Ministry of Transport
Bureau of Public Roads

PROJECT JUSTIFICATION

PROPOSED PROJECT SIQUIRRES - LIMON

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PROJECT JUSTIFICATION

PROPOSED PROJECT SIQUIRRES-LIMON

GENERAL BACKGROUND

The economic stability of Costa Rica is largely a function of the balance of payments between her imports and exports Since 1951 the pendulum of payments has swung heavily in favor of imports Table 1 - Appendix page 1 depicting the ratio of imports to exports for the ports of Limon and Puntarenas bears this out This point is further amplified by Figure 1 Appendix page 2, which shows the imbalance of payments in millions of dollars for all imports and exports for the years 1953 through 1962 The ports of Golfito and Quepos are not included in Table 1 since they are operated primarily as private facilities by the United Fruit Company

In order to create the desired balance of payments between imports and exports, it becomes necessary to provide adequate transport facilities between San Jose and Port Limon This will allow for the development of the raw material potential to the North and East of San Jose and place the Valle del General within economic distance of the United States and European markets

In recent years highway transport has taken on added significance and will continue to do so as improvements in highway facilities make the highway more attractive to the shipper For

example In 1963 the San Jose - Puntarenas highway carried approximately 60 percent of the import tonnage handled by the port of Puntarenas This figure represents an increase of 100 percent in the import tonnage transported over the San Jose - Puntarenas highway in 1962, although total import tonnage increased only 10 percent

It appears reasonable to assume that a highway facility connecting San Jose to Limon would likewise carry a large percentage of the import - export tonnage handled by port Limon This point is postulated on the fact that the Northern Railroad, the only facility for transporting freight between San Jose and Limon, will not be able to materially increase its capacity Even present day tonnage cannot be handled efficiently In 1961 a total of 2477 hours were lost by ships in port awaiting export cargo This amounted to 20 percent of the total time in port

The theory has been advanced that by making better utilization of present locomotive power, purchasing nine new locomotives, and making yard and track improvements, the Northern can increase its capacity by 30 6 percent In this respect, one major difficulty presents itself which makes it appear that little investment will be made by the Northern to make these changes Specifically, this difficulty is the result of the terms of the original Keith-Soto

contract under which the Northern operates According to the terms of this contract, the Northern must relinquish its facilities to the government of Costa Rica in 1989 This in effect makes operation of the Northern a terminating investment Therefore, it does not appear reasonable that the stockholders will invest a considerable sum of money to increase the carrying capacity of the railroad

At the present time excess tonnage imports and exports are routed through the Panama Canal to Puntarenas This is occasioned by the inadequacies of port facilities at Limon and the Northern Railroad's rate policies The Northern sometimes scales certain commodity rates upwards on large volumes for the purpose of discouraging additional traffic when they anticipate that their facilities would be overcrowded This has the effect of causing the people of Costa Rica to pay excessively for this diverted tonnage

The exact amount of this tonnage is difficult to obtain Hence it was necessary to make estimates based on Puntarenas import data and figures for imports to Puntarenas which originated in Atlantic areas Statistics on Puntarenas imports indicate that approximately 65 percent of these imports originate in Atlantic areas Figures contained in "Comercio Exterior de Costa Rica, Año 1962" indicate that approximately 449,000 tons originate in Atlantic areas Limon import statistics reveal that 261,000 metric tons were handled

by the port in 1962 This leaves a balance of 183,000 metric tons which must pass through the Panama Canal When corrections are made for tonnage moving to Golfito, approximately 150 000 metric tons remain which could move through Limon to San Jose and other parts of the Central Plateau

A check of freight rates from Europe and the United States reveals that it costs considerably more per ton to move freight to Puntarenas than it does to Limon For example The Royal Dutch Line assesses an extra charge of $9 00 per ton to move freight through the Panama Canal to Puntarenas The rate from the East coast of the United States via Tico-Line is about $23 00 per ton to Limon This compares to $40 00 per ton via Marina Mercante Nicaraguense S A through the Panama Canal to Puntarenas Transportation Consultants Inc , in a summary of their report concerning a port and railway study for Costa Rica states that the extra charge for average cargo is $8 00 per ton and $6 00 per ton for coffee Therefore, it seems that $7 00 per ton may be used as a conservative estimate

