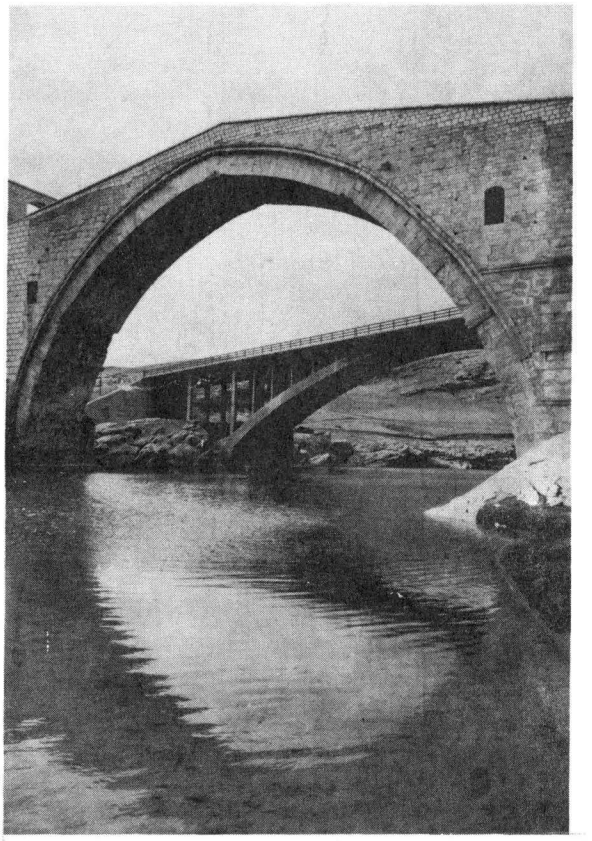
FINAL REPORT

on TECHNICAL ASSISTANCE

to THE GENERAL DIRECTORATE OF HIGHWAYS

of THE REPUBLIC OF TURKEY

Prepared by
U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
Office of Operations
Foreign Projects Division



1 - FOREWORD

The Turkey of today is a progressive republic in the bridge of Asia Minor which joins the Middle East with Western Europe and which in the past has witnessed the passage of many peoples, both in terms of world trade and in conquests. It is the legendary land of the Hittites, the Persians, the Greeks, the Romans, the Genoese, the Crusaders and (finally) the Ottoman Turks of Central Asia. It was the land of Helen of Troy; it was the land which interested Jason in his search for the Golden Fleece. The descendants of the Amazons still live in the northeastern section near the Russian border. Paul of Tarsus traveled much in southern Turkey and you will remember his Epistles to the Ephesians who dwelled in Ephesus in western Turkey on the Aegean Sea.

Turkey is a little larger than Texas. It has roughly one tenth of the area of the United States and one eighth the population of the United States. Turkey in Asia Minor is about a thousand miles long from east to west and about three hundred miles wide. Turkey in Europe, across the Dardanelles, the Sea of Mamara and Straits of Bosporus from Asiatic Turkey is a minor part of the Republic in area, being roughly triangular in shape with maximum dimension of about one hundred fifty miles. Istanbul, capital city of Turkey under the Sultans, lies on both sides of the Strait of Bosporus with its most important sections in Europe. It is the metropolis of the Republic. Ankara, the capital city of the Republic of Turkey, second city in population, is situated on the Anatolian plateau about two hundred fifty miles east of Istanbul.

Turkey has been a Republic since 1923, when a constitutional convention was convened by Mustafa Kemal Ataturk establishing the new Republic and dropping the curtain on the Sultanate that had ruled Turkey for centuries. Ataturk became first President of the new Republic. He was firmly convinced that progress in his new Republic could result only by adopting the ways of the West and he made many sweeping reforms that paved the way for the progress in new construction, industrialization, agriculture, utilization of natural resources and transportation that has taken place in the relatively short period of time that the Republic has lived. He died in 1938 and was succeeded first by Ismet Inonu and later by Celal Bayar. Both have continued the progressive ways of the founder of the Republic.

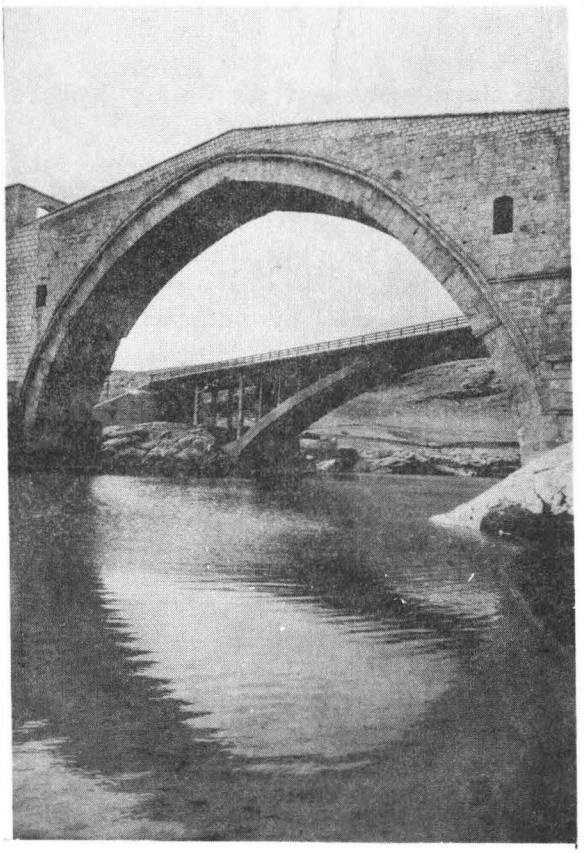
In 1947 at the time the cooperative assistance program was being initiated and before emphasis was placed on accelerating the highway construction program, Turkey had all-weather roads with aggregate length of less than one percent of the mileage of all-weather roads in the United States. With a population of about 19,000,000 people or a population density of 57 per square mile as compared with 44 per square mile in this country, Turkey had only 3 miles of all-weather road for each 100 square miles of area as compared with 50 miles of all-weather road in this country in a similar area. Being predominantly an agricultural nation with its population spread fairly uniformly throughout the area of the country, the lack of adequate highway facilities at that time is apparent from the above comparisons.

Modern Turkey was keenly aware of the necessity for providing transportation facilities throughout the nation as a part of its development program. While statistics that were available in 1947 indicated little progress in highway construction during the period following establishment of the Republic, Turkey had taken a big step toward building a 4,300-mile network of standard gauge railroad. This network, although inadequate, did reach into most sections of the country and provided mass transportation for the areas within reach and formed a backbone for other forms of transportation. This rail network was provided for the most part in the short space of twenty-three years. A few extensions of this system have been and are still being provided. Railroads in Turkey are a Government monopoly. Good service, both passenger and freight are provided but there is a shortage of rolling stock and it is not always possible to secure the desired services on short notice. Seasonal requirements for handling crops and military movements are given priority over other business which at times results in delays. The Government is working on a solution to this problem.

With the railroad expansion program tapering off, the determination of the Turkish nation to proceed in an attack on its highway needs problem in an orderly manner was quite rational. Increased mobility was an economic necessity. Agriculture and industry could not expand dependent on animal transportation and could no longer be retarded by lack of highway transportation. Fertile land in regions too far removed from railroads to make products marketable could be brought into agricultural production by tapping these isolated areas with farm-to-market highways. Similarly in the other economic fields, mining, manufacturing, lumbering, fishing, etc., trade could be stimulated by bringing product and market closer together by modern highway transportation. Similarly, stimulation of a tourist trade that could readily surpass anything in the Near East is conceivable with modern highways and tourist accommodations to open an almost endless list of historical and archaeological places of interest to comfortable travel by tourists. Modern military units are dependent on rail and highway systems for supply and maneuverability. All of these factors were in the mind of Turkish officials when financial and other assistance was requested from the Government of the United States early in 1947.

This request from Turkey being in the spirit of the United Nations and followed closely by a notification that England was no longer able to render sufficient aid to Greece resulted in a special Presidential message to Congress requesting that aid be extended to the two countries. Public Law 75 of the 80th Congress approved by the President on May 22, 1947, provided 400 million dollars in aid to Greece and Turkey. It was subsequently decided that of the 100 million dollars granted to Turkey, 5 million dollars should be used for a public highway program. The original implementation plans contemplated that the highway program would be undertaken by the Army, which organization with others of the military were made responsible for the remainder of the program under the over-all direction of the State Department. The highway program was, however, transferred to the Bureau of Public Roads on December 4, 1947. The program was immediately activated and by subsequent legislative enactments, funds were provided for the continuation of the program through the calendar year 1958, at which time it had been decided, through an understanding reached with the Turkish General Directorate of

Highways and the International Cooperation Administration that the mission had been accomplished and that the technical assistance program should be discontinued.



The old and the new bridges over the Malabadi River between Diyarbakir and Bitlis

2 - ELEVEN YEARS OF PROGRESS

The vanguard of the Bureau of Public Roads' group arrived in Turkey on December 2, 1947. A report on the existing situation in regard to highways was requested by the Minister of Public Works. In compliance with this request, a report titled "The Highway Situation in Turkey" was prepared based on field trips and data made available to the group by the various Ministries, Departments and Bureaus of the Government of Turkey. This report, submitted to the Minister of Public Works on February 27, 1948, suggested an "Action Program" to be used in modernizing the Turkish highway organization and accelerating the highway construction program. This action program consisted of thirty-four separate recommendations in the fields of organization, finance, engineering, operations, accounting, and safety that need not be repeated here in detail but do include the important items of accomplishment that made the highway program in Turkey an outstanding success.

During the period December 1947 to December 1958 the Bureau of Public Roads maintained a group of specialists in Turkey. However, the reorganization and expansion of the highway programs of the country that took place during this period was primarily a Turkish accomplishment. Certainly, sound managerial, technical advice and training provided by Bureau specialists and limited, but critically needed, funds from the various Foreign Aid Programs used to pay specialists' salaries and provide the foreign exchange required for purchase of equipment and supplies on foreign markets were important; but the required actions, enabling legislation and local financing, in amounts far greater than the aid funds made available were all responsibilities of the Turkish counterparts. It was the desire on the part of the Turks themselves to improve the highway situation within their country that was largely responsible for the success of the program.

In 1947, as at present, the highway organization was a part of the Ministry of Public Works which was composed of five Departments and five Bureaus. The five Departments included: (1) The Department of Roads and Bridges; (2) The Department of Railroad Construction; (3) The Department of Buildings; (4) The Department of Irrigation and Reclamation; and (5) The Department of Rates for Public Utilities.

The five Bureaus of the Ministry of Public Works included: (1) The Bureau of Publications; (2) The Bureau of Accounting and Finance; (3) The Personnel Bureau; (4) The Bureau of Supply; and (5) The Bureau of Correspondence. The Bureaus operated as service organizations to the Departments and could approve or disapprove a request from a Department for such services as additional personnel; printing or supplies, because of the status of funds. While the Bureaus normally furnished needed services on the request of the Departments, they could prevent accomplishment of useful work. An appeal to the Minister of Public Works and a favorable decision was required to secure service desired by a Department in case of a denial.

The February 1948 Report recommended that an autonomous Department of Highways be created in the Ministry of Public Works, to be directed by a Commissioner of Highways reporting directly to the Minister of Public Works,

the Department of Highways to consist of three staff Divisions of Design and Research, Construction and Maintenance, and Finance and Control.

Turkish Law No. 5539, effective March 1, 1950, titled "Organization Law Establishing the General Directorate of Highways in the Ministry of Public Works," is a result of the recommendation contained in the February 1948 Report and subsequent numerous conferences and exchanges of correspondence.

Two years elapsed between the initial recommendation and the enactment of this legislation which was a key to the success of the project. It indicates the thorough and deliberate manner in which important actions are taken in Turkey.

The law as enacted established the General Directorate of Highways within the Ministry of Public Works. It defined the functions and outlined the organization of the General Directorate of Highways. It provided the basis for far more autonomy by the General Directorate of Highways than exists in any other Turkish governmental agency. The functions and organization as provided for in the law closely parallel those of a State highway department in this country.

The law further provides that the organization shall be directed by, and be in charge of, a Director General of Highways and includes an assistant Director General, a Department of Administration, a Department of Technical and Economic Research, a Department of Construction and Maintenance, a Solicitor, a Chief Accountant, and Division Engineers in the field.

The law provides that:

(1) The Department of Administration shall consist of a Division of Technical Accounting, a Division of Personnel, a Division of Procurement, and a Division of Administrative Services.

(2) The Department of Technical and Economic Research shall consist of a Division of Planning and Programing, a Division of Highway Surveys and Design, a Division of Bridge Surveys and Design, and a Division of Materials.

(3) The Department of Construction and Maintenance shall consist of a Division of Highway Construction, a Division of Bridge Construction, a Division of Maintenance, and a Division of Equipment.

The law also provides that the Director General shall be appointed, transferred, or promoted upon proposal by the Minister of Public Works and by the joint discussion of the Council of Ministers. The Assistant Director General, Department Heads, Solicitor, and Division Engineers are appointed upon proposal by the Director General and approval of the Minister of Public Works. The appointment, transfer, and promotion of all other employees and officials are made by the Director General. The Chief Accountant and personnel of the Office of the Chief Accountant are appointed by the Ministry of

Finance. The organization as outlined in Law No. 5539 is essentially in accordance with recommended practice and the early charts of the General Directorate of Highways indicate that the organization, as set up, followed the letter of the law.

