ECONOMIC FEASIBILITY REPORT

on

PROPOSED MUS-TATVAN RAILWAY EXTENSION

Turkish State Railways

FEBRUARY 1960

DE LEUW, CATHER & COMPANY • CONSULTING ENGINEERS • CHICAGO

ECONOMIC FEASIBILITY REPORT ON

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TURKISH STATE RAILWAYS

Prepared for
Development Loan Fund
United States of America
Washington, D. C.

FEBRUARY 1960

DE LEUW, CATHER & COMPANY · CONSULTING ENGINEERS · CHICAGO

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February 15, 1960

The Managing Director
Development Loan Fund
Washington, D. C.

Gentlemen:

We are pleased to present herewith our report entitled "Economic Feasibility Report--Proposed Mus-Tatvan Railway Extension of the Turkish State Railways" which has been prepared pursuant to our contract of October 2, 1959. The report contains our investigations and recommendations for railway construction, estimates of cost, estimates of revenues and expenses, and our findings on economic feasibility.

The studies and analyses involved in the preparation of this report were greatly facilitated by the fine cooperation extended to us by the Turkish Ministry of Public Works, the officials of the railway system, the CENTO Mission, and the United States of America Operations Mission.

The opportunity to conduct these studies and to prepare this economic feasibility report on this important railway extension has been most sincerely appreciated.

Very truly yours,

DE LEUW, CATHER & COMPANY

L. H. Cather
Vice President

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February 15, 1960

The Managing Director
Development Loan Fund
Washington, D. C.

Dear Sir:

In accordance with De Leuw, Cather & Company's contract with you and our agreement with them, we have reviewed in detail their report on the proposed extension of the rail lines of the Turkish State Railways from the city of Mus in eastern Turkey to the city of Tatvan on the shore of Lake Van. Our review was confined to the economic aspects of the report, specifically the prospective freight and passenger traffic to be generated, the revenues therefrom, and the operating expenses connected therewith.

Subsequent to this review we have discussed these matters in some detail with the representatives of De Leuw, Cather & Company, who visited Turkey and prepared the report, in order further to satisfy ourselves as to the facts which they relied upon and the validity of their conclusions.

The conclusions of De Leuw, Cather & Company with respect to prospective revenues and expenses for the proposed extension, and incremental revenues and expenses on presently operated lines, are set forth in Chapter VI of their report. In the table titled "Summary of Revenue and Expenses," the "Income Available to Meet Bond Service Charges" is given as Turkish Liras 3,793,000 in the first full year of operation (assumed to be 1963) and TL 9,807,000 in the tenth year (1972).

Based on our review and discussion, and our general knowledge of such matters, we are of opinion that the revenues and expenses set forth in that table represent reasonable expectations of such revenues and expenses based upon conditions now known or reasonably foreseeable.

Respectfully submitted,

Coverdale & Colpitts

Consulting Engineers

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SCOPE OF THE REPORT

It is proposed to extend the Turkish State Railways system in eastern Turkey from Mus to Lake Van at Tatvan. The economic feasibility of this 103-kilometer extension is discussed herein. 65 MILES

The Turkish State Railways system now comprises 7,804 road-kilometers (4,850 road-miles). A map of the system is shown in Exhibit 1. Existing lines in east-central Turkey extend to terminals at Mus and Kurtalan. Kurtalan in Siirt Province is 412 kilometers southeast of Malatya. The station at Mus, 357 kilometers east of Malatya, provides the only major transportation outlet for the potentially highly productive agricultural and grazing area in the vicinity of Lake Van. Lack of direct transportation through the rugged country east of Mus has restricted economic development in the area.

De Leuw, Cather & Company in June 1958 reported the findings of a comprehensive analysis of the physical and economic feasibility of a railway link connecting the cities of Mus in Turkey with Sharifkhaneh in Iran. Physical and economic data in that report will supplement information presented herein.

CHAPTER I

DESCRIPTION OF THE AREA

Economy

Part of a five-province area in eastern Turkey will be tributary to the proposed railway extension from Mus to Lake Van. As planned, the railway will pass through Mus and Bitlis Provinces. Van, directly east of the lake, is already linked to the proposed railhead by ferry service. Agri and Hakkari Provinces, north and southeast of the lake, respectively, would have access to the railway terminal via road and ferry routes.

The estimated 1958 population of the five provinces is 711,000. The total land area, excluding lakes and marshes, is about 55,000 square kilometers.

PROVINCE STATISTICS

Province	Estimated 1958 Population	Area (Sq. Kms.)
Mus	145,000	7,630
Bitlis	121,000	6,940
Van	191,000	17,760
Agri	196,000	12,660
Hakkari	58,000	9,640
Total	711,000	54,630

This area is made up of farm land, forests, lakes, grassland and rugged mountains. Agriculture and livestock production are the basic economic activities. Principal crops include wheat and other cereals, potatoes, melons, nuts, onions, and pulses. Sugar beets and sunflower seed have been introduced recently.

Although sheep ranching is the most important branch of animal husbandry in eastern Turkey, cattle and goats are also raised in quantity. Other major activities include the associated production of milk, raw wool, and hides and skins.

Existing Roads

An 82-kilometer gravel-surfaced road extends east from Mus to Tatvan through the Mus Valley. The highway is maintained in fair condition. Twelve kilometers west of Tatvan, another road branches southerly to the city of Bitlis, the major center in the province of the same name. Kurtalan, 150 kilometers southwest of Tatvan, is linked to Bitlis by a gravel-surfaced road through the rugged Bitlis Canyon.

A road to Karakose, the principal city in Agri Province, intersects the east-west road at Tatvan.

The road along the south shore of Lake Van is the shortest land route to Van, but is narrow, has many sharp curves, and crosses very difficult terrain. Altitudes in excess of 10,000 feet must be traversed in some locations. There is a north-south road from Van to Hakkari.

The limited supply of fuel oil and the expense and general unavailability of motor transportation preclude general use of trucks to reach the railhead at Mus. Generally, crops are transported in oxcarts and livestock is driven to market.

Lake Van Ferry Service

Four combination passenger and cargo ships--each of 90- to 150-ton cargo capacity--make one scheduled round trip per week between Tatvan and Iskele (the port of Van), a distance of 100 kilometers. Two trips each way are direct sailings, while the other two trips stop at Ercis and Givas enroute. In addition, supplemental all-cargo service is provided, but not on fixed schedules, to give cargo service almost every day between Tatvan and Iskele. Another ship, a new 300-ton capacity vessel, will be commissioned in April 1960.

This service is provided by the Turkish Port Authority. A privately owned passenger and cargo ship is also in daily service on Lake Van.

CHAPTER II

RECOMMENDED RAILWAY CONSTRUCTION

Review

The construction proposed for the Mus-Tatvan section of the Turkey-Iran railway link, as presented in our June 1958 report, has been reviewed and economies have been effected where possible. Building requirements have been reduced, and some siding and yard tracks have been eliminated from the plan. These changes, however, will not in any way restrict development of a transit operation on the line in the future.

Railway Alignment

The proposed railway location between Mus and Tatvan generally follows the alignment described in our 1958 report. East of Mus station the line follows the Karasu River along the floor of Mus Valley for some 40 kilometers. Climbing out of the valley, the route curves to the south along the west slope of Nemrut Mountain (see plan and profile, Exhibit 2). The proposed line reaches its summit about 85 kilometers east of Mus in the broad pass between Nemrut Mountain and the rugged Bitlis Massif to the south. Through the pass, the track will be some 500 meters higher than at Mus. Descending from the mountains to Tatvan station near Lake Van, the track elevation will drop 110 meters in a distance of 10 kilometers necessitating several reversals in direction.

From a switchback at the Tatvan station and yard, the tracks will descend another 30 meters along a 4.6-kilometer section to a ferry landing on Lake Van. The maximum grade in this section will be one percent.

Curves on the proposed 103-kilometer line will have radii of 400 meters or greater. The maximum grade will be about 1.4 percent.

Stations and Terminals

Five intermediate stations are planned between Mus and Tatvan at the locations indicated in Exhibit 2. A siding and a house track will

be provided at these points. Station area plans for a typical way station, and Tatvan station, are shown in Exhibits 3 and 4, respectively.

Building requirements at the stations are shown on Table 1 in the Appendix. In total, 24,000 square meters of floor space are proposed. A station building, residences, offices and employee service facilities are planned at each of the locations.

Exhibit 5 shows the proposed ferry landing at Lake Van. The ferry landing has been designed for direct transfer of goods between railway car and ship. An 18-ton wagon crane will be provided for heavy loads. A 1,000-square meter warehouse building is planned adjacent to the dock.

Construction Progress

The railway's contractor has set up a complete headquarters plant just north of Tatvan. A smaller office has been established in the Mus area. Construction is progressing, but with some difficulty due to the limited amount of equipment, lack of spare parts, and general dependence on hand methods.

Approximately 16 percent of the substructure work has been completed in two years' time including 600,000 cubic meters of grading. Rough grading has been partially finished between the Tatvan station and a tunnel portal some five kilometers west thereof, along with some embankment to subgrade in the vicinity of Rahova and Mus.

One thousand lineal meters of tunneling in the arch sections of two of the four tunnels on the route have been completed. The contractor has built 25 kilometers of rugged mountain service road for access to the construction sites and has set up camps at the tunnel portals.

Both grading and tunneling are being done on two 10-hour shifts operating seven days a week.

In Iran, the Ministry of Roads is extending the existing line from Sharifkhaneh to Kara Tepe, some 70 kilometers. The necessary rail and switches are available and no additional rolling stock will be needed. The new line will terminate a short distance south of

Khoy and is expected to aid, to a marked degree, the expansion of agriculture and industry in the area.

The former Russian gauge rail lines between Tabriz and Sharifkhaneh, and Tabriz and Julfa, have been rebuilt to standard gauge.

CHAPTER III

COST ESTIMATES

Construction Costs

Construction costs include the equipment, material and labor to complete the railway extension from Mus to Tatvan as well as the Tatvan ferry landing. It is estimated that this work can be completed by the end of 1962.

Construction equipment requirements are shown in Table 2 in the Appendix. This equipment will enable the railway's contractor to complete the substructure and buildings and distribute the ballast along the embankment by mid-1961. Railway labor forces under subcontract to the Ministry of Public Works will then lay the track and complete the superstructure.

Detailed construction costs by item are shown in Table 3 (see Appendix). These costs include acquisition and operation of equipment; procurement and movement of materials; and necessary labor. Credit for the value of equipment at the end of the construction period has not been shown, since it will not affect the initial capital requirements.

Cost of Engineering and Administrative Services

Upon completion of financial arrangements for the project, it is recommended that a qualified United States engineering firm be employed in a supervisory engineering capacity to undertake the following phases of the work:

1. Specify and assist in procuring the proper construction equipment to assure adherence to the estimated time schedule.

2. Review in detail the railway extension plans, specifications and estimates as developed by the Railroad and Harbor Construction Department of the Turkish Ministry of Public Works.

3. Recommend corrections and revisions as necessary to assure good engineering practice and economical construction procedures.

4. Coordinate and supervise the contract work in the field to secure uniformity of workmanship and completion of the project within the specified time limits.

5. Check and approve all payments.

Contingencies

Contingencies are estimated at ten percent of the total construction cost.

Cost of Additional Motive Power and Rolling Stock

The following motive power and rolling stock should be acquired to enable to Turkish State Railways to meet estimated service demands on the Mus-Tatvan line:

ROLLING STOCK REQUIREMENTS

Item	Number of Units	Cost per Unit*	Total
Diesel Locomotives, 1900 H.P., 6-axle	2	$300,000	$ 600,000
Diesel Switching Locomotive, 400 H.P., 3-axle	1	150,000	150,000
Freight Cars:			
Box and Cattle Cars	120	8,000	960,000
Gondola Cars	80	6,000	480,000
Flat Cars	40	6,000	240,000
Passenger Cars	4	50,000	200,000
Rotary Snowplow	1	190,000	190,000
Total			$2,820,000

*-Includes insurance and freight.

Basic equipment requirements are discussed in Chapter V.

Cost Allocation

Allocation of construction costs--including equipment, material and labor--in Turkish Liras and U. S. Dollars is presented by item in Table 4 in the Appendix. An exchange rate of nine Turkish Liras to one U. S. Dollar is used throughout this report.

The summary of cost allocations is presented in the following table. In these estimates it is assumed that all equipment and materials, including new rail, switches, motive power and rolling stock, covered in the United States currency requirements will be manufactured in the United States and shipped to Turkey.

The cost of engineering and administration has been allocated in Turkish Liras and U. S. Dollars according to the estimated division of services to be performed by the Turkish Ministry of Public Works and the United States consulting firm.

SUMMARY OF COST ALLOCATIONS

Cost Item	Turkish Liras (U. S. Dollar Equivalent)*	U. S. Dollars	Total
Construction	$8,362,000	$5,317,000	$13,679,000
Engineering and Administration	547,000	340,000	887,000
Contingencies	684,000	684,000	1,368,000
Subtotal	$9,593,000	$6,341,000	$15,934,000
Motive Power and Rolling Stock	-	2,820,000	2,820,000
Total	$9,593,000**	$9,161,000	$18,754,000

*-9 Turkish Liras = 1 U. S. Dollar
**-TL 86,337,000

The estimated use of U. S. Dollars in each construction year is shown on the next page.

U. S. DOLLAR REQUIREMENTS BY YEAR

	Construction Year			Total
	First 1960	Second 1961	Third 1962	U. S. Dollars
Construction Equipment	$1,843,000	$ -	$ -	$1,843,000
Material, Labor and Operation of Equipment	873,000	2,715,000	570,000	4,158,000
Motive Power and Rolling Stock	-	-	2,820,000	2,820,000
Engineering and Administration	110,000	115,000	115,000	340,000
Total	$2,826,000	$2,830,000	$3,505,000	$9,161,000

Interest During Construction

Capitalized interest, as an item of U. S. Dollar requirements, has been omitted from this study on instructions from our client.

CHAPTER IV

TRAFFIC AND REVENUES

Freight Movements on Proposed Railway Extension

Production statistics for the major crops raised in the Mus, Bitlis, Van, Agri and Hakkari Provinces are shown in Table 5 of the Appendix.

