 2.

TABLE 1
SUMMARY OF YEARLY ALLOCATED GOG BUDGETS
From 1977 Through 1984

YEAR	ALLOCATED (Q.)
1977	291,157
1978	680,865
1979	753,425
1980	1,636,063
1981	775,831
1982	2,137,390
1982*	1,425,555
1983	3,825,080
1983*	3,675,000
1984	1,737,013
1984*	2,214,696
TOTAL	19,152,075

GOG budgets for expansion, improvement of secondary roads and access roads, and construction of new settlements in Region V using labor-intensive methods. This is not included as counterpart to the AID-financed portion of the construction program.

TABLE 2
ADDITIONAL HEAVY EQUIPMENT OPERATORS AND DRIVERS

(Cantidad)	Title of Position (Título del Puesto)	Salary (Sueldo) Monthly (Mensual)	Salary (Sueldo) Annual (Anual)	Christmas Bonus (Aguinaldo)	TOTAL
11	Heavy Equipment Operators (Operadores de Equipo Pesado)	Q200	Q26,400	Q1,540	Q27,940
10	Drivers (Conductores de Vehículo)	165	19,800	1,100	20,900
11	Helpers (Ayudantes)	140	18,480	825	19,305
TOTAL (32)			Q64,680	Q3,465	Q68,145

The operating costs of additional personnel for the life of the Project are given in Table 3 below.

TABLE 3
OPERATING COSTS FOR ADDITIONAL PERSONNEL FOR THE LIFE OF THE PROJECT

	First Year	Second Year	Third Year*	Fourth Year	Total 4th Year
Heavy Equipment Operators (11)	Q27,940	Q27,940	Q27,940	Q27,940	Q111,760
Drivers (10)	20,900	20,900	20,900	20,900	83,600
Helpers to Heavy Equipment Operators (11)	19,305	19,305	19,305	19,305	77,220
Inflation	--	--	6,815	6,815	13,630
TOTAL (32)	Q68,145	Q68,145	Q74,960	Q74,960	Q286,210

*a 10% inflation rate was considered during the third year.

TABLE 4
PERSONNEL AT THE DGC's GENERAL COORDINATOR UNIT

General Coordinator	1
Assistant to the General Coordinator	1
Social Area Coordinator	1
Secretaries	2
Chief of the Heavy Equipment Operators	1
Watchman	1
Warehouseman	1
Draftsman 1	
Drivers	3
Soils Engineer	1
Assistant to the Soils Engineer	1
Warehouse Helpers	4
T O T A L	18

TABLE 5
PERSONNEL AT THE DGC's REGIONAL OFFICES
(Per Region)

Regional Resident Engineer	1
Assistant to Regional Engineer	1
Surveyor	1
Social Worker	1
Office Assistant	2
Rodman	1
Chainman	5
Helpers	20
Warehouse Attendant	1
Fuel Attendant	1
Gas Mechanic	1
Diesel Mechanic	1
Drivers	8
Heavy Equipment Operators	4
Watchmen	2
Accountant	1
Chief of Foremen	3
Payroll Clerk	1
Masons	3
Welder	1
Electrician	1
Cook	1
Materials Control Person	1
Foremen	2

Compressor Operator	2
Concrete Mixer Operator	1
Greaser	1
Carpenter	1
Radio Operator	1
TOTAL	70

EXHIBIT 3

LABOR INTENSIVE CONSTRUCTION OF ACCESS ROADS/FORMULA FOR PHYSICAL DATA OR THE ROAD

PROGRAMA: CONSTRUCCION DE CAMINOS RURALES CON USO INTENSIVO DE MANO DE OBRA

FORMULARIO PARA DATOS FISICOS DEL CAMINO

1. DATOS GENERALES:

1.1. NOMBRE DEL CAMINO: _____

1.2. MUNICIPIO: _____ DEPARTAMENTO: _____

1.3. LONGITUD: _____ Kms.

Obtenida con odómetro _____

Estimada: _____

LEVANTO: _____

FECHA: _____

DIRECCION GENERAL DE CAMINOS
MINISTERIO DE COMUNICACIONES Y O. P.

PROGRAMA: CONSTRUCCION DE CAMINOS RURALES CON USO INTENSIVO DE MANO DE OBRA

FORMULARIO PARA DATOS FISICOS DEL CAMINO

DATOS GENERALES:

1.1. NOMBRE DEL CAMINO: _____

1.2. MUNICIPIO: _____ DEPARTAMENTO: _____

1.3. LONGITUD: _____ Kms.

Obtenida con odómetro _____

Estimada: _____

LEVANTO: _____

FECHA: _____

DIRECCION GENERAL DE CAMINOS
MINISTERIO DE COMUNICACIONES Y O.

II. DATOS FISICOS DEL CAMINO:

II.1 Topografía del Camino:

	De Km.	A Km.	P	P	O	M
1.						
2.						
3.						
4.						
5.						

P= plano O= ondulado M= Montañoso

II.2 Tipo y densidad en porcentaje, de la vegetación:

Areas de cultivo o pastizales _____ %

Selva o bosque _____ %

Arido _____ %

II.3 Tecnología a aplicar por tramos:

TRAMO DE Km.	a Km.	CON MANO DE OBRA Volúmen aprox.	CON MAQUINARIA Volúmen aprox.

Observaciones: _____

11.4 Tramos de Terracería existentes que pueden aprovecharse total y parcialmente.

Tramo de Km.	a Km.	Aprovechable total	o parcialmente	No aprovechable.

11.5 DRENAJE:

Estimación del número y tipo de obras necesarias:

11.5.1 Menor:

Tipo	Cantidad	Dimensiones
Alcantarilla de losa de concreto.		
Tubos de Concreto		
Badenes		
Otros		

11.5.2 Mayor:

	Ubicación geográfico	Nombre del accidente	material del cause	Nivel max.	Aguas ext.
1.					
2.					
3.					
4.					
5.					

II.6 Localización con respecto al camino de bancos de materia
les para: Balasto, piedra, grava, arena y agua:

	Ubicación	Material:
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____

II.7 Observaciones:

_____

_____

_____

III. CROQUIS DEL CAMINO:

EVALUACION SOCIO ECONOMICA

BOLETA DE INVESTIGACION

Dirección General de Caminos
Caminos Rurales con uso intensivo
de mano de Obra.

No. de Boleta:_____
Región No.:_____
Comunidad:_____
Informante:_____
Investigador:_____
Fecha:_____

OBJETO: El presente Estudio, tiene como finalidad; recabar datos Socio-Económicos de las comunidades que solicitan Construcción de Caminos Rurales, por lo tanto, la información que se obtenga será de caracter Técnico-Administrativo.

I. DATOS GENERALES DEL PROYECTO:

A. Nombre del Proyecto:_____
B. De:_____ A:_____
C. Departamento:_____ MUNICIPIO:_____
Aldea:_____ Caserío o Cantón:_____
D. Fecha de la Solicitud:_____
E. Longitud estimada del proyecto:_____

II. DEMOGRAFIA

A. Población que se beneficia con la construcción del Camino:_____
_____
B. Qué cantidad de habitantes se benefician con la Construcción del Camino:___
C. De cuántos miembros está integrada su familia: 1. Hombres ( ) 2.Mujeres( )
D. Grupo Etnico al que pertenece: 1. Ladino ( ) 2. Indígena ( )

III. PRINCIPALES FORMAS DE VIDA ECONOMICA:

A. Propiedad y Tenencia de la Tierra.
1. Tiene usted terrenos?: SI_____ NO_____
2. Cuántas Cuerdas?: a) 1-5_____ b) 6-10_____ c) 11-15_____ 16-20_____
e) 21-25_____ f) 26 a más_____

3. Formas de Tenencia: a) Propia____ b) Arrendada_____ c)Usufructo_____
d) Comunal____ e) Otros, especifique:_____

B. Producción.

1. Utiliza abono en sus cultivos: SI_____ NO_____
a) Cuál:_____ b) Cuántos qq:_____ c) Costos Q._____
d) Formas de transportarlo:_____

2. Cuerdas Cultivadas: Principales Cultivos.

CULTIVO	CUERDAS CULTIVADAS	CONSUMO	VENTA	COSTO POR qqs.	MERCADO	COSECHAS

ESPECIFIQUE:_____

3. Ha recibido Asesoría Técnica para el mejoramiento de sus cultivos:SI____NO__
a) De qué Institución:_____

4. Ha recibido Asistencia Crediticia para el mejoramiento de sus cultivos:SI___
NO____
a) De qué Institución:_____

5. Contata a otras personas para que le ayuden a cultivar la tierra: SI____NO__
a) Durante qué meses:_____
b) De qué lugar vienen éstas personas:_____
c) Formas de pago: c.1. Especie____ c.2. Dinero_____ c.3. Intercambio de Tra
bajo_____
d) Cuánto Paga:_____

6. Acostumbra trabajar fuera de la comunidad: SI_____ NO_____
a) En qué actividad:_____
b) A dónde:_____

c) En qué meses: _____

d) Cuánto gana al día: _____

7. Aparte de la Agricultura: se dedica Ud. a otra actividad: SI _____ NO _____

a. GANADERIA

ESPECIE	CANTIDAD	VALOR Q.	MERCADO	FORMAS DE TRANSPORTARLOS
Ovino				
Caprino				
Bovino				
Vacuno				
Porcino				

ESPECIFIQUE: _____

b. AVES DE CORRAL.

ESPECIE	CANTIDAD	VALOR Q.	MERCADO	FORMAS DE TRANSPORTARLOS
Pollos, Pollitos				
Gallos, Gallinas				
Chompipes				
Patos				

OTROS, ESPECIFIQUE: _____

c. ARTESANAL

ESPECIE	CANTIDAD	VALOR Q.	MERCADO	FORMAS DE TRANSPORTARLOS
Barro				
Madera				
Maguey				
Raices				
Palma				
Cuero				

OTROS, ESPECIFIQUE: _____

d. TEXTIL.

