This material was not used.

November 10, 1939.

Memorandum to Mr. MacDonald

From H. S. Fairbank

The following information is supplied in response to your request for data on the approximate dimensions of a master highway program to be used in your Petroleum Institute paper.

Construction of an Interregional Highway System

We have tentatively selected an interregional highway system which, with additions since publication of the report "Toll Roads and Free Roads", totals 28,968 miles. The roads selected in each State have been indicated on maps of the State and these maps have been referred to the respective State highway departments for study. Eventually we will have selected an interregional system not exceeding 30,000 miles in which we will have the concurrence of all State highway departments.

Of the 28,968 miles in the system as tentatively selected, approximately 3,725 miles are within the limits of urban communities, approximately 25,243 miles are rural roads classified according to present traffic density as follows:

Annual average traffic less than 2,000 vehicles per 24-hour day.	16,876 miles
Annual average traffic 2,000 to 10,000 vehicles per 24-hour day.	8,129 miles
Annual average traffic more than 10,000 vehicles per 24-hour day.	238 miles

The above average traffic density classes segregate the total mileage approximately into portions on which pavements will be two lanes, four lanes (divided), and more than four lanes wide.

A rough estimate of the cost of right of way and construction for this system is $5,000,000,000, of which $2,000,000,000 would be the cost of the urban sections, totaling 3,725 miles, and $3,000,000,000 would be the cost of the rural sections, totaling 25,243 miles.

Express Ways and New Facilities in Metropolitan Areas

In the larger cities there is need of extensive development which can be accomplished only in small part through the construction of the intracity sections of the interregional system. Unless these additional facilities are provided, the sections of the interregional route will attract a disproportionately large share of traffic and tend to cause an unbalanced development of the city along their lines and outward in the direction of their extension into rural territory. Only by construction of comparable facilities in other directions can a balanced growth of the city be assured and an efficient plan of the future city be provided.

It is probable that no such facilities will be required in most cities of less than 10,000 population. In cities of such smaller size, located on the interregional system, the route of that system through the city would be included in the estimates given above for the interregional system.

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On the basis of very general studies of probably needed facilities in a few cities we estimate that the probable cost of such new express ways and similar facilities in all cities larger than 10,000 population, exclusive of sections of the interregional highway system, will cost approximately $11,500,000,000, of which approximately $9,000,000,000 would be required in cities traversed by the interregional highway system and approximately $2,500,000,000 in cities not traversed by the interregional system.

Additional Work of Reconstruction and Modernization of Primary Rural Highways During the Period 1940 to 1960

During the period 1940 to 1960 it is estimated that approximately 40,000 miles of the State primary highways now unsurfaced will be surfaced at a total cost of approximately $1,000,000,000. Reconstruction with major relocations and considerable widening will be required on approximately 60,000 miles of the more important routes at an estimated total cost of approximately $3,000,000,000, and normal reconstruction during the period (in some instances more than once on the same section) involving a total of approximately 330,000 miles, will cost approximately $4,000,000,000. Summing the above estimates, the estimated total cost of completing the surfacing, modernizing and reconstructing the State primary highway system during the period 1940 to 1960 is $8,000,000,000.

Reconstruction of Ordinary City Streets

During the period 1940 to 1960 it is estimated, on the basis of past expenditures, that total expenditures for reconstruction of ordinary streets in all cities will total approximately $6,000,000,000. This amount is exclusive of all work normally classifiable as maintenance.

Improvement and Reconstruction of Rural Secondary Roads

At the present time it is estimated that approximately 500,000 miles of rural secondary roads are surfaced. This includes all roads of this class not included in the Federal-aid or primary State highway systems, regardless of the governmental agencies by which they are administered.

There is now in progress the designation of a Federal secondary or feeder road system which is to include not to exceed 10% of the total rural highway mileage, or approximately 300,000 miles. This system will include all portions of the State highway systems not included in the Federal-aid system or potential additions thereto. The present extent of the designated Federal-aid system is approximately 227,000 miles. Allowing 3,000 miles for potential additions, the mileage of State primary highway systems not included in the Federal-aid system and its potential additions probably approximates 120,000 miles. Deducting this mileage from the 300,000-mile total of the secondary and feeder road system to be selected leaves 180,000 miles, which is the

probable extent of the Federal secondary or feeder road system to be designated that will lie outside of the State primary highway system. As the Federal-aid secondary system is to be selected on a basis of relative importance next in order to the Federal-aid system, it is probable that the major part of the roads included in it will already have been surfaced. The work to be done on the system first selected will consist of the surfacing of such portions as are not yet surfaced and needed reconstruction.