Production surpluses, after local consumption, are available for shipment to other areas. Since the five provinces have other transportation outlets, only part of the surpluses have been estimated as potentially available to the Mus-Tatvan railway line.

PORTION OF SURPLUSES POTENTIALLY TRIBUTARY TO MUS-TATVAN LINE

Province	Percent
Mus	70
Bitlis	90
Van	100
Agri	40
Hakkari	80

The resulting tonnage allocations have been further reduced by 25 percent to allow for motor transport along routes parallel to the railway system.

The freight tonnages so determined were assumed to move on the Turkish State Railways system between points on the proposed line and market centers to the west. A few local movements have been assigned to the proposed line for transporting surplus products from Van to make up deficiencies in Mus.

The outbound (westbound) assignments are shown in detail in Tables 6 and 7 in the Appendix. The freight assignments for inbound goods from western Turkey and overseas points are indicated in Tables 8 and 9. All of these movements are representative of traffic that would have occurred if the proposed railway extension had been

in operation in 1958--the base year for analytical purposes. To gauge the effect of the devaluation of the Turkish Lira, however, revenue estimates are based on 1959 freight rates on the Turkish State Railways system.

Freight Movements on Existing Lines

Some of the freight traffic assigned to the proposed railway and its western connections presently move through the existing railhead at Mus. These freight tonnages have been subtracted from our estimates of traffic on the existing system. Thus, our traffic estimates represent only new traffic to the Turkish State Railways system.

The determination of existing freight movements was based on a sampling of 24 freight trains at Mus--one train per month in each direction--from December 1958 to November 1959, inclusive. Records maintained by the Turkish State Railways indicate that 104 freight trains arrived at the Mus station during this 12-month period. An equal number were dispatched during the same period. The tonnages carried on the trains sampled were expanded by commodity to an annual basis. The results are shown in Appendix Tables 6 through 9, inclusive.

Passenger Traffic

In the five-year period from 1954 to 1958, average long distance passenger usage on the Turkish State Railways (excluding suburban passengers) increased from 0.97 to 1.13 trips per capita. Revenue per passenger averaged TL 2.96 in 1954 and TL 5.77 in 1958.

The pastoral economy of eastern Turkey and the great distances to the major centers in the western region will result in a lower usage of railway passenger services than experienced nationally. If the Mus-Tatvan line had been in operation in 1958, we estimate that some 200,000 railway trips would have been made by the 526,000 people in the tributary area. This represents 0.38 trip per capita--one-third of the national average usage.

In 1958, however, a total of 33,000 passengers boarded the 312 passenger trains that were dispatched from the Mus station. It is estimated that an equal number of passengers arrived during the same period.

Thus, about 135,000 new railway passenger trips would have been made in 1958 if the proposed extension had been in operation. These additional trips represent a riding habit at 22.7 percent of the national average level of usage.

At a rate of TL 5.75 per passenger, revenue attributable to operation of the proposed railway extension would amount to TL 775,000 at 1958 traffic levels.

Estimates of Traffic and Revenues for the First and Tenth Years of Operation

To develop estimates of future traffic and revenues, a series of trend curves have been prepared. The population forecast for Turkey is presented on Plate 1 in the Exhibit section of this report. The projection indicates continued population growth at a rather constant rate for the next 40 years.

Plate 2 shows the trends of imports and exports in Turkey. A steady increase in imports is foreseen during the next three decades because of anticipated development and continued population growth. While the projected import curve indicates increase at a constant rate in the immediate future, a diminishing rate of growth may be expected as the country becomes more self-sufficient.

Likewise, the amount of exports from Turkey is expected to increase. The rate, however, will tend to decrease slightly, since the present ratio of internal demand to internal production will rise gradually with continued domestic development and improved living standards.

The expansion of industrial and agricultural production in Turkey, together with increasing volumes of exports and imports, will result in an increase in net ton-kilometers on the railroad system. Establishment of new domestic production centers may tend to decrease the average length of haul for freight. This would result in a more gradual rate of growth of net ton-kilometers on the railway system in the future, as shown on Plate 3.

Selected values shown on the trend curves have been used as the basis for estimating future freight traffic and revenues. Factors so developed are shown on the following table for the various freight movement classifications. The table shows for each group a growth factor and an induced traffic factor.

EXPANSION FACTORS FOR FREIGHT MOVEMENTS

Classification	First Year Factors			Tenth Year Factors		
	Growth	Induced	Combined	Growth	Induced	Combined
Turkey						
Westbound Internal	1.27	1.05	1.33	1.65	1.50	2.48
Exports	1.50	1.03	1.55	2.08	1.30	2.70
Eastbound Internal	1.27	1.05	1.33	1.65	1.50	2.48
Imports	1.31	1.03	1.35	1.65	1.30	2.15

The normal growth factors are indicative of the increasing usage of the railway due to normal population growth and expected economic development in the area tributary to the proposed railway extension, as well as increased import and export volumes.

Whenever a new or superior transportation facility is constructed, it improves the general economy of the area served, and growth over and above the normal trend of the country occurs. This newly generated traffic is characterized as induced traffic.

These expansion factors have been applied to the base year freight estimates to give first year (1963) and tenth year (1972) estimates.

The ever-expanding population of Turkey, continued economic development, and rising levels of income are expected to further increase passenger traffic on the railway system. We estimate that long distance railway trips per capita on a national basis will increase to 1.20 by 1963, and to 1.32 by 1972.

As with freight movements, it is expected that railway passenger traffic to and from the five-province tributary area will be greatly stimulated by the Mus-Tatvan line. By 1963, we estimate that the number of railway passenger trips per capita attributable to the proposed extension will increase to 30 percent of the estimated national average; and to 50 percent of the national average by 1972.

The estimated traffic and revenues on the proposed line, along with additional traffic and revenues on existing lines attributable to the Mus-Tatvan extension are summarized in the table on the next page.

SUMMARY OF TRAFFIC AND REVENUES
ATTRIBUTABLE TO PROPOSED RAILWAY EXTENSION

Classification	Freight Movements by Year								
	Metric Tonnage			Ton-Kilometers			Revenue in Liras		
	Base	First	Tenth	Base	First	Tenth	Base	First	Tenth
Freight									
Westbound Internal									
Proposed Line	153,100	203,600	379,700	11,303,000	15,033,000	28,031,000	1,472,000	1,958,000	3,651,000
Existing Lines	77,600	103,200	192,400	34,159,000	45,431,000	84,714,000	3,810,000	5,067,000	9,449,000
Subtotal	-	-	-	45,462,000	60,464,000	112,745,000	5,282,000	7,025,000	13,100,000
Export									
Proposed Line	7,200	11,200	19,400	523,000	811,000	1,412,000	54,000	84,000	146,000
Existing Lines	5,800	9,000	15,700	4,198,000	6,507,000	11,335,000	421,000	653,000	1,137,000
Subtotal	-	-	-	4,721,000	7,318,000	12,747,000	475,000	737,000	1,283,000
Eastbound Internal									
Proposed Line	105,900	140,800	262,600	6,994,000	9,302,000	17,345,000	821,000	1,092,000	2,036,000
Existing Lines	74,100	98,600	183,800	69,208,000	92,047,000	171,636,000	8,129,000	10,812,000	20,160,000
Subtotal	-	-	-	76,202,000	101,349,000	188,981,000	8,950,000	11,904,000	22,196,000
Import									
Proposed Line	6,700	9,000	14,400	447,000	603,000	961,000	66,000	89,000	142,000
Existing Lines	2,400	3,200	5,200	1,723,000	2,326,000	3,704,000	228,000	308,000	490,000
Subtotal	-	-	-	2,170,000	2,929,000	4,665,000	294,000	397,000	632,000
All Freight									
Proposed Line	272,900	364,600	676,100	19,267,000	25,749,000	47,749,000	2,413,000	3,223,000	5,975,000
Existing Lines	159,900	214,000	397,100	109,288,000	146,311,000	271,389,000	12,588,000	16,840,000	31,236,000
TOTAL	-	-	-	128,555,000	172,060,000	319,138,000	15,001,000	20,063,000	37,211,000

	Number of Passengers			Passenger-Kilometers			Revenue in Liras		
	Base	First	Tenth	Base	First	Tenth	Base	First	Tenth
Passengers	135,000	200,000	420,000	20,250,000	30,000,000	63,000,000	775,000	1,100,000	2,500,000
GRAND TOTAL--Proposed and Existing Lines	-	-	-	-	-	-	15,776,000	21,163,000	39,711,000

CHAPTER V

MAINTENANCE AND OPERATING EXPENSES AND DEPRECIATION COSTS

Definition

The maintenance and operating expenses for the proposed railway extension include maintenance of equipment, fuel, transportation and maintenance of way expenses, the cost of providing employee health services, and general and miscellaneous expenses.

Depreciation charges for the proposed railway line have been estimated for fixed properties, but not for motive power and rolling stock.

The cost of accommodating traffic attributable to the proposed railway extension on existing lines is based on out-of-pocket costs for providing the necessary train service to handle the additional traffic.

Locomotive and Car Requirements

Motive power and rolling stock requirements to serve estimated traffic demands on the proposed extension and connecting lines are presented in the following table for the initial year of operation. Purchases of new locomotives and cars (detailed on page 8) will augment the equipment now in use on the Turkish State Railways system.

EQUIPMENT NEEDED TO SERVE TRAFFIC
ATTRIBUTABLE TO PROPOSED RAILWAY EXTENSION

Item	To be Purchased	Existing Equipment	Total
Diesel Locomotives	2	4	6
Diesel Switch Engines	1	-	1
Freight Cars	240	260	500
Passenger Cars	8	-	8

The switching locomotive will be used at the Tatvan station to shunt cars between the yard and the ferry landing. The total number of freight cars needed is based on a service usage factor of 25 percent, and an average loading of 15 tons per car--factors similar to national usage.

Based on the traffic estimates, the following service is warrented on the Mus-Tatvan line:

SERVICE REQUIREMENTS

Item	Number First Year	Number Tenth Year
Average daily number of trains in each direction	1	2
Average number of loaded freight cars per train passing Mus station	33	31
Average number of passenger cars per train	4	5

Operating Expenses for Proposed Line

Annual maintenance-of-way, mechanical department, station service, and train and traffic expenses are based on the following monthly pay scales supplied by the Turkish State Railways:

EMPLOYEE SALARIES

Job Title	Monthly Pay
Terminal Master	TL 1,002
Assistant Superintendent or Station Master	768
Switchman	476
Engineman	1,120
Fireman	678
Conductor	612
Brakeman	495
Maintenance-of-Way Foreman	560
Storekeeper	370
Maintenance-of-Way Guard	370
Electrician	532
Electrician's Helper	395
Maintenance-of-Way Laborer	395

The estimated annual cost of maintenance-of-way materials is TL 115,000. The cost of diesel fuel has been estimated on a unit price of 67 kurus per kilogram (24.5 cents per gallon). Diesel fuel consumption has been estimated at 1.37 kilograms per locomotive-kilometer (0.67 gallons per locomotive mile)--the average for the entire system in 1958. Other locomotive expense has been estimated on a unit operating cost of TL 1.50 per locomotive-kilometer (26.8 cents per locomotive-mile).

Car expense is estimated at 58 kurus per car-kilometer, or 10.4 cents per car-mile.

The total maintenance and operating expenses for the proposed Mus-Tatvan railway extension, based upon the aforementioned factors, are shown in Table 10 of the Appendix.

Additional Operating Expenses on Existing Lines

According to the records of the Turkish State Railways, the maintenance and operating cost of transporting freight during 1958 was TL 0.0899 per net metric ton-kilometer (1.46 cents per net short ton-mile). Passenger service cost was TL 0.0415 per passenger-kilometer (0.75 cents per passenger-mile).

Actual 1958 railway expenditures by account (excluding port expenses, depreciation, and all fixed charges), along with the estimated unit costs, are shown in the table on the next page.

MAINTENANCE AND OPERATING EXPENSES
ON TURKISH STATE RAILWAYS--1958

Account	Railway Expenses	Freight--Cost per Net Metric Ton-Km	Passengers--Cost per Passenger-Kilometer
General Directorate and Transportation	TL 198,635,182	TL 0.032	TL 0.015
Way and Construction	58,489,965	0.010	0.005
Materials and Tools	240,985,789	0.039	0.018
Traffic	54,642,473	0.009	0.004
Total Annual Maintenance and Operating Expenses	TL 552,753,409	TL 0.090	TL 0.042

There are certain railway operating expenses on existing lines that will not be increased by the accommodation of additional goods and passengers from the proposed extension. On the basis of 1958 railway expenditures, it is estimated that the portion of the maintenance and operating expense directly dependent on the number of trains operated is TL 0.064 per net metric ton-kilometer of freight carried, and TL 0.029 per passenger-kilometer.

The 1958 railway maintenance and operating expenses, however, reflect only the partial effect of the devaluation of the Turkish Lira, which was realized early in that year. The 1959 unit cost of moving freight--TL 0.1045 per net metric ton-kilometer--is 16.2 percent higher than in the previous year. Other 1959 expenditure information not yet being available, the aforementioned 1958 out-of-pocket costs have been increased by 16.2 percent and, as such, have been used as the basic unit costs for our estimates. Thus, the additional expense of transportation on existing lines is estimated as TL 0.074 per net metric ton-kilometer of freight carried, and TL 0.034 per passenger-kilometer.

Maintenance Reserve Fund

Annual depreciation costs on fixed road properties for the proposed railway extension--at the standard rates used by the Turkish State Railways--are shown on the next page.

DEPRECIATION SCHEDULE

Item	Estimated Initial Cost	Depreciation per Year--Percent	Approximate Annual Depreciation
Rails, Switches, etc.	$2,904,000	2.0	$ 58,100
Native Ties--Wood	1,271,100	4.0	50,800
Bridges and Culverts	920,600	1.5	13,800
Tunnels	2,564,900	1.0	25,600
Signs, Signals, Telecommunications	199,300	4.0	8,000
Buildings	1,787,600	2.0	35,800
Subtotal			$192,100
Tatvan Ferry Landing	230,000	2.5	5,800
Total Annual Depreciation			$197,900*

*-TL 1,781,100

In our opinion, a depreciation account of this kind is not appropriate for the type of financing contemplated. First, such an account ignores some of the more expendable items of property, and second, the estimated service life of some of the depreciated items is much longer than the term of the loan.