ACTIVIDAD	CANTIDAD	VALOR Q.	MERCADO	FORMAS DE TRANSPORTARLO
Telares				
Cintas				
Chamarras				
Guipiles				
Cortes				
Morrales				
Perrajes				

OTROS, ESPECIFIQUE: _____

e. OTRAS ACTIVIDADES

ACTIVIDAD	CANTIDAD	VALOR Q.	MERCADO	FORMAS DE TRANSPORTARLO
Floricultura				
Cal				
Leña				
Madera				
Sastrería				
Panadería				

OTROS, ESPECIFIQUE: _____

PRINCIPALES FORMAS DE VIDA SOCIO-CULTURAL.

Organización:

1. Cuenta la comunidad con comités organizados: SI_____ NO_____
   a) Indique cuáles?: _____
2. Estaría usted en condiciones de participar en el comité Pro-Construcción de su camino: SI_____ NO_____

D. Educación:

1. Existe Escuela en su comunidad: SI_____ NO_____
2. En qué condiciones se encuentra: a) Buena_____ b) Regular_____ c) Mala_____
3. Sabe leer y escribir: SI_____ NO_____
4. Qué dialecto habla usted:_____

C. Salud:

1. Cuál es el servicio médico con que cuenta la comunidad:_____
2. Con qué servicios cuenta su comunidad: a) Letrinización_____ b) Drenajes_____ c) Agua Potable_____ d) Riego_____

D. Vivienda:

1. Tenencia de la Vivienda: a) Propia ( ) b) Alquilada ( ) c) Usufructo ( )
2. Tipo de construcción de la vivienda: a) Adobe ( ) b) Ladrillo ( ) c) Block ( ) d) Madera ( ) e) Otros:_____
3. Servicios con que cuenta su casa:_____

E. Recreación:

1. Cuál es su medio de Recreacion:_____

GRADO DE COOPERACION DE LA COMUNIDAD EN LA CONSTRUCCION DEL CAMINO:

A. Estaría usted de acuerdo a trabajar en la Construcción del camino, aportando su mano de obra: SI_____ NO_____

B. Cree usted que los demás vecinos estarían dispuestos a trabajar en la Construcción del Camino: SI_____ NO_____

C. Si fuera necesario estaría dispuesto a permitir que el camino pasara por sus tierras cediendo el paso en forma gratuita: SI_____ NO_____

D. Si dentro de su propiedad se localizan Recursos Naturales, aprovechales para la construcción del camino (Arena, piedra, madera, agua, etc.), estaría dispuesto a permitir su extracción y uso gratuito: SI_____ NO_____

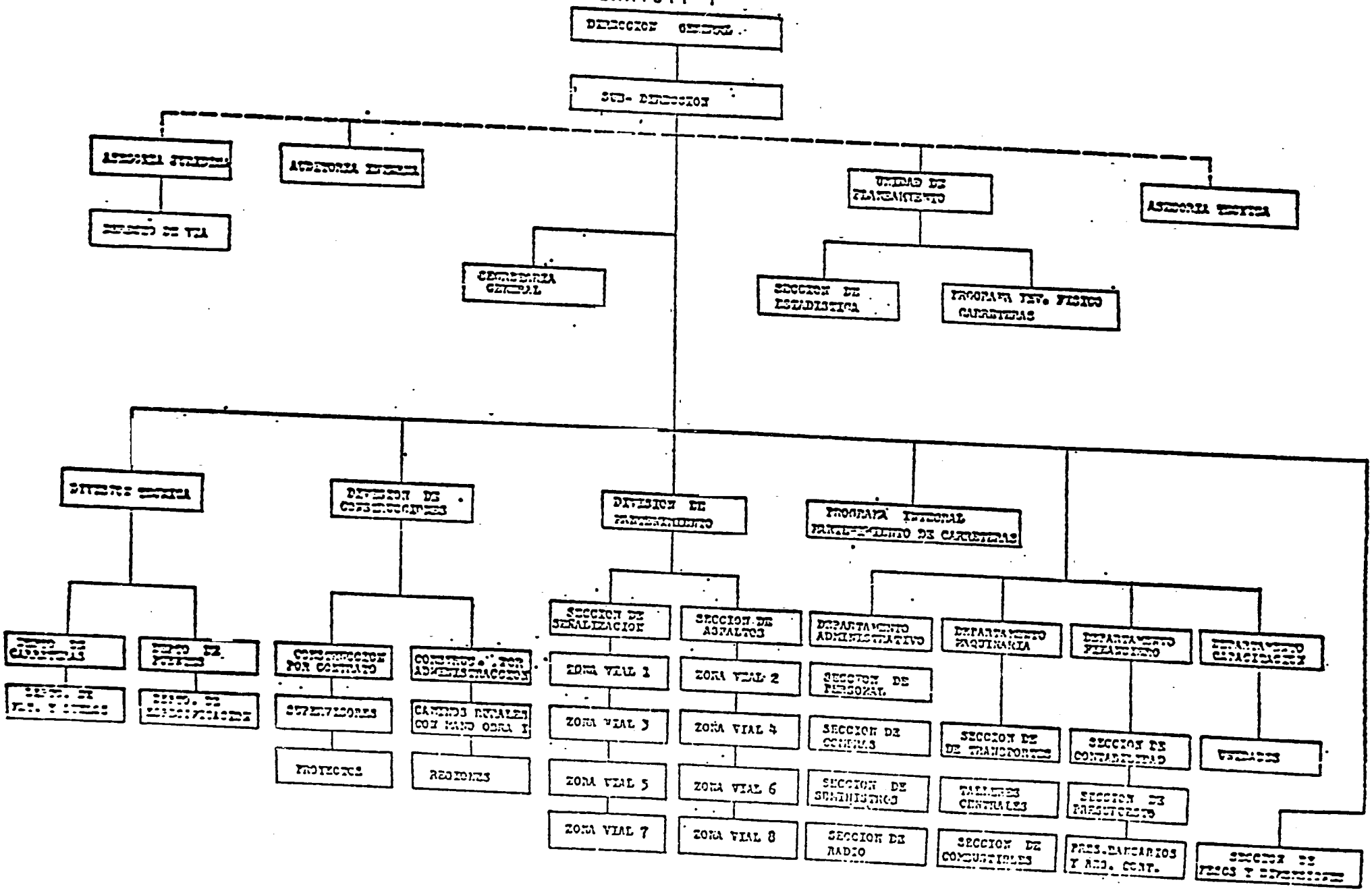
E. Con cuantas personas cree usted que se contaría en sú comunidad para trabajar en la construcción del camino:_____

F. Cree usted que se contaría con la colaboración estrecha de las Autoridades Civiles o Militares del área, en la construcción del camino: SI____NO_____