The railroad mileage from Puntarenas to San Jose is 72 miles and from Limon is 101 miles A check of freight rates throughout Central America and Costa Rica indicates that $0 07 per ton mile is a reasonable rate for highway transport Therefore it would cost $5 00 per ton to move freight by highway from Puntarenas to

San Jose and $7.00 from Port Limon Now considering the extra ocean freight charge of $7 00 per ton, it appears reasonable to assume that this 150,000 tons would move to San Jose and the Central Plateau via highway through Port Limon

Aside from this saving to the country on present imports and exports, the effect on newly planned industries is important The details of the planned Aluminum Foil plant for all C A are included in the Appendix page 3 This planned mill, if established in Costa Rica, would gross almost $2,000,000 per year with a foreign exchange earning of about $1,000,000 per year for the country

The Buenos Aires Pineapple Co, is planting pineapple to export 12,000 tons per year of products If the road were established they could cut present freight costs by road via Guatemala and ferry to U S by about half This means about 40 tons/day or 4 trucks one way

If the road opens up, it is estimated that most of the processed beef for export, 50,000 head per year, would move out via Limon To this could readily be added 15,000 head per year since it would bring Valle del General and other zones into economic reach of the U S export market This would make an estimated 5000 tons per year with possibly the same amount diverted from high cost present routes, making a total of 10,000 tons of frozen beef

The new food processing plants in the Central Plateau, Conafrut S A and Fritz, plus expansion of older units to take advantage of lower rates, will mean a new tonnage of about 20 tons/day for export via Limon

The planned paper convertor, based on imported tanker lots of pulp, will mean about 100 tons a day of kraft rolls coming in from Limon and up to Cartago, where part goes to Golfito at less cost than by ship imports and the rest to San Jose and North

To this must then be added the potential of export of fresh fruits and vegetables and dried onions from the farms in almost all parts of the country The lower rates would make this possible by truck direct from the farm, sealed, conditioned and fumigated Estimated at 20 tons/day by 1965

Industrial products from Limon, 10 tons/day of coconut oil, 5 tons/day of starch, 150 tons/day of flour and feed 2 tons/day of paper containers, fertilizers and acid, 100 tons/day, insecticides, 5 tons/day

Therefore with these new developments planned for the next two or three years, it is estimated that the road or system would be needed to handle about 500 tons/day of materials each direction as a fairly conservative estimate, average for the year The real benefit to the country is the new competitive industries such increased transportation at reduced rates makes possible, and the dollar

savings to the country in ocean freight

BASIC ASSUMPTIONS

It is not expected that population increases along the highway will not be large or occur rapidly

Because of this there is expected to be little demand for local service except for the hauling of materials Therefore, economic justification for the Siquirres - Limon highway must be based on the following assumptions

1 - Improvements will be made on the port Limon or a new port will be constructed at Moin to adequately handle additional tonnage,

2 - Because the Northern Railroad represents a terminating investment to its stockholders new investments will not be made which will materially increase its capacity

3 - The industrial development which is anticipated will occur

ECONOMICAL FEASIBILITY

PRESENT AND PROJECTED CARGO

Table 2 Metric tons of freight to be transported by railroad and highway (1) between San Jose and Limon (both directions)

YEAR	TOTAL	IMPORTS	EXPORTS	LOCAL
1963	544 431	256 963	165 849	121 619
1969	1 111 254	619.122	329 632	162 500
1974	1 632 158	738 648	438 510	455 000
1979	1 944 430	804 113	500 067	640 250

The following annual rates of growth are derived from Table 2

PERIOD	IMPORTS	EXPORTS	LOCAL
1969	3%	5%	10%

Table 2A 1984 and 1989 Exports and Imports

YEAR	TOTAL	IMPORTS	EXPORTS	LOCAL
1984	2 510 189	924 730	625 084	960 375
1989	3 075 948	1 045 347	750 101	1.280 500

1984 and 1989 Exports and Imports are found by extrapolation

It is concluded, that present facilities of the Northern Railway Co , has a freight capacity of about 600 000 tons/year and for the purpose of this study it is assumed that freight capacity will remain at 600.000 metric tons/year