There should be a replacement reserve fund for short-lived items, however, and a maintenance reserve fund for extraordinary repairs of both fixed equipment and rolling stock during the life of the proposed bond issue. We recommend a fund for this purpose, therefore, which should be approximately equal to the sum which the Turkish State Railways would customarily set up as a depreciation reserve.

Summary of Expenses

Estimated maintenance and operating expenses and maintenance reserve fund appropriations for movements on the proposed railway extension, as well as for traffic on existing lines which will be generated by the proposed line, are shown in the following table.

SUMMARY OF MAINTENANCE AND OPERATING EXPENSES AND MAINTENANCE RESERVE APPROPRIATIONS ATTRIBUTABLE TO PROPOSED RAILWAY EXTENSION

Account	Expenses in Liras			
	First Year (1963)		Tenth Year (1972)	
	Proposed Line	Existing Lines	Proposed Line	Existing Lines
Maintenance and Operating Expenses	TL 4,082,000	TL 11,507,000	TL 6,612,000	TL 21,511,000
Maintenance Reserve Fund	1,781,000	-	1,781,000	-
Total	TL 5,863,000	TL 11,507,000	TL 8,393,000	TL 21,511,000
GRAND TOTAL	TL 17,370,000		TL 29,904,000	

CHAPTER VI

CONCLUSIONS ON FINANCING

Summary of Revenues and Expenses Attributable to Proposed Railway Extension

Detailed revenue and expense estimates for the first and tenth years of the proposed operation have been presented in Chapters IV and V, respectively, and are summarized in the following table:

SUMMARY OF REVENUE AND EXPENSES

Item	First Year (1963)	Tenth Year (1972)
Revenues		
Freight	TL 20,063,000	TL 37,211,000
Passenger	1,100,000	2,500,000
Total	TL 21,163,000	TL 39,711,000
Expenses		
Maintenance and Operation	TL 15,589,000	TL 28,123,000
Reserve Fund	1,781,000	1,781,000
Total	TL 17,370,000	TL 29,904,000
Income Available to meet Bond Service Charges	TL 3,793,000	TL 9,807,000
Ratio of Expenses to Revenues	0.82	0.75

Projections of revenue and expenses to the year 2000 are presented on Plate 4 of the Appendix.

Operating results for the Turkish State Railways system are presented in Table 11 of the Appendix. Revenues shown therein include income from port operations and miscellaneous sources. The 1958 revenue solely from railway operations amounted to TL 691,000,000.

Our estimate of base year (1958) revenue attributable to the proposed railway extension is TL 15,776,000, as heretofore noted. Thus,

this line would have increased system revenue from railway operations about 2-1/4 percent in 1958.

Conclusion

The estimated cost of the proposed railway extension from Mus to Lake Van at Tatvan is $18,754,000. It is estimated that approximately $9,160,000--49 percent of the total cost--will be payable in U. S. Dollars. For the purpose of analysis it is assumed that the loan for this amount from the Development Loan Fund will have a 30-year term and an interest rate of three percent on the unpaid balance.

Our investigation has developed the practicability of financing the railway project. Table 12 (see Appendix) shows a sample amortization schedule for a $9,160,000--three percent--thirty-year loan. This table indicates that net revenues would cover interest 1.53 times in 1963, assumed to be the first year of operation. Principal payments for bond retirement are scheduled to start at the end of the second year of operation. Coverage on principal and interest is estimated at 1.53 for that year. Average debt service coverage for the thirty-year term is estimated at 2.62.

Estimates of traffic and revenues shown in this report are based on normal conditions, existing tariffs, and the availability and use of the motive power and rolling stock specified in Chapter V. Fluctuations in economic and political conditions, or reductions in equipment assignments, will naturally have the effect of altering the anticipated usage of the railway extension.

It is our view that the financing of the U. S. Dollar requirements and the construction of this project is warranted by the development potential of Turkey, as well as by the many benefits that would accrue to the area served. Moreover, the railway extension would provide a link to a future connecting railway between Turkey and Iran.

TABLE 1

STATION BUILDING REQUIREMENTS

(Areas in Square Meters)

Type of Building	Mus Station		Way Stations--Total		Tatvan Station	
	Number of Buildings or Units	Floor Area	Number of Buildings or Units	Floor Area	Number of Buildings or Units	Floor Area
Residence						
Class A	1	150	-	-	5	750
Class B	9	1,215	21	2,835	30	4,050
Class C	10	1,000	11	1,100	32	3,200
Class D	5	350	15	1,050	8	560
Office	5	225	5	300	2	295
Shops	1	300	1	70	5	2,000
School	1	300	-	-	1	300
Warehouse	-	-	5	150	1	1,000
Station	-	-	5	1,000	1	845
Medical	-	-	-	-	1	400
Stores and Services	-	-	-	-	1	550
Total		3,540		6,505		13,950
Grand Total						23,995

TABLE 2

CONSTRUCTION EQUIPMENT REQUIREMENTS

Item	Description	Number Required	Unit Price	Equipment Cost	Spare Parts	Shipping Cost
1	Shovel and Dragline, 1-1/2 CY Crawler, Diesel	2	$60,000	$ 120,000	$ 30,000	$ 8,300
2	Scraper, 12 CY	4	38,500	154,000	30,800	4,000
3	Tractor, RD-8	6	38,000	228,000	68,400	10,800
4	Angledozer Attachment	5	4,300	21,500	4,300	1,100
5	Ripper Attachment	2	5,700	11,400	2,300	400
6	Sideboom Attachment	1	13,000	13,000	-	200
7	Low Boy and Truck, 50 T Diesel	1	28,000	28,000	5,600	600
8	Dump Truck, 5 CY	20	7,500	150,000	30,000	6,600
9	Pick-up Truck	10	1,800	18,000	3,600	700
10	Dragline and Shovel, 3/4 CY Crawler, Diesel	1	28,000	28,000	8,400	3,400
11	Motor Grader, 12 Ft. Blade, Diesel	2	21,000	42,000	12,600	1,800
12	Compressor, 365 CFM Portable Diesel	10	13,900	139,000	26,000	2,300
13	Rock Drill, 45# Class	27	500	13,500	4,000	100
14	Wagon Drill, Crawler, Portable	4	15,000	60,000	24,000	400
15	Drill Steel 4' to 12' by 1-1/4"	1200 m.	16	19,200	-	800
16	Drill Steel 2' to 8' by 1"	1800 m.	9	16,200	-	700
17	Air Hose, 3/4"	3500 m.	3	10,500	-	300
18	Air Hose, 2"	435 m.	8	3,500	-	100
19	Narrow Gage Track with Ties, 30"	3000 m.	4.5	13,500	-	3,400
20	Narrow Gage Lorries	20	200	4,000	-	1,000
21	Narrow Gage Switches	20	125	2,500	-	300
22	Rock Crusher, Primary, 150 T	1	48,000	48,000	6,000	2,400

TABLE 2--Concluded

CONSTRUCTION EQUIPMENT REQUIREMENTS

Item	Description	Number Required	Unit Price	Equipment Cost	Spare Parts	Shipping Cost
23	Rock Crusher, Secondary, 150 T	1	$58,000	$ 58,000	$ 10,200	$ 2,300
24	Electric Generating Plant, 45 Kw., Diesel	4	8,000	32,000	4,800	600
25	Concrete Vibrator, Gas Engine, 2-1/2 Hp	10	350	3,500	1,400	100
26	Sheep Foot Roller, 5' x 5'	2	2,500	5,000	500	300
27	Workshop Equipment	1	30,000	30,000	3,000	500
28	Grease Truck	2	4,000	8,000	1,600	200
29	Pile Driver, Diesel	1	13,000	13,000	2,600	200
30	Ventilating Fan, 25,000 CFM	4	1,200	4,800	700	200
31	Failing CFD-2 Holemaster	1	23,000	23,000	6,000	600
32	Welding Machine, Diesel, 400 amp.	4	4,000	16,000	3,200	800
33	End Loader, 1-1/2 CY, Diesel	4	16,000	64,000	12,800	7,600
34	Wire Rope 1/2", 5/8", 3/4", 7/8"	25000 m.	1	25,000	-	1,300
35	18-Ton Wagon Crane, Tatvan Ferry	1	40,000	40,000	8,000	2,000
	Total			$1,466,100	$310,800	$ 66,400
	Grand Total					$1,843,300

TABLE 3

SUMMARY OF QUANTITIES AND COST

Main Line Track	100 Km
Sidings, Terminals and Stations	10 Km
Total	110 Km

Item	Description	Unit	Quantity	Unit Cost (Liras)	Total Cost Turkish Liras	Total Cost U.S. Dollar Equivalent
1	Roadway Excavation to Embankment, Earth	CM	502,500	TL 4.70	TL 2,361,800	$ 262,400
2	Roadway Excavation, Rock	CM	387,000	10.70	4,140,900	460,100
3	Borrow Excavation to Embankment	CM	1,692,000	5.10	8,629,200	958,800
4	Structural Excavation, Unclassified	CM	45,600	11.90	542,600	60,300
5	Masonry, Culverts and Bridges	CM	27,500	161.50	4,441,300	493,500
6	Masonry, Protection Walls	CM	7,200	144.50	1,040,400	115,600
7	Concrete	CM	5,800	170.00	986,000	109,600
8	Reinforcing Steel	Kg	386,300	3.30	1,274,800	141,600
9	Tunnel, Masonry Lined	LM	1,990	7,560.00	15,044,400	1,671,600
10	Ballast	CM	226,000	51.00	11,526,000	1,280,700
11	Tele-communication	Km	100	17,190.00	1,719,000	191,000
12	Station Buildings	SM	24,000	650.00	15,600,000	1,733,300
13	Station Platform, 8", Gravel	SM	88,875	5.50	488,800	54,300
14	Water Supply and Utilities	LS	-	-	1,927,800	214,200
15	Signs and Signals	LS	-	-	74,800	8,300
16	Road Crossings	Ea	20	26,350.00	527,000	58,600
17	Snow Tunnel (in open cut)	LM	2,010	4,000.00	8,040,000	893,300
18	Maintenance Access Road	Km	100	13,600.00	1,360,000	151,100
	Total--Subgrade and Stations				TL 79,724,800	$ 8,858,300

TABLE 3--Concluded

SUMMARY OF QUANTITIES AND COST

Item	Description	Unit	Quantity	Unit Cost (Liras)	Total Cost Turkish Liras	Total Cost U.S. Dollar Equivalent
19	Placing Track and Tamping Ballast	Km	110	TL 33,970.00	TL 3,736,700	$ 415,200
20	Native Ties, Wood, 110 Km x 1600 Kg/Km	Kg	176,000	65.00	11,440,000	1,271,100
21	Rail (46.303 Kg/m) 110 Km x 92,600 Kg/Km	1000 Kg	10,186	1,260.00	12,834,400	1,426,000
22	Fittings, Tie and Rail, 110 Km x 25,600 Kg/Km	1000 Kg	2,815	2,345.00	6,601,200	733,500
23	Turnouts, No. 9	Ea	39	36,730.00	1,432,500	159,200
24	Turntable, 30-Meter	Ea	1	731,675.00	731,700	81,300
25	50-Ton Scale	Ea	3	73,170.00	219,500	24,400
	Total--Trackwork and Miscellaneous				TL 36,996,000	$ 4,110,700
26	Tatvan Ferry Landing	LS	-	TL -	TL 2,070,000	$ 230,000
27	Freight, Ocean--New York to Iskenderun	1000 Kg	13,200	TL 255.00	TL 3,366,000	$ 374,000
28	Freight, Rail--Iskenderun to Mus	1000 Kg	13,200	72.00	950,400	105,600
	Total--Freight Cost of Track Items				TL 4,316,400	$ 479,600
	TOTAL COST				TL 123,107,200	$13,678,600

TABLE 4

ALLOCATION OF COST

Item	Description	Estimated Construction Cost	Percent Allocation		Cost Allocation	
			Liras	Dollars	Liras (Equivalent Dollars)	U. S. Dollars
1	Roadway Excavation to Embankment, Earth	$ 262,400	50	50	$ 131,200	$ 131,200
2	Roadway Excavation, Rock	460,100	50	50	230,100	230,000
3	Borrow Excavation to Embankment	958,800	50	50	479,400	479,400
4	Structural Excavation, Unclassified	60,300	60	40	36,200	24,100
5	Masonry, Culverts and Bridges	493,500	70	30	345,500	148,000
6	Masonry, Protection Walls	115,600	80	20	92,500	23,100
7	Concrete	109,600	80	20	87,700	21,900
8	Reinforcing Steel	141,600	90	10	127,400	14,200
9	Tunnel, Masonry Lined	1,671,600	80	20	1,337,300	334,300
10	Ballast	1,280,700	70	30	896,500	384,200
11	Tele-communication	191,000	25	75	47,700	143,300
12	Station Buildings	1,733,300	90	10	1,560,000	173,300
13	Station Platform, 8" Gravel	54,300	60	40	32,600	21,700
14	Water Supply and Utilities	214,200	60	40	128,500	85,700
15	Signs and Signals	8,300	60	40	5,000	3,300
16	Road Crossings	58,600	80	20	46,900	11,700
17	Snow Tunnel (in open cut)	893,300	80	20	714,600	178,700
18	Maintenance Access Road	151,100	80	20	120,900	30,200
	Total--Subgrade and Stations	$8,858,300			$6,420,000	$2,438,300

TABLE 4--Concluded

ALLOCATION OF COST

Item	Description	Estimated Construction Cost	Percent Allocation		Cost Allocation	
			Liras	Dollars	Liras (Equivalent Dollars)	U. S. Dollars
19	Placing Track and Tamping Ballast	$ 415,200	90	10	$ 373,700	$ 41,500
20	Native Ties, Wood 110 Km x 1600 Kg/Km	1,271,100	98	2	1,245,700	25,400
21	Rail (46.303 Kg/m) 110 Km x 92,600 Kg/Km	1,426,000	0	100	0	1,426,000
22	Fittings, Tie and Rail, 110 Km x 25,600 Kg/Km	733,500	0	100	0	733,500
23	Turnouts, No. 9	159,200	20	80	31,800	127,400
24	Turntable, 30-Meter	81,300	40	60	32,500	48,800
25	50-Ton Scale	24,400	40	60	9,800	14,600
	Total--Trackwork and Miscellaneous	$ 4,110,700			$1,693,500	$2,417,200
26	Tatvan Ferry Landing	$ 230,000	62	38	$ 142,600	$ 87,400
27	Freight, Ocean--New York to Iskenderun	$ 374,000	0	100	$ 0	$ 374,000
28	Freight, Rail--Iskenderun to Mus	105,600	100	0	105,600	0
	Total--Freight Cost of Track Items	$ 479,600			$ 105,600	$ 374,000
	TOTAL COST	$13,678,600			$8,361,700	$5,316,900

TABLE 5

CROP AND LIVESTOCK PRODUCTION
IN FIVE PROVINCES TRIBUTARY
TO PROPOSED RAILWAY EXTENSION

Commodity	1958 (Metric Tons)	Six-Year Average (Metric Tons)
1. Wheat	304,648	285,938
2. Barley	66,758	74,068
3. Rye	6,181	13,939
4. Maize, Millet, Rice and Mixed Grains	16,013	43,605
5. Tobacco	269	268
6. Potatoes	36,146	44,693
7. Pulses: Peas and Beans	1,168	1,339
8. Onions	3,840	4,290
9. Sugar Beets*	9,739	6,112
10. Raw Wool**	1,982	2,099
11. Pistachios, Almonds and Walnuts	4,380	5,209
12. Melons	37,425	39,534
13. Other Fruit	4,425	4,576
14. Milk	177,833	195,327
15. Eggs	27,737,000 eggs	23,332,000 eggs
16. Hides and Skins	88,280 skins	87,847 skins
17. Cattle	626,925 head	578,819 head
18. Sheep	2,326,011 head	2,264,662 head
19. Goats	838,620 head	830,125 head

*-Sugar beet production in this area started in 1956.
**-Items 10-19 show 1957 production and five-year averages --
-- 1958 data not available.