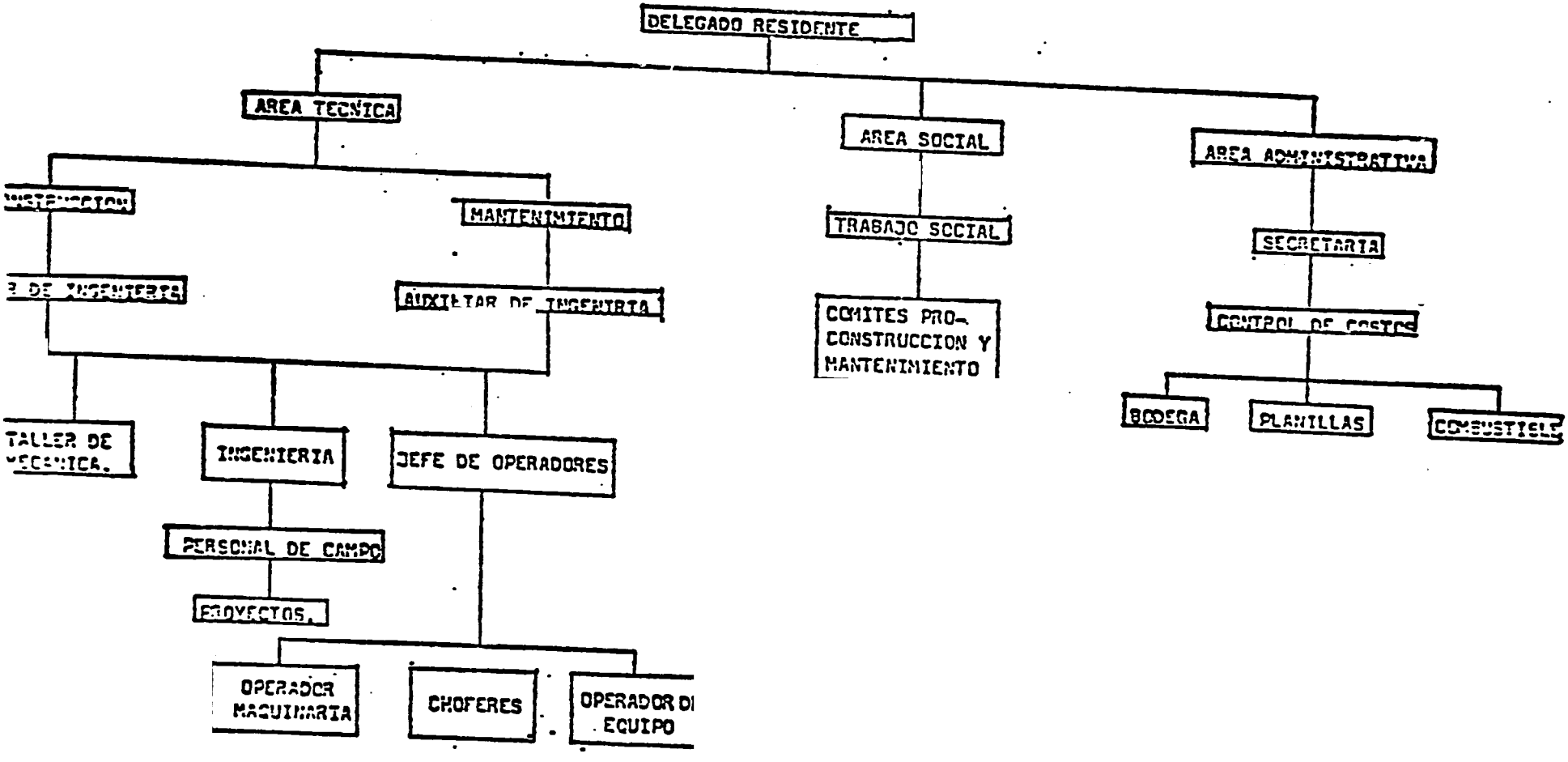
OBSERVACIONES:_____

ANNEX 4

EXHIBIT 1

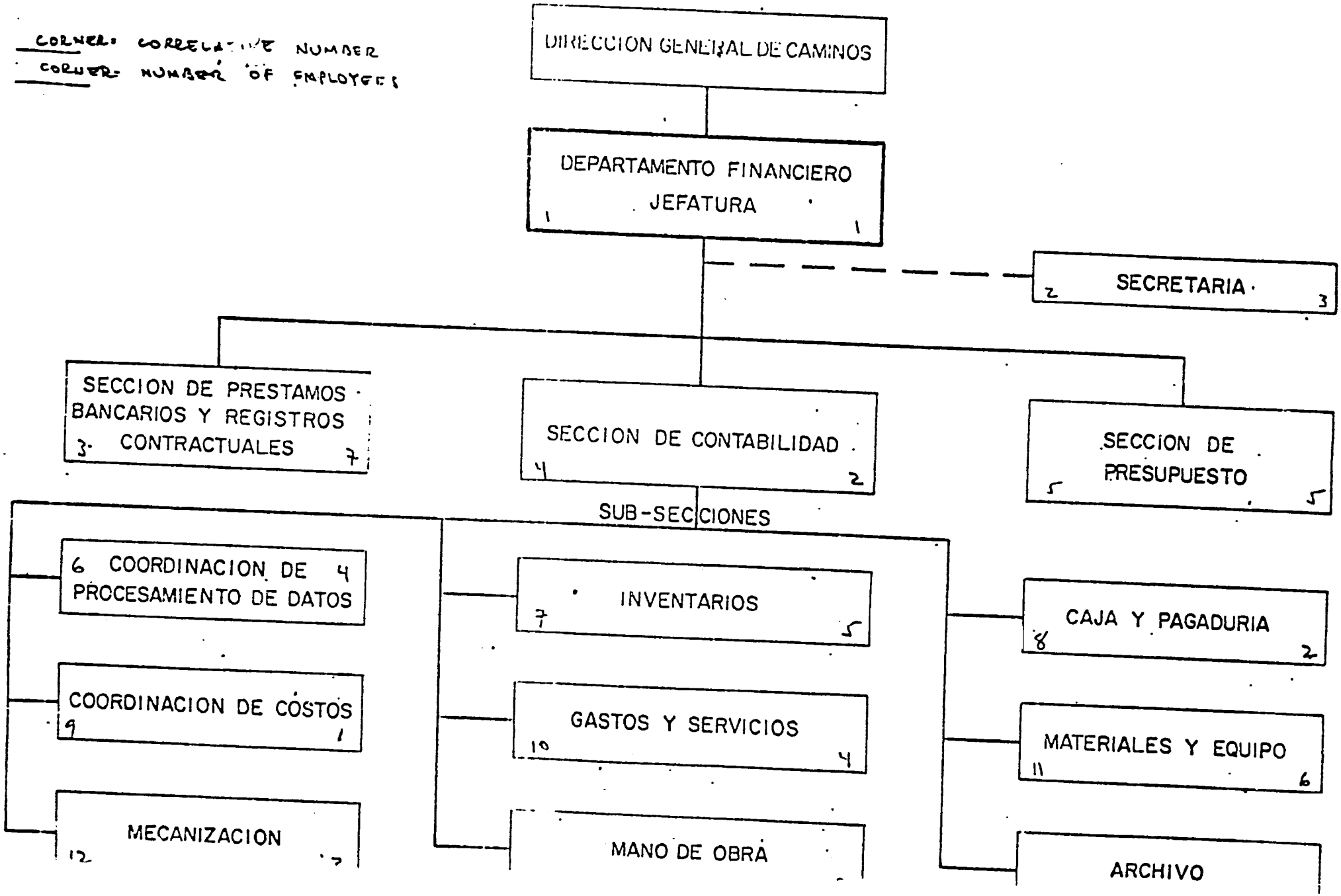


ORGANIGRAMA DEL PERSONAL RESPONSABLE DE LA REGION DE CAMINOS RURALES.



ORGANIGRAMA DEL DEPARTAMENTO FINANCIERO

CORNER: CORRELATIVE NUMBER
CORNER: NUMBER OF EMPLOYEES



ANNEX 5
FARM TO MARKET ROADS

Financial Analysis

The purpose of this section is to assess the administrative and financial capability of the Directorate of Roads in areas relevant to implementing the Farm to Market Roads Project and to determine the feasibility of the project implementation plan.

It will then present the current administrative chart (Annex No. 4) and a yearly calendar for the new project implementation plan. It will also include cost tables and methods of implementation and financing.

1. Accounting and financial evaluation of the executive institution of the program:

A revision of the accounting and internal control systems used by the General Directorate of Roads was conducted in order to determine if they were adequate to handle AID funds. The revision included the following:

a) Interviews with the chief of the financial department, chief accountant, bank loan section, and budget section.
b) Examination of the accounting records
c) Examination of support documentation and filing procedures.

The organizational chart of the Financial Department is attached as Exhibit No. 1. It shows its composition in 14 sections and a total number of 54 employees.

1.1 Accounting Records

The DGC's Accounting System was designed with the collaboration of the United Nations and a Decree made it mandatory. DGC is under this system since 1979.

The accounting registers of DGC consist basically of the following:

a) Cumulative trial balance
b) Detailed trial balance
c) Cost control by line item
d) Inventory
e) Fixed assests control
f) Sundry debtors
g) Sundry creditors

a) to e) are computerized records. f) and g) are mechanized. Different auxiliary registers are maintained (handkept) that control every movement.

Also, the bank loans section uses additional registers to account for the loans and/or grants given by different financial institutions.

1.2 System of Internal Control

The revision of this system was made at its high level, not at the implementing one. The revision irdicates the following:

a) the functions of accounting and treasury are satisfactorily defined and separated.

b) A budget exists to control costs.

c) External auditors have stated that DGC's internal control system is satisfactory.

The government's general audits office performs periodic audits especially of managed funds.

1.3 Purchase and Contract Procedures

To purchase goods or services DGC has to operate in accordance with Decree No. 35-80 Purchase and Contracting Laws and Related Dispositions, that is mandatory for GOG institutions. The procedures are compatible with AID regulations.

As with other GOG institutions the bid procedures at DGC are 180 days long.

1.4 Audits:

In addition to the periodical fiscal audits made by the General Accounting Office of the Government of Guatemala, DGC has an Internal Audit Department.

This Department has 15 employees. Its function is basically preventive. They review all the documents prior to their payment. The typical documents are:

-Requisition, duly authorized
-The sign of warehouse manager indicating that the item is not available
-Purchase Order
-Pro-Forma invoices

The auditor also confirms that the legal requirements are met. Finally, he signs on an specific place. As an average, all the process takes only one day.

On a random basis, the audit department verifies prices and other aspects of the purchase.

The documents continue their process through the budget section, accounting section, etc. to the Ministry of Finance and National Treasury for final review and allocation of funds.

Project budget has a line item for evaluations and audits in the amount of $150,000 (Grant component).

1.5 GOG Counterpart Contribution

Major GOG counterpart contribution to the project is in the form of administrative costs. We would only suggest that they assign a prefix number in the Cost Control book for an easy identification of related counterpart costs so as to facilitate later review.

Conclusion

The conclusion is that General Directorate of Roads has enough administrative and financial personnel and capability to carry out satisfactorily the purpose of the project.

Additional information concerning the structure of the financial and administrative unit of the project is provided in the administrative analysis.

2. Cost and Budget Analysis

As mentioned in the appropriate section, Technical analysis and Financial Analysis, Table Nos. 1 through 7 (Annex No. 3) and Tables 1, 2, 3 in Annex 5 indicate the quantity and timing of the financial resources.

Costs are projected for the 4-year life project by funds source showing separately the contingencies and inflation factors.

Costs are also presented identifying the foreign exchange and local currency requirements.

The methods of implementation and financing for this program as currently envisioned by the Mission are shown in Tables Nos. I, II, III of Annex 5.

Replicability

The proposed expansion is designed to maintain the current level of activity in DGC's Construction Department (Rural Roads Prcgram).

FIGURES IN Q MILLIONS

	Year	1980	1981	1982	1983	1984	1985
Rural Roads Investment,*		3.8	2.5	2.8	4.0	4.7	4.2
	Base,	100%	66%	74%	105%	124%	111%

* Source, GOG Budget

The institution will finance all the project administrative component and as shown in Table No. 1 of Annex No. 5 total Loan/GOG contributions goes from 80% loan, 20% GOG to 20% loan and 80% GOG.

The importance of the General Directorate of Roads in the Ministry of Communications, Transportation and Public Roads appears in the following table:

	YEARS					
	1980	1981	1982	1983	1984	1985
	Figures In Q Millions					
Total Ministry Budget	365.6	432.7	405.0	282.0	301.7	231.4
Total DGC Budget	68.4	106.6	79.4	84.4	77.4	69.3
Percentage of MCTPW Budget	19%	25%	20%	30%	26%	30%

In terms of the financial support provided by the GOG to the Communications sector for Direct Investment, it can be observed in the following Table that the percentage of the total GOG budget has raised to its 1983 level after the extraordinary investments in hydroelectrification projects in prior years.