(1) "Costa Rica Port and Railway study outline final report" TCI page 8

TRAFFIC ASSUMPTIONS

a) The Limon-Siquirres highway will transport the excess between the total expected cargo and the maximum railroad capacity

b) Useful life 20 years

Projection period 1969-1989

c) Composition of traffic

Light vehicles 65%

Buses 5%

Heavy vehicles 30 %

d) Composition of heavy vehicles

Table 3 Composition of heavy vehicles according to gross vehicle weight and pay load

GVW Tons	Pay Load	% of heavy vehicles				
		1963	1965	1969	1984	1989
5 to 10	4	80	75	70	25	20
10 to 15	8	17	21	25	55	50
15 or more	12	3	4	5	20	30

e) Factor of utilization for heavy vehicles 95%

Trucks required to transport attracted cargo as shown by tables 2 and 2A

TRAFFIC PROJECTIONS

There are three assumptions

1 - Based on projected cargo according to TC-1.

2 - Based on import cargo attracted from Puntarenas, cargo generated by new industries, local cargo and import and export cargo

3 - Based on traffic projections factors as found in "Traffic Projections for Costa Rica"

1 - 1969 - Vehicles per year

$$\frac{1\ 111\ 254\text{-}600\ 000}{0\ 95\ (4x0\ 7/8x0,25\text{-}/12x0\ 05} = 99660$$

Vehicles per day

$$\frac{99660}{300} = 332$$

ADT

$$\frac{332}{0\ 30} = 1110$$

1984 - Vehicles per year

$$\frac{2\ 510\ 189\text{-}600,000}{0\ 95\ (4x0\ 25/9x0\ 55/12x0\ 20)} = 257\ 785$$

Vehicles per day

$$\frac{257\ 785}{300} = 859$$

ADT

$$\frac{859}{0\ 30} = 2860$$

1989 - Vehicles per year

$$\frac{3\ 075\ 948\text{-}600\ 000}{0\ 95\ (4x0\ 20/8x0\ 50/12x0\ 30} = 310\ 269$$

Vehicles per day

$$\frac{310\ 269}{300} = 1034$$

ADT

$$\frac{1034}{0\ 30} = 3450$$

2 - 1965 Import cargo attracted from Puntarenas 2/ 183.284
Cargo generated by new industries (3) 150 000
Petroleum (1/3 of the total production) 90 000
Local cargo (Annual rate of growth 10%) 145 943
Exports (Annual rate of growth 5%) 182 434
Imports (Annual rate of growth 3%) 272 381

Total 1 024 042

Vehicles per year

$$\frac{1\ 024\ 042\text{-}600\ 000}{0\ 95\ (4x0\ 75/8x0\ 21/12x0\ 04} = 86539$$

Heavy vehicles per day

$$\frac{86539}{300} = 288$$

ADT

$$\frac{288}{0\ 30} = 960$$

2/ It is assumed that approximately 65% of import cargo to Puntarenas would use the appropriate Port Limon facilities should they exist Corresponding freight in 1963 would be 0 65x234 980=152 737 tons, and for an annual rate of growth of 10% the attracted 1965 cargo (in this item) would be 183 284 tons
(3) According to a report by Mr Val de Beausset Adviser Engineer to the Ministry of Industries C R

Assuming the traffic projection factors found in "Proyecciones de tránsito para Costa Rica"

YEAR	PROJ FACTOR	ADT
1965	1 000	960
1969	1 232	1180
1984	4 027	3870
1989	5 755	5520

3 - From estimate No 1

ADT 1969 = 1110

Projecting according to the above factors

YEAR	PROJ FACTOR	ADT
1969	1 000	1110
1984	3 268	3630
1989	4 670	5180

Summary of estimates

EST	ADT 1969	ADT 1984	ADT 1989
1	1110	2860	3450
2	1180	3870	5520
3	1110	3630	5180

Recommended ADT 5000

BENEFIT COST RATIO

A) Savings in ocean transport

Attracted cargo, 1963	153 000 tons
Rate of growth (1963-1989)	3%
Average cargo per year	158 000 tons
Savings per ton (4)	¢46
Total annual saving	¢7 268 000

B) Freight costs by railroad and highway

Via Puntarenas - San Jose

Cost/ton = highway 0 2212 x 130 = ¢28 76
Cost/ton - railroad 0 3325 x 116 = ¢38 57