The present organization has deviated to a considerable extent from the original. A number of the division units have been given departmental status and other departments created. At the present time the heads of eleven departments or divisions that have been detached from their original department report directly to the Director General or his Deputy. The reasons for these changes, which have evolved slowly since the reorganization, are due to personalities, salary ceilings, and other circumstances which were considered of sufficient importance to warrant the changes. Considering the fact that the annual budget has increased by approximately eight times and the number of personnel employed has increased by approximately three times since 1950, changes in the organization were logical and in some instances necessary. The present organization can without doubt be improved. An over-all organizational study by qualified individuals could be beneficial, but restrictions imposed by law or administrative decision on salaries would have to be revised to permit attracting and holding the best qualified departmental and division heads before effective reorganization could be accomplished.

In regard to financing a highway program, the February 1948 Report recommended that:

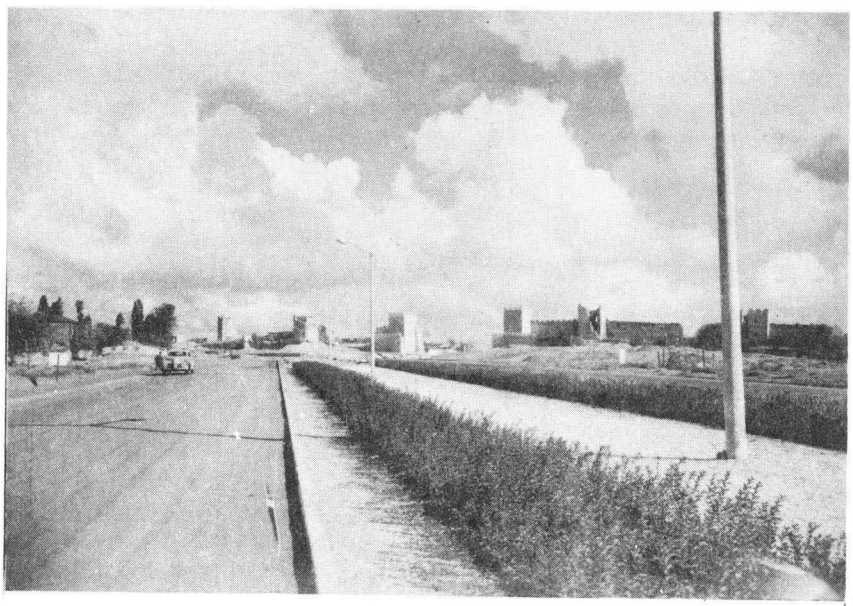
A highway fund should be created in the Ministry of Finance to receive all funds available for the use of the Directorate of Highways. It recommended, further, that certain existing revenues be placed in the highway fund and suggested other taxes and duties that could be collected for the highway fund. It recommended that the highway fund be increased to about 55 million Turkish lira by direct appropriation which amount had been determined to represent a reasonable budget for the initial year.

The report also advised that budgeting was a dynamic function requiring analysis each year and determination on the basis of economic need and availability of funds. It further advised, as essential, that the major part of the monies needed for the improvement of the National Highway System should be obtained from revenue collected year by year, that such funds be made available to the Directorate of Highways on a continuing basis, and that the annual budget should be closely geared to the over-all national economy in order to cause no inflationary effect.

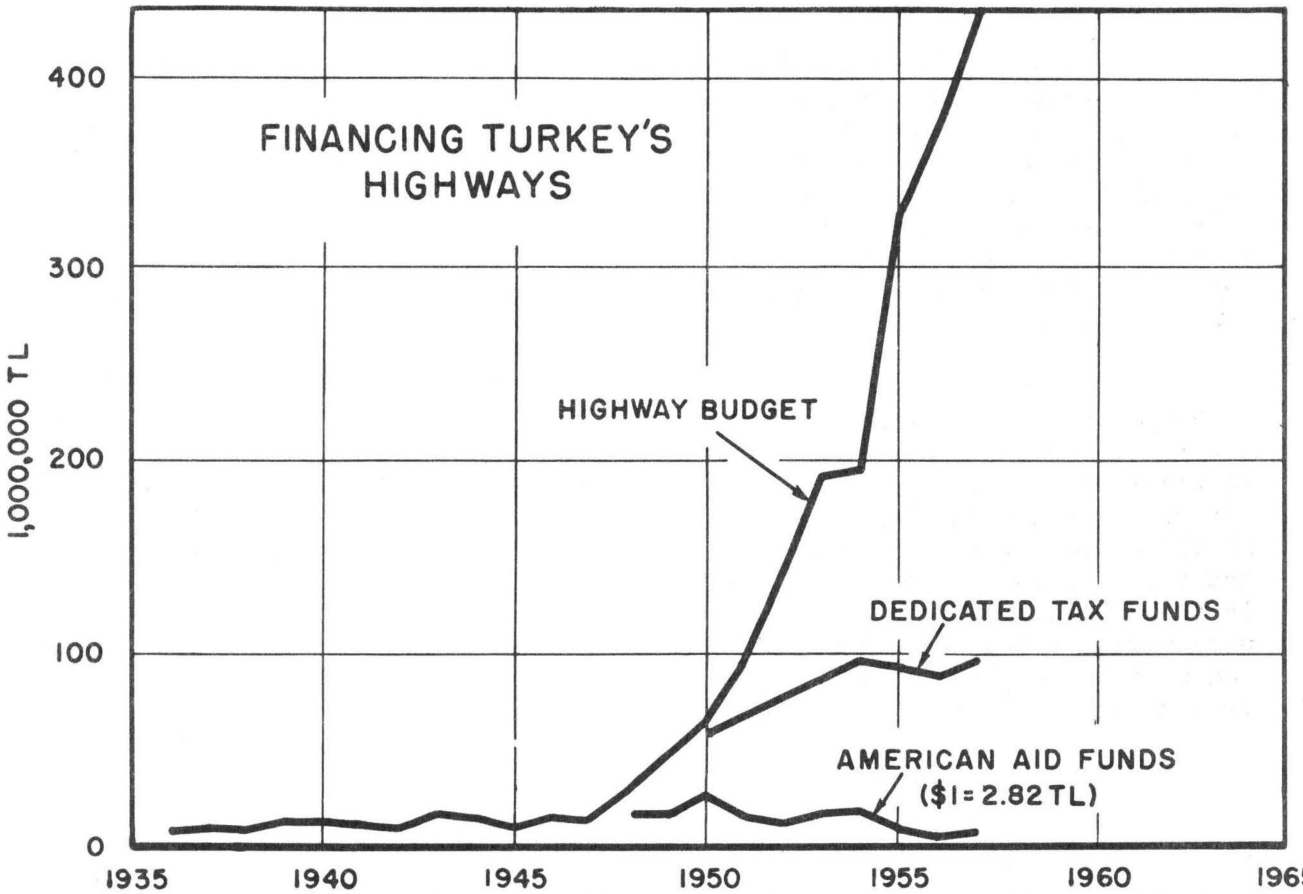
Statistics available when the above recommendations were made indicated that National highway expenditures had averaged about 10 million Turkish lira per year during the ten preceding years. An analysis of road conditions indicated that roads were wearing out about as fast as new ones were being provided and that little or no progress was being made. The only sources of revenue for National highway purposes were 15 percent of the compulsory road tax known as the Poll Tax, an annual tax of from eight to twelve lira on each of the male population of age 18 to 60 years and appropriations from the general funds. An increase to 55 million lira in highway expenditures in the initial year of expansion would certainly result in

Law No. 5539 goes a long way toward compliance with the recommendation of the February 1948 Report. It requires preparation annually of a three-year program of construction and maintenance for both the National and Provincial systems which form the basis for the annual budget. It defines and earmarks certain tax receipts as the income of the General Directorate of Highways which, for all practical purposes, consist of taxes and duties levied on petroleum products. Dedicated revenues do not include custom fees on motor vehicles, parts, accessories, etc., or vehicle license, registration, and operation fees as was recommended.

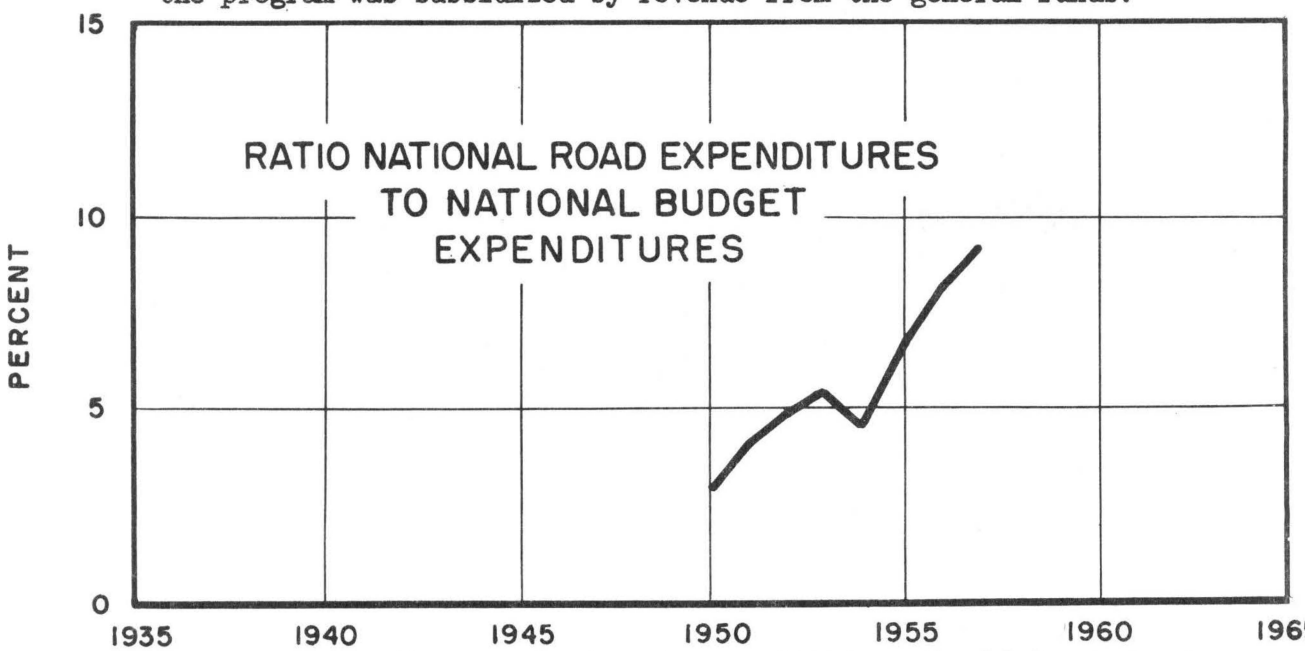
The 55 million lira budget was made available to the Directorate of Highways in 1950 but the highway officials and the National Assembly did not see fit to heed the advice contained in the report to keep the annual budget geared to the over-all national economy in order to cause no inflationary effect. The annual budget has been increased steadily since 1950 to a total of 531,000,000 lira in 1958. This amount is approximately ten percent of the total national budget and considering the light traffic on most routes in rural Turkey seems difficult to justify economically. USOM/T economists were very critical of the magnitude of the highway program during the latter years of Bureau of Public Roads' participation as contributory to the inflationary economic situation in the country.



Approaching the walls of Old Istanbul on the Road from International Airport at Yesilkoy



This upper chart is interesting in that it indicates the relatively small amount of American Aid Funds that were used in the accelerated road construction program. This chart also indicates the extent that the program was subsidized by revenue from the general funds.



This chart indicates the importance placed on the highway program by the Turkish Government. Current expenditures for highways approximate ten percent of national expenditures.

The February 1948 Report recommended the adoption of modern control and accounting procedures that would not only control and account for all expenditures but would also permit complete and detailed understanding by management, of the cost of construction, production, maintenance, administration and of each of the activities of the organization.

Law No. 5539 provides for a Chief Accountant in the organization of the General Directorate of Highways. It further provides that the Chief Accountant and personnel of his office are appointed by the Ministry of Finance. The law also provides for establishment of a Division of Technical Accounting within the Department of Administration. The law does not define the duties of these two accounting offices. In practice the office of the Chief Accountant is concerned entirely with fiscal accounting to determine if appropriated funds are expended for the purpose intended. Their accounts consist of a single entry record of expenditures and balance.

The office of Technical Accounts attempts to keep a record of cost by projects but due to an inadequate system for obtaining and distributing indirect costs, these records are not complete or accurate and reports are so infrequent that they are only of historical interest and of no use to management in directing the affairs of the General Directorate of Highways.

The Bureau of Public Roads has investigated this situation and has recommended and prepared manuals for a coordinated system of budgeting, programing and accounting, and an engineering progress reporting procedure based largely on approved practice in the United States but modified to comply with Turkish law and custom.