	YEARS					
	1980	1981	1982	1983	1984	1985
	Figures in Q. Millions					
Total GOG Budget	484.3	633.7	589.8	447.2	417.7	333.8
Total MCTPW Budget	316.9	378.7	350.7	244.1	251.2	181.1
Percentage of GOG Budget	65%	60%	59%	55%	60%	54%

Furthermore the continuity of this project is supported by the following loans: No. 520-T-026 Construction of access roads $2.9 and Q3.8 million GOG counterpart. No. 520-T-037 Highlands Agricultural Dev. $4.6 and Q3.7 million GOG counterpart.

The Access Road component of Loan No. 520-T-037 has the purpose to assure that the rural roads constructed or to be constructed, especially in the Highland region, will provide the inhabitants of this area with continuous access to markets, agricultural inputs, agricultural extension services, and education and health services. This component includes the following three separate, but related activities.

a) maintenance of rural access roads with labor intensive methods supported with heavy equipment.

b) maintenance of heavy equipment which will be used for the construction, rehabilitation and maintenance of access roads, and,

c) mapping, promotion and planning of the access roads program.

The General Directorate of Roads will be the implementing agency responsible for these activities.

The investment for this component in the five-year project is,

AID Loan	$3.9 million
AID Grant	0.7 million
GOG counterpart	3.7 million
Total	$8.3 million

The replicability of the project is based on the sliding scale of financing, that is, during the first year some items, especially the unskilled labor is financed 80% by the loan and 20% by the GOG. In year 84 the percentages are budgeted as exactly the opposite, Loan 20% and GOG 80%.

The above means that DGC has to increase its budget on a yearly basis to be capable of covering the implementation plan. On the other hand, administrative costs, skilled labor etc. have been financed 100% by GOG during the four-year life project.

At the end of the project it is expected that DGC has developed the institutional capability to manage this workload and created the necessity of continuing programs like this, because of its experience, prior budgets and benefits got by the inhabitants of the poor rural areas.

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TABLE 1

FARM-TO MARKET ROADS 520-0332 - 4-YEAR PROJECT FINANCIAL PLAN

Loan/GOG Contributions

($000's)

Item	Year 1			Year 2			Year 3			Year 4			TOTAL		
	Total	Loan	GOG	Total	Loan	GOG	Total	Loan	GOG	Total	Loan	GOG	Total	Loan	GOG
A. 100% LOAN-FINANCED															
1. Heavy Equipment and Vehicles	1,968	1,958	—	—	—	—	480	480	—	—	—	—	2,448	2,448	—
2. Constructing and Equipping Six Regional Offices	136	136	—	90	90	—	—	—	—	—	—	—	226	226	—
3. Inflation	14	14	—	10	10	—	96	96	—	—	—	—	120	120	—
Subtotal	2118	2,118	—	100	100	—	576	576	—	—	—	—	2,794	2,794	—
B. 100% GOG-FINANCED															
1. Administrative Costs	347	—	347	347	—	347	347	—	347	404	—	404	1,445	—	1,445
2. Preliminary Work	156	—	156	156	—	156	155	—	155	191	—	191	658	—	658
3. Skilled Labor	267	—	267	267	—	267	267	—	267	298	—	298	1,099	—	1,099
4. Fuels and Lubricants	303	—	303	303	—	303	303	—	303	324	—	324	1,233	—	1,233
5. Equipment Depreciation (Non-Add)	71	—	71	71	—	71	71	—	71	81	—	81	294	—	294
6. Land	150	-	150	-	-	-	-	-	-	-	-	-	150	-	150
7. Six Regional Offices Utilities Landscaping	29	-	29	18	-	18	-	-	-	-	-	-	47	-	47
8. Const. Contingency	20	-	20	10	-	10	-	-	-	-	-	-	30	-	30
9. Inflation	3	-	3	32	-	32	142	-	142	176	-	176	353	-	353
Sub total	1275	-	1275	1,133	-	1,133	1,214	-	1,214	1,393	-	1,393	5,015	-	5,015
C. SLIDING SCALE FINANCED	—	80%	20%	—	60%	40%	—	40%	60%	—	20%	80%	—		
1. Unskilled Labor	1,982	1,586	396	1,982	1,189	793	1,982	793	1,189	2,245	449	1,796	8,191	4,017	4,174
2. Handtools	136	109	27	136	82	54	136	54	82	168	34	134	576	279	297
3. Construc. Materials	371	297	74	372	223	149	372	149	223	457	92	365	1,572	761	811
4. Spare Parts	186	149	37	186	112	74	186	74	112	213	43	170	771	378	393
5. Tires & Tubes	77	62	15	77	46	31	77	31	46	88	18	70	319	157	162
6. Inflation	-	-	-	78	46	32	360	144	216	478	93	385	916	283	633
Sub-Total	2,752	2,203	549	2,831	1,698	1,133	3,113	1,245	1,868	3,649	729	2,920	12,345	5,875	6,470
Contingency	216	216	—	19	19	—	77	77	—	19	19	—	331	331	—
TOTAL	6,361	4,537	1,824	4,083	1,817	2,266	4,980	1,898	3,082	5,061	748	4,313	20,485	9,000	11,485

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TABLE II

Farm-To-Market Roads - Grant Portion
($000)

ITEM	Year 1		Year 2		Year 3		Year 4		T O T A L		
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	Total
Supervision	---	100	---	100	---	100	---	100	---	400	400
Environmental Training	25	15	10	10	10	10	10	10	55	45	100
Baseline Survey	---	50	---	---	---	---	---	---	---	50	50
Final Evaluation	---	---	---	---	---	---	---	50	---	50	50
Seminars,Travel,Promotion	10	25	10	25	10	25	20	25	050	100	150
Access Roads, Inventory	---	90	---	20	---	20	---	20	---	150	150
Audits	10	---	10	---	10	---	20	---	50	---	50
Contingencies	10	10	---	10	---	10	---	10	10	40	50
T O T A L	55	290	30	165	30	165	50	215	165	835	1000

TABLE III

Farm-to-Market Roads (Loan Portion)

ITEM	YEAR 1		YEAR 2		YEAR 3		YEAR 4		TOTAL		
	FY	LC	FY	LC	FY	LC	FY	LC	FY	LC	TOTAL
Heavy Equipment & Vehicles	1,968	—	—	—	480	—	—	—	2,448	—	2,448
Constructing & Equipping Six Regional Offices	14	122	—	90	—	—	—	—	14	212	226
Unskilled Labor	—	1,586	—	1,189	—	793	—	449	—	4,017	4,017
Hand Tools	109	—	82	—	54	—	34	—	279	—	279
Construction Materials	—	297	—	223	—	149	—	92	—	761	761
Spare Parts	149	—	112	—	74	—	43	—	378	—	378
Tires and Tubes	62	—	46	—	31	—	18	—	157	—	157
Inflation	1	13	24	32	130	110	24	69	179	224	403
Contingency	200	16	3	16	61	16	3	16	267	64	331
TOTAL LOAN	2,503	2,034	267	1,550	830	1,068	122	626	3,722	5,278	9,000
TOTAL GRANT	55	290	30	165	30	165	50	215	165	835	1,000
TOTAL AID FINANCING	2,558	2,324	297	1,715	860	1,233	172	841	3,887	6,113	10,000

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ANNEX 6

ECONOMIC ANALYSIS

1. Introduction and Conclusions

Analysis of the initial labor-intensive roads project (1975) showed the investment to be economically very profitable, with an internal rate of return projected to be 24-34%. Substantial increases in small farmer incomes were expected to result from reductions in transport costs and adoption of higher value crops. The economic costs of the project were judged to be low owing to its heavy reliance on unskilled community labor.

The original economic analysis was updated for the project amendment (1983). Again the economic feasibility of investment in rural road construction was demonstrated.

For the project currently under consideration, the economic analysis will attempt to verify the high rates of return predicted in the earlier project papers. Baseline and current data from the Chuicaxtun-Rancho de Teja road suggest that economic returns may be higher than those originally projected. In addition, evidence from two project evaluations and several socio-economic analyses of other subprojects will be presented. These reports identify a number of positive impacts of the roads project which were not envisioned in the original economic analysis.

2. Description of Subproject

The rural access road chosen for the economic analysis is the 15 kilometer Chuicaxtun-Rancho de Teja penetration road, constructed in 1983 in the northeast part of the Department of Totonicapan. The majority of the beneficiary population of 3000 toil as small farmers on plots of about 1-2 hectares.

This road was chosen solely because there was enough baseline and current data to put together an analysis with a minimum of arbitrary assumptions. The region is somewhat atypical where roads have been constructed in that it does not produce any high-value crops such as coffee or fruit. Most farmers along the Chuicaxtun-Rancho de Teja road cultivate corn and beans for home consumption, and wheat and vegetables (habas, potatoes, etc.) for sale outside the community. Area residents engage in little livestock or handicraft production.

The continued reliance on low-value crops implies that this subproject may have a lower economic return than many others.[1/] However, in the community's favor is the availability of additional cultivable land, which has allowed farmers to respond quickly to the incentives of lower transport costs.

1/ Since the road has only been completed for a year, it may be too early to observe the introduction of new crops.

Baseline production data for 1983 showed the following crop production in the road's area of influence:

CROP	PRODUCTION (qq)	% OF CULTIVATED LAND
Corn	10,548	50% (Intercropped)
Beans	5,237	
Wheat	12,808	30%
Vegetables	14,152	20%

3. Observed Project Benefits

The changes noted in the road's first year are probably only a portent of its eventual full impact. The standard wisdom of road project analysis is that benefits will rise gradually, reaching their full level possibly by the fifth to the tenth year. Thus, for this analysis, the production increases attributed to the road in the first year will be extrapolated into the future. The following major impacts have been observed along the Chuicaxtun-Rancho de Teja feeder road:

- Land which had been abandoned has been brought back into production. For example, at least 20 additional hectares of wheat are under cultivation (about a 6% increase). Production of all crops is noted to be higher this year.