Assuming 40% of the excess cargo to be transported by highway

Total cost = (40x28 76/0 60x38 37)x158 000= ¢5 474 068

Via Limon - San Jose

Assuming 100% of the excess cargo to be transported by highway

C) Cost/ton -0 2212 x 165 = ¢36 50
Total cost 158 000 x 36 50 = ¢5 760 000

Difference ¢285 932

Benefits 7 268 000 - 285 932 = ¢6 982 068/year

D) Construction and maintenance costs

a) Construction (total cost)

Limon - Liverpool - Siquirres ¢61 500 000

b) Maintenance

58 Km at ¢10 000/Km = ¢580 000

RECONNAISSANCE COST ESTIMATES

Two possible lines were considered in this reconnaissance study See map in Appendix. Line "A" generally follows the south line of the Northern Railway from Limon to Zent From this point the line runs, northwesterly to rejoin the railroad at Madre de Dios,

follows the railroad to Monteverde, swings Northwesterly to cross the Pacuare river, and then runs between the Pacuare and Reventazon rivers to Siquirres The estimated length is 58 kilometers

Line "B" generally runs along the edge of the hills just to the south of Line "A" The major river crossings are effected before the rivers spill out onto the coastal flood plain The estimated length of this line is 60 kilometers

Comparisons of estimated construction, maintenance, and vehicle operating costs demonstrate a clear superiority for line "A" This is necessarily so due to the heavy cut and fill encountered, higher bridge costs and longer length The following shows the costs of lines "A" and "B"

	Length	Roadbed	Bridges
Line "A"	58 Km	¢50,431,250	¢10,850,000
Line "B"	60 Km	¢53,500,000	¢14,730,000

Roadway Section

The roadway structural design is judged to be that most appropriate for existing conditions, as determined from reconnaissance field study and comparison with projects of similar characteristics High water levels and visual characteristics of the foundation material were used in estimating fill heights Estimates

were based on the following section Figure 2 Appendix
The estimate is necessarily sketchy but is believed to be accurate within 15 percent

Bridges

The lengths of drainage structures were estimated on the basis of drainage areas, channel location and size during normal flow and a visual inspection of the proposed crossings Of these crossings, the structures necessary to span the Chirripó and the Pacuare rivers are the most expensive

Since no foundation information was available for these areas, costs of all bridges were estimated on a unit cost basis These estimates were based on costs of bridges of similar size under similar conditions

c) Annual construction cost

Amortization period 40 years

Rate of interest 6%

CRF = 0 0665

Annual cost = 61 500 000 x 0 0665 = ¢4 089 750

d) Total annual cost

Construction	¢4 089 750
Maintenance	¢ 580 000
	¢4 669 750

e) Benefit cost ratio

$$B/C = \frac{6\ 982\ 063}{4\ 669\ 750} = 1\ 50$$

The above value is a conservative estimate considering the fact that passenger transport saving is not included and it could amount to ₡0 025 per passenger-Km or ₡1 00/passenger for an average of a 40 Kms trip (4)

Should the highway attract 30% of 1,000 000 (5) railroad passengers the annual saving for this item would amount to ₡300 000/year