It is unfortunate that it was not possible, due to recruitment and personnel problems, to furnish the services of a specialist in the field of cost accounting and research for the time necessary to accomplish installation of a modern cost accounting system. During 1958, the General Directorate of Highways established a small organizational section in charge of a competent engineer to supervise the installation of the recommended system. Further consultation by an American specialist is desired and every effort should be made to comply with this desire to assist in expediting establishment of the system, to assist in training personnel and to assist in working out solutions to problems that may be encountered in operation due to the great distances and poor communications that exist within Turkey. Cost accounting and research is the only phase of the technical assistance program assumed by the Bureau of Public Roads that was not brought to a satisfactory status of completion by December 31, 1958. Further assistance in this field by the Bureau of Public Roads or the International Cooperation Administration is recommended.

The February 1948 Report recommended prompt initiation of studies to determine the economics of rail, highway, water and air transport systems in Turkey. It recommended initiation of a physical inventory of all National highways and bridges and adjacent culture. It recommended initiation of traffic surveys to determine volume, classification, weight, dimensions and origin and destinations of vehicles using the National Highway System. It recommended amplification of studies into all existing and potential sources

of highway revenue and the impact of highway operations on the whole Turkish economy.

Operating a loadometer station during the 1958 truck and bus survey

Law No. 5539 created a Division of Planning and Programing within the Department of Technical and Economic Research of the General Directorate. Under this authority a very capable and energetic Division was created. The studies and surveys recommended were made and inventory and traffic data is being kept current. Inventory data has been presented on maps showing the condition of the National and Provincial road system which are kept current. Routine traffic studies provide current information and trends on the movement of vehicles over the National system. The Division also makes such special traffic studies as are required for solution of design problems. Continuing economic studies are made to determine the effect of highway improvements on the cost of transportation of people and commodities and the effect of highway improvements on other segments of the over-all economy of the country. Compilation of the annual activity program of the General Directorate and such control of this program as is required is a function of this Division.

In the current organization this Division has departmental status and its Chief reports to the Director General or his deputy rather than to the Chief of the Department of Technical and Economic Research as was contemplated by the original organizational law. The Division performs functions similar to those performed by the planning organization in many of the State highway departments and is doing a good job.

Izmit-Hereke Road along the shore of the Sea of Marmara

Prior to initiation of the technical assistance program in Turkey, highway location surveys, preparation of construction plans and actual construction work was performed by construction contractors, usually under a contract that would call for these services between specified termini. The February 1948 Report recommended that all surveys and plans should be made by Department forces and the Department should aggressively proceed with the preparation of a shelf of plans for roads and bridges. The Report also recommended establishment of a Materials Department to investigate and advise in regard to suitability for use in construction of local materials, to prepare specifications for materials of construction and to control the quality of all materials used by the Department.

Law No. 5539 provides for a Division of Highway Surveys and Design, a Division of Bridge Surveys and Design, and a Division of Materials within the Department of Technical and Economic Research. This law does not further define the duties of these Departments. Difficulties were experienced in the staffing of these departments during the early years of the expanded highway program because of the extent of location survey and plans required and due to the acute shortage of engineering personnel experienced in these fields. By means of training programs, the early ones of which were conducted by Bureau of Public Roads' engineers, an organization was gradually developed and staffed in these divisions.

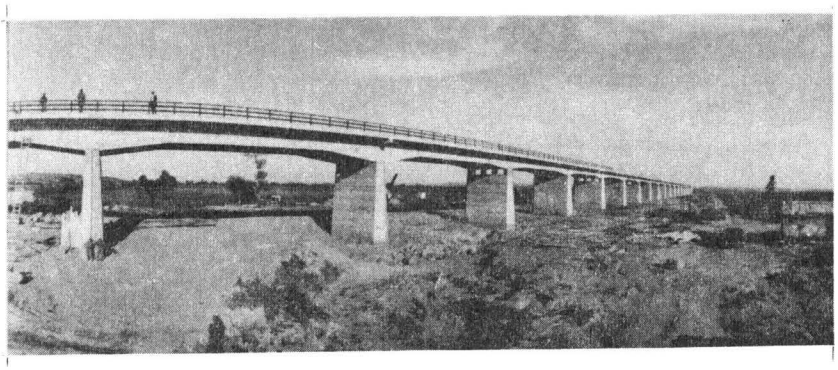
The present organization for surveys, design and materials research is headed by a Department of Research and Design and a Department of Bridges. This is a deviation from the original organizational plan.

Under the Department of Research and Design are two divisions: (1) Plans and Survey Division responsible for road locations, road design and preparation of contract or force account PS&E assemblies; and (2) the Materials Research Division responsible for investigations, tests and recommendations in regard to use of all highway construction materials.

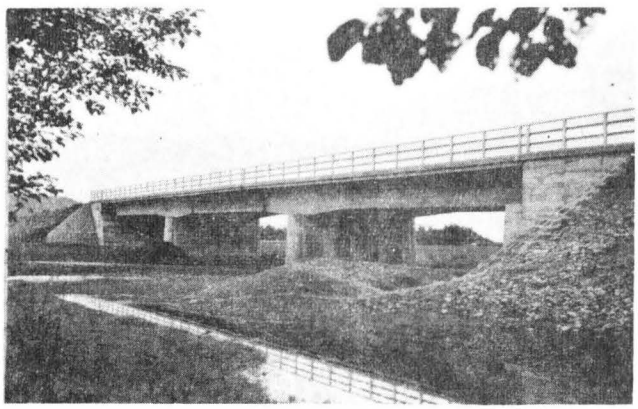
Under the Department of Bridges there are also two divisions: (1) Bridge Design Division; and (2) Bridge Construction Division. The responsibilities of the two divisions are as the names suggest. This organization is unusual in that the Bridge Department is responsible for all force account bridge construction and award and supervision of contract bridge construction.

These two engineering departments currently handle an average annual work load of 700 miles of highway location and design and the design and construction of 150 bridges. They are manned by approximately 200 permanent employees in the Directorate's headquarters office.

The recommended and modern approach to highway location and design problems are used. Considerable use is made of aerial photography and photogrammetry in reconnaissance and preliminary surveys. Bridges are designed with the use of available materials in mind which results in use of considerable massive concrete to conserve reinforcing steel which is in short supply. Poured-in-place reinforced concrete superstructures of the cantilever beam and suspended span type are most common for multiple span bridges. Use is made of simple and composite rolled steel beam spans to a limited extent and also of rigid and continuous reinforced concrete superstructure designs.



Meric River Bridge near Ipsala between Turkey and Greece



Kucukdere Bridge between Trabzon and Rize

Purchase of an electronic computer is being considered by the General Directorate. It is anticipated that a major portion of the use of a computer will be generated in these two engineering departments.

The Materials Division with headquarters in Ankara and representatives in each of the field divisions make soil investigations as a routine survey operation and report on local materials with recommended use thereof to the Design Division. The staff and facilities of the testing and research laboratory established in Ankara are second to none in the Near and Middle East. Its technicians perform all necessary tests on soil, aggregates, cement, and bituminous materials.

Stabilization of Ankara-Kochisar Road
in 1952

The February 1948 Report recommended that design standards, vehicle registration and vehicle taxation be kept in balance. It recommended stage construction on alignment suitable for continued improvement. It set out definite minimum geometric standards for new construction. For maintenance and betterment it recommended working toward these standards but recognized the need for extensive mileage in the beginning of the program and suggested initial widths below those planned for the future.

Standards that were adopted by the General Directorate of Highways were in substantial compliance with the recommended standards. Roads improved as betterment projects and maintenance on locations not considered final were not brought up to the recommended geometric standards.

The principal items of the adopted standards are indicated in the following tabulation:

TURKISH HIGHWAY CONSTRUCTION STANDARDS

Subject	National Highways	Provincial Highways
Surfaced Width (meters)	7	6 - 8*
Shoulder Width (meters)	1.5 - 2.5*	None
Roadway Width (meters)	10 - 12*	6 - 8*
Maximum Grade (5)	7	8
Design Speed (Km/Hr.)	50 - 120*	20 - 80*
Minimum Radius of Curvature (meters)	100 - 2000*	35 - 500*
Type of Ultimate Surfacing	Bituminous	Bituminous
Bridge Width (meters)	8.50	7 - 8.50
Minimum Clearance (meters)	4.80	4.80
Design Axle Load (metric tons)	16	12 - 16
Right-of-way Width (meters)	50 - 60*	40

* Depending on type of terrain

In 1958 the Director General requested a review of roadway standards and appointed a committee to work on this review. As a result of this committee's study a new set of geometric standards was developed which, with slight modification, was approved for use on September 11, 1958. These standards are included on the following page.

GEOMETRIC DESIGN STANDARDS FOR NATIONAL SYSTEM

CLASS	A	B	C	D	E
20 Year traffic A. D. H. D. H. V.	 3500 500	 1500 3500 200 500	 700 1500 100 200	 330–700 50 100	 330 50
DESIGN SPEED	Min. Max.	Min. Max.	Min. Max.	Min. Max.	Min. Max.
Flat	100 110 km/hr	100 110 km/hr	100 110 km/hr	80 100	80 100
Rolling	100 110	80 100	80 100	60 80	60 70
Mount.	80 100	60 80	60 80	50 70	40 60
Rugged	70 80	60 80	50 80	40 60	30 50
Pavement Width.	4 Lanes 14 m.	2 Lanes 7 m.	2 Lanes 7m	2 Lanes 6m.	4 m. 6 m.
Shoulders	3.00–3.50	3.00 m.	1½–3.00 m.	1.00–1½	1.00 m.
Max. Grade	5 %	6 %	7 %	8 %	9 %
Max. super elevation	0.08–0.10	0.08–0.10	0.08–0.10	0.08–0.10	0.08–0.10
Crown					
Gravel				4 %	4 %
Asphalt	1%–2%	2 %	2%–3%	2%–3%	2%–3%
Shoulder	4 %	4 %	4 %	4 %	4 %
Non passing sight distance	A.A.S.H.O. recommendations corresponding to design speed.				
Min. radius of curvature	A.A.S.H.O. recommendations corresponding to design speed and rate of super elevation.				
Right of way	60m.	40.m.	30 m.	24 m.	24 m.
Bridges longer than 6 meters		8.50m+2x0.60m. Sidewalks	8.50m+2x0.60m. Sidewalks	7.00m+2x0.60m.	7.00m+2x0.60m.
Bridges length 6 meters or less	Full road bed width for all classes.				

Traffic: 60% Trucks and 40% passenger cars have been considered.

1-Truck lanes will be provided on steep grades in accordance with A.A.S.H.O

2-Use .08 superelevation where icing is severe.

3-Right of way width to be increased if necessary to contain construction as designed.

4-Turnouts may be provided as needed where less than 6 meter widths are used.

The 1948 Report recommended that specifications for all types of road and bridge construction and for materials of construction should be studied and revised where necessary and subjected to continued study in order to secure satisfactory work, reasonable in cost, that would give a full, economical, service life. The construction specifications were subsequently studied and revised along lines similar to the Bureau of Public Roads Standard Specification FP-41. Contract documents now contain a considerable volume of supplemental specifications and a further revision of the standard specifications is in order.

The 1948 Report indicates that the National Highway System of Turkey should ultimately consist of about 35,000 kilometers (21,000 miles) of arterial routes connecting all major centers of population. The extent of the National System in 1958 is reported as 24,553 kilometers, or 15,600 miles. As selected, the National System does connect all major centers of population. Next to the National System, in importance, is the Provincial System, approximately 30,500 kilometers (18,900 miles) in extent which contains potential additions to the National System. The General Directorate has resisted increasing the length of the National System on the basis that the National System now contains the top priority mileage which should be brought to a tolerable state of improvement before extensive additional mileage is added to the National System. There is a movement in progress at the present time, 1959, to require the General Directorate of Highways to increase their responsibilities in regard to construction and maintenance on the Provincial System which will, if successful, have the effect of enlarging the National System.

The 1948 Report includes an estimate of cost of an essential routine maintenance and betterment program to be performed with equipment and forces of the General Directorate of Highways and advises that this program could absorb an annual expenditure of 30 million T.L. for about 15 years as the system expands to about 25,000 kilometers (15,500 miles). The report estimates the capital expenditure for equipment and shops required to implement this program at 48 million T.L. The report did not contemplate that new or heavy construction work would be performed by the equipment and forces of the General Directorate of Highways.

The estimate for the annual cost of the maintenance and betterment program proved to be reasonably close but the actual capital expenditure for shops and equipment is more than double the amount estimated, due primarily to purchase of heavy construction equipment. The principal reason for the General Directorate entering the heavy construction field by force account was the inability of the local contracting industry to expand at a rate necessary to handle the annual construction program and the rather unsatisfactory record of completion of contracts awarded by the Directorate. While it was, and is, the policy of the Directorate to encourage development of the contracting industry, difficulties in procurement of equipment, parts and tires within Turkey and in obtaining foreign exchange for procurement in foreign markets makes contracting a very unsatisfactory business.

A section of highway built by contract between Gerede and Karabuc

Since the 1948 Report was not based on the premise that heavy construction would be performed by equipment and forces of the General Directorate, it is logical that the difference between the estimated and actual capital expenditures for shops and equipment has resulted.