- Before the road was extended, farmers could either carry their produce to market on foot or horseback, or sell to middlemen who made their way to the community. Either way the prices they received were low. In addition, the arduous and unpredictable nature of transport represented a real deterrent to increasing cultivation of market-oriented crops. Now farmers can use regular transport (at 25 cents per quintal) to the municipal market where their crops command prices that are between 2-25% higher.

From the information on the impacts of the subproject on agricultural production and prices, a projected benefit stream was calculated for the assumed 15 year life of the road. Two benefit measures were used:

1) The increased revenue for the baseline output of marketed crops resulting from higher prices received, less vehicle transport costs.

2) Incremental net farm income due to production increases.

Since information on additional land under cultivation only covers the first year of the new road, an eventual 20% increase in the production of all commercialized crops was assumed, with the additional net income phased in over five years. This assumption implies a 5% overall increase for bean production,[2/] 8% for corn, 16%, for vegetables, and 20% for wheat, based on

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2/ For simplicity, this incremental production is assumed to be net of any increased local consumption. Farm prices are taken as constant.

the proportion of each crop that was reported as the marketable surplus.[3/] Table 1 reports the estimated economic values of project benefits over the estimated 15 year useful life of the road.

3. Measurement of Subproject Costs

The 1983 project paper amendment estimated the cost per kilometer of rural access road to be Q.20,000 per kilometer. This financial cost is adjusted to reflect the low opportunity cost to the Guatemalan economy of employing rural unskilled laborers. The value of imported equipment and materials is also recalculated to reflect the scarcity of foreign exchange at the official rate.

The annual financial cost of maintaining the Chuicaxtun-Rancho de Teja road is estimated to be Q.1,149 per kilometer.[4/] Maintenance costs have been adjusted according to the same shadow-pricing scheme as costs of construction. The calculation of the economic cost of the subproject appears in Table 2.

4. Summary of Benefit-Cost Analysis

The ratio of discounted economic benefits to costs for the subproject is 1.27, assuming a 15% opportunity cost of capital. The economic rate of return to the subproject is estimated to be 21%.

The estimated rate may be understated, as the analysis does not quantify other benefits which communities have realized as a result of rural road construction. Evidence of these impacts was detailed in the PID and is summarized in Table 3.

Increased availability of motor transport has been noted in all of the communities that have been evaluated. Better transport has implied not only greater access to markets to sell produce, but also improved health care, less costly agricultural inputs, greater variety in community stores, and more children able to attend school.

3/ Assuming that the land intensity of production does not change, this implies a 12% increase in land under cultivation by the end of the fifth year, which is judged reasonable given area land availability.

4/ Based on information from the rural road maintenance component of the Guatemala Highlands Development Project.

TABLE 1

ECONOMIC BENEFITS OF CHUICAXTUN-RANCHO DE TEJA
RURAL FEEDER ROAD
(Q'000)

YEAR	1983	1984	1985	1986	1987	1988	1989-97
Net Income from Agricultural Production Increases							
Corn	--	904	1,808	2,712	3,616	4,520	4,520
Beans	--	580	1,160	1,740	2,320	2,900	2,900
Vegetables	--	5,152	10,304	15,456	20,608	25,760	25,760
Wheat	--	3,312	6,624	9,936	13,248	16,560	16,560
Increase Revenue from Traditional Production Levels[1/]	--	26,655	26,655	26,655	26,655	26,655	26,655
TOTAL BENEFITS	--	36,603	46,551	56,499	66,447	76,395	76,395

PV(15%) = Q313,749

TABLE 2

ECONOMIC COSTS OF CHUICAXTUN - RANCHO DE TEJA
RURAL FEEDER ROAD (Q.000's)

		FINANCIAL COST		SHADOW PRICE		ECONOMIC COST
Construction Per Km	(Unskilled Labor)	10.206	x	.3 1/	=	3,062
	(Foreign Exchange)	3,402	x	1.2	=	3,845
	(Other Costs)	6,392	x	1.0	=	6,392
	TOTAL	Q. 20,000				Q. 13,299
Maintenance Per Km	(Unskilled Labor)	344	x	.3	=	103
	(Foreign Exchange)	343	x	1.2	=	412
	(Other Costs)	462	x	1.0	=	462
	TOTAL	Q. 1,149				Q. 977

YEAR	1983	1984	1985	1986	1987	1988	1989-97
COSTS 2/ from							
Construction	199,485	-	-	-	-	-	-
Maintenance	-	14,655	14,655	14,655	14,655	14,655	14,655
TOTAL COSTS	199,485	14,655	14,655	14,655	14,655	14,655	14,655

PV (15%) = Q.246,415

1/ .3 x Q.2.70 daily wage = .25 Urban Min. Wage.

2/ For 15 kilometers.

The opening of an access road appears to be a precondition for the introduction of complementary social services. Communities noticed more frequent extension service and greater responsiveness to their requests for schools, electricity, and potable water. From an economic standpoint, this impact is attributable to the reduction in the cost of providing public services once transportation is facilitated.

Finally, there appear to be social gains to the community of working together toward a common long-term goal. A number of localities have redirected their efforts toward other infrastructural projects once the road was completed.

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TABLE 3

SUMMARY OF EVIDENCE OF IMPACTS FROM THE CONSTRUCTION OF LABOR - INTENSIVE - RURAL ROADS

Rural Roads Evaluations

Road (Year Road Completed)	Observed Impacts
1. Chichicastenango - Tzaminam (1980 - 82)	- Increased agricultural production.
	- Initiation of truck and bus service.
	- New school.
	- More access to credit and extension services.
	- Easier transport of sick to hospitals.
	- Transport has spurred local production of wooden furniture.
	- Reduced emigration due to greater employment opportunities.
2. Tecpan - Guatemala Xecoxol (1980)	- Increased agricultural production
	- Daily truck service.
	Improved access to government services.
3. Totonicapan - Patulup (1984)	- Farmers transport produce by truck to the market, where crops command higher prices.

Road (Year Road Completed)	Observed Impacts
	- Establishment of roadside stores.
	- Communities now organizing to seek electrical service.
4. San Pedro Necta Santiago Chimaltenango (1982)	- Establishment of transport service to Huehuetenango.
	- Residents no longer transport goods on horseback - now use trucks.

5. La Capellania - El Suj (1982)	- Cooperative purchase of a truck to transport produce.
6. Arenal - Sashico (1980)	- Increase in land under cultivation.
	- More access to extension agents and other government services.
	- 70% (of a sample) of farmers indicated that they were growing new crops.
7. Los Izotes - El Carrizal (1980)	- Increased production due to new technologies introduced by extension agents.
	- Introduction of new crops.
	- Increase in land under cultivation.
	- Better prices received for crops.

Road (Year Road Completed)	Observed Impacts
	- Electric service, for which having a road was a prerequisite.
8. Chuicaxtun-Rancho de Teja (1984)	- Abandoned land brought back into cultivation.
	- Higher prices received for crops.
	- Daily bus service.
	- Increased farm incomes.

AID EVALUATIONS (DATE)

1. Various sites in Quetzaltenango and San Marcos (Dec. 9, 1982)	- Easier transport of agricultural commodities.
	- Reduced transport costs.
	- Introduction of higher value crops.
	- Greater access to government services, especially in health care, extension and forestry.

2. Guatemala and San Marcos Departments (May, 1983)	-	Positive Impacts
	-	New truck and busing firms.
	-	Transport of local charcoal and handicrafts to capital (Guatemala Dept.)
	-	Increased roadside busineses.
	-	Greater contact with government service personnel.
Road (Year Road Completed)		Observed Impacts
	-	Increase in school attendance.
	-	Savings of one labor day per week per household due to better transport.
	-	20-30% increases in produce brought to market.
		Negative Impacts
	-	Accelerated deforestation.
	-	Greater outmigration.

Distribution of Benefits

Most of the positive impacts of rural road construction listed in Table 3 benefit small farmers. The table reflects a bias in the evaluation methodology which has tended to rely on information provided by the small farmers themselves. Other benefits which may be traced to the construction of rural access roads are increased incomes for transporters and lower prices for consumers.

Rural access roads can serve to worsen rural income disparities where there are more serious constraints to increased production (e.g. land availability) and where auxiliary services such as health extension, credit, and irrigation are not forthcoming. Since any improvement in a small farmer's income rests largely on his ability to expand production for market, without auxiliary services the poorest small farmers may be left out. However, most communities reported improved access to public services, so it is reasonable to assume that even the worst-off farmers have benefited.

A few negative effects of road construction have been noted in Guatemala. In areas near the cities, road improvements have motivated the production of charcoal and firewood for sale, thus accelerating the pace of deforestation. In a few communities near the capital, an increase in outmigration has been

blamed on the newly constructed road. Overall, however, the extension of rural access roads appears to be a major stimulus to agricultural production and a source of improvement in rural farm incomes.

ANNEX 7

SOCIAL SOUNDNESS ANALYSIS

The analysis given in this annex is taken from a larger, more compassing report prepared for AID entitled "REGIONAL DEVELOPMENT MISSION REPORT" which, addressed the social impact and constraints of four developmental innovations including land terracing, small scale irrigation, labor intensive access roads, and forestry projects. A summary update of the analysis of the labor intensive access roads is given below.

Background

Guatemala's western Highlands is a region of rugged, mountainous terrain. In this region live a predominantly rural, agricultural population of mostly Indians and rural Ladinos[1/]. The already high population density[2/] is further pressured by a population increase in an excess of three percent per year. Those that feel the most immediate effects of this increased population expansion are the rural poor of Guatemala's Highlands, for they are utterly dependent on successful agricultural exploitation, or they are forced into the slums of Guatemala's major cities.

a. Socio-Economic Impacts

Rural farmers interviewed during the development of the Regional Development Mission Report indicated that rural access roads facilitated the export of their agricultural produce and reduced the transportation cost of their product to market. The presence of the roads allowed them the opportunity of producing crops of greater cash value and facilitated the delivery of needed goods from market centers.