TABLE 6

WESTBOUND INTERNAL FREIGHT MOVEMENTS

BASE YEAR ESTIMATES

Commodity	Estimated Tonnage (Metric)	Railway Stations		Rate Per Ton-Km. (Kurus)	Proposed Line			Existing Lines					Total New Traffic	
								Present Tonnage Between Mus and West	Additional Traffic Due to Proposed Extension					
		Origin	Destination		Km.	Ton-Km.	Liras		Tonnage (Metric)	Km.	Ton-Km.	Liras	Ton-Km.	Liras
Wheat	6,770	Cizemburun	Malatya	9.6	12	81,200	7,800	830	5,940	357	2,120,600	203,600	2,201,800	211,400
	2,320	Mus	Malatya	9.6	0	0	0	280	2,040	357	728,300	69,900	728,300	69,900
	4,450	Tatvan Sta.	Diyarbakir	9.6	99	440,600	42,300	550	3,900	422	1,645,800	158,000	2,086,400	200,300
	22,960	Tatvan Ferry	Malatya	9.6	103	2,364,900	227,000	2,820	20,140	357	7,190,000	690,200	9,554,900	917,200
Total	36,500							4,480	32,020					
Barley	1,600	Cizemburun	Malatya	9.6	12	19,200	1,800	280	1,320	357	471,200	45,200	490,400	47,000
	170	Mus	Malatya	9.6	0	0	0	30	140	357	50,000	4,800	50,000	4,800
	330	Rahova	Bingol	9.6	84	27,700	2,700	60	270	106	28,600	2,700	56,300	5,400
	110	Bahcetepe	Malatya	9.6	46	5,100	500	20	90	357	32,100	3,100	37,200	3,600
	2,500	Tatvan Ferry	Malatya	9.6	103	257,500	24,700	440	2,060	357	735,400	70,600	992,900	95,300
	850	Tatvan Ferry	Diyarbakir	9.6	103	87,600	8,400	150	700	422	295,400	28,400	383,000	36,800
	1,440	Tatvan Sta.	Malatya	9.6	99	142,600	13,700	260	1,180	357	421,300	40,400	563,900	54,100
Total	7,000							1,240	5,760					
Rye	2,000	Tatvan Ferry	Malatya	9.6	103	206,000	19,800	260	1,740	357	621,200	59,600	827,200	79,400
	2,000	Tatvan Ferry	Diyarbakir	9.6	103	206,000	19,800	270	1,730	422	730,100	70,100	936,100	89,900
Total	4,000							530	3,470					
Other Cereals	2,700	Rahova	Malatya	9.6	84	226,800	21,800	0	2,700	357	963,900	92,500	1,190,700	114,300
	900	Sicaksu	Malatya	9.6	60	54,000	5,200	0	900	357	321,300	30,800	375,300	36,000
	6,100	Tatvan Ferry	Malatya	9.6	103	628,300	60,300	0	6,100	357	2,177,700	209,100	2,806,000	269,400
Total	9,700							0	9,700					
Tobacco	200	Cizemburun	Samsun	12.0	12	2,400	300	200	0	1,011	0	0	2,400	300
Total	200							200	0					
Raw Wool	150	Cizemburun	Sivas	12.8	12	1,800	200	70	80	609	48,700	6,200	50,500	6,400
	90	Mus	Sivas	12.8	0	0	0	40	50	609	30,400	3,900	30,400	3,900
	100	Rahova	Diyerbakir	12.8	84	8,400	1,100	50	50	422	21,100	2,700	29,500	3,800
	30	Bahcetepe	Diyarbakir	12.8	46	1,400	200	10	20	422	8,400	1,100	9,800	1,300
	470	Tatvan Ferry	Diyarbakir	12.8	103	48,400	6,200	220	250	422	105,500	13,500	153,900	19,700
	100	Tatvan Ferry	Istanbul	12.8	103	10,300	1,300	50	50	1,788	89,400	11,400	99,700	12,700
	60	Tatvan Sta.	Sivas	12.8	99	5,900	800	30	30	609	18,300	2,300	24,200	3,100
Total	1,000							470	530					
Potatoes	5,700	Tatvan Ferry	Ankara	12.0	103	587,100	70,500	0	5,700	1,211	6,902,700	828,300	7,489,800	898,800
	3,400	Tatvan Ferry	Mus	12.0	103	350,200	42,000	-	-	-	-	-	350,200	42,000
Total	9,100							0	5,700					
Sugar Beets	6,050	Cizemburun	Elazig	8.4	12	72,600	6,100	3,180	2,870	239	685,900	57,600	758,500	63,700
	3,950	Tatvan Sta.	Elazig	8.4	99	391,000	32,800	2,080	1,870	239	446,900	37,500	837,900	70,300
Total	10,000							5,260	4,740					
Onions	100	Ozden	Ankara	12.0	28	2,800	300	100	0	1,211	0	0	2,800	300
Total	100							100	0					

TABLE 6 - CONCLUDED

WESTBOUND INTERNAL FREIGHT MOVEMENTS

BASE YEAR ESTIMATES

Commodity	Estimated Tonnage (Metric)	Railway Stations		Rate Per Ton-Km. (Kurus)	Proposed Line			Existing Lines					Total New Traffic	
								Present Tonnage Between Mus and West	Additional Traffic Due to Proposed Extension					
		Origin	Destination		Km.	Ton-Km.	Liras		Tonnage (Metric)	Km.	Ton-Km.	Liras	Ton-Km.	Liras
Nuts	500	Tatvan Ferry	Sivas	12.0	103	51,500	6,200	0	500	609	304,500	36,500	356,000	42,700
	100	Tatvan Ferry	Mus	12.0	103	10,300	1,200	-	-	-	-	-	10,300	1,200
Total	600							0	500					
Melons	1,200	Cizemburun	Sivas	12.8	12	14,400	1,800	0	1,200	609	730,800	93,500	745,200	95,300
Total	1,200							0	1,200					
Milk	800	Tatvan Ferry	Malatya	12.0	103	82,400	9,900	0	800	357	285,600	34,300	368,000	44,200
	300	Tatvan Ferry	Diyarbakir	12.0	103	30,900	3,700	0	300	422	126,600	15,200	157,500	18,900
	2,000	Tatvan Ferry	Mus	12.0	103	206,000	24,700	-	-	-	-	-	206,000	24,700
Total	3,100							0	1,100					
Hides and Skins	500	Rahova	Istanbul	12.8	84	42,000	5,400	150	350	1,788	625,800	80,100	667,800	85,500
	500	Cizemburun	Ankara	12.8	12	6,000	800	150	350	1,211	423,800	54,200	429,800	55,000
Total	1,000							300	700					
Hay	2,500	Tatvan Ferry	Malatya	10.9	103	257,500	28,100	1,560	940	357	335,600	36,600	593,100	64,700
	2,500	Rahova	Malatya	10.9	84	210,000	22,900	1,560	940	357	335,600	36,600	545,600	59,500
Total	5,000							3,120	1,880					
Cattle	3,870	Cizemburun	Diyarbakir	18.6	12	46,400	8,600	3,560	310	422	130,800	24,300	177,200	32,900
	1,960	Mus	Erzurum	18.6	0	0	0	1,800	160	932	149,100	27,700	149,100	27,700
	1,870	Rahova	Kayseri	18.6	84	157,100	29,200	1,720	150	831	124,600	23,200	281,700	52,400
	640	Bahcetepe	Kayseri	18.6	46	29,400	5,500	590	50	831	41,600	7,700	71,000	13,200
	4,050	Tatvan Ferry	Diyarbakir	18.6	103	417,200	77,600	3,720	330	422	139,300	25,900	556,500	103,500
	1,350	Tatvan Ferry	Malatya	18.6	103	139,000	25,900	1,240	110	357	39,300	7,300	178,300	33,200
	1,910	Tatvan Sta.	Diyarbakir	18.6	99	189,100	35,200	1,750	160	422	67,500	12,600	256,600	47,800
	550	Tatvan Ferry	Erzurum	18.6	103	56,600	10,500	510	40	932	37,300	6,900	93,900	17,400
Total	16,200							14,890	1,310					
Sheep	4,690	Cizemburun	Diyarbakir	18.6	12	56,300	10,500	4,180	510	422	215,200	40,000	271,500	50,500
	2,280	Mus	Erzurum	18.6	0	0	0	2,030	250	932	233,000	43,300	233,000	43,300
	2,850	Rahova	Erzurum	18.6	84	239,400	44,500	2,540	310	932	288,900	53,700	528,300	98,200
	950	Bahcetepe	Ankara	18.6	46	43,700	8,100	850	100	1,211	121,100	22,500	164,800	30,600
	12,340	Tatvan Ferry	Diyarbakir	18.6	103	1,271,000	236,400	11,020	1,320	422	557,000	103,600	1,828,000	340,000
	4,120	Tatvan Ferry	Malatya	18.6	103	424,400	78,900	3,670	450	357	160,600	29,900	585,000	108,800
	2,410	Tatvan Sta.	Diyarbakir	18.6	99	238,600	44,400	2,150	260	422	109,700	20,400	348,300	64,800
	2,360	Tatvan Ferry	Erzurum	18.6	103	243,100	45,200	2,110	250	932	233,000	43,300	476,100	88,500
Total	32,000							28,550	3,450					
Goats	1,700	Sicaksu	Erzurum	18.6	60	102,000	19,000	1,550	150	932	139,800	26,000	241,800	45,000
	980	Tatvan Ferry	Diyarbakır	18.6	103	100,900	18,800	890	90	422	38,000	7,100	138,900	25,900
	320	Tatvan Ferry	Kayseri	18.6	103	33,000	6,100	290	30	831	24,900	4,600	57,900	10,700
Total	3,000							2,730	270					
Miscellaneous	13,400	Ozden	Elazig	12.0	28	375,200	45,000	8,170	5,230	239	1,250,000	150,000	1,625,200	195,000
Total	13,400							8,170	5,230					
GRAND TOTAL	153,100					11,303,200	1,471,700	70,040	77,560		34,159,200	3,810,500	45,462,400	5,282,200

TABLE 7

EXPORT FREIGHT MOVEMENTS

BASE YEAR ESTIMATES

Commodity	Estimated Tonnage (Metric)	Railway Stations		Rate Per Ton-Km. (Kurus)	Proposed Line			Existing Lines					Total New Traffic	
								Present Tonnage Between Mus and West	Additional Traffic Due to Proposed Extension					
		Origin	Destination		Km.	Ton-Km.	Liras		Tonnage (Metric)	Km.	Ton-Km.	Liras	Ton-Km.	Liras
Wheat	650	Cizemburun	Iskenderun	9.6	12	7,800	700	70	580	730	423,400	40,600	431,200	41,300
	180	Mus	Iskenderun	9.6	0	0	0	20	160	730	116,800	11,200	116,800	11,200
	1,800	Tatvan Ferry	Iskenderun	9.6	103	185,400	17,800	190	1,610	730	1,175,300	112,800	1,360,700	130,600
	470	Tatvan Sta.	Iskenderun	9.6	99	46,500	4,500	50	420	730	306,600	29,400	353,100	33,900
Total	3,100							330	2,770					
Barley	570	Cizemburun	Iskenderun	9.6	12	6,800	700	100	470	730	343,100	32,900	349,900	33,600
	60	Mus	Iskenderun	9.6	0	0	0	10	50	730	36,500	3,500	36,500	3,500
	160	Rahova	Iskenderun	9.6	84	13,400	1,300	30	130	730	94,900	9,100	108,300	10,400
	1,200	Tatvan Ferry	Iskenderun	9.6	103	123,600	11,900	210	990	730	722,700	69,400	846,300	81,300
	510	Tatvan Sta.	Iskenderun	9.6	99	50,500	4,800	90	420	730	306,600	29,400	357,100	34,200
Total	2,500							440	2,060					
Nuts	200	Tatvan Ferry	Iskenderun	12.0	103	20,600	2,500	0	200	730	146,000	17,500	166,600	20,000
Total	200							0	200					
Hides and Skins	500	Sicaksu	Iskenderun	12.8	60	30,000	3,800	200	300	730	219,000	28,000	249,000	31,800
Total	500							200	300					
Cattle	100	Sicaksu	Iskenderun	18.6	60	6,000	1,100	100	0	730	0	0	6,000	1,100
Total	100							100	0					
Sheep	120	Tatvan Ferry	Iskenderun	18.6	103	12,400	2,300	120	0	730	0	0	12,400	2,300
	80	Behcetepe	Iskenderun	18.6	46	3,700	700	80	0	730	0	0	3,700	700
Total	200							200	0					
Miscellaneous	600	Ozden	Iskenderun	12.0	28	16,800	2,000	180	420	730	306,600	36,800	323,400	38,800
Total	600							180	420					
GRAND TOTAL	7,200					523,500	54,100	1,450	5,750		4,197,500	420,600	4,721,000	474,700