The equipment owned by the General Directorate of Highways in 1958 as compared with previous years of the program is indicated by the following tabulation:

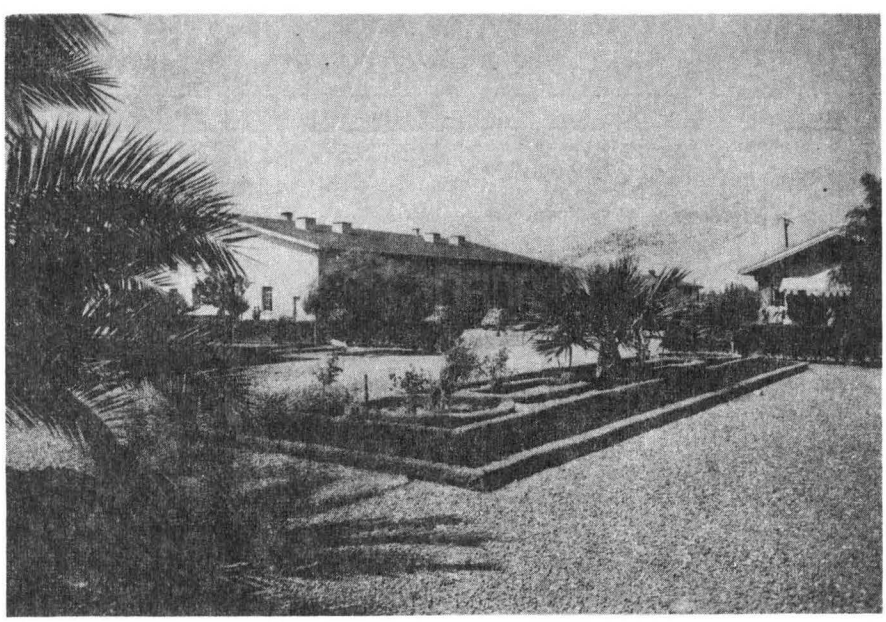
Type	1950	1956	1958
Trucks	714	1,605	1,722
Pickups	145	621	578
Tractors	63	443	647
Power shovels	15	63	70
Compressors	38	140	282
Crushers	37	92	136
Scrapers	16	137	206
Rollers	331	194	207
Loaders	1	85	94
Graders	140	334	476
Maintenance graders		427	424
Snow removal equipment	101	229	280
Asphalt equipment	81	935	1,544
Service vehicles	110	205	258
Auxiliary equipment	229	2,224	2,692

The acquisition cost of the equipment included in the current inventory based on 1953 costs is $38,314,000.

To service and repair this equipment the Directorate operates a Central shop, 12 Division and 40 District shops.

At the central shop, located in Ankara, are facilities for complete overhaul of automobile and light truck equipment, a tire repair and recapping plant, a manufacturing and fabricating plant, sign shop and training school for shop personnel and operators. The manufacturing plant makes simple pieces of equipment such as asphalt relay and storage tanks, road brooms, pneumatic rollers and building frames. This shop is equipped to grind crank shafts, to build up track rollers and to perform other special jobs for the Division shops. It repairs and services all of the Government-owned civilian light automotive equipment in the area. It does not service or repair construction or maintenance equipment.

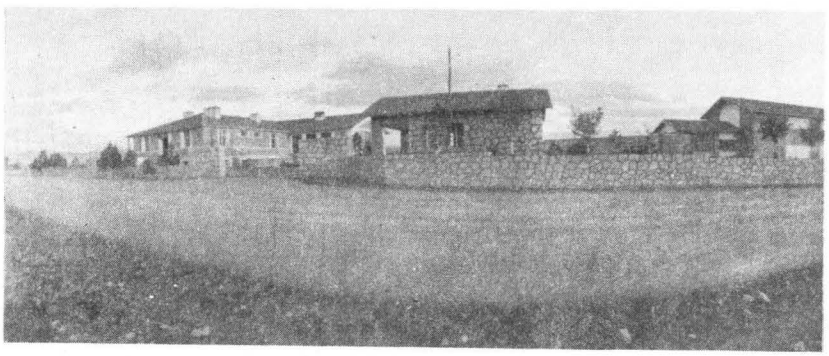
Each of the twelve Division shops located at the field Division headquarters is equipped to service and make major repairs on any type of highway construction equipment in use in Turkey. The District shops are satellite to the Division shops and perform service and minor repair to the equipment assigned to the immediate area. It is planned to expand the number of District shops to 68 and some of the additional planned shops are under construction.



The Division shop in Izmir

To supply this operation, the Directorate has a Procurement Division under the Department of Administration and Finance and a Supply Division under the Department of Equipment. Equipment, parts, materials, and supplies are received and stored at three transit warehouses located at Iskenderun, Ankara, and Istanbul. Warehouses at each field Division headquarters are supplied by the transit warehouses and stock a supply of slow and fast moving items used in its shop. Each Division shop supplies the District shops and projects within its area. Each District has a warehouse that stocks fast moving items such as fan belts, oil filter elements, spark plugs and the like.

The extent of the mechanization and modernization of the maintenance and betterment operation accomplished during the eleven-year period of direct cooperation is indicated by the contrast between the information above and a quotation from an early Bureau of Public Roads report which states: "The equipment of the Department of Roads and Bridges in 1947 consisted of eighteen trucks and many steam rollers, some of which were in operating condition. The average maintenance crew consisted of one man with a broom and a shovel who worked on about twenty miles of road. This man did his best but the damage to the highways suffered from attack by the elements and usage was cumulative."



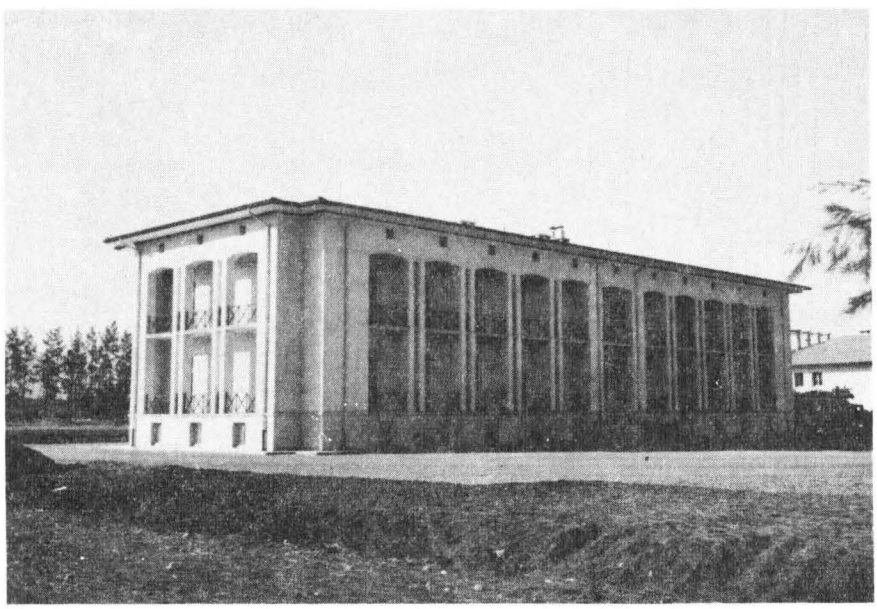
The District shop and office building at Corum

A tour of the roads of Turkey in almost any part of the country, during any time of the year, will indicate the Directorate of Highways is on top of their maintenance problem. By their betterment and construction program, they are adding to their mileage of all weather roads at the rate of almost 500 miles per year.

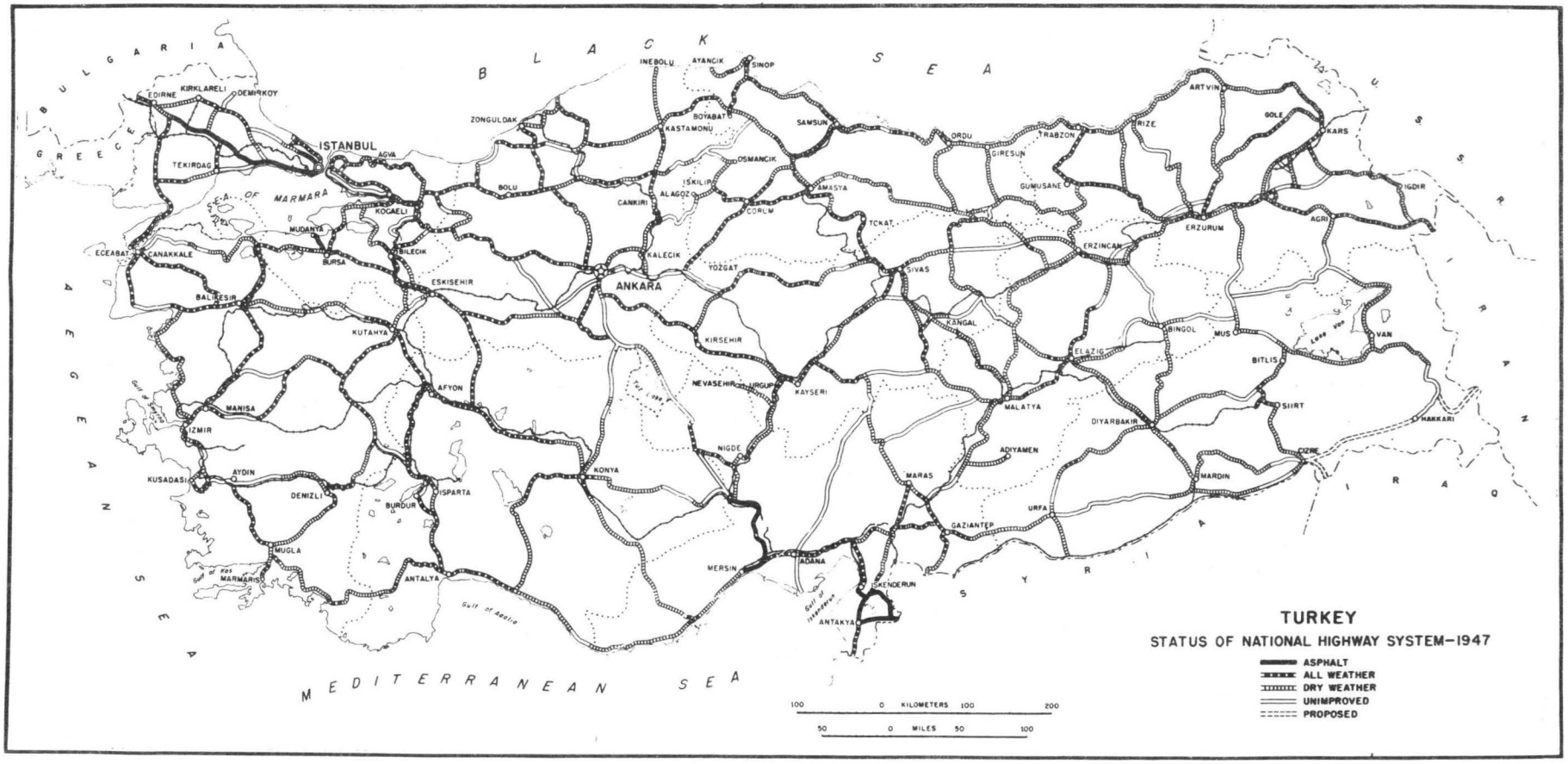
The 1948 Report does not go into the problem of personnel training. It did suggest the possibility of a management contractor who would attend to the delivery of equipment, furnish a sufficient number of superintendents, foremen, and operators to direct the work.