Rural farmers also emphasize their greater access to numerous government services. Foremost among these are health benefits. The farmers recognize that the roads allow emergency medical transportation and permit

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1/ An Indian is one who speaks some non-Hispanic mother tongue, speaks Spanish generally with phonological and syntatic interference from the indigenous language, wears clothing which is distinctive (special the woman), and adheres to numerous group-specific domestic, social and religious patterns. A Ladino, in contrast, speaks accent-free Spanish as sole (or dominant) language, wears western style clothing, and adheres to the generalized Hispanic domestic, social and religious institutions relevant throughout Latin America.

2/ Project area population is 91 persons per square kilometer, or 253 persons per square mile.

government health agents to bring to the villages regular innoculations and medical extension education. Other agencies of the GOG such as agricultural extension agents and forestry officials, were able to deliver additional services and supervise projects with greater facility. In short, the construction of rural access roads is perhaps one of the most important first steps in the development process, for they bring with them many collateral services and open significant new opportunities.

Of a more immediate nature, the process of road construction injects funds directly into the rural communities since the roads are to be constructed with an emphasis on the use of paid local labor. This will have a significant impact on those employed under the program. During the project Q8,614,000 will be paid for 179,290 man months of labor. Work will be distributed throughout communities. Crews work for two week periods after which a different crew is selected. Thus, agricultural activities are not significantly interrupted.

b. Beneficiaries

The beneficiaries will be those people living within the area of influence of each access road. During the four years of project execution 800 kilometers of roads will be constructed or reconditioned benefiting about 150,000 rural inhabitants.

c. Participants

There will be two types of participants within the proposed construction program. Active participants will supply labor and receive payment for their work efforts. As mentioned in the above Socio Economic Section, during the life of the project 179,290 man months of labor will be required at a total payment of Q8,614.000. Inactive participants are those individuals living within the area of influence of the roads who will reap socio-economic benefits from the well maintained roads, but will not participate directly in the road maintenance plan.

d. Social-cultural Constraints and Solutions

The beneficiaries of the Farm to Market Roads Project are small farm owners, mainly Indians, who live in the Highlands where access roads have been previously constructed or will be constructed during the proposed project. In Guatemala these Highland Indians occupy the lowest socio-economic strata. One of the main contributors to this situation is that because of the difficulty of travel in the mountainous Highland terrain, Indian groups isolated from each other have, over time, developed 23 different dialects. Separated from the lowlands, they have not learned Spanish. This isolation, the numerous dialects and the lack of knowledge of the Spanish language have reduced educational opportunities for Indians further preventing their economic, social and political participation outside of the Highlands. Because of this and other cultural differences, it has often been difficult for generally non-Indian government workers to introduce new technology in the Highlands.

This is not expected to be a significant problem for the proposed project since the DGC has effectively implemented similar projects in the past utilizing extension agents and promoters trained in community development techniques. The proposed project will utilize the same field tested extension technology while benefiting from the experience of many of the same field trained extension personnel.

Current experience has demonstrated that projects such as the Rural Access Roads Program have improved Indian perceptions of government extension workers. These projects are thought to have been effective because they involved the Indian communities in decisions concerning the planned interventions. Access roads, for example, are initiated only after request for such roads from interested communities. Promoters then visit the communities to discuss the roads, and community committees are formed to help in the organization of community participation. These committees, elected by the communities, select both local work crews and local foremen for the construction. This system has worked well enough to produce 707 kilometers of roads over the past six years. The same committees will participate in the organization of community participation for road maintenance. The local foreman will not only supervise construction crews but will provide an accounting of work performed to the DGC for worker payroll.

One problem that was not forseen under the Pilot Rural Access Road Program was that after construction, roads were not well maintained. The assumption was that communities would maintain roads without payment for their labor because of perceived benefits of the road to the community. However, community members would not accept individual responsibility to work on the roads since many people who used the roads had no responsibility to maintain them. Further, the workers believed that road maintenance is a proper responsibility of government. Therefore, the maintenance component of the recently signed Highlands Agricultural Development project (520-0274) was designed to correct this program by providing wages for labor on the roads.

CERTIFICATION PURSUANT TO SECTION 611 (e)

OF THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, CHARLES E. COSTELLO, the principal officer of the Agency for International Development in Guatemala, CERTIFY that to the best of my knowledge and belief Guatemala possesses both the financial capability and human resources to effectively maintain an utilize the access roads to be built under the Farm-to-Market Roads Project. The construction of these roads will stimulate the growth of farm-related activities in the Guatemalan Highlands.

This judgement is based on the fact that the 200 Kms. per year of access roads constructed within this $10.0 million loan/grant project will enter directly into the access roads maintenance program established within the AID/GOG Highlands Agricultural Development Project (520-0274) which has been designed to accept up to 200 Kms. of new roads annally into its road maintenance program.

(Signed) 

Charles E. Costello
Director
USAID/Guatemala

(Date) 2-12-85

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ANNEX 9

5 C (2) - PROJECT CHECKLIST

Listed below are statutory criteria applicable to projects. This section is divided into two parts. Part A includes criteria applicable to all projects. Part B applies to projects funded from specific sources only: B.1 applies to all projects funded with Development Assistance Funds, B.2 applies to projects funded with Development Assistance loans, and B.3 applies to projects funded from ESF.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? — Yes, attached.

HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT? — Yes

A. GENERAL CRITERIA FOR PROJECT

1. FY 1985 Appropriation Act Sec. 523; FAA Sec. 634A; Sec. 653(b).

(a) Describe how authorizing and appropriations committees of Senate and House have been or will be notified concerning the project; (b) Is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than $1 million over that amount)? — This project was presented in the Mission's FY 1986 Congressional Presentation as a new initiative during FY 1985.

2. FAA Sec. 611(a)(1). Prior to obligation in excess of $100,000, will there be: (a) engineering, financial or other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance? — Yes.

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?	Not applicable.
4. FAA Sec. 611(b); FY 1982 Appropriation Act Sec. 501. If for water or water-related land resource construction, has project met the standards and criteria as set forth in the Principles and Standards for Planning Water and Related Land Resources, dated October 25, 1973? (See AID Handbook 3 for new guidelines.)	Not applicable.
5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed $1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability to maintain and utilize the project effectively?	Yes.
6. FAA Sec. 209. Is project susceptible to execution as part of regional or multilateral projects? If so, why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.	Not applicable.

7. FAA Sec. 601(a). Information and conclusions whether project will encourage efforts of the country to: (a) Increase the flow of international trade; (b) foster private initiative and competition; and (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) Improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.	Improved access to Guatemala's rural agriculturally productive Highlands will encourage trade, both internally and internationally, as well as stimulate private initiative and competition. As the previously isolated regions become more involved in Guatemala's economic mainstream, the demand for and use of cooperatives, credit unions, savings and loan associations will discourage monopolistic practices through increased competition, thereby providing incentives for technical efficiencies. Labor unions will also have greater access to potential members.
8. FAA Sec. 601(b). Information and conclusions on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the service of U.S. private enterprise).	Increased access to rural areas will make potential investments more attractive.
9. FAA Sec. 612(b), 636(h); Fy 1982 Appropriation Act Sec. 507. Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.	The Government of Guatemala has consistently supported all A.I.D. financed development projects with counterpart necessary to achieve project objectives.
10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?	No.

11. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?	Yes.
12. FY 1982 Appropriation Act Sec. 522. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?	Not applicable.
13. FAA 118(c) and (d). Does the project comply with the environmental procedures set forth in AID Regulation 16? Does the project or program take into consideration the problem of the destruction of tropical forests?	Yes. The focus of the project is on Guatemala's Highlands, as such no tropical forests will be destroyed.
14. FAA 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (dollars or local currency generated therefrom)?	Not applicable.
15. FY 1985 Continuing Resolution Sec. 536. Is disbursement of the assistance conditioned solely on the basis of the policies of any multilateral institution?	No.

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(b), 111, 113, 281(a). Extent to which activity will (1) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions, (2) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions, (3) support the self-help efforts of developing countries, (4) promote the participation of women in the national economies of developing countries and the improvement of women's status, and (5) utilize and encourage regional cooperation by developing countries?

(1) The access roads construction program will provide direct payment to laborers for labor-intensive work utilizing local appropriate technologies, (2) access roads construction committees will be established to assist the rural poor help themselves, (3) rural Guatemalans will build their own access roads all with the assistance of GOG implementing agencies, (4) rural women will provide logistical support to the construction crews as well as use the completed roads to take farm produce to markets where in many cases the women themselves do the selling, (5) the anticipated increased farm production caused by improved access may encourage more active regional trade and cooperation within the Central American Common Market (CACM).

b. FAA Sec. 103, 103A, 104, 105, 106. Does the project fit the criteria for the type of funds (functional account) being used?

Yes.

c. FAA Sec. 107. Is emphasis on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)?

Yes.

d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed" country)?	Yes.
e. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"? (M.O. 1232.1 defined a capital project as "the construction, expansion, equipping or alternation of a physical facility or facilities financed by AID dollar assistance of not less than $100,000, including related advisory, managerial and training services, and not undertaken as part of a project of a predominantly technical assistance character".	Grant funds will not finance capital assistance.
f. FAA Sec. 122(b). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth?	Yes.
g. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the contry's intellectual resources to encourage institutional development; and supports civil education and training in skills required for	By providing the rural poor with means of increasing their income through improved access to markets, it is anticipated that the rural poor will not be as economically or phyrically isolated from those resources as described in Section 281(b). In addition, rural committees established to construct and

effective participation in government processes essential to self-government.	maintain the access roads will provide a foundation for rural farmer participation in self-government through their participation in construction committees.
2. Development Assistance Project Criteria (Loans Only)	
a. FAA Sec. 122(b). Information and conclusion of capacity of the country to repay the loan, at a reasonable rate of interest.	Guatemala has demonstrated its capacity to repay on a timely basis all AID loans.
b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?	Not applicable.
c. ISDCA of 1981, Sec. 724(c) and (d). If for Nicaragua, does the loan agreement require that the funds be used to the maximum extent possible for the private sector? Does the project provide for monitoring under FAA Sec. 624 (g)?	Not applicable.
3. Economic Support Fund Project Criteria	
a. FAA Sec. 531(a). Will this assistance promote economic or political stability? To the extent possible, does it reflect the policy directions of FAA Section 102?	Not applicable.
b. FAA Sec. 531(c). Will assistance under this chapter be used for military, or paramilitary activities?	Not applicable.

c. FAA Sec. 534. Will ESF funds be used to finance the construction of the operation or maintenance of, or the supplying of fuel for, a nuclear facility? If so, has the President certified that such use of funds is indispensable to non-proliferation objectives?	Not applicable.
d. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?	Not applicable.

