

## DEVELOPMENT OF THE INTER-AMERICAN HIGHWAY

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Since 1923, when the Fifth International Conference of American States met at Santiago, Chile, the possibility of constructing modern highway communication from the northern part of North America to the southern part of South America has been under official consideration. Such highways would permit of motor communication from the United States through Central America to the several countries of South America. A project of such vast scope, however, may not be realized for a long time; and it was in the interest of prompt and practical action that the central section of the so-called Pan-American highway—a section traversing Central America and Mexico, to be known as the Inter-American Highway—has been made the object of the first definite plans.

Pursuant to action taken at various international meetings, both favoring and urging the building of this highway, the Congress of the United States by joint resolution, approved March 4, 1929, authorized the appropriation of \$50,000 to enable the Secretary of State of this Government to cooperate with the several governments, members of the Pan American Union, in reconnaissance surveys of possible routes, probable cost, economic service, and other pertinent information looking toward the building of an inter-American highway or highways.

The first Inter-American Highway Congress, which was held at Panama City, October 7-12, 1929, created an Inter-American Highway Commission, and recommended co-operation in its work by the governments concerned.

The Bureau of Public Roads of the United States Department of Agriculture was requested by the Secretary of State to make the actual reconnaissance survey in Central America and to prepare a report for transmittal to the Congress. Accordingly, during the three years, 1930-1933, reconnaissance was made through Panama, Costa Rica, Nicaragua, Honduras, Guatemala, the line of survey totaling about 1,400 miles. A complete report of the reconnaissance survey was prepared by the Bureau of Public Roads and transmitted through the Secretary of State to the Congress, and on June 6, 1934, this report was ordered printed as Senate Document 224. Copies of this report, entitled, *Proposed Inter-American Highway*, are now available from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 70 cents each.

## ENGINEERING AND TECHNICAL CONSIDERATIONS

Although the most promising route for a feasible highway through the Central American Republics was generally agreed upon as following the Pacific slope of the mountains, a broad study of the whole terrain was made from all available sources of data, and the general route to be followed in each country was approximately determined in such a way as to make the greatest advisable use of existing highways.

In Panama, starting at Panama City, the route makes use of the new ferry across the Canal at Balboa, the new Thatcher Highway from the Canal to Arraijan, and a new piece of highway recently graded and surfaced by the road authorities of Panama between Arraijan and Chorrera. At this point the existing Central Highway is intersected and followed through Chame, Anton, Penonome, Aguadulce, Santiago, Sona, David, and Concepcion to El Volcan, where an elevation of about 4,200 feet is attained. The line then extends to the westward, crossing the Rio Chiriqui Viejo and intersecting the Costa Rican frontier near the Llanos de Canas Gordas.

Excepting Panama and Mexico, the route in Costa Rica will be longer than in any other of the countries crossed. After thoroughly considering several possible routes, it appeared that the best location in Costa Rica will be found along the Pacific slope, generally staying under approximately 2,500 feet elevation after leaving the Panama frontier, but rising to the Continental Divide in order to serve the rich and highly cultivated section known as the Meseta Central and to utilize the present improved road from near Cartago to Naranjo, a distance of approximately 50 miles. The junction on top of the Continental Divide at El Alto serves the purpose of giving a connection to the Atlantic seaboard of Costa Rica.

To avoid competition with the Ferrocarril Electrico del Pacifico, which is owned by the Costa Rican government, a reconnaissance is now being made of an alternate route between the Meseta Central and Guanacaste province, which will follow closely the Continental Divide and furnish access to a region now little developed but capable of producing valuable agricultural crops both for national consumption and for export.

In Nicaragua the route acceptable to that government lies between Lake Nicaragua and the Pacific to a point abreast of the divide between that lake and Lake Managua. From this point to the crossing of the Rio Negro on the Honduranian frontier, an alternate route is to be developed which, as in Costa Rica, will avoid paralleling the railroad owned and operated by the government. This alternate line, which will replace that following the railroad through Managua, Leon, and Chinandega, will pass near Matagalpa, and thence extend by way of Esteli to the Honduras line.

The total length of the route in Honduras is relatively short, being about 90 miles. It follows the Pacific coastal plain through Choluteca and Nacaome, and near Nacaome the existing road between Tegucigalpa and its shipping point of San Lorenzo is intersected. To provide access to all capitals, it is proposed to include in the project the reconstruction of the present road from San Lorenzo to Tegucigalpa.

In El Salvador the line enters at a point on the Rio Guasoran, approximately at Santa Clara, and will probably follow the existing road via San Miguel, Jucuapa, San Vicente, Cojutepeque, Ilopango, Soyapango, San Salvador, Santa Tecla, Coatepeque, and Santa Ana to the Guatemalan frontier en route to Jutiapa. This route traverses El Salvador from end to end and passes through the capital city.