If all Federal and State and local matching funds available for improvement of this class of roads can be concentrated upon the improvement of the secondary system to be selected, it is probable that all additional work necessary to bring the roads included up to a satisfactory standard can be done in a relatively short time and a further designation of an additional 10% of the total mileage would then be indicated with continued application of all available revenues for construction to the enlarged system thus created.

Even when a second 10% secondary system has been designated it is probable that the total mileage of such roads, exclusive of the sections included in the State primary highway system, will not exceed 460,000 miles. As there have already been surfaced approximately 800,000 miles of such roads, it is apparent that the Federal-aid program will not, for many years, reach more deeply into the total rural highway system than has already been reached with some form of improvement. The effect of the Federal

plans, however, will be to improve a certain mileage of roads not now improved which are of greater importance than much of the mileage that has been surfaced, and the work done in cooperation with Federal agencies will be supplemented by a small amount of construction carried out by local authorities independently. It is estimated that all construction and reconstruction of secondary and feeder roads, during the period 1940 to 1960, will not exceed $6,000,000,000.

Total Costs of Construction and Reconstruction During the Period 1940 to 1960

The general estimates given above for the various classes of highways and streets include the total costs of construction and reconstruction of the roads, streets, all essential bridges, grade crossing elimination structures, and rights of way. They do not include essential expenditures for maintenance, the carrying charges on indebtedness, the administration and equipment of highway departments, or the regulation and control of traffic.

Recapitulating, these costs are as follows:

For the interregional highway system	
Urban sections	$2,000,000,000
Rural sections	3,000,000,000
For new express highways in cities exclusive of sections of the interregional highway system	
In cities traversed by the interregional system	9,000,000,000
In cities not traversed by the interregional system	2,500,000,000

Initial surfacing of sections of State primary highways	$1,000,000,000
Modernization of major State highways not included in the interregional system	3,000,000,000
Normal reconstruction of remaining portions of the State primary highway system	4,000,000,000
Reconstruction of ordinary city streets	6,000,000,000
Improvement and reconstruction of rural secondary roads	6,000,000,000

Highways of Maximum Importance for National Defense

The highways indicated by the War Department as of special interest for the national defense total approximately 51,000 miles. This mileage includes approximately 26,000 miles of the interregional system as tentatively selected. Of the 51,000 miles the Department indicates approximately 26,000 miles (not identical with the included portion of the interregional system) as of first priority, 41,000 miles as of second priority, and 14,000 miles as of third priority.

In cooperation with the State highway departments we are now ascertaining the condition of this entire mileage and the average traffic density on all parts of it. We are also ascertaining the character and condition and the load limitations of all included bridges.

In addition to the above indicated mileage which is of interest for general troop movements, and also because of its importance in the mobilization of industrial forces in case of war, the Department has also indicated 110 military reservations and other points of special military interest to which special access roads will be required. Sixteen of these points are in urban areas and 94 are in rural areas.

We are now in course of receiving from the Department indications of the particular access roads desired for these reservations and thus far have had brought to our attention a total of 576.5 miles needed to give local access to 43 points in 30 States and longer sections of road communicating with more isolated points in 13 States, totaling 2,435 miles.

It is believed that the estimated costs recapitulated above are sufficient to include whatever work may be required on all such military highways.

Rights of Way

As previously indicated, the costs of right of way are included in the total estimated costs of construction as above stated under each class of roads and streets.

The heaviest costs for rights of way will be incurred in connection with the construction of the interregional highway system and the construction of other express highways and special facilities in cities. Approximately $600,000,000 of the estimated cost of $2,000,000,000 for urban sections of the interregional highway system is for right of way, and approximately $400,000,000 of the estimate of $3,000,000,000 for rural sections of the interregional system is for right of way. The total for right of way on the interregional system is approximately $1,000,000,000. Not less than $3,000,000,000 will be required for rights of way for other express ways and special facilities in cities, this being the part of the estimated total cost of $11,500,000,000 for such facilities. An amount probably not exceeding $300,000,000 of the $3,000,000,000 estimate, as required for modernization of other primary rural highways, will cover the cost of right of way for such improvements and there will be smaller requirements in connection with

other rural operations. It is probable that the total expenditure required for rights of way during the period 1940 to 1960 will not exceed $4,500,000,000, which cost is included in the above recapitulation cost.