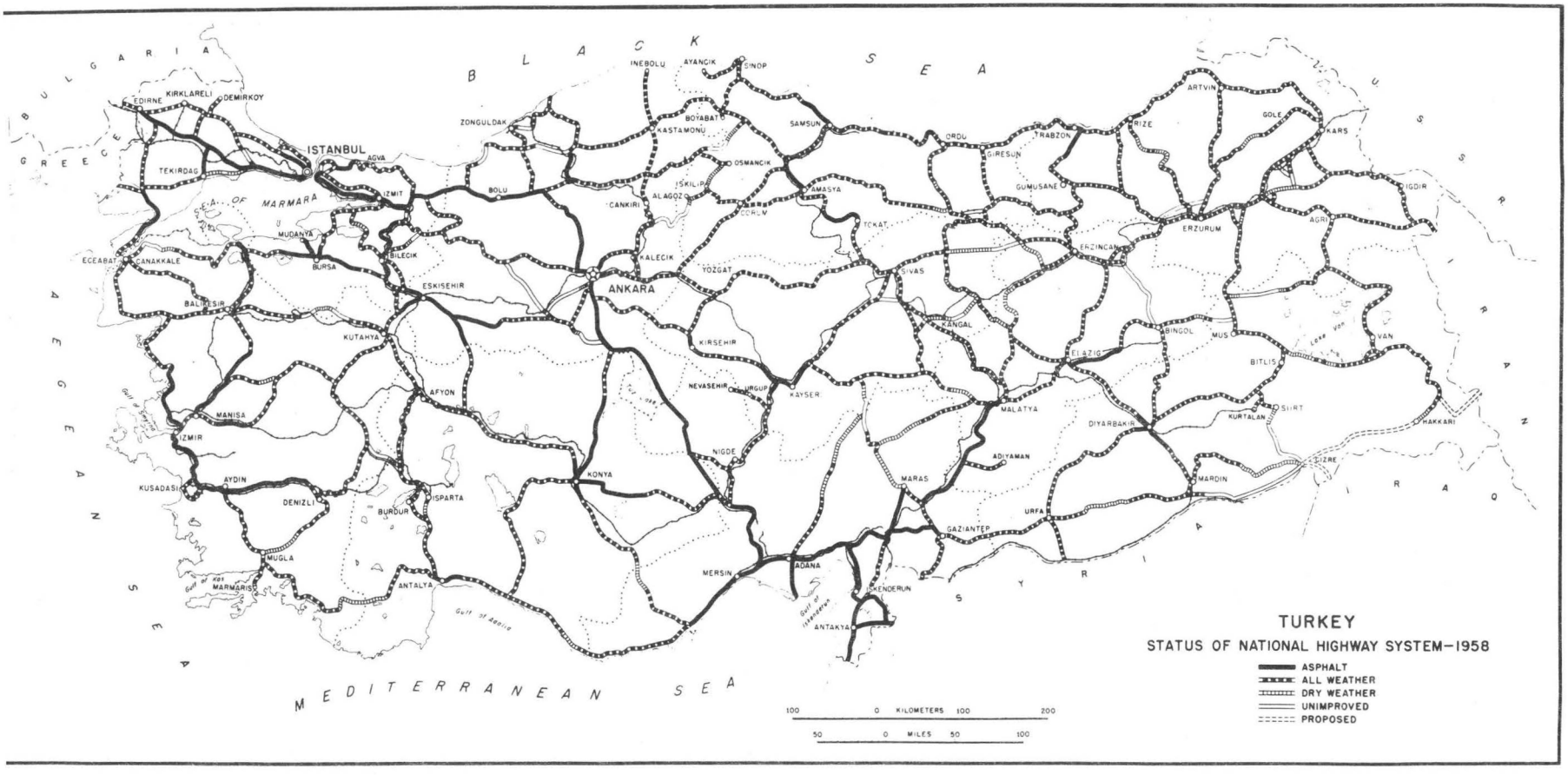
Turkish officials did not favor the management contractor approach to the problem. They preferred to develop the needed supervisory and operational personnel from their own citizens. The required training programs started slowly with Bureau of Public Roads specialists as instructors in the initial phase; then, by using trained Turkish personnel from the classes as instructors, it was found possible to keep up with the demands of the expanding program. The engineers, mechanics, and operators trained in this manner lacked the experience so desirable for successful operation. They were placed in positions of responsibility with very little actual experience. Naturally, mistakes were made but as the organization so developed and operated gained experience, it grew into an organization outstanding in its part of the world. It has gained a desired reputation which is demonstrated by the number of administrators, engineers, and technicians who come to Turkey from other Near East and Middle East countries to observe the way the highway program operates in Turkey.

Progress that has been made in several aspects of the highway program is portrayed in chart form and on maps that follow on the next several pages.



The Division office building in Mersin


BULGARIA
GREECE
BLACK SEA
SEA OF MARMARA
AEGEAN SEA
MEDITERRANEAN SEA
SYRIA
IRAQ
USSR
IRAN
EDIRNE
KIRKLARELI
DEMIRKOY
ISTANBUL
AGVA
TEKIRDAG
ZONGULDAK
INEBOLU
AYANCIK
SINOP
BOYABAT
KASTAMONU
SAMSUN
ORDU
GIRESUN
TRABZON
RIZE
ARTVIN
GOLE
KARS
IGDIR
AGRI
ERZURUM
ERZINCAN
OSMANCIK
ISKILIP
ALAGOZ
CANKIRI
BOLU
AMASYA
GUMUSANE
CORUM
TOKAT
KOCAELI
MUDANYA
BURSA
ECEABAT
CANAKKALE
BILECIK
KALECIK
YOZGAT
SIVAS
ESKISEHIR
ANKARA
BALIKESIR
KUTAHYA
KIRSEHIR
KANGAL
BINGOL
MUS
VAN
ELAZIG
BITLIS
AFYON
NEVSEHIR
URGUP
KAYSERI
MALATYA
DIYARBAKIR
SIIRT
HAKKARI
MANISA
IZMIR
NIGDE
ADIYAMEN
KUSADASI
AYDIN
KONYA
MARAS
MARDIN
DENIZLI
ISPARTA
BURDUR
URFA
GAZIANTEP
MUGLA
MERSIN
ADANA
SKENDERUN
ANTALYA
ANTAKYA
Gulf of Kos
MARMARIS
Gulf of Adalia
Gulf of Iskenderun
Lake Van
100 0 KILOMETERS 100 200
50 0 MILES 50 100
TURKEY
STATUS OF NATIONAL HIGHWAY SYSTEM–1947
ASPHALT
ALL WEATHER
DRY WEATHER
UNIMPROVED
PROPOSED


BULGARIA
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IRAN
IRAQ
SYRIA
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ZONGULDAK
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KASTAMONU
SAMSUN
ORDU
GIRESUN
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ISTANBUL
AGVA
TEKIRDAG
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BOLU
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ALACOZ
CANKIRI
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AMASYA
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BILECIK
KALECIK
YOZGAT
ANKARA
SIVAS
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BURSA
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KIRSEHIR
KANGAL
BINGOL
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AFYON
NEVASEHIR
URGUP
KAYSER
MALATYA
SIIRT
KURTALAN
HAKKARI
MANISA
IZMIR
DIYARBAKIR
NIGDE
ADIYAMAN
KUSADASI
AYDIN
KONYA
MARAS
MARDIN
DENIZLI
BURDUR
ISPARTA
URFA
GAZIANTEP
MUGLA
GULF OF MARMARIS
ANTALYA
MERSIN
ADANA
KENDERUN
GULF OF ADALIA
GULF OF ISKENDERUN
ANTAKYA
100 0 KILOMETERS 100 200
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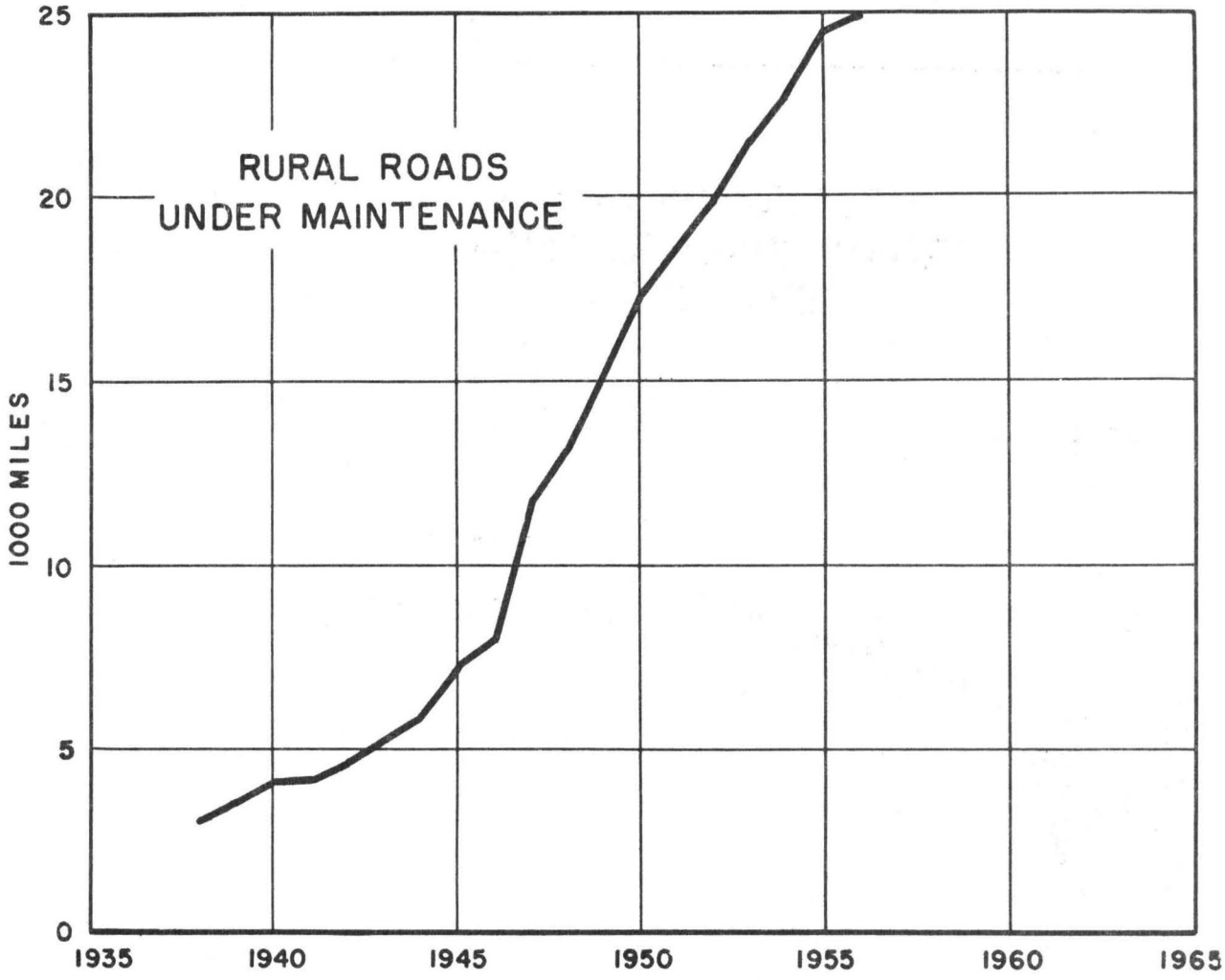
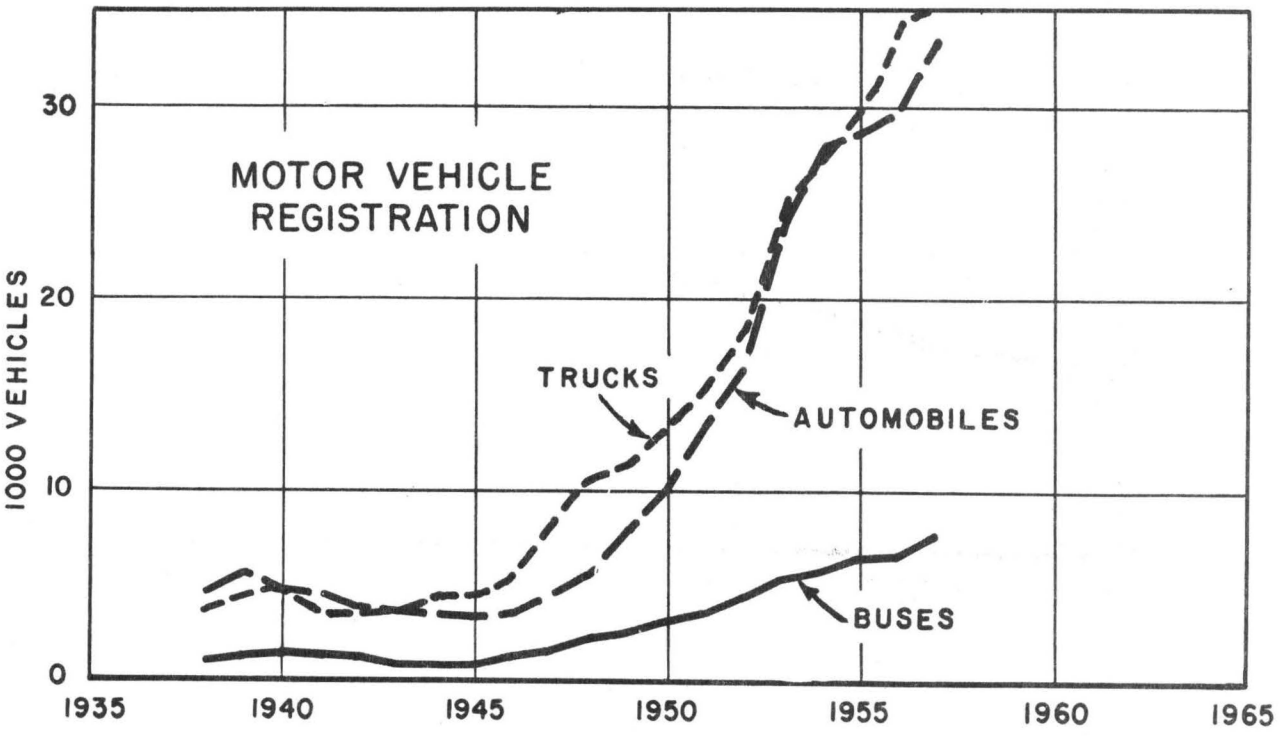
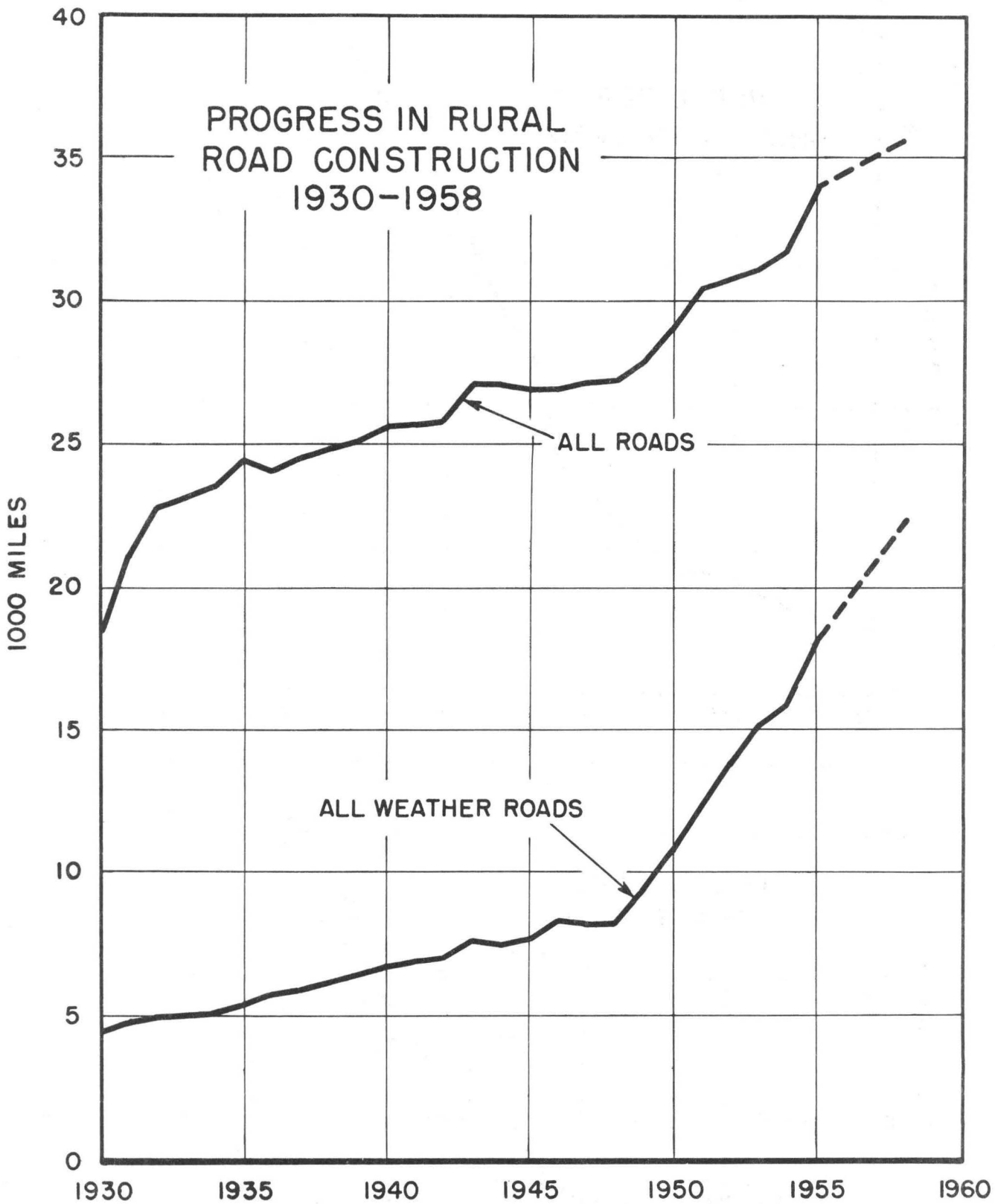
TURKEY
STATUS OF NATIONAL HIGHWAY SYSTEM—1958
ASPHALT
ALL WEATHER
DRY WEATHER
UNIMPROVED
PROPOSED