In Guatemala a route across the plateau to the east of the volcanic range is preferred, using the existing roads from Santa Ana in El Salvador via Jutiana, Guatemala City, Chimaltenango, Solola, Totonicapan, Quezaltenango, and San Marcos to the Rio Suchiate, which marks the frontier of Mexico.

From the Rio Suchiate, the Mexican national system of highways provides for a line through Oaxaca, Puebla, Mexico City, Pachuca, and Monterrey to the United States border at Nuevo Laredo. More than half of the entire 1,600 miles of the highway in Mexico is already open to motor traffic, most of this being represented by the road from Tehuacan, about 150 miles south of Mexico City, to Nuevo Laredo.

It has not been found advisable to adopt definitely fixed standards of width and other details of design for all possible conditions; but wherever new construction is involved, the estimates are based on a width of graded roadway of 28 feet and a surfaced width of 18 feet. A maximum grade of 7 per cent is used except where alignment of existing roads is satisfactory on steeper grades. Minimum radius of curvature is kept at 164 feet. The estimates are based on three separate plans of construction. The first calls for a graded road with all structures complete, and surfacing of local material found in the course of the grading operations. The second plan provides for a gravel and waterbound macadam surface, oiled to make it mudless and dustless. In addition, a separate estimate shows the cost of a modern concrete surface, 20 feet wide, with a 32-foot grade.

Of the 3,250 miles in the projected highway, about 1,265 miles are already completed and open to all-weather traffic. To bring the remainder of the entire route up to a similar standard, with surfaces of local materials adequate for the traffic to be carried in all seasons of the year, an expenditure of approximately \$55,000,000 has been estimated. Of this sum, approximately \$30,000,000 will be required for the work in Panama and the five Central American Republics, and the re-

maining \$25,000,000 in Mexico. Estimates have also been made for carrying out the work on the basis of higher types of surfacing. The total cost with an oil-surface treatment is estimated at \$38,000,000 in Panama and Central America, and \$26,000,000 in Mexico. The total cost for concrete construction is \$101,000,000 and \$58,000,000 respectively.

#### ECONOMIC CONSIDERATIONS

All of the seven countries to be served by the Inter-American Highway are capable of much greater internal development than now exists, and further substantial progress in each is dependent to a large extent on the expansion of the systems of internal communications. There is today overland communication between only two pairs of these countries—by rail and ferry between Mexico and Guatemala, and by rail and highway between El Salvador and Guatemala. In each of the countries some highways have been built, serving the interior, but these are confined to the more thickly settled areas. Unquestionably, both internal and external communication would be greatly benefited by a common plan linking all the Republics and constituting a basis for further highway extension.

Considering all the countries, exclusive of Mexico, more than half of the entire population of upwards of 6,000,000 persons resides in the provinces to be traversed by the highway. The proposed route would serve most of the larger cities and towns, including the capital city of every country except Honduras.

Heretofore, all these countries have depended mainly on coffee, bananas, and cacao as their chief agricultural resources. The construction of the Inter-American highway would encourage the raising of many other agricultural products, both of the temperate and tropical zones. Potential development of minerals and metals of all kinds, ranging from gold and silver to manganese and copper, may be made actual by development of highway communications. It is known that mining prospects are in existence which remain valueless until reached by means of transportation, and the same is true of large stands of valuable hardwoods. Considering grazing areas now in existence, with more advanced methods of stock raising and improved means of transportation the number of cattle which could be raised would be more than ample to supply the requirements of the Central American countries.

The potential foreign trade of the region is large. The 1911-1915 average of this trade of the five Central American countries and Panama aggregated: imports, \$41,691,000; exports, \$44,715,000. There was a fairly steady increase in foreign trade until the peak year 1929 was reached, when the totals were: imports, \$113,558,000; exports, \$101,125,000. Foreign trade during the depression has declined in approximately

the same ratio as that recorded by practically all other countries throughout the world.

The Inter-American Highway, if completed and adequately equipped with the facilities required for intensive motor traffic, would certainly have unusual attractions as a route for tourists. The tropical conditions, nowhere available to the northern motorist at the present time, that are encountered at intervals along the entire route south of Oaxaca in Mexico, would furnish a new variety of attraction and scenery.

#### PRESENT STATUS

By two appropriations in 1934, the Congress of the United States authorized the expenditure of \$1,000,000 for survey and construction operations on the Inter-American Highway, and \$75,000 for the continuation of co-operative reconnaissance surveys. Pursuant to these appropriations, a field office of the Bureau of Public Roads was reopened in Panama City in 1935, and later an office was opened in Costa Rica. Location surveys over certain sections of the reconnoitered route were started and co-operative bridge construction has been arranged with the governments of Panama, Honduras, and Guatemala. Nicaragua has recently accepted the terms of co-operation, and the Costa Rican government has indicated its intention to co-operate on completion of the further reconnaissance studies requested.