TABLE 8

EASTBOUND INTERNAL FREIGHT MOVEMENTS

BASE YEAR ESTIMATES

Commodity	Estimated Tonnage (Metric)	Railway Stations		Rate Per Ton-Km. (Kurus)	Proposed Line			Existing Lines					Total New Traffic	
								Present Tonnage Between Mus and West	Additional Traffic Due to Proposed Extension					
		Origin	Destination		Km.	Ton-Km.	Liras		Tonnage (Metric)	Km.	Ton-Km.	Liras	Ton-Km.	Liras
Sugar	630	Kayseri	Mus	12.0	0	0	0	80	550	831	457,000	54,800	457,000	54,800
	1,070	Kayseri	Cizemburun	12.0	12	12,800	1,500	130	940	831	781,100	93,700	793,900	95,200
	310	Elazig	Bahcetepe	12.0	46	14,300	1,700	40	270	239	64,500	7,700	78,800	9,400
	950	Elazig	Rahova	12.0	84	79,800	9,600	110	840	239	200,800	24,100	280,600	33,700
	500	Kayseri	Tatvan Sta.	12.0	99	49,500	5,900	70	430	831	357,300	42,900	406,800	48,800
	2,840	Elazig	Tatvan Ferry	12.0	103	292,500	35,100	350	2,490	239	595,100	71,400	887,600	106,500
Total	6,300							780	5,520					
Iron and Steel Products and Machinery	2,500	Karabuk	Mus	12.0	0	0	0	700	1,800	1,435	2,583,000	310,000	2,583,000	310,000
	4,250	Ankara	Cizemburun	12.0	12	51,000	6,100	1,200	3,050	1,211	3,693,600	443,200	3,744,600	449,300
	1,250	Istanbul	Bahcetepe	12.0	46	57,500	6,900	350	900	1,788	1,609,200	193,100	1,666,700	200,000
	3,750	Karabuk	Rahova	12.0	84	315,000	37,800	1,060	2,690	1,435	3,860,200	463,200	4,175,200	501,000
	2,000	Karabuk	Tatvan Sta.	12.0	99	198,000	23,800	560	1,440	1,435	2,066,400	248,000	2,264,400	271,800
	11,250	Karabuk	Tatvan Ferry	12.0	103	1,158,800	139,000	3,170	8,080	1,435	11,594,800	1,391,000	12,753,600	1,530,000
Total	25,000							7,040	17,960					
Cement and Building Material	3,000	Elazig	Mus	12.0	0	0	0	370	2,630	239	628,600	75,400	628,600	75,400
	5,100	Elazig	Cizemburun	12.0	12	61,200	7,300	630	4,470	239	1,068,300	128,200	1,129,500	135,500
	1,500	Malatya	Bahcetepe	12.0	46	69,000	8,300	180	1,320	357	471,200	56,500	540,200	64,800
	4,500	Elazig	Rahova	12.0	84	378,000	45,400	560	3,940	239	941,700	113,000	1,319,700	158,400
	2,400	Mercin	Tatvan Sta.	12.0	99	237,600	28,500	300	2,100	816	1,713,600	205,600	1,951,200	234,100
	13,500	Sivas	Tatvan Ferry	12.0	103	1,390,500	166,900	1,670	11,830	609	7,204,500	864,500	8,595,000	1,031,400
Total	30,000							3,710	26,290					
Wood and Wood Products	200	Cankiri	Mus	10.0	0	0	0	60	140	1,243	174,000	17,400	174,000	17,400
	340	Adana	Cizemburun	10.0	12	4,100	400	110	230	749	172,300	17,200	176,400	17,600
	400	Cankiri	Sicaksu	10.0	60	24,000	2,400	120	280	1,243	348,000	34,800	372,000	37,200
	160	Adana	Tatvan Sta.	10.0	99	15,800	1,600	50	110	749	82,400	8,200	98,200	9,800
	900	Adana	Tatvan Ferry	10.0	103	92,700	9,300	280	620	749	464,400	46,400	557,100	55,700
Total	2,000							620	1,380					
Cotton Fabric	200	Istanbul	Tatvan Ferry	12.8	103	20,600	2,600	0	200	1,788	357,600	45,800	378,200	48,400
Total	200							0	200					
Jeeps, Etc.	200	Istanbul	Rahova	12.0	84	16,800	2,000	170	30	1,788	53,600	6,400	70,400	8,400
Total	200							170	30					
Diesel and Fuel Oil	200	Batman	Mus	11.0	0	0	0	160	40	513	20,500	2,300	20,500	2,300
	340	Batman	Cizemburun	11.0	12	4,100	400	280	60	513	30,800	3,400	34,900	3,800
	400	Batman	Sicaksu	11.0	60	24,000	2,600	320	80	513	41,000	4,500	65,000	7,100
	160	Batman	Tatvan Sta.	11.0	99	15,800	1,700	130	30	513	15,400	1,700	31,200	3,400
	900	Batman	Tatvan Ferry	11.0	103	92,700	10,200	740	160	513	82,100	9,000	174,800	19,200
Total	2,000							1,630	370					

TABLE 8 - CONTINUED

EASTBOUND INTERNAL FREIGHT MOVEMENTS

BASE YEAR ESTIMATES

Commodity	Estimated Tonnage (Metric)	Railway Stations		Rate Per Ton-Km. (Kurus)	Proposed Line			Existing Lines					Total New Traffic	
								Present Tonnage Between Mus and West	Additional Traffic Due to Proposed Extension					
		Origin	Destination		Km.	Ton-Km.	Liras		Tonnage (Metric)	Km.	Ton-Km.	Liras	Ton-Km.	Liras
Coal and Lignite	1,000	Sivas	Mus	10.0	0	0	0	120	880	609	535,900	53,600	535,900	53,600
	1,700	Sivas	Cizemburun	10.0	12	20,400	2,000	210	1,490	609	907,400	90,700	927,800	92,700
	500	Zonguldak	Bahcetepe	10.0	46	23,000	2,300	60	440	1,556	684,600	68,500	707,600	70,800
	1,500	Zonguldak	Rahova	10.0	84	126,000	12,600	190	1,310	1,556	2,038,400	203,800	2,164,400	216,400
	800	Sivas	Tatvan Sta.	10.0	99	79,200	7,900	100	700	609	426,300	42,600	505,500	50,500
	4,500	Zonguldak	Tatvan Ferry	10.0	103	463,500	46,400	560	3,940	1,556	6,130,600	613,100	6,594,100	659,500
Total	10,000							1,240	8,760					
Gasoline	300	Batman	Mus	12.0	0	0	0	260	40	513	20,500	2,500	20,500	2,500
	510	Batman	Cizemburun	12.0	12	6,100	700	450	60	513	30,800	3,700	36,900	4,400
	600	Batman	Sicaksu	12.0	60	36,000	4,300	530	70	513	35,900	4,300	71,900	8,600
	240	Batman	Tatvan Sta.	12.0	99	23,800	2,900	210	30	513	15,400	1,800	39,200	4,700
	1,350	Batman	Tatvan Ferry	12.0	103	139,000	16,700	1,190	160	513	82,100	9,900	221,100	26,600
Total	3,000							2,640	360					
Fertilizer	400	Kutahya	Mus	12.0	0	0	0	0	400	1,486	594,400	71,300	594,400	71,300
	680	Kutahya	Cizemburun	12.0	12	8,200	1,000	0	680	1,486	1,010,500	121,300	1,018,700	122,300
	800	Kutahya	Sicaksu	12.0	60	48,000	5,800	0	800	1,486	1,188,800	142,700	1,236,800	148,500
	320	Kutahya	Tatvan Sta.	12.0	99	31,700	3,800	0	320	1,486	475,500	57,100	507,200	60,900
	1,800	Kutahya	Tatvan Ferry	12.0	103	185,400	22,200	0	1,800	1,486	2,674,800	321,000	2,860,200	343,200
Total	4,000							0	4,000					
Fruit	1,000	Adana	Mus	14.0	0	0	0	920	80	749	59,900	8,400	59,900	8,400
Total	1,000							920	80					
Beer	300	Ankara	Rahova	13.0	103	30,900	4,000	260	40	1,211	48,400	6,300	79,300	10,300
	300							260	40					
Soap	100	Adana	Tatvan Sta.	14.1	99	9,900	1,400	0	100	749	74,900	10,600	84,800	12,000
Total	100							0	100					
Olives and Olive Oil	100	Adana	Sicaksu	12.0	60	6,000	700	0	100	749	74,900	9,000	80,900	9,700
Total	100							0	100					
Military Supplies	300	Ankara	Mus	15.8	0	0	0	50	250	1,211	302,800	47,800	302,800	47,800
	510	Ankara	Cizemburun	15.8	12	6,100	1,000	90	420	1,211	508,600	80,400	514,700	81,400
	600	Ankara	Sicaksu	15.8	60	36,000	5,700	110	490	1,211	593,400	93,800	629,400	99,500
	240	Ankara	Tatvan Sta.	15.8	99	23,800	3,800	40	200	1,211	242,200	38,300	266,000	42,100
	1,350	Diyarbakir	Tatvan Ferry	15.8	103	139,000	22,000	240	1,110	422	468,400	74,000	607,400	96,000
Total	3,000							530	2,470					
Yard Goods	200	Istanbul	Bahcetepe	12.8	46	9,200	1,200	0	200	1,788	357,600	45,800	366,800	47,000
Total	200							0	200					
Rice	200	Maras	Tatvan Ferry	11.2	84	16,800	1,900	0	200	583	116,600	13,100	133,400	15,000
Total	200							0	200					

TABLE 8 - CONCLUDED

EASTBOUND INTERNAL FREIGHT MOVEMENTS

BASE YEAR ESTIMATES

Commodity	Estimated Tonnage (Metric)	Railway Stations		Rate Per Ton-Km. (Kurus)	Proposed Line			Existing Lines					Total New Traffic	
								Present Tonnage Between Mus and West	Additional Traffic Due to Proposed Extension					
		Origin	Destination		Km.	Ton-Km.	Liras		Tonnage (Metric)	Km.	Ton-Km.	Liras	Ton-Km.	Liras
Salt	700	Kayseri	Ozden	10.9	28	19,600	2,100	650	50	831	41,600	4,500	61,200	6,600
Total	700							650	50					
Pipe	500	Izmit	Mus	11.7	0	0	0	350	150	1,696	254,400	29,900	254,400	29,900
	850	Izmit	Cizemburun	11.7	12	10,200	1,200	590	260	1,696	441,000	51,600	451,200	52,800
	250	Izmit	Bahcetepe	11.7	46	11,500	1,300	170	80	1,696	135,700	15,900	147,200	17,200
	750	Izmit	Rahova	11.7	84	63,000	7,400	510	240	1,696	407,000	47,600	470,000	55,000
	400	Izmit	Tatvan Sta.	11.7	99	39,600	4,600	270	130	1,696	220,500	25,800	260,100	30,400
	2,250	Izmit	Tatvan Ferry	11.7	103	231,800	27,100	1,550	700	1,696	1,187,200	138,900	1,419,000	166,000
Total	5,000							3,440	1,560					
Flour	300	Elazig	Mus	8.8	0	0	0	240	60	239	14,300	1,300	14,300	1,300
	510	Adana	Cizemburun	8.8	12	6,100	500	400	110	749	82,400	7,300	88,500	7,800
	600	Kayseri	Sicaksu	8.8	60	36,000	3,200	470	130	831	108,000	9,500	144,000	12,700
	240	Adana	Tatvan Sta.	8.8	99	23,800	2,100	180	60	749	44,900	4,000	68,700	6,100
	1,350	Adana	Tatvan Ferry	8.8	103	139,000	12,200	1,050	300	749	224,700	19,800	363,700	32,000
Total	3,000							2,340	660					
Miscellaneous	9,600	Ankara	Ozden	12.0	28	268,800	32,300	5,790	3,810	1,211	4,613,900	553,700	4,882,700	586,000
Total	9,600							5,790	3,810					
GRAND TOTAL	105,900					6,993,500	821,300	31,760	74,140		69,208,200	8,128,600	76,201,700	8,949,900