(4) Anuario Estadístico 1962, page 119

(5) Passengers transported by Northern Railway Co 1962 884 869 - Ibid,

APPENDIX

Fig Nº 1

VALUE OF IMPORTS AND EXPORTS
COSTA RICA
1953 — 1962

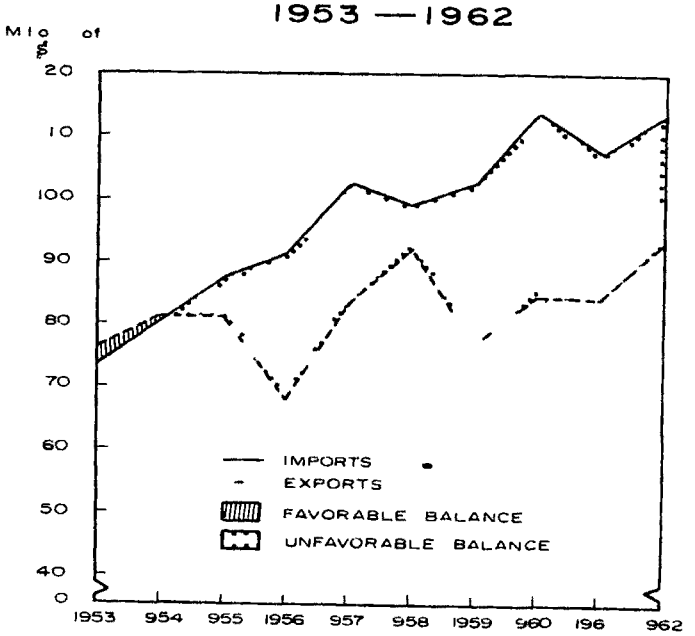
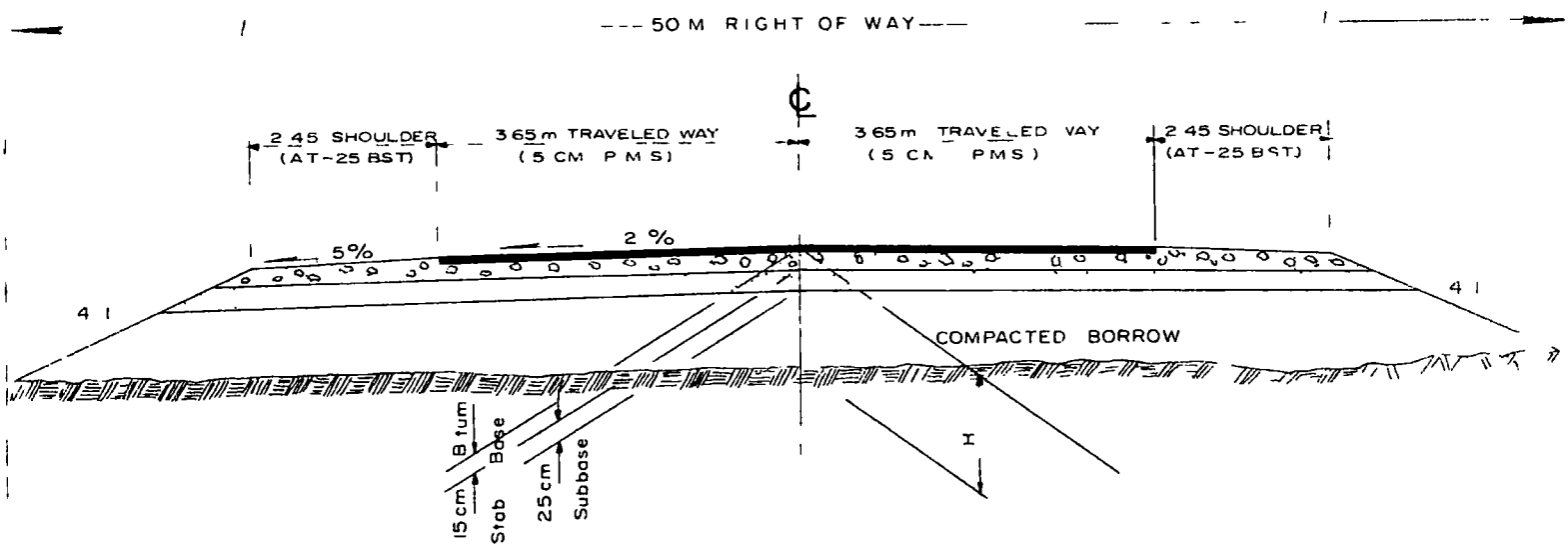


Fig Nº 2

SIQUIRRES - LIMON HIGHWAY

RECONNAISSANCE COST ESTIMATE



ASSUMED TYPICAL SECTION

EXPORTS & IMPORTS

Port Limon and Port Puntarenas -

1962
(Metric Tons)

YEAR	IMPORTS		EXPORTS		RATIO IMPORTS/EXPORTS	
	Limón	Puntarenas	Limón	Puntarenas	Limón	Puntarenas
1951	87 5	111 4	67 1	18 7	1 3	6.1
1952	00 7	94 0	69 3	15 5	1 5	6 1
1953	128 5	128 9	62 9	23 6	2 0	5.5
1954	123 9	161 4	41 2	14 6	3 0	11.1
1955	199 7	193 2	49 3	11 4	4 1	17.0
1956	160 3	221 8	40 4	8 7	4 0	25 5
1957	145 2	172.6	45 2	9 4	3 2	18 4
1958	107 7	211 1	46 7	22 4	2 3	9.4
1959	201 2	186 7	78 0	15 8	3 9	11.8
1960	208 1	189 3	110 4	31 8	1 9	6 0
1961	212 4	195 0	131 5	23 0	1 6	8 5
1962	261 0	217 2	161 8	15 0	1 6	14.5