RURAL ROADS
UNDER MAINTENANCE
1000 MILES
25
20
15
10
5
0
1935
1940
1945
1950
1955
1960
1965


MOTOR VEHICLE
REGISTRATION
1000 VEHICLES
30
20
10
0
TRUCKS
AUTOMOBILES
BUSES
1935
1940
1945
1950
1955
1960
1965


PROGRESS IN RURAL
ROAD CONSTRUCTION
1930–1958
ALL ROADS
ALL WEATHER ROADS
1000 MILES
0
5
10
15
20
25
30
35
40
1930
1935
1940
1945
1950
1955
1960

3 - ELEVEN YEARS OF COOPERATION

An exchange of correspondence dated April 4, 1934, is the earliest documented evidence located indicating that the Turkish Government desired American advice in highway matters. These letters indicate that the Minister of Public Works desired advice in making intelligent expenditures of road tax funds, in establishment of a road system, in design and construction of roads and in training Turkish engineers in road construction.

In 1945 the Bureau of Public Roads arranged a tour for personnel from the Turkish Ministry of Public Works to a number of State highway departments and equipment manufacturing plants in order that they could make firsthand investigations of American methods of highway administration and operation.

As mentioned previously in this report, Public Law 75 of the 80th United States Congress, known as the Aid to Greece and Turkey Program, enacted May 22, 1947, authorized aid to Turkey of several kinds, including a $5,000,000 allocation for highway purposes. Turkey was quick to request assistance in accordance with the terms of the law. They indicated a desire to take advantage of the experience and methods developed in the United States in highway construction, maintenance, and administration in order to establish a plan for a long-range highway improvement program.

By agreement with the State Department on July 12, 1947, the Bureau of Public Roads undertook to supervise the highway program for the United States as part of the Turkish Aid program. Following this agreement, the type of Bureau organization to be placed in Turkey was determined and recruitment of the group from experienced and qualified personnel of the Bureau and State organization was started. The initial staff assignments were: (1) Administration and Management, (2) Personnel, Finance and Accounting, (3) Planning and Programing, (4) Surveys and Plans, (5) Bridges, (6) Materials, (7) Construction, (8) Equipment, and (9) Maintenance. Recruitment of this staff was completed by December 1947 and before the end of that month all members had arrived in Ankara, Turkey. A few months prior to this time a group of civilian equipment specialists had been placed in Iskenderon by the U. S. Army Corps of Engineers to receive construction equipment and train Turkish personnel in its operation. This group, seven in all, were transferred to the Bureau of Public Roads and continued this work under Bureau direction following arrival of the Bureau's group in Turkey.

At the end of calendar year 1947, the Bureau of Public Roads' staff in Turkey consisted of eighteen men, all specialists in their particular branch of the highway improvement operation. Office space was assigned without delay and, except for the division engineer and the Administrative Service personnel, the specialists shared space with their counterparts in the Turkish organization and worked closely with them. Cordial relationships, developed at the beginning, through mutual understanding brought about by working closely with and holding frequent conferences with the Turkish organization, prevailed throughout the life of the program.

The initial objectives of those charged with the responsibility of advising on administration and planning were: (1) to prepare the report on the Turkish Highway situation referred to so frequently in the preceding chapter; and (2) to negotiate a formal agreement with the Turkish Government covering the objectives of the cooperative program, the obligations assumed by each party, the ways of attaining the desired objectives and the financial arrangements pertinent to the program.

The report was completed and delivered to the Minister of Public Works through the State Department within two months. The agreement was executed on April 26, 1948. It was signed by Mr. H. E. Hilts, Deputy Commissioner for the Bureau of Public Roads, and by Mr. Kasim Gulck, Minister of Public Works for the Government of Turkey.

The objectives of the cooperative program in the language of the agreement were as follows:

"The -- (Public Roads Group) -- will assist the Ministry of Public Works of Turkey in establishing a long-range highway improvement program and in establishing a pattern for highway administration on a national scale based upon:

A. Inspection and studies of the topography, present condition of the roads and other physical aspects, such as soil types and available local materials;

B. Economic studies of present and potential kinds and uses of improved highways, particularly with reference to the national security and the national economy;

C. Preparation of estimates of costs of proposed improvements;

D. Methods and types of construction and maintenance and their application to the actual operations;

E. A study of equipment and equipment-maintenance, shop requirements to carry out the proposed program;

F. A study and establishment of required highway laboratory facilities;

G. Training of Turkish personnel in highway construction, maintenance and administration."

The initial staffing pattern of the Public Roads group provided the required organizational arrangement for the work assigned by the terms of the agreement. This pattern was not changed throughout the eleven years of cooperation. Specialists were added to the organizational units as required by the work load that developed. Then, as Turkish personnel were found capable of taking over an organizational unit, that unit was dropped from the Public Roads organization. The following tabulation indicates the

level at which the Public Roads group employment was maintained throughout the period of the cooperative program. Secretaries, stenographers, and clerks are not included in the tabulation.

ENGINEERS AND SPECIALISTS IN TURKEY DURING COOPERATIVE PROGRAMS:

*	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958
ADMINISTRATION	2	2	2	1	1	2	2	1	1	1	1	1
PERSONNEL, FINANCE AND ACCOUNTING	2	2	2	2	2	3	2	2	1	1	1	2
PLANNING AND PROGRAMING	2	2	2	2	2	1	1					
SURVEY AND DESIGN	1	1	2	1	1	2	2	2	1			
BRIDGES	1	1	1	1	1	1	1	1	1	1		
MATERIALS	1	1	1	1	1	1	1	1				
CONSTRUCTION	0	3	5	5	3	3	2	1			2	2
EQUIPMENT AND SHOPS	8	10	17	29	23	22	19	13	8	8	7	6
MAINTENANCE	1	1	1	2	1	1	1	1	1	1		
TOTALS	18	23	23	44	35	36	30	21	13	12	11	11

* MONTH OF DECEMBER ONLY

PERSONNEL, FINANCE AND ACCOUNTING

The Bureau Specialist for Personnel, Finance, and Accounting had two responsibilities: (1) Division Administrative Officer, and (2) Consultant to counterparts in the Turkish organization.

Aid funds for the cooperative program which were transferred to the Bureau of Public Roads were used primarily for salaries of the Bureau personnel in Turkey and for procurement of equipment, parts and supplies that were not available in Turkey. Control of these funds and the basic accounts were kept in the Washington office of the Bureau. Fiscal accounting was not required but records were kept for reference purposes.

Procurement of equipment, parts, and supplies was in most instances performed by the Washington office of the Bureau. The Bureau Division office, in a transmittal and advisory capacity, maintained a file of all procurement and shipping documents and compiled therefrom useful information regarding prices, brands, trade names, and sources of supply.

The Division administrative officer was also responsible for the personnel records and administrative services of the Bureau group in Turkey including time and attendance, leave, travel, per diem, allowances, arrangements for shipment of effects including packing and unpacking and arrangements for identification cards. Two to five local hire clerical employees were required for this work depending on the workload.

Little progress was made in modernizing the work in his counterpart sections of the Turkish organization prior to passage of the organization law establishing the General Directorate of Highways effective March 1, 1950, because the laws, rules, and regulations then in effect were rigid and would not permit the necessary reorganization. After enactment of the law, assistance was given in the organization of the Technical Accounting Division and the Personnel Division. During the period of reorganization and expansion of the highway construction and maintenance program it is possible that the Turkish organization was more interested in action than in costs. A satisfactory cost accounting system has not been installed to date. What is considered to be a satisfactory and workable system has been worked out by a specialist of the Bureau and left with the General Directorate of Highways in the form of an accounting manual and a field manual of cost accounting. Installation of the system is very probably dependent on furnishing additional United States technical assistance in this field.

PLANNING AND PROGRAMING

The early work of the Planning and Programing specialist was concerned with gathering data and preparation of the initial report to the Minister of Public Works. Establishment of a planning and programing unit within the Turkish organization was possible under the existing law and such a unit was initiated without delay. The work of this unit as set up was to gather statistics, make studies and prepare presentations for use by management in the fields of highway inventory, highway traffic, and transportation economics. The organization as developed was also responsible for preparation of the annual highway program of activities and budget.

Since most of the procedures set out above were new in Turkey it was the task of the Bureau specialist to properly advise his counterpart in the methods of performing the necessary surveys, conducting the studies and preparing the reports or other means of data presentation. It was also his task and a most important one, to train and supervise the training of the Turkish personnel who would be responsible for performing the work.

Under the Highway Organization law this unit became the Division of Planning and Programing under the Department of Technical and Economic Research. It was later given departmental status.

The success of the effort in planning and programing is evidenced by the facts that: (1) the initial inventory of roads and bridges was completed in 1948 and has been kept current since that time; (2) the initial traffic studies, volume, classification, weight, dimensions, origin and destination were completed in 1948 and have been kept current; (3) financial studies of sources of revenue and impact of highway improvement and traffic on the economy of the country are a continuing function of the division; and (4) research pertinent to and compilation of the annual program and budget are performed by the division. The Bureau of Public Roads considered this division in capable hands in 1953 and dropped the position from their staffing pattern. There are approximately 60 employees in the division.

Two recent activities of this Division which are of considerable magnitude are: (1) a sufficiency survey of the entire National Highway System and (2) a comprehensive traffic survey of the home interview type in the city of Istanbul (population 1,550,000). Field work is complete for both surveys. Analysis is underway on the sufficiency survey. Coding is underway on the Istanbul survey as this report is written. A Bureau of Public Roads Specialist was furnished on a temporary duty basis to assist in organization and early operations of the field work for the Istanbul traffic survey. It is expected he will return to Turkey to advise and assist during the analysis of the data.