ANNEX 10

ENERGY ANALYSIS

A. Background

Given the mountainous geography and rainy climate Guatemala is rich in hydroelectric generation potential. Although at the present time much of Guatemala's electricity is diesel generated, when power generated from Guatemala's new Chixoy Hydroelectric facility comes on stream during the summer of 1983 diesel generated electricity will no longer be required except in unusual circumstances to satisfy the internal needs of Guatemala. Guatemala anticipates that when a second large hydroelectric power plant is completed in few years, it will be able to provide both for a growing internal demand for electrical consumption as well as provide electrical power to other countries connected to the Central American energy grid.

In addition to its large hydroelectric potential, Guatemala is the only Central American country with significant petroleum resources. At the present time Guatemalan wells pump about 8,000 barrels of crude oil per day, most of which is exported for refining. A small portion of Guatemala's crude is sent directly to the larger diesel powered electrical generating power plant where it is mixed or burned as is, perhaps inefficiently, to generate Guatemala's electricity. In spite of the existence of petroleum resources Guatemala imports all its petroleum needs with the exception of that mentioned above. At the present time Guatemala uses about 25,000 barrels of imported gasoline and diesel per day, the largest uses being the industrial and transportation sectors. Unless Guatemala discovers and develops additional petroleum resources, and initiates its own petroleum refining infrastructure, it is anticipated that Guatemala will continue to be dependent on externally supplied petroleum derivatives.

Presently, the greatest demand for energy is internally grown firewood. It is estimated that more than 70% of all the energy consumed in Guatemala is through the burning of Guatemala's large yet finite forestry resources. With a rapidly growing rural population, Guatemalan energy planners anticipate an increasing demand for fuelwood in the foreseeable future

B. Proposed Project's Energy Demands

The project as described within section 2 of the PID is designed to use labor intensive methods to complete project activities wherever feasible. The road construction program will use almost exclusively manual labor with only minor support from small dump trucks, road graders and backhoes. The heavy equipment maintenance program financed under the Highlands Agricultural Development Project (520-0274) will insure that existing heavy equipment remains finely tuned to guarantee the use of fuels as efficiently as possible. In short, the proposed Farm-To-Markets Roads Project is designed to rely heavily on manual labor to achieve project objectives.

In order to further reduce the demands on Guatemala's scarce refined petroleum resources, all vehicles purchased with project funds will be required to be the most energy efficient vehicle currently available in the U.S.

C. The Proposed Project's Long Term Impacts on Energy Use

The labor intensive access roads construction program will guarantee the continual access of Guatemala's rural farmlands to the larger internal Guatemalan and external market. This in turn will encourage increased transportation of farm related inputs and outputs which will put more demands on Guatemala's limited petroleum resources. It is anticipated that the increased farming activities due to better access will encourage increased exportation of Guatemalan farm produce to Central American markets and the U.S. as well as provide for import substitution. The increased cost of petroleum imports can be partially offset by the increased revenues generated by exports as well as the savings in food imports.

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ANNEX II

MEMORANDUM

TO: OFFICIAL FILES
520-0332 FARM TO MARKET ROADS

FROM: LAWRENCE ODLE/PDSO

SUBJECT: MISSION DAEC REVIEW OF 520-0332

DATE: FEBRUARY 12, 1985

1. On January 31, 1985 at 11:00 A.M., the Mission held a DAEC review of the Farm-to-Market Roads PID. The meeting was chaired by the Director, Charles Costello and was attended by Mr. Peter Kolar, Deputy Director, Ricardo Pérez, Engineer, and Lawrence Odle, Assistant Project Development officer.

2. The Mission DAEC reviewed and approved the PID subject to minor revisions to be incorporated into the final document during the week of February 4-8, 1985. The Mission DAEC also provided further guidance for the preparation of the Project Paper and for policy dialogue during project negotiations as follows:

3. The PID as currently designed will use $ 10.0 in Loan funds and $ 11.5 million in counterpart funds to continue road construction in six already established construction regions. The PP design team should study the feasibility to expand the construction effort into one or two more regions. Approximate AID and GOG costs to undertake this type of construction expansion and its associated road maintenance costs should also be identified. The design team should also show how the project fits within the national road construction effort.

4. The PP design team should consider including covenants to the agreement to enforce inter ministerial coordination in the selection of road sections to be constructed and in planning for future infrastructure construction where these access roads have been built. A covenant may also be useful to provide interagency coordination of reforestation programs to mitigate the trend toward deforestation where access has been improved through the construction of these roads.

5. Negotiation with the GOG Ministry of Communications, Transportation and Public Works should be undertaken to insure that national road network will be maintained to guarantee the properly year round access by the small rural farmers to national markets. Also the Ministry should be encouraged to seek a larger annual budget to be able to expand the successful program into other mountainous regions of Guatemala.

cc: CCostello
PKolar
EBaker
RPérez

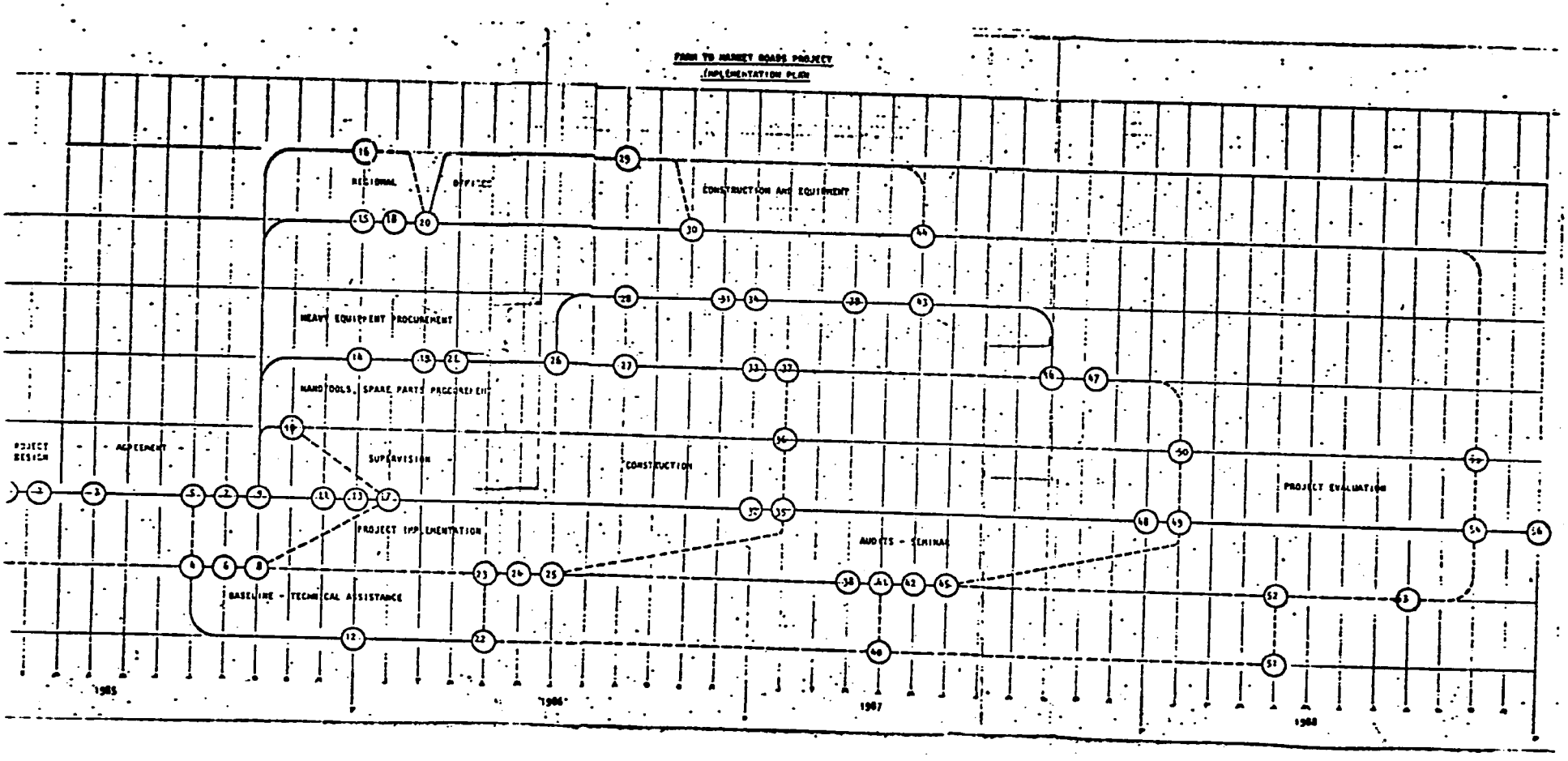
ANNEX 12

FARM TO MARKET ROADS
Implementation Plan

No.	Activity	Completion Date of Activity
	First Year:	
0.	First group of roads initiated	January 7, 1985
1	Pid completed and approved by the Mission	February 12, 1985
2.	PP preparation completed	March 12, 1985
3.	GOG/AID Agreement signed	April 31, 1985
4.	Baseline initiated, first and second group of roads selected	July 31, 1985
5.	Agreement ratified by GOG	July 31, 1985
6.	DGC's yearly implementation plan completed	August 31, 1985
7.	Initial CPs met by the Ministry of Finance	August 31, 1985
8	DGC's yearly budget requested to MINFIN	September 30, 1985
9.	Secondary CPs met by the Ministry of Public Works	September 30, 1985
10.	First procurement of handtools, spare parts, etc. made by DGC	October 31, 1985
11.	Construction Supervisory Services contracted	November 30, 1985
12.	Baseline completed and Technical Assistance contacted	December 31, 1985
13.	First group of roads completed	December 31, 1985
14.	IFB for first heavy equipment procurement prepared	December 31, 1985
15.	Regional Offices designs and construction plans completed by DGC	December 31, 1985
16.	Land plots obtained by DGC	December 31, 1985
17.	Second group of roads initiated	January 31, 1986
18.	Regional Offices construction plans approved	January 31, 1986