Ports of Golfito and Quepos are not included since they are primarily operated as private ports by the United Fruit Company

SUBJECT OLIN MATHIESON - ALUMINUM ROLLING MILL SELECTION OF COUNTRY FOR ITS LOCATION

General

The purpose herein is to compare the relative effect of transportation cost to the business of the Olin Mathieson Company and its possible local affiliated interests on establishing a proposed aluminum rolling mill either in Costa Rica or El Salvador Consideration should be given in general terms to the cost of delivery of raw materials to a plant located in the vicinity of San Salvador or San Jose Possible consideration should also be given to Managua in Nicaragua

Raw Material

The raw material will be aluminum metal in coils from $\frac{1}{4}$" to $\frac{1}{2}$" thick and weighing from 2, 500# to 5, 000 # each Total production is estimated initially at 3, 000, 000# (1500 tons) per year Manufacturing loss as scrape having a resale value is calculated at 12%

Finished Products

The finished products to be shipped are rolls of foil and paper, aluminum circles, and aluminum sheet These are estimated to be solidly packed so that shipping is made on the basis of weight ton (2000#),not volume ton

Ocean Freight

1 Marina Mercante Nicaraguense S A

$42 00/ton (All ingot rate) from Gulf or Atlantic Coast ports via Panama Canal to Costa Rica, Nicaragua, or El Salvador

2 Gran Colombiana S A

$32 00/ton from New Orleans to Limon, Costa Rica

$34 00/ton from New Orleans to Puerto Barrios, Guatemala

3 Tica Line

$23/ton from Atlantic Coast to Limon This is the rate on Kraft paper rolls

4 Cia Azta Line

$39 50/ton New Orleans to Puntarenas as deck cargo

Land Freight

$19 50/M ton - Limon to San Jose - Northern (103 miles)

$4 98/M ton - Puntarenas to San Jose - Pacifico (72 miles)

$7 55/ton Puntarenas to San Jose - Setrana Trucking

$4 15/M ton - Unloading ship-loading rail car both ports

$5 66/M ton - Unloading ship-loading truck both ports

Finished Products

$30 00/ton San Jose to San Salvador - Soyfe Truck

$16 00/ton San Jose to Managua - Soyfe Truck

$35 00/ton San Salvador to San Jose - Alcoa in Salvador

Summary

With more or less equal distribution of the products throughout Central America the location will be effected to a rather large degree by the importation costs of the raw material Below are total costs using various transport mediums

San José $32 00 Ocean freight to Limon from New Orleans
4 15 Unloading
19 50 Rail (Northern)
$55 65 Total

San Jose $42 00 Ocean freight to Puntarenas from New Orleans
4 15 Unloading
4 98 Freight rail (Pacific)
$51 13 Total

San Jose $42 00 Ocen freight to Puntarenas from New Orleans
5 66 Unloading to truck
6 04 Truck to San Jose
$53 70 Total

San Salvador $42 00 Ocen freight Pacific, Acajutla
3 50 Unloading (estimate)
6 00 Trucking (estimate) to San Salvador from
$51 50 Total

San Salvador $34 00 Ocean freight (Atlantic - Guatemala)
3 50 Unloading (estimate)
18 00 Truck or rail (estimate)
$55 50 Total

San Jose (Limon Highway) $32 00 Ocean freight to Limon
3 50 Lightering
8 00 Truck
$43 50 Total

Conclusion

1 Under present conditions there is no freight advantage in locating the rolling mill either in San Jose, San Salvador, or Managua since these cities are all located about 100 kilometers from Pacific ports and handling and trucking costs are about the same in each case

2 There would be a distinct advantage in locating the rolling mill in Costa Rica once a highway to Limon is completed since trucking costs are $0 06 to $0 07 per ton mile thereby saving more than $10 per ton in raw material transportation if the rolling mill is located in Costa Rica rathern than Nicaragua or El Salvador

3 The moving of finished goods from San Jose to other Central American countries is less since trucks going north are running empty or part full The quoted saving is $5 per ton between San Salvador and San Jose if the movement is from San Jose