Grade Crossing Eliminations and Protection

There remain at present on the entire street and highway system of the country approximately 231,000 grade crossings. Of this number approximately 1,700 would be in the proposed interregional highway system and approximately 20,000 are on the State primary system. So far as I have been able to discover, there is no reasonably exact determination of this latter number, but I believe that the estimate is reasonable. The large remainder of existing grade crossings is located in greatest part on secondary and local rural roads and in smaller part on city streets not included in the interregional highway system.

It is probable that at least two-thirds, or 154,000, of the existing crossings can be eliminated by closure of crossings on unimportant local roads. This would leave 77,000 crossings. In the Federal-aid operations, up to and including the fiscal year 1937, a total of 10,864 crossings were eliminated and protected. Of this total, 9,161 were eliminated, 3,560 by separation and 5,601 by relocation of the road. A total of 1,703 crossings were protected by the installation of signs, signals, barriers, etc. If the 77,000 crossings indicated above as not eliminated by closure are dealt with in the manner similar to the treatment

of crossings involved in the Federal-aid program, as indicated above, these 77,000 main crossings would be dealt with as follows:

Crossings eliminated

By separation	25,200
By relocation	39,700
Crossings protected	12,100

The approximate cost of separating the 25,200 crossings above indicated would be $2,000,000,000. The approximate cost for protection on 12,100 crossings would be $3,630,000: a total of $2,003,630,000 for crossings not eliminated by relocation or closure. This total, as above indicated, is accounted for in the recapitulated costs given above.

Maintenance of Highway and Street Facilities

It is difficult to estimate upon any available basis the probable cost of maintenance of the various types of facilities described above. From such information as we have available it is believed that during the period from 1940 to 1960 the maintenance of all city streets will not exceed in cost the sum of $3,000,000,000. For all rural roads the cost is estimated at an average of $500,000,000 a year, or $10,000,000,000 for the twenty-year period. The total estimated cost for maintenance is therefore $13,000,000,000 for the period 1940 to 1960.

Motor Vehicle Registration and Revenues

By 1960 it is estimated that the registration of motor vehicles will be approximately 38,000,000. In the twenty year period between 1940 and 1960 it is estimated that the consumption of gasoline will be approximately 514,000,000,000 gallons, which at the average rate of 5¢ per gallon (4¢ of State revenue, the approximate weighted average at present, and 1¢ of Federal revenue) will produce a total of 25,700,000,000. The present average yield of all State motor vehicle registrations and other fees is approximately $13 per vehicle. By reason of relatively greater increase in motor truck registrations it is probable that this average may be increased to an average for the twenty-year period of $13.50 per vehicle without increase of the present rates of taxation. At these rates the approximate yield of all State motor vehicle license fees and other fees for the twenty-year period is estimated at approximately $9,300,000,000.

The Federal excise taxes on motor vehicles and parts and all lubricating oil, that is all Federal excise taxes exclusive of the tax on gasoline considered above, averages at present approximately $86,000,000 per year. Assuming a rate of production and marketing equal to the present, estimated over the twenty-year period, such Federal taxes will produce in that period a total of approximately $1,700,000,000.

Summing up the above estimated yields of motor vehicle taxes, the total that may be expected to be derived during the twenty-year period from 1940 to 1960 is $36,700,000,000.

The above estimate of yield of motor vehicle taxes approximates the estimated costs of construction of all facilities for the twenty year period, the total of which was $36,500,000,000. At the present rates of taxation therefore motor vehicle contributions would fail to produce whatever may be required for the maintenance of the roads and streets estimated above as $13,000,000,000 and all costs for administration and equipment of the highway departments and other agencies, the regulation of traffic and such costs as there may be for the servicing of debts.

The indicated surplus of costs may be reduced in part by profits on excess takings of land and in part by direct tolls levied wherever their imposition is feasible and finally an indeterminable general revenue reasonable as a contribution to the costs expressive of the general benefits furnished by all parts of the complete system and especially by the secondary and land service roads.