TABLE 9

IMPORT FREIGHT MOVEMENTS

BASE YEAR ESTIMATES

Commodity	Estimated Tonnage (Metric)	Railway Stations		Rate Per Ton-Km. (Kurus)	Proposed Line			Existing Lines					Total New Traffic	
								Present Tonnage Between Mus and West	Additional Traffic Due to Proposed Extention					
		Origin	Destination		Km.	Ton-Km.	Liras		Tonnage (Metric)	Km.	Ton-Km.	Liras	Ton-Km.	Liras
Agricultural Machinery	40	Iskenderun	Mus	12.0	0	0	0	10	30	730	21,900	2,600	21,900	2,600
	70	Iskenderun	Cizemburun	12.0	12	800	100	30	40	730	29,200	3,500	30,000	3,600
	80	Iskenderun	Sicaksu	12.0	60	4,800	600	30	50	730	36,500	4,400	41,300	5,000
	30	Iskenderun	Tatvan Sta.	12.0	99	3,000	400	10	20	730	14,600.	1,800	17,600	2,200
	180	Iskenderun	Tatvan Ferry	12.0	103	18,500	2,200	80	100	730	73,000	8,800	91,500	11,000
Total	400							160	240					
Trucks	20	Iskenderun	Mus	12.0	0	0	0	20	0	730	0	0	0	0
	40	Iskenderun	Cizemburun	12.0	12	500	100	30	10	730	7,300	900	7,800	1,000
	40	Iskenderun	Sicaksu	12.0	60	2,400	300	30	10	730	7,300	900	9,700	1,200
	10	Iskenderun	Tatvan Sta.	12.0	99	1,000	100	10	0	730	0	0	1,000	100
	90	Iskenderun	Tatvan Ferry	12.0	103	9,300	1,100	80	10	730	7,300	900	16,600	2,000
Total	200							170	30					
Mine Supplies and Machinery	80	Iskenderun	Mus	12.0	0	0	0	20	60	730	43,800	5,300	43,800	5,300
	140	Iskenderun	Cizemburun	12.0	12	1,700	200	30	110	730	80,300	9,600	82,000	9,800
	40	Iskenderun	Behcetepe	12.0	46	1,800	200	10	30	730	21,900	2,600	23,700	2,800
	120	Iskenderun	Rahova	12.0	84	10,100	1,200	20	100	730	73,000	8,800	83,100	10,000
	60	Iskenderun	Tatvan Sta.	12.0	99	5,900	700	10	50	730	36,500	4,400	42,400	5,100
	360	Iskenderun	Tatvan Ferry	12.0	103	37,100	4,500	70	290	730	211,700	25,400	248,800	29,900
Total	800							160	640					
Yard Goods	20	Iskenderun	Mus	12.8	0	0	0	0	20	730	14,600	1,900	14,600	1,900
	40	Iskenderun	Cizemburun	12.8	12	500	100	0	40	730	29,200	3,700	29,700	3,800
	40	Iskenderun	Sicaksu	12.8	60	2,400	300	0	40	730	29,200	3,700	31,600	4,000
	10	Iskenderun	Tatvan Sta.	12.8	99	1,000	100	0	10	730	7,300	900	8,300	1,000
	90	Iskenderun	Tatvan Ferry	12.8	103	9,300	1,200	0	90	730	65,700	8,400	75,000	9,600
Total	200							0	200					
Lubricating Oil	100	Iskenderun	Mus	14.4	0	0	0	30	70	730	51,100	7,400	51,100	7,400
	170	Iskenderun	Cizemburun	14.4	12	2,000	300	50	120	730	87,600	12,600	89,600	12,900
	50	Iskenderun	Behcetepe	14.4	46	2,300	300	20	30	730	21,900	3,200	24,200	3,500
	150	Iskenderun	Rahova	14.4	84	12,600	1,800	40	110	730	80,300	11,600	92,900	13,400
	80	Iskenderun	Tatvan Sta.	14.4	99	7,900	1,100	20	60	730	43,800	6,300	51,700	7,400
	450	Iskenderun	Tatvan Ferry	14.4	103	46,400	6,700	130	320	730	233,600	33,600	280,000	40,300
Total	1,000							290	710					
Kerosene	350	Iskenderun	Mus	16.2	0	0	0	330	20	730	14,600	2,400	14,600	2,400
	600	Iskenderun	Cizemburun	16.2	12	7,200	1,200	550	40	730	29,200	4,700	36,400	5,900
	170	Iskenderun	Behcetepe	16.2	46	7,800	1,300	160	10	730	7,300	1,200	15,100	2,500
	530	Iskenderun	Rahova	16.2	84	44,500	7,200	490	40	730	29,200	4,700	73,700	11,900
	280	Iskenderun	Tatvan Sta.	16.2	99	27,700	4,500	260	20	730	14,600	2,400	42,300	6,900
	1,570	Iskenderun	Tatvan Ferry	16.2	103	161,700	26,200	1,460	120	730	87,600	14,200	249,300	40,400
Total	3,500							3,250	250					
Miscellaneous	600	Iskenderun	Ozden	12.0	28	16,800	2,000	310	290	730	211,700	25,400	228,500	27,400
Total	600							310	290					
GRAND TOTAL	6,700					447,000	66,000	4,340	2,360		1,722,800	228,200	2,169,800	294,200

TABLE 10

ESTIMATED ANNUAL MAINTENANCE AND OPERATING EXPENSES
MUS-TATVAN LINE

Account	Year of Operation First	Tenth
Maintenance-of-Way	TL 602,000	TL 727,000
Mechanical Department (Tatvan)	253,000	311,000
Station Service	304,000	304,000
Train and Traffic	93,000	187,000
Locomotive Expense	194,000	388,000
Car Expense	1,910,000	3,819,000
Health Center Expense (Tatvan)	310,000	365,000
General and Miscellaneous Expenses	416,000	511,000
Total Annual Maintenance and Operating Expense for Mus-Tatvan Line	TL 4,082,000	TL 6,612,000

TABLE 11

TURKISH STATE RAILWAYS--OPERATING RESULTS

Revenue and Expenses

Year	Revenue in Liras				Total Expenses and Fixed Charges	Net Income or (Deficit)
	Freight	Passengers and Baggage	Service and Miscellaneous	Total		
1949	94,241,000	44,787,000	19,502,000	158,530,000	166,045,000	(7,515,000)
1950	106,870,000	44,849,000	17,198,000	168,917,000	176,740,000	(7,823,000)
1951	106,693,000	46,164,000	31,942,000	184,799,000	213,799,000	(29,000,000)
1952	118,732,000	49,017,000	22,318,000	190,067,000	206,340,000	(16,273,000)
1953	164,393,000	55,725,000	27,523,000	247,641,000	220,418,000	27,224,000
1954	188,901,000	72,551,000	46,273,000	307,725,000	338,146,000	(30,421,000)
1955	211,345,000	80,483,000	70,343,000	362,171,000	355,903,000	6,268,000
1956	241,758,000	92,956,000	86,295,000	421,009,000	491,260,000	(70,251,000)
1957	290,861,000	114,803,000	118,408,000	524,072,000	553,229,000	(29,157,000)
1958	465,534,000	190,128,000	86,250,000	741,912,000	770,159,000	(28,247,000)

Goods and Passengers Carried

Year	Net Metric Tons of Freight	Net Metric Ton-Kilometers--Freight	Number of Passengers
1949	8,128,000	2,722,852,000	49,182,000
1950	8,977,000	3,086,873,000	50,715,000
1951	8,681,000	3,078,266,000	53,130,000
1952	9,213,000	3,146,784,000	56,352,000
1953	10,222,000	3,645,914,000	60,322,000
1954	11,790,000	4,165,640,000	61,966,000
1955	12,981,000	4,366,112,000	57,301,000
1956	14,566,000	4,812,000,000	67,503,000
1957	16,292,000	5,371,000,000	84,579,000
1958	16,775,000	5,522,000,000	92,483,000

TABLE 12

SAMPLE AMORTIZATION SCHEDULE FOR $9,160,000 THREE PERCENT 30-YEAR LOAN

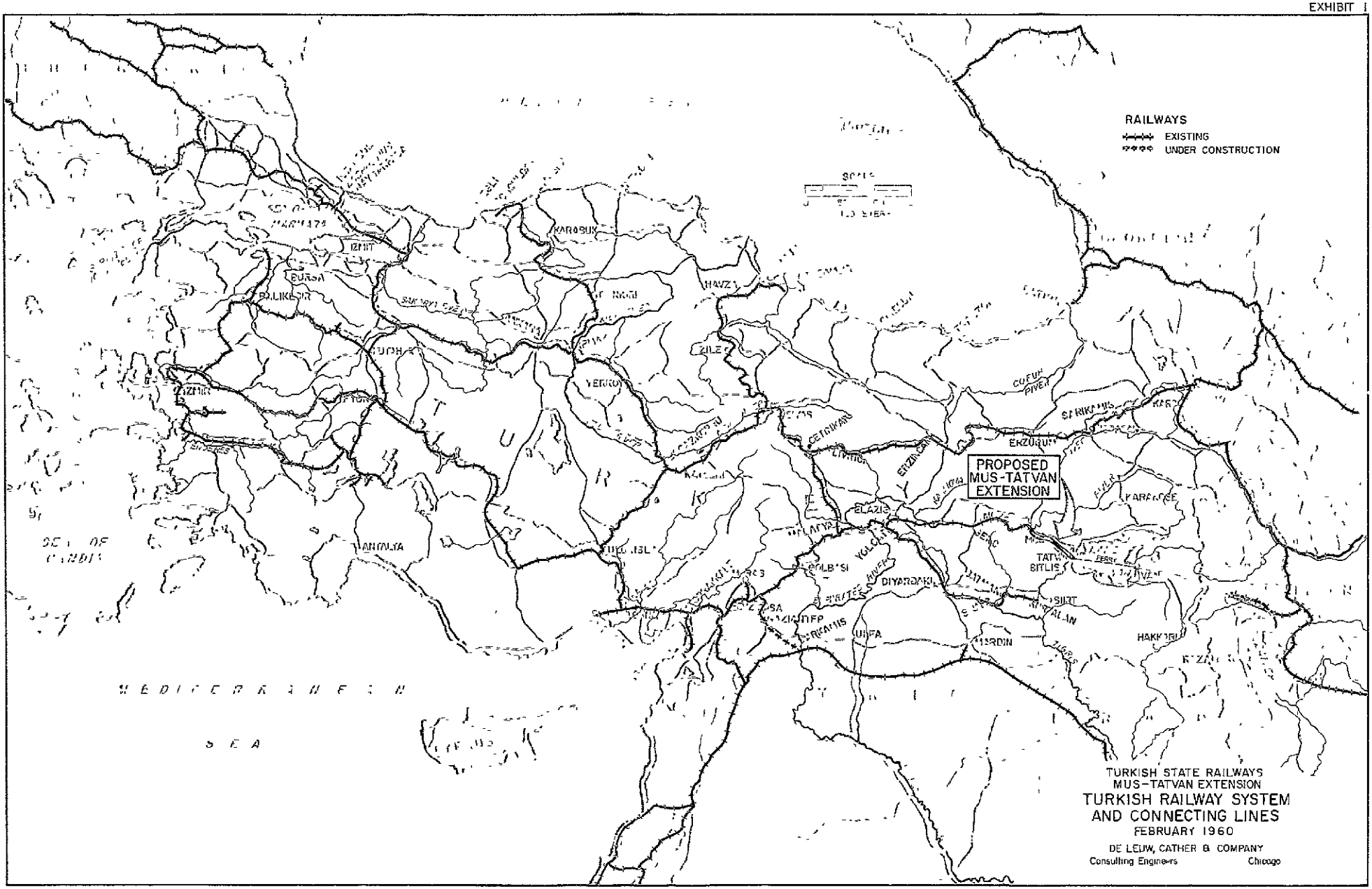
FOR FINANCING PROPOSED MUS-TATVAN RAILWAY EXTENSION

(ADD 000)

Year	Revenue	Expenses	Revenue Available for Bond Service Charges		Bond Interest at 3%	Interest Coverage	Assumed Principal Amount of Bonds Retired	Assumed Total Interest and Principal Payments	Total Debt Service Coverage	Loan Outstanding
			Turkish Liras	Equivalent U.S.Dollars						
1963	TL 21,200	TL 17,400	TL 3,800	$ 422	$ 275	1.53	$ -	$ 275	1.53	$9,160
1964	24,100	19,200	4,900	544	275	1.98	80	355	1.53	9,080
1965	26,500	20,800	5,700	633	272	2.33	80	352	1.80	9,000
1966	28,800	22,200	6,600	733	270	2.71	100	370	1.98	8,900
1967	30,800	23,700	7,100	789	267	2.96	100	367	2.15	8,800
1968	32,900	25,000	7,900	878	264	3.33	100	364	2.41	8,700
1969	34,900	26,300	8,600	955	261	3.66	150	411	2.32	8,550
1970	36,600	27,400	9,200	1,022	257	3.98	150	407	2.51	8,400
1971	38,200	28,700	9,500	1,055	252	4.19	150	402	2.62	8,250
1972	39,700	29,900	9,800	1,089	248	4.39	150	398	2.74	8,100
1973	41,500	31,000	10,500	1,167	243	4.80	200	443	2.63	7,900
1974	42,900	32,000	10,900	1,211	237	5.11	200	437	2.77	7,700
1975	44,300	33,000	11,300	1,255	231	5.43	200	431	2.91	7,500
1976	45,900	34,000	11,900	1,322	225	5.88	200	425	3.11	7,300
1977	47,000	34,900	12,100	1,344	219	6.14	300	519	2.59	7,000
1978	48,200	35,700	12,500	1,389	210	6.61	300	510	2.72	6,700
1979	49,400	36,400	13,000	1,444	201	7.18	300	501	2.88	6,400
1980	50,500	37,100	13,400	1,489	192	7.76	300	492	3.03	6,100
1981	51,500	37,800	13,700	1,522	183	8.32	400	583	2.61	5,700
1982	52,400	38,500	13,900	1,544	171	9.03	400	571	2.70	5,300
1983	53,300	39,100	14,200	1,578	159	9.92	400	559	2.82	4,900
1984	54,300	39,800	14,500	1,611	147	10.96	400	547	2.95	4,500
1985	55,200	40,200	15,000	1,667	135	12.35	500	635	2.63	4,000
1986	56,000	40,800	15,200	1,689	120	14.08	500	620	2.72	3,500
1987	56,700	41,300	15,400	1,711	105	16.30	500	605	2.83	3,000
1988	57,300	41,800	15,500	1,722	90	19.13	500	590	2.92	2,500
1989	58,000	42,200	15,800	1,755	75	23.40	600	675	2.60	1,900
1990	58,600	42,400	16,200	1,800	57	31.58	600	657	2.74	1,300
1991	59,100	42,800	16,300	1,811	39	46.44	600	639	2.83	700
1992	59,700	43,100	16,600	1,844	21	87.81	700	721	2.56	-
	TL 1,355,500	TL 1,004,500	TL 351,000	$38,995	$5,701		$9,160	$14,861		