SURVEYS AND DESIGN

The Department of Roads and Bridges had always contracted for their surveys and plans for roads. To implement the recommendation that the department should make all surveys and plans by departmental forces required establishment of a new unit for this purpose. There were few engineers in Turkey experienced in highway location and none in methods in general use by the Bureau of Public Roads and State highway departments. It, therefore, was the task of the Bureau Specialist to assist his assigned counterpart in establishing a unit for Surveys and Plans; to train Turkish engineers in the American way of route reconnaissance, location surveys, highway design, preparation of plans and estimates; to supervise the training program carried on by the Turkish personnel after it got underway; to supervise as much of the field and office work as time permitted.

No time was lost in getting work underway. The first survey party, transit and level, was in the field in January 1948 on a revision of Route No. 1 west of Ankara. This party became a nucleus of an expanding field survey organization. By the end of that year there were eleven survey parties at work in the field. This number was subsequently increased to 37 survey parties by the end of 1951.

During this expansion, training of design engineers was also in progress, initially by the Bureau specialist and subsequently under his supervision.

The use of photogrammetry in reconnaissance and location was introduced in 1952. Turkish engineers readily adapted themselves to this process and considerable preliminary survey work is now done by use of aerial photography.

The Division of Surveys and Design was considered entirely capable in 1955 and this position was dropped from the Bureau of Public Roads staffing pattern.

The present organization furnishes plans and estimates for the annual program and maintains a considerable shelf of plans for program revisions and future programs.

BRIDGES

The Department of Roads and Bridges was making bridge plans prior to the initiation of the cooperative project. They had built some very creditable structures. Its personnel were well qualified for bridge design. It had, for the most part, concerned itself with designs for large and important bridges. In order to provide for the needs of the expanded highway program it was now faced with the additional problem of providing plans for a large number of structures of all types and sizes that would be required. It was the task of the Public Roads Bridge Engineer to assist his Turkish counterpart in the development of an organization that could turn out the required number of plans, and, by utilizing modern equipment, develop construction gangs within the Department to build required structures that could not be built by contract due to limited capacity of the local contracting industry.

Simple designs based on American practice utilizing local materials were introduced by the Public Roads specialist. He also directed the fabrication of leads for a pile driver, the fabrication of steel piles from output of the local steel mill, the treatment with preservatives of local timber and directed the first force account crew in the erection of the first trestle type highway bridge in Turkey.

It had been a practice to award bridge contracts prior to preparation of or completion of the design for the structure in order to use the forces of the contractor to make foundation investigations and obtain data necessary for design purposes.

The Bureau Specialist and his Turkish counterpart worked up a list of core drilling and foundation exploration equipment needed for the program and when aid funds were available for the purpose it was purchased. This equipment is now operated by the Materials Research Division which furnishes foundation information to the Bridge Design Division. Contracts are now awarded on the basis of completed plans.

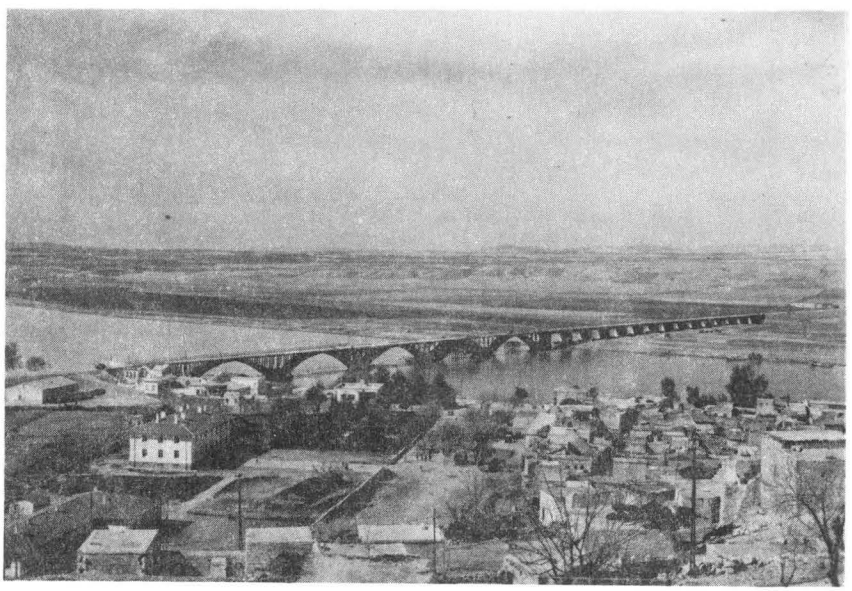
The Public Roads Specialist was influential in other programs that tended to Americanize the Department of Bridges. The controlling specifications for bridge design and bridge construction were standardized and modernized after those of the American Association of State Highway Officials which govern in most instances in the United States.

Standard plans for several types of superstructures were developed.

Standard plans for plain and reinforced concrete culverts were developed.

An inventory of all bridges on the National System was completed and by use of a standard rating procedure the live load capacity has been computed for each structure. This is used in some Provinces for determination of posting of load limit restrictions for bridges which are inadequate to carry the maximum loads permitted by law.

When the Public Roads bridge engineer was transferred from Turkey in 1956 there did not seem to be much purpose in filling the vacancy since the Bridge Department was in capable hands and making good and efficient use of available materials. The position was therefore dropped from the Bureau staffing pattern at that time. The Bridge Department has approximately 25 employees in its Design Division at headquarters.

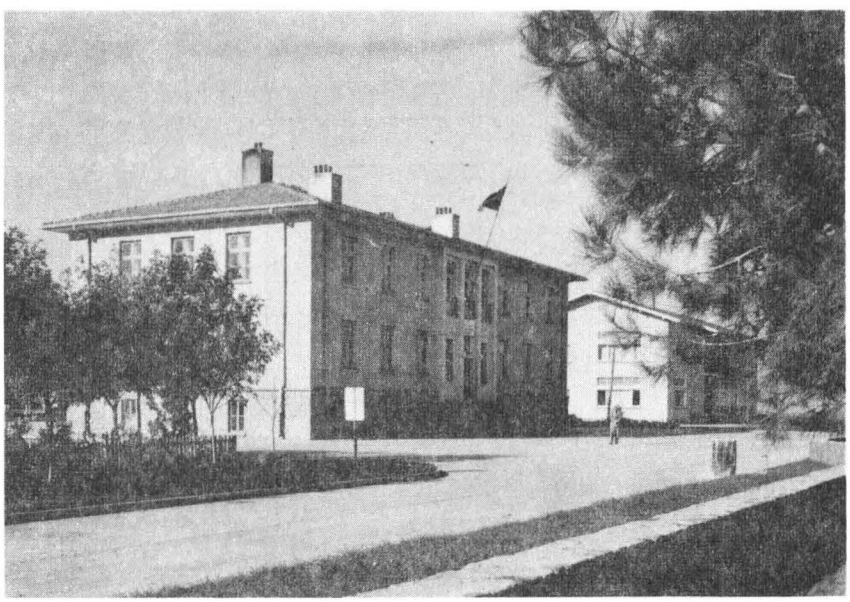


Birecik Bridge over the Euphrates River. Construction was started in 1951 and completed in 1956. The bridge is 2,365 feet long with a 26' 3" roadway and two 4' 10" sidewalks.

MATERIALS

Similar to the situation in Survey and Design, the Bureau Materials Engineer found no counterpart in the Turkish organization when he arrived in Ankara. No time was lost in making the appointment of an engineer, educated in the United States, to head a Materials Division. Together these men established the unit and prepared orders for equipment for making field surveys and equipping a testing laboratory. They trained men in lifting samples in the field and testing and reporting on materials for design and construction in the laboratory.

The position of materials engineer was dropped from the Bureau staffing pattern in 1954. The present Materials Division has 70 employees at headquarters and additional employees at each field division headquarters. The headquarters laboratory, modeled after American practice, has made quite a reputation in the Near East. The Highway Directorate is called upon quite frequently to provide training for materials engineers and laboratory technicians from other countries in that part of the world. They are very cooperative in this respect and consider such requests as complimentary to their organization.

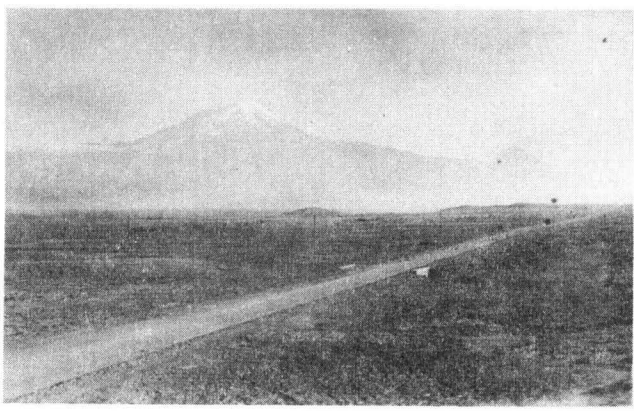


The Division Office Buildings in Samsun
on the Black Sea

CONSTRUCTION

Specialists in highway construction were assigned to the early force account construction projects and assisted counterparts in training engineers in staking and other construction engineering activities. Specialists also worked with counterparts in the modernization of construction specifications patterned after the Bureau of Public Roads Standard Specifications FP-41. The standard specification so developed is still in use. These specialists also assisted in the organization and training of construction engineering parties to control contract construction similar to American practice. Turkish practice at the time consisted of assignment of one engineer to a project who had little authority and did little more than inspection. Engineering work in connection with staking of earthwork, drainage layouts, computation of quantities, etc., was performed by the contractor.

American practice prevails in Turkey today, that is performance of construction engineering by Highway Directorate forces, but compliance with specifications and quality of work are variable items. Some projects are very well constructed, others leave considerable to be desired. In some cases compliance with specifications is waived due to shortages of equipment or to reduce wear on equipment and tires. Usually there is a reason or at least an excuse for not requiring compliance with the specification. It is possible that some of the noncompliance results from lack of experience on the part of the project engineer. There are well qualified construction engineers in both field and headquarters organizations and recommendation has been made that some of the more experienced personnel be used in an active and aggressive inspection and training program as a means of obtaining more uniform field construction control.



Dogubayazit-Agri highway in Eastern Turkey. Mount Ararat in the background.

MAINTENANCE

The Bureau maintenance engineer, recruited from his position as State highway maintenance engineer, found conditions in Turkey sharply contrasting from those he left in the States. The Turkish maintenance operation was not mechanized in any degree. Surface and drainage maintenance was being performed by hand with broom and shovel. Highways were deteriorating as fast or faster than new ones were being built.

This specialist then had the important task of advising his counterpart in organization of a division capable of maintaining the travelable portion of the National highway system and as equipment was made available to increase the mileage of all weather roads in the country by surfacing and making minor betterments to existing roads. He advised in developing ways of keeping records on the location, operating cost, and cost of repairs for each piece of equipment. He advised in the purchase of new equipment for maintenance operations. Most of his time was taken up on inspection of work in progress and advising in proper use of equipment and ways of doing work in a satisfactory and economical way.

Road Maintenance 1947

Machine maintenance a curiosity in 1948

Snow removal between Istanbul and Ankara

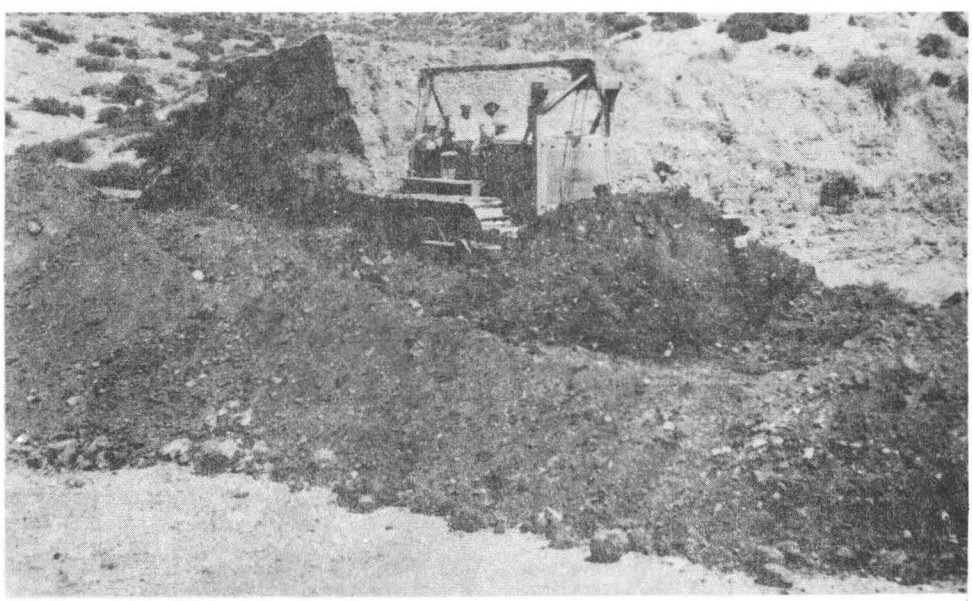
The rate at which all weather mileage was added to the country's system is evidence of the success of this cooperation. In 1956, when the Bureau specialist was transferred to other work, the maintenance and betterment program was considered to be in capable hands and the position was dropped from the Bureau staffing pattern.