19.	IFB approved by GOG and AID	February 28, 1986
20.	Regional Offices construction works initiated	February 28, 1986
21.	IFB for first heavy equipment procurement issued	March 31, 1986
22.	Environmental technical assistance completed	April 30, 1986
23.	Third group of roads selected	April 30, 1986
24.	DGC's yearly implementation plan completed	May 31, 1986
25	DGC's yearly budget requested to MINFIN	June 30, 1986
26.	First heavy equipment bid openning date	June 30, 1986
27.	First heavy equipment procurement contracts awarded and signed	August 31, 1986
28.	IFB for second heavy equipment procurement prepared	August 31, 1986
29.	Regional Offices funiture procured	August 31, 1986
30.	Four Regional Office buildings completed	October 31, 1986
31.	IFB for second heavy equipment procurement approved by DGC and AID	November 30, 1986
32.	Second group of roads completed	December 31, 1986
33.	First heavy equipment procurement to arrive in country	December 31, 1986
34.	IFB for second heavy equipment procurement issued	December 31, 1986
35.	Third group of roads initiated	January 31, 1987
36.	Second procurement of handtools spare parts, etc. made by DGC	January 31, 1987
37.	First heavy equipment procurement to arrive at Regional Offices	January 31, 1987
38.	First audit completed	March 31, 1987
39.	Second heavy equipment bid opening date	March 31, 1987

40.	Environmental technical assistance, yearly visit	April 30, 1987
41.	Fourth group of roads selected	April 30, 1987
42.	DGC's yearly implementation plan completed	May 31, 1987
43.	Second heavy equipment procurement contracts awarded and signed	May 31, 1987
44.	Six Regional Office buildings completed	May 31, 1987
45.	DGC's yearly budget requested to MINFIN	June 30, 1987
46.	Second heavy equipment procurement to arrive in country	September 30, 1987
47.	Second heavy equipment procurement to arrive at Regional Offices	October 15, 1987
48.	Third group of roads completed	December 31, 1987
49.	Fourth group of roads initiated	January 31, 1988
50.	Third procurement of handtools spare parts, etc. made by DGC	January 31, 1988
51.	Environmental technical assistance, yearly visits	April 30, 1988
52	Access Roads Seminar completed	April 30, 1988
53.	Second audit completed	August 31, 1988
54.	Project evaluation completed	October 31, 1988
55.	Fourth procurement of handtools, spare parts, etc. made by DGC	October 31, 1988
56.	Fourth group of roads and project completed	December 31, 1988


FARM TO MARKET ROADS PROJECT
IMPLEMENTATION PLAN
REGIONAL
OFFICE
CONSTRUCTION AND EQUIPMENT
HEAVY EQUIPMENT PROCUREMENT
HAND TOOLS, SPARE PARTS PROCUREMENT
PROJECT DESIGN
AGREEMENT
SUPERVISION
CONSTRUCTION
PROJECT EVALUATION
PROJECT IMPLEMENTATION
AUDITS - SEMINAR
BASELINE - TECHNICAL ASSISTANCE
1985
1986
1987
1988

ANNEX 12

PROCUREMENT PLAN (GRANT PORTION)

FARM-TO-MARKET MARKET ROADS

Action No.	Description of Goods and Services	Estimated Cost ($000)	Origin - O Source - O	Contracting Mode	Award Basis	Grant Disbursement	% Grant Financed
1	Supervision Services	400	O/S - HC	AID Contract	RFP	Direct Payment	100%
2	Environmental T.A and Training	100	O - 000 S - 941	AID Contract	Gray amendment set aside	Direct Payment	100%
3	Baseline Survey	50	O/S - HC	N.A.	—	GOG Disbursement	100%
4	Evaluation	50	O - 000 S - 941	AID Contract	Gray amendment set aside	Direct Payment	100%
5	Seminars, Travel, Promotion	150	O/S - 941,HC	N.A.		GOG Disbursement Direct Payment	100%
6	Access Roads Inventory	150	O - 941 S - 941, HC	AID Contract Amendment	N.A.	Direct Payment	100%
7	Audits	50	O - 000, HC S - 941	AID Contract	Gray Amendment Set Aside	Direct Payment	100%
8	Contingencies	50	O/S - 941, HC	—	—	—	
	TOTAL	1,000					

ANNEX 12
DGC PROCUREMENT PLAN
FARM TO MARKET ROADS

Action No.	Description of Goods and Services	Estimated Cost ($000)	Origin = O Source = S	Contracting Mode	Award Basis	Loan Disbursement	% Loan Financed
1.	Heavy Equipment and Vehicles	2,448	O = 941 S = 941 and HC*	IFB	Lowest Price	Letter of Commitment	100%
2.	Spare Parts for Heavy Equipment Vehicles	771	O = 941 S = 941 and HC	RFP	Lowest Price	Direct Payment and GOG reimbursement	49%
3.	Tires and Tubes	319	O = 941 and HC. S = 941 and HC	RFP	Lowest Price	Direct Payment and GOG Reimbursement	49%
4.	Construction of Six Regional Offices	212	O/S = 941 and HC	Force Account	N.A.	FAR (Modified)	100%
5.	Equipment of Six Regional Offices	14	O = 941 S = 941 and HC	RFP	Lowest Price	GOG Reimbursement	100%
6.	Unskilled Labor	8,191	O/S = HC	-	-	GOG Reimbursement	49%
7.	Handtools Procurement	576	O = 941 and HC S = HC	RFP	Lowest Price	GOG Reimbursement	48%
8.	Construction Materials	1,572	O/S = 941 and HC	RFP	Lowest Price	GOG Reimbursement	48%
9.	DGC Administrative and Other Costs	4,662	O/S = 941 and HC				
10.	Inflation	1,389	O/S = 941				29%
11.	Contingencies	331	O/S = 941				
	Total	$20,485					100%

*Bids will be accepted from authorized local representatives of Code 941 manufacturers.

NOTE: Dates for key procurement are included in the Implementation Plan.

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NOT FOR COPY

Department of State

TELEGRAM

PAGE 01 GUATEM 08301 191555Z 7535 009022 AID/369
ACTION AID-00

ACTION OFFICE LADR-01
INFO LACE-03 LADP-04 STAG-02 SAST-01 ENGR-01 STFA-01 RELO-01
/016 A4 819

INFO LOG-00 CIAE-00 EB-08 DODE-00 ARA-00 L-03 /011 W
225466 191653Z /38

R 191526Z AUG 85
FM AMEMBASSY GUATEMALA
TO SECSTATE WASHDC 0357

UNCLAS GUATEMALA 08301

ANNEX 13

AIDAC

E.O. 12356: N/A
SUBJECT: FARM TO MARKET ROADS PROJECT 520-0332

REF: ODLE/JORDAN TELCON 7/29/85

1. MISSION NORMALLY REQUESTS A LETTER OF APPLICATION FOR PROJECT FUNDS FROM THE MINISTER OF FINANCE, SECRETARIAT OF PLANNING AND/OR THE TECHNICAL MINISTRY UPON USAID'S SUBMISSION TO THE MINISTERS OF SPANISH VERSION OF APPROPRIATE SECTIONS OF THE DRAFT PROJECT PAPER. SUCH LETTERS NORMALLY TAKE SEVERAL WEEKS TO CLEAR IN THE MINISTRIES. IN MID MARCH AFTER THE MINISTER OF FINANCE RECEIVED THE DRAFT SPANISH PROJECT PAPER HE VERBALLY REQUESTED THAT IF AT ALL POSSIBLE HE WOULD LIKE TO SIGN THE SUBJECT PROJECT PRIOR TO HIS INTERNATIONAL TRIP SCHEDULED FOR MARCH 22, 1985. WITH GREAT EFFORT ON THE PART OF USAID, THE MINISTRY OF PUBLIC WORKS, AND THE MINISTRY OF FINANCE THIS REQUEST WAS MET ON MARCH 20, 1985 WITH THE SIGNING OF THE LOAN AND GRANT AGREEMENTS FOR THE SUBJECT PROJECT. THE PP, LOAN AND GRANT AGREEMENTS WERE PREPARED BEFORE SUCH A LETTER COULD BE DRAFTED AND CLEARED IN THE MINISTRY OF FINANCE. IN THIS SPECIAL CASE THE MISSION HAS ACCEPTED THE SIGNATURES ON THE AGREEMENTS BY THE MINISTERS OF FINANCE AND PUBLIC WORKS, AND THE SECRETARY GENERAL OF PLANNING AND THE SUBSEQUENT RATIFICATION OF THE AGREEMENTS AS A SUBSTITUTE FOR A PRELIMINARY LETTER OF APPLICATION. PIEDRA

ANNEX 13

EVALUATION ARRANGEMENTS

As indicated in Section II.D.2 program support, an initial baseline data gathering survey and a final evaluation are planned during the life of the Project. FIFTY THOUSAND DOLLARS in grant funds for each of these evaluations have been allotted for such purposes. In accordance with the implementation plan given in Annex 12, the baseline survey will begin during the seventh month of the Project and the final Project evaluation is to be completed three years and ten months after the beginning of the four-year Project.

PDSO:LOdle:sr
10/9/85 5806C