The Republic of Panama has undertaken to complete the route in that Republic as a part of the co-operation in the reconstruction of a bridge over the Chiriqui River, which will be 730 feet long with a suspended span of 400 feet. Construction of the foundations for this bridge was begun by the Panamanian Government under the supervision of American engineers on April 1, and piers and anchorages were expected to be completed by November 1, 1936.

Honduras is continuing work on the short section of road in that Republic between San Lorenzo and the Nicaragua line, and has agreed to co-operate in the construction of a bridge at the Rio Choluteca, adjacent to the city of the same name. This structure will be a double-cable suspension bridge with two suspended spans of 330 feet each and a total length of 930 feet. Foundations for this structure, which is the largest in the present program, were started by Honduranian forces under the supervision of American engineers on April 29, 1936. All work except the center pier is now well above high water. The center pier will be started on November 10 if rain conditions are favorable, and should be completed by December 15 of this year. The substructure of this bridge will be faced with cut stone.

In El Salvador, a continuing road program is scheduled, closing the gaps in the route through that country south of San Salvador. The section from San Salvador to the Lempa

River will probably be completed in this calendar year. North of San Salvador the road is completed to Santa Ana and Candelaria at the Guatemala border, with the exception of a few bridges which are now being constructed.

In Guatemala, considerable maintenance work has been done on the old cart road by way of Asuncion Mita, Jutiapa, Cuajiniquilapa to Guatemala City, so that it is being kept open for motor traffic except during the worst parts of the rainy season. During a considerable part of the year, commercial vehicles are operating over this part of the route. The government has arranged to co-operate in the construction of an eye-bar suspension bridge over the Tamazulapa River, the largest unbridged stream on the main route between the capital and San Salvador. The suspended span is to be 240 feet, the total length 440 feet. Foundation work at the Tamabulapa River was the last to be started because of the necessity for using steel piling shipped from the United States. Work was begun, however, by Guatemala forces under the supervision of American engineers in September, and is progressing rapidly. It is expected that this substructure will be entirely ready for steel by December 15, this year.

Under date of August 28, after the usual advertising, award of contract for the three steel superstructures was made to the United States Steel Products Company. The work on the three bridges, according to contract, should be completed by June 30, 1937. It is expected that the first steel delivered will be for the Tamazulapa bridge in Guatemala, and erection will follow in order on the Choluteca and Chiriqui bridges.

In March, 1936, the governments of Guatemala, Nicaragua, Costa Rica and Panama were informed that an unobligated balance of the available appropriation remained, and that the United States would consider the approval of additional structures in each of the countries to a total of \$200,000.

Panama, Nicaragua, and Guatemala at once indicated sites at which they would prefer construction of other bridges, and these proposals are now under consideration.

The reconnaissance surveys requested by Costa Rica and Nicaragua have been completed, and the report for the Costa Rica survey has been presented to the government of that country. Report for the Nicaragua survey is nearing completion, and bridge site surveys have also been completed in that country.

Line survey has been completed in Panama from David to the Costa Rican frontier, a distance of approximately 65 miles, to enable the Panamanian government to proceed with construction in accordance with the agreement of that government.

On July 1, by invitation of the Mexican Government, delegates from Guatemala and the United States made a trip over

the first section of the Inter-American Highway to be completed in Mexico at a formal opening which began with ceremonies in the center of the international bridge at Laredo, Texas, and included the trip over the highway by about 55 cars of the official party, frequent celebrations in cities along the way, and a very elaborate program of civic activities in Mexico City. The length of the Laredo-Mexico section is approximately 765 miles. South of Mexico City, about 160 miles have been completed, and surveys have been started at the Guatemala frontier for further work by the Mexican Government.

### THE MOTOR AND THE HIGHWAY IN MODERN TRAFFIC

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When the historian writes the story of the twentieth century and sees what is happening today with that perspective which comes only with the passing of time, it is a fair guess that he will set down as the outstanding technical development of the first quarter of that century the advent of motor transport.

In saying this, I am quite aware that we have been presented, by the scientist and technician during the last 25 or 30 years, with many other marvels—for example, the radio and all that series of developments that depend on the electronic principle. But those still are in their infancy; we have yet to see clearly what they all will mean to us in terms of social and economic values.

But motor transportation today is approaching maturity. It is approaching the fullness of its powers and the fulfillment of its promise, and that is why I ascribe to motor transportation first place in the technical developments of the last 25 or 30 years.

To get some idea of the magnitude of this function and of the speed with which it has become a major feature of the modern scene, we need recall only the fact that in 1900 there were only about 8,000 automobiles in the United States, while today there are more than 26,000,000. So it is distinctly the achievement of the first quarter of the twentieth century to have set up this effective, flexible, and almost universal transportation agency.

### EFFECTS OF MOTOR TRANSPORT

Probably it is unnecessary to dwell on the social aspects of this innovation. They must be obvious to every thoughtful observer. It is the motor car that has opened up, through in-