Average Debt Service Coverage = 2.62

EXHIBIT 1


RAILWAYS
EXISTING
UNDER CONSTRUCTION
PROPOSED MUS-TATVAN EXTENSION
TURKISH STATE RAILWAYS
MUS-TATVAN EXTENSION
TURKISH RAILWAY SYSTEM
AND CONNECTING LINES
FEBRUARY 1960
DE LEUW, CATHER & COMPANY
Consulting Engineers
Chicago
MEDITERRANEAN SEA
ANTALYA
ADANA
ELAZIG
DIYARBAKIR
BITLIS
MUS
ERZURUM
KARS
SIVAS
KAYSERI
ANKARA
IZMIR
BURSA
ESKISEHIR
KONYA
KARABUK
ZONGULDAK
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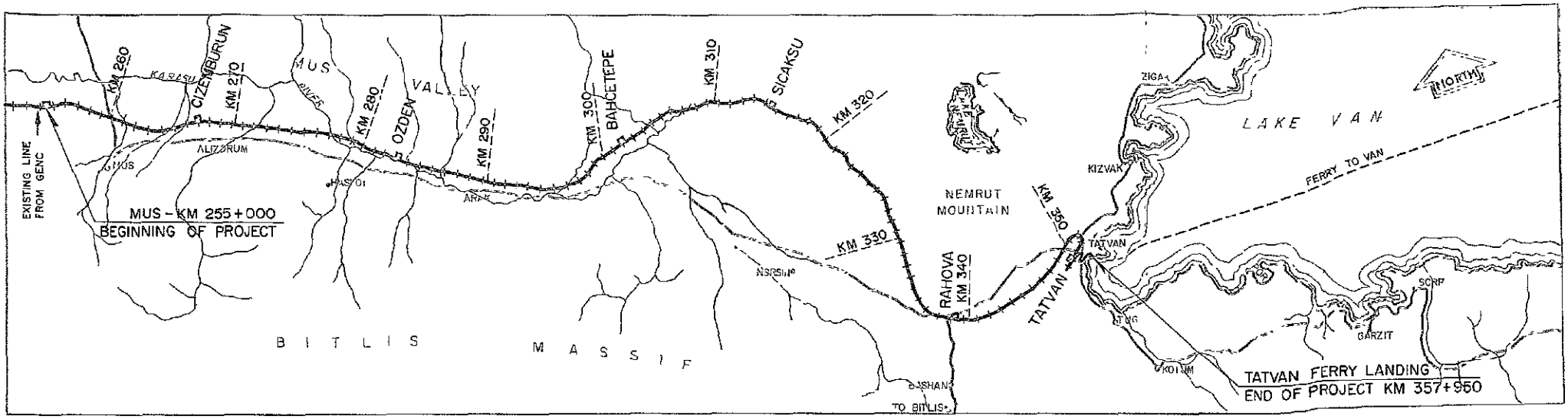
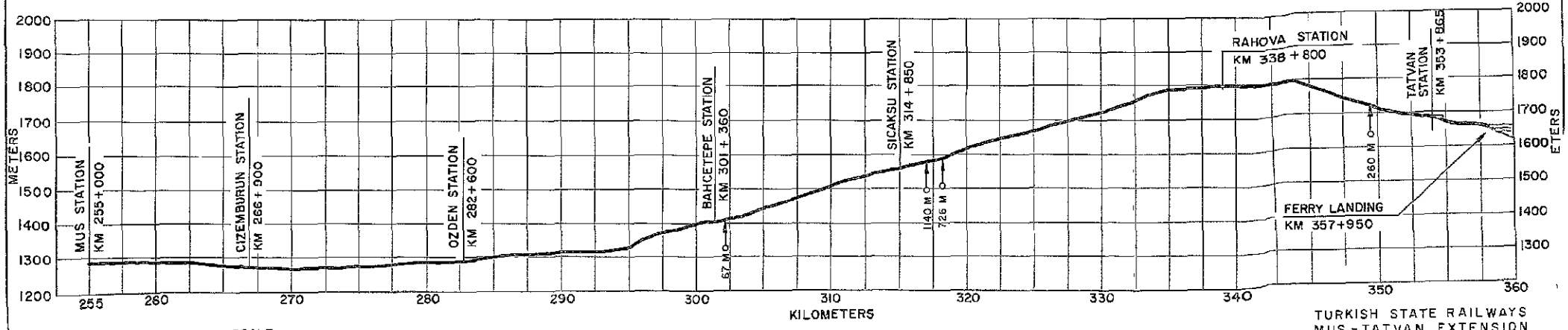
TRABZON
ERZINCAN
GAZIANTEP
URFA
MARDIN
SIIRT
HAKKARI
VAN





SCALE

VERTICAL 0 100 200 400 METERS

HORIZONTAL 0 5 10 KILOMETERS

LEGEND

INDICATES TUNNEL

TURKISH STATE RAILWAYS
MUS - TATVAN EXTENSION

PLAN AND PROFILE

FEBRUARY 1960

DE LEUW, CATHER & COMPANY
Consulting Engineers Chicago

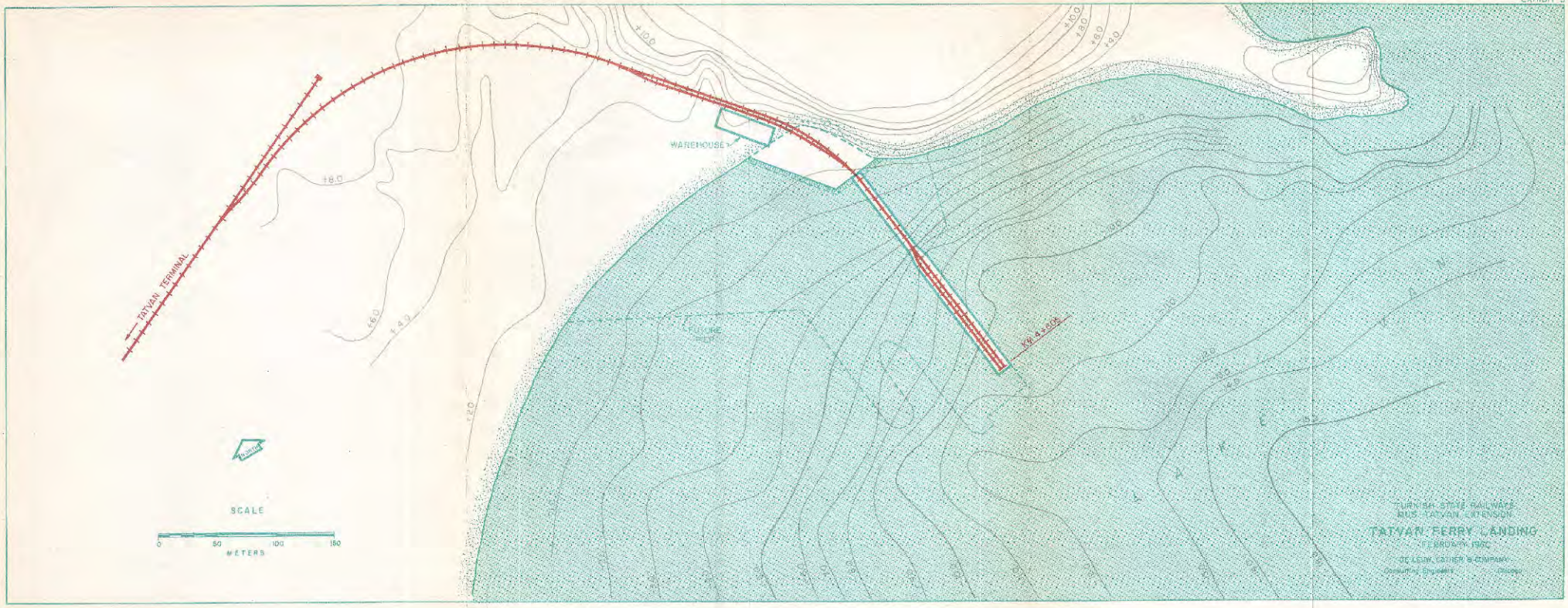
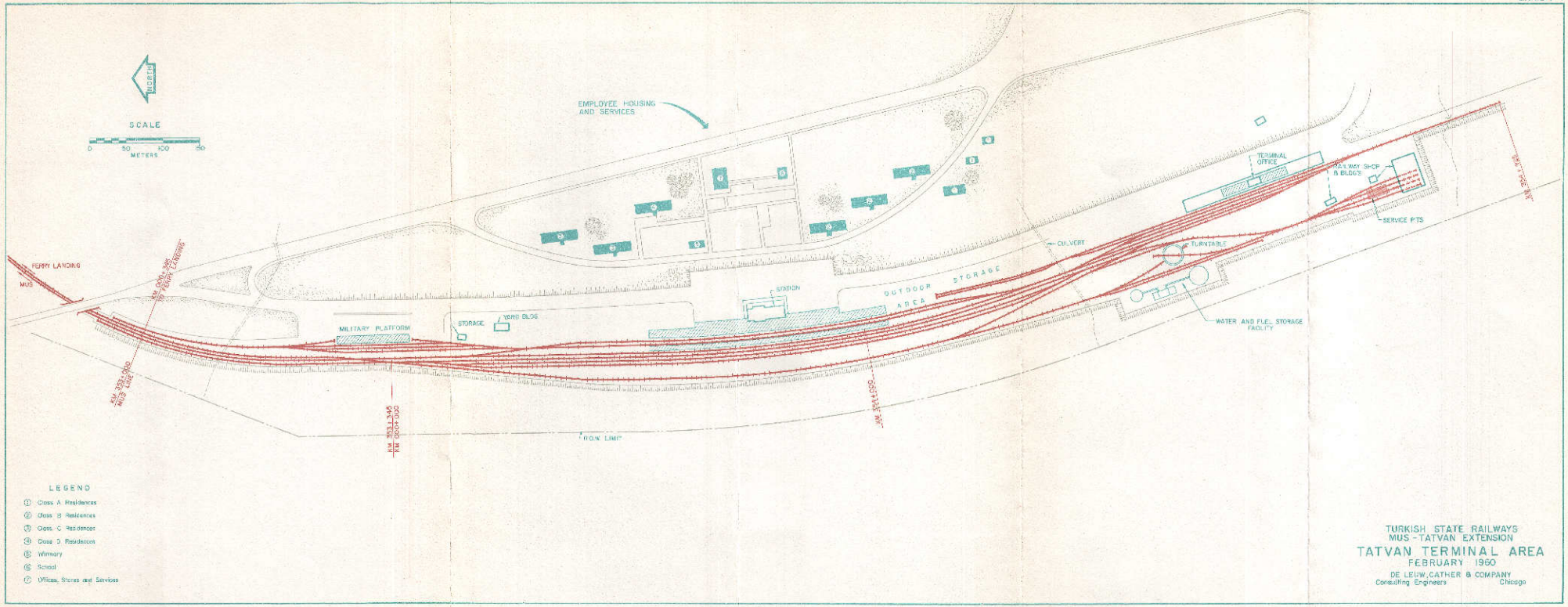

TATVAN TERMINAL
WAREHOUSE
FUTURE SIDING
KM 4+300
+8.0
+6.0
+4.0
+2.0
+10.0
+12.0
+14.0
SCALE
0
50
100
150
METERS
TURN-OF-STEEL RAILWAYS
BUS - TATVAN EXTENSION
TATVAN FERRY LANDING
FEBRUARY, 1960
DE LEUW, CATHER & COMPANY
Consulting Engineers
Chicago

EXHIBIT 4



TURKISH STATE RAILWAYS
MUS - TATVAN EXTENSION

TATVAN TERMINAL AREA

FEBRUARY 1960

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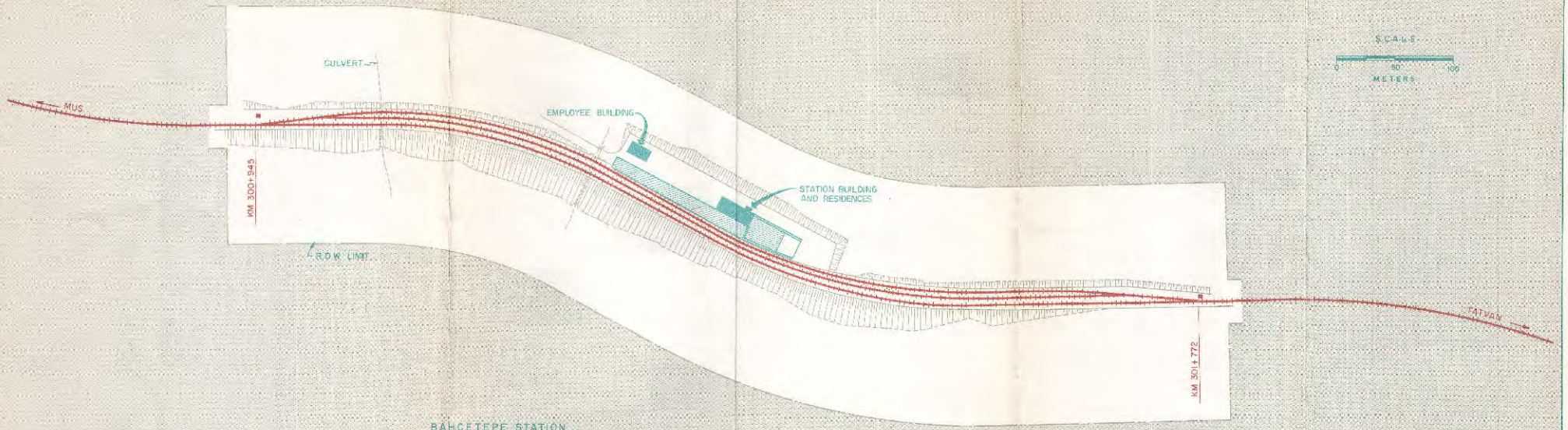
EXHIBIT 3