EQUIPMENT AND SHOPS

By far the greatest part of Bureau of Public Roads effort, insofar as Public Roads personnel was concerned, was in the equipment field. The initial aid program provided for shipment to Turkey of equipment, materials, and parts valued at approximately $4,500,000 and subsequent aid programs increased this figure to approximately $41,000,000. Equipment was arriving in Turkey in December 1947 when the first of the Bureau of Public Roads group arrived. Receiving equipment from the ships and a start on the training of operators was under way by a group of seven civilians placed in Iskenderon by the U. S. Army but later transferred to the Bureau of Public Roads. There were many urgent jobs to be done quickly which required the utmost cooperation between the Bureau specialist and his Turkish counterpart to accomplish them.

Initially, recruitment of personnel satisfactory for equipment operator training proved to be difficult, and, to furnish men in the required numbers, arrangements were made with the Turkish army to supply officers and men to the program. Speeding up construction of strategic highways was considered to be sufficient justification for bringing Army personnel into the training program. Fifty-one military personnel received training the first year. The later classes were entirely civilian.

Training of operators in the number required was accomplished by using the more capable graduates from the courses as instructors. Prior to start of actual road construction, operators received training in filling swamps, grading equipment storage areas and other useful work in the Iskenderon area.



A Turkish trainee and instructor on bulldozer at Iskenderon, 1948

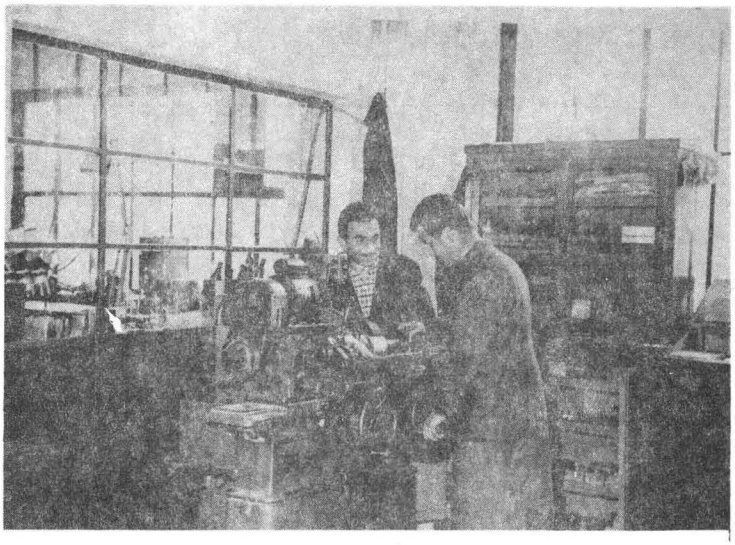
The training of warehousemen and the devising of a system for recording receipt and issuance of items, for which in many instances there was no name in the Turkish language, was accomplished.

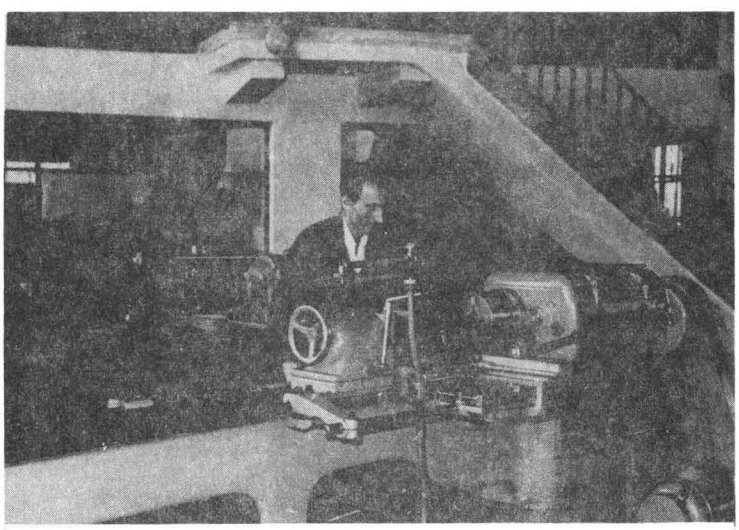
Training of shop supervisory personnel and mechanics for maintenance of the equipment being received was essential and a difficult accomplishment.

Numerous conferences and discussions between the Bureau specialists and their counterparts resulted in an early decision to build main repair shops at Istanbul, Ankara, and Elazig. The buildings were well along and shop equipment was being installed by the end of 1948. This was the beginning of the equipment maintenance program that ultimately provided a shop in each of the twelve field divisions capable of any repair or rebuild job.

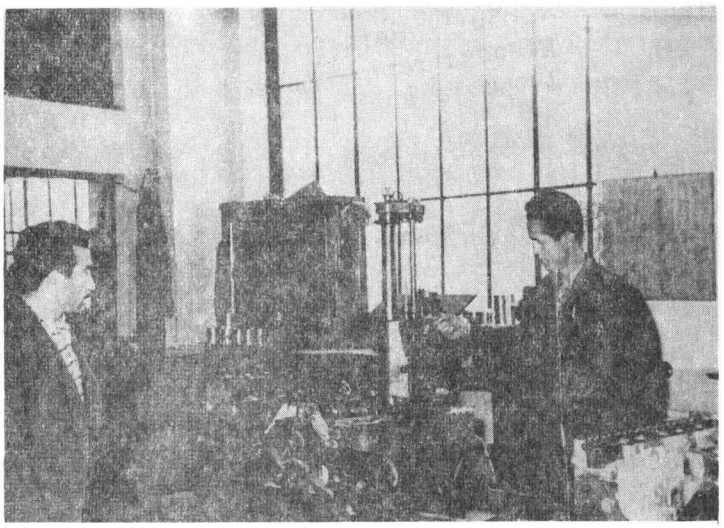
As these shops, complete with modern machine tools and comparable to the better shops in State highway departments in the United States were completed and readied for operation, one or more Bureau specialists were assigned to them to assist in shop management or to work with the machinists or mechanics. Equipment specialists also accompanied counterparts on inspections to the projects and assisted them in promoting good operation and preventive maintenance of equipment on the job.

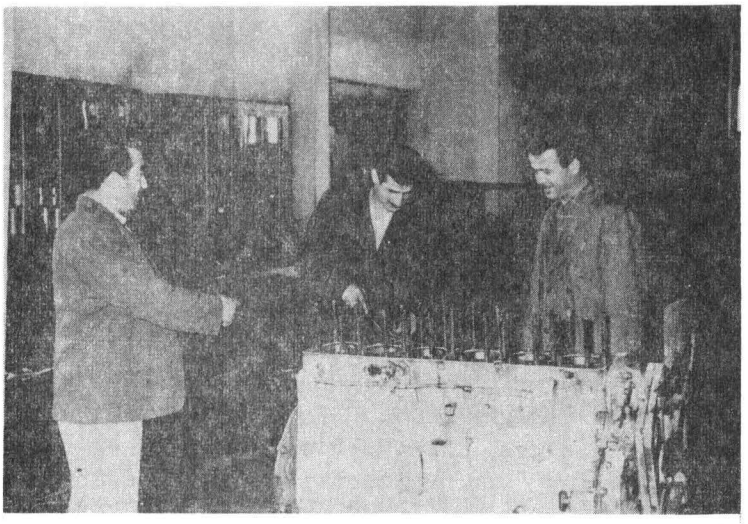
The main shop building at the Ankara Division Headquarters. This is one of the three original shops. Later shops were built of concrete or stone masonry.





Aid purchased machine tools and Turkish Government shop buildings make a modern repair layout





Skilled machinists and mechanics keep
highway equipment operating

Equipment specialists worked with their counterparts in the Equipment Division preparing specifications for new equipment to be purchased and with the Supply Division in preparing orders for shop materials, tools and replacement parts.

The training courses started at Iskenderon have continued throughout the life of the project. The scene of operations has been transferred from Iskenderon to Ankara. Engineers, operators, and mechanics receive field training at Alanya on the Mediterranean where facilities are maintained to service construction operations on a shoreline route. Due to the turnover of shop and field personnel there will always be a need for training of engineers, operators, machinists, and mechanics. This training, at one time done entirely by Public Roads specialists, is now entirely in the hands of qualified Turkish instructors. Education, training, and experience has produced sufficient qualified Turkish personnel to operate the shops and supervise the operation, repair and maintenance of the highway equipment permitting phase out of this operation and with it the remaining activities of the Bureau of Public Roads in Turkey.

The General Directorate of Highways has recognized the value and necessity of constant training as a means of maintaining a vigorous organization. They have promoted and taken advantage of training courses given by specialists of the equipment manufacturers who have supplied equipment to the country. Several manufacturers have provided this service without cost, others as a part of a purchase contract. Over 5,000 men have received training under the programs given by the General Directorate of Highways since 1947.

TRAINING IN THE UNITED STATES

Training in the United States has been provided through the participant program of the International Cooperation Administration and its predecessor organizations for eighty-one employees from all organizational units of the Directorate of Highways. As this report is written an additional thirteen employees are being processed for training in the United States.

In most instances the details in connection with Stateside training has been arranged by the Office of Operations, Foreign Projects Division of the Bureau of Public Roads. Training for two civil engineers, which included academic study, was arranged by the International Road Federation.

The personnel selected for this training were for the most part from positions of responsibility and were selected from the broad organizational units of the General Directorate of Highways as follows:

Administration and Management	10
Engineering	42
Operation	29

Experience with returned participants has been that approximately 30 percent leave the General Directorate of Highways within a few years and

enter related work in government or private industry. Many of the responsible positions in the organization are occupied by returned participants. Most of the returned participants indicate satisfaction with and appreciation for the opportunity they had to study in the United States.

Presentation of certificate to a Turkish participant on completion of training in the United States

PROCUREMENT

Except for the initial shipments of war surplus highway construction equipment valued at approximately $603,000, the procurement facilities of the Washington, D. C., office of the Bureau of Public Roads were utilized for purchase of and arrangement for transportation to Turkey of construction, maintenance and shop equipment, spare parts, materials, and supplies furnished under the Foreign Aid programs to the General Directorate of Highways.

On receipt of a procurement authorization commodity lists and specifications were prepared by the Supply Division of the General Directorate with the assistance of Bureau of Public Roads specialists and submitted by the Bureau's division engineer to the Washington office as a series of requisitions. Procurement was generally on the basis of sealed bids with award to the low bidder in accordance with government procurement regulations. This office also arranged for inland and ocean transportation and handled the payments to vendors and for transportation costs.

Procurement by the Bureau of Public Roads was terminated with 1957 fiscal year authorization. The Procurement Division of the General Directorate of Highways now performs this function.

During the period 1948 to 1958 procurement by the Bureau of Public Roads amounted to approximately $41,000,000 of which approximately $21,000,000 was for road construction and maintenance equipment and the remainder for shop equipment, materials, and supplies.

Azapzade Canyon, between Ankara and Istanbul

4 - BENEFITS

Some of the benefits that have accrued to Turkey as a result of the accelerated highway program, without attempting to assign a value thereto are:

(1) Routes of strategic value have been made available to the defense organizations.

(2) Improved roads into formerly isolated areas have expanded the area served by trucks and buses thus stimulating agriculture and industry in these areas.

(3) Improved roads have resulted in lower rates for freight and passenger service.

(4) Improved roads have greatly reduced travel time between areas and centers of population.

Many interesting studies have been made regarding the economic benefits that have resulted from this program. A 1956 study of freight rates indicated that for a representative group of terminal points freight rates were reduced 62.8 percent between 1949 and 1955.

Reduction in road travel time for a few important routes are tabulated below:

	September 1948 In Dry Weather	1958
Ankara-Istanbul	15 hours	7 hours
Ankara-Iskenderon	21 "	11 "
Ankara-Mersin	16 "	8 "
Ankara-Bursa	8 "	7 "
Ankara-Konya	28 "	3 "
Bursa-Izmir	7 "	6 "
Ulukisla-Konya	7 "	2½ "
Iskenderun-Maras	8 "	3 "
Iskenderun-Elazig	25 "	9 "

As a direct result of the roads program to date, the interior of Turkey has been completely opened up to the benefits of modern commerce. Since 82 percent of Turkey's population lives in small villages, the effect of this penetration is obvious - increased incentive to grow surplus crops for sale to other areas of the country and to the outside world; increased purchasing power and therefore increased demand for the manufactured products which go toward raising standards of living; expansion of interest on the part of the villages in the rest of the country and all that this idea implies for education, mass communication, government, business, and local industry.

The Division Office Building at Diyarbakir

The Bureau of Public Roads-General Directorate of Highways cooperation has not come to an end with the removal of the Division office from Ankara. The Director General has been advised that the Bureau will continue to furnish specialists on a T.D.Y. basis to assist in the solution of specific problems when such assistance and the cost thereof is arranged through the International Cooperation Administration. The Bureau will continue to cooperate to the best of its ability in arranging profitable training courses for General Directorate employees who come to the United States under the International Cooperation Administration participant program.