SCALE
0 50 100
METERS

TURKISH STATE RAILWAYS
MUS - TATVAN EXTENSION

TYPICAL WAY STATION PLAN

FEBRUARY 1960

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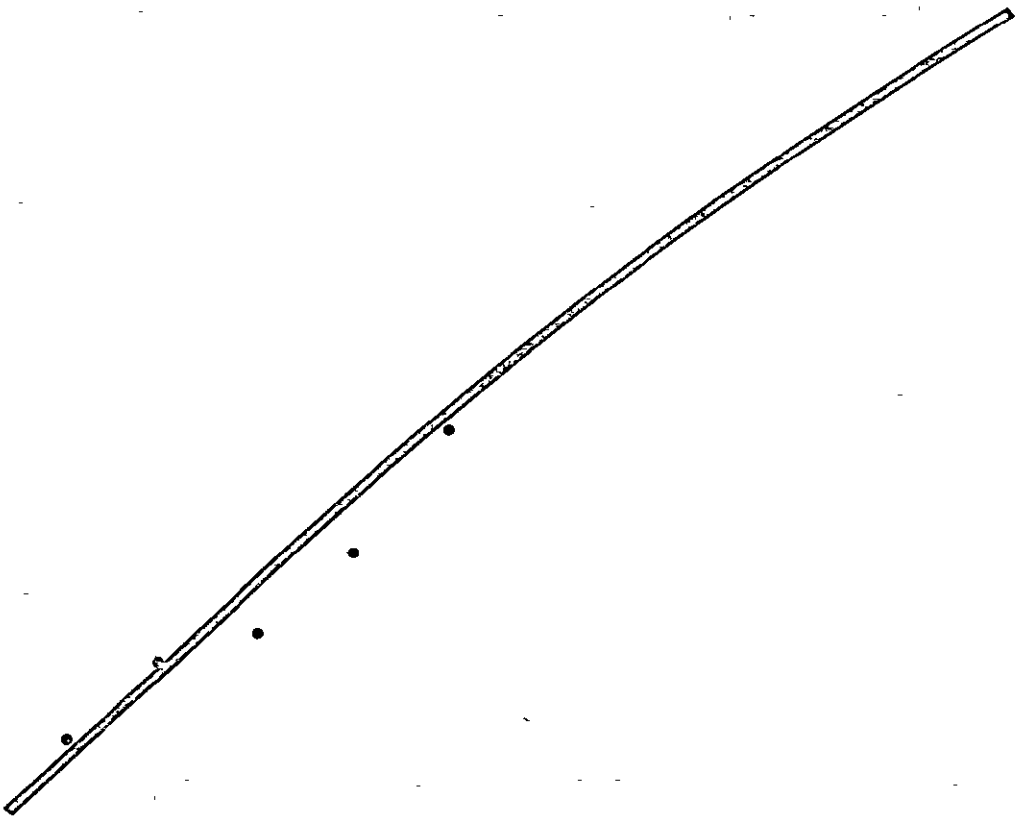

TURKISH STATE RAILWAYS
MUS-TATVAN EXTENSION

POPULATION TRENDS

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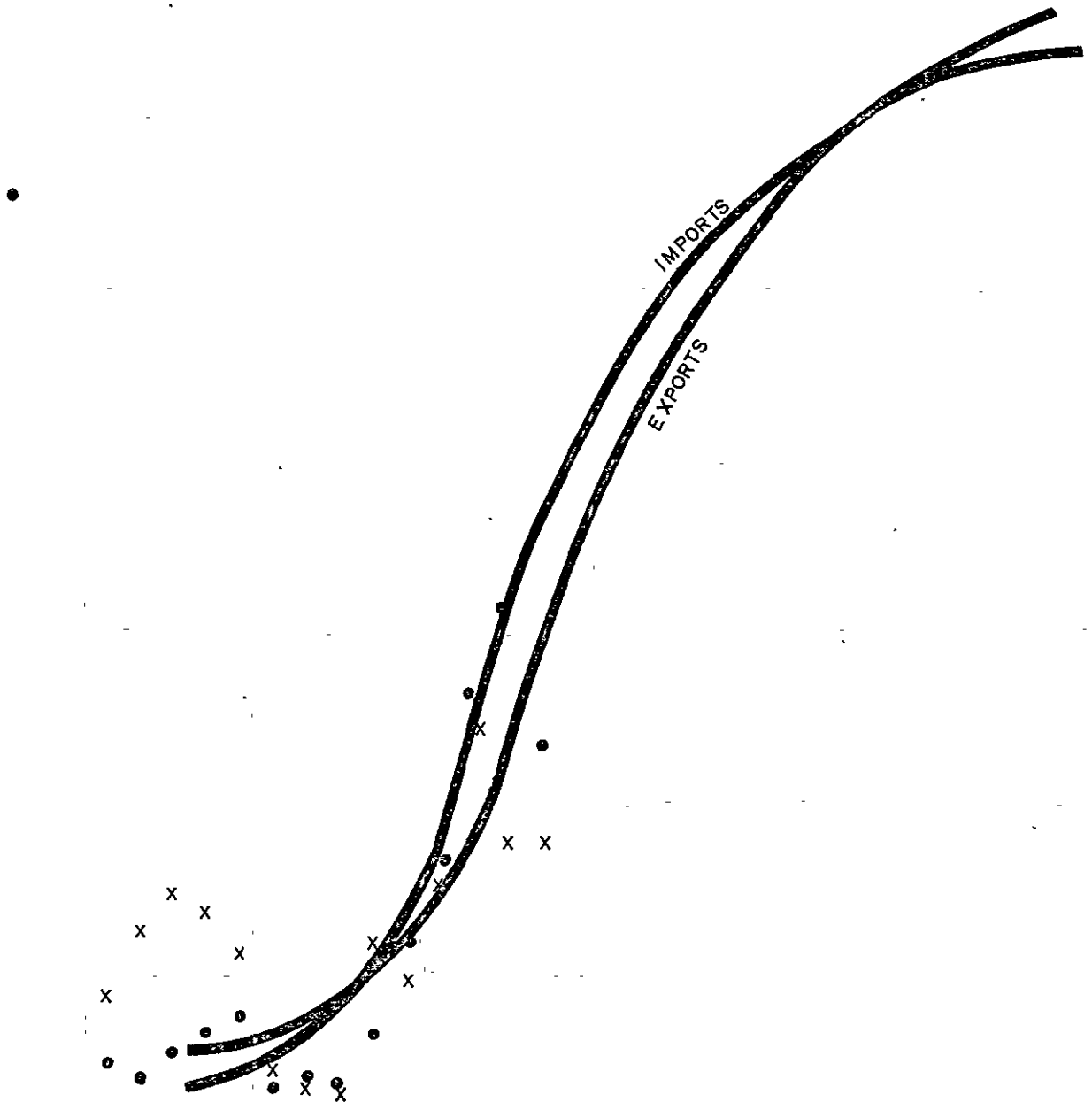

TURKISH STATE RAILWAYS
MUS-TATVAN EXTENSION

IMPORT AND EXPORT TRENDS

FEBRUARY 1960

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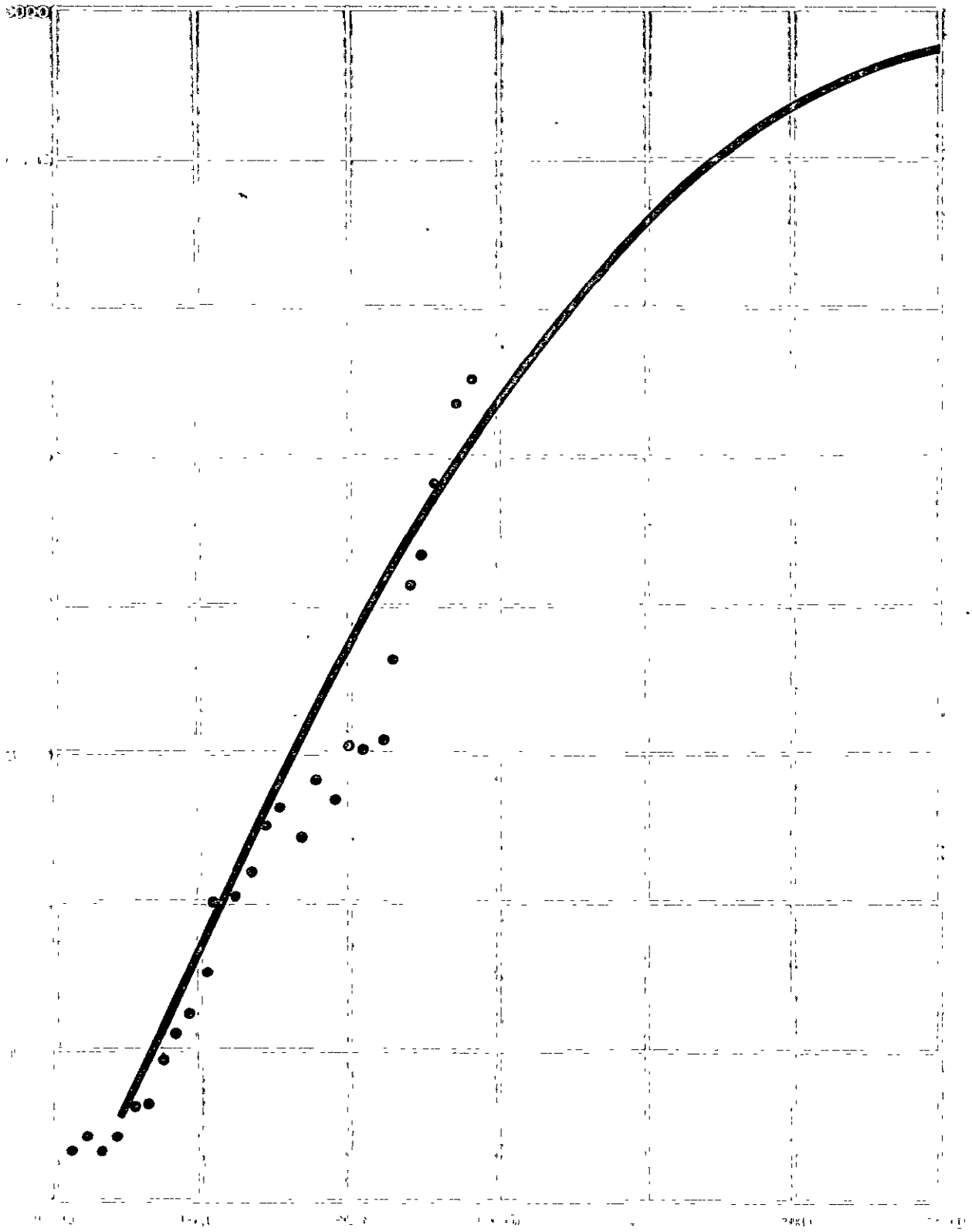

TURKISH STATE RAILWAYS
MUS–TATVAN EXTENSION

TREND OF RAILWAY FREIGHT MOVEMENTS IN NET TON-KILOMETERS

FEBRUARY 1960

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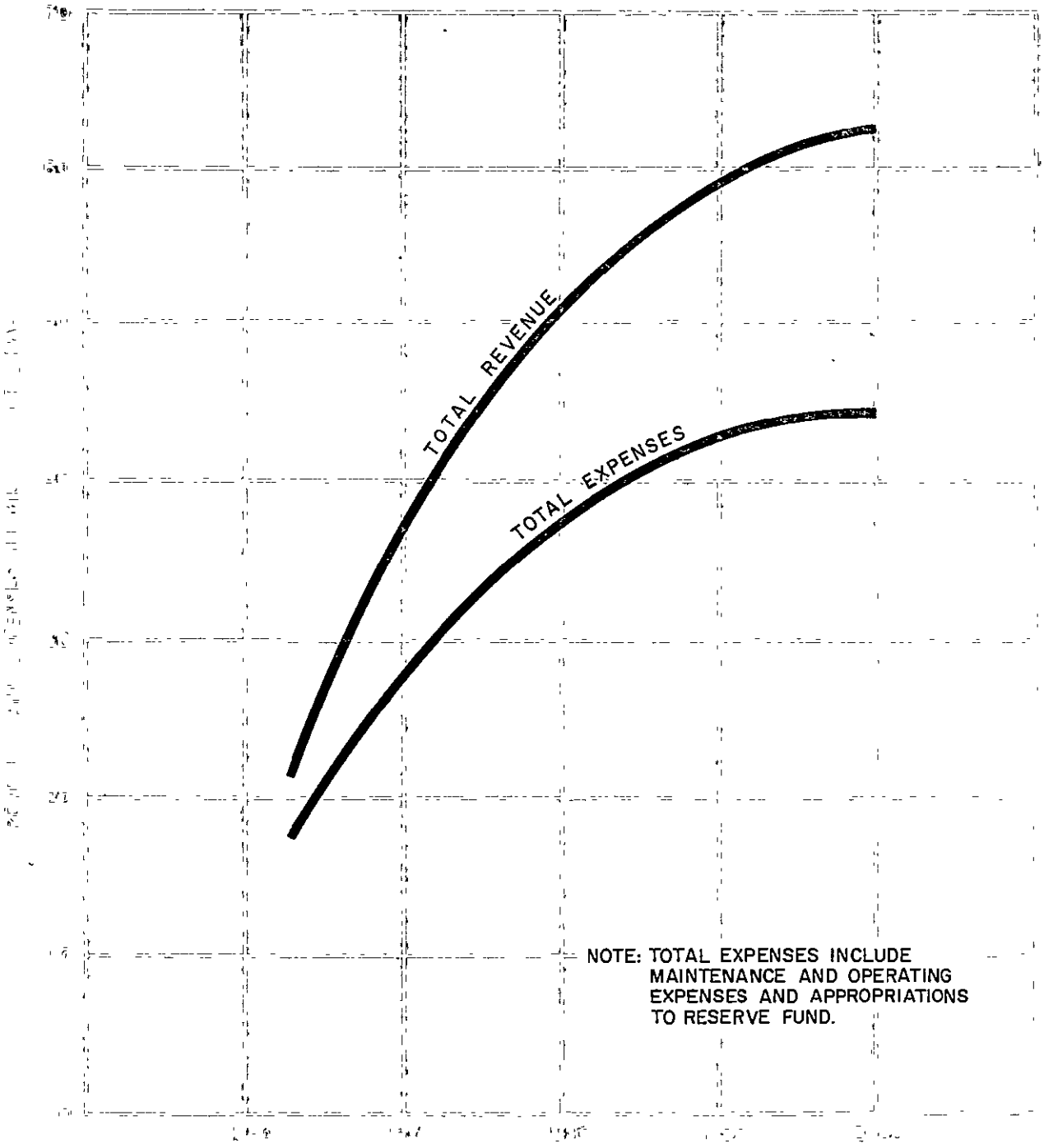

TURKISH STATE RAILWAYS
MUS-TATVAN EXTENSION

ESTIMATES OF REVENUE AND EXPENSES ATTRIBUTABLE TO PROPOSED RAILWAY EXTENSION

FEBRUARY 1960

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