

ACCIDENT RECORDS AND TRAFFIC REGULATION

SOME IMPLICATIONS OF COST AND ORGANIZATION

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SYNOPSIS

There is a fairly developed consensus that the means for securing the greatest results in the direction of safer and more efficient highway operation include

- (1) The control of licensing through training and examination,
- (2) The inspection of motor vehicles and their proper conditioning,
- (3) A detailed knowledge of when where and how accidents occur,
- (4) A record of accidents so maintained as to facilitate the determination of proximate and contributory causes,
- (5) A system of highway patrol,
- (6) Methods of detecting violations of traffic regulations and of fair, reasonable and certain enforcement,
- (7) A method for determining the driver having more than his share of accidents,
- (8) A system of records suited to statistical analysis of essential facts relating to accidents

The development of these or other means considered necessary for securing the results desired is exemplified in similar auxiliary services already developed for the other recognized modes of transport—marine, rail and air

In connection with marine transport, there are the Coast and Geodetic Survey, the Hydrographic Office of the Navy Department, the Bureau of Lighthouses, the Bureau of Marine Inspection and Navigation, the Division of Marine Hospitals of the Public Health Service, the Coast Guard, and the North Atlantic Iceberg Patrol, and admiralty work in the Department of Justice

For railroad transportation, there are the block signal system, the interlocking and other safety devices on the permanent way, car and air-brake inspection, railroad telegraph and telephone systems a complicated financial and accounting service, and most of the Interstate Commerce Commission

And, for the air service, we find the same sort of services being developed, such as the established service of beacons and signals including radio direction control, a meteorological service and increasing requirements for more rigid inspection

Without undertaking to cover all the minor developments, we find the principal services represent large investments in capital plant and heavy annual operating costs, as follows

Maritime transport	Capital investment of auxiliary services \$142 650,000, annual operation of such services \$46,625,000
Rail transport	Capital investment, \$480,000 000, annual operation, \$62,400,000
Air transport	Capital investment, \$34 400,000, annual operation, \$1 740,000

In the field of highway transport, corresponding though not similar auxiliary services will probably develop and an approximation of their possible cost is indicated based on the present apparent tendencies

Assuming that present indications as to the prerequisites cited are sound, and that these will be eventually represented by more or less uniform adoption and organization throughout the United States, it appears that the costs may amount to the following

- (1) For capital investment in the needed plant depending on extent of development, from \$76 600,000 to \$124,000,000
- (2) For annual operating charges from \$169,000,000 to \$366,200,000

While we are at the moment considering principally the details of methods and means of securing greater safety and efficiency in highway transport as a utility for moving persons and goods, it is time we paused to study the implications of a general extension of the detailed operations that may finally be considered necessary and adequate.

Recent studies made by the Bureau of Public Roads and the Highway Research Board in the general field of highway safety under a special authorization of Congress disclosed that many States are making an attack on the accident problem along similar lines, but in most cases the methods adopted are so differently administered that there is comparatively little cumulative advantage in the work being done because of its variety and incompleteness.

We may agree, as most States do, that prerequisites of accident prevention are (1) The control of licensing through training and examination, (2) inspection of motor vehicles and their proper conditioning, (3) a detailed knowledge of when, where and how accidents occur, (4) a record so maintained as to facilitate use in determining proximate and contributory causes, assigning responsibility, indicating especially hazardous locations, conditions, or driving practices, (5) a system of highway patrol operating similarly to a rural police organization, but in addition capable of making an intelligent study of accident data, (6) methods of detecting violations of traffic regulations and of fair, reasonable and certain enforcement, (7) the determination of the habitual violator of traffic regulations and of the accident-prone driver, and (8) a system of statistical analysis that will disclose the true significance of accident facts. Without considering further the customary present administrative details of the usual State motor vehicle depart-

ment, such as licensing, registering, accounting, theft detection, et cetera, or the promotion of better and uniform legislation that falls to the lot of most agencies administering regulatory activities, we sense at once that the list of prerequisites recited is such as may develop into a very costly organization.

Every State today recognizes the need for one or more of these services in connection with highway or motor vehicle administration, and several States have organized agencies to meet several of these prerequisites to a greater or lesser degree. How far such agencies are to develop will depend upon the extent to which their partial application favorably affects the accident record. Whether these activities toward accident control and reduction, now generally accepted, are expanded or not, we may expect to have corresponding services developed, because the safe and efficient growth of motor transport is a vital matter in the general field of transportation. The annual accident record incident to motor transport and the consequent losses in life and property are clear evidence that highway transport today is neither as safe nor efficient as it should be, nor as it probably can be made. If we turn to marine, rail, or air communication, we find that certain auxiliary services have grown with the development of each of these major forms of transport, and the number and magnitude of these activities are impressive.

For example, along with the expansion of marine transport, which historically is man's earliest form of an artificial means of communication, we have as auxiliary services, the Coast and Geodetic Survey, the Hydrographic Office of the Navy Department, the Bureau of Lighthouses, the Bureau of Marine Inspection and Navigation, the Division of Marine Hospitals, the Coast Guard and the North Atlantic Iceberg Patrol, and admiralty

work in the courts None of these agencies is needed for the mere operation of a ship, but each has been developed in an effort, which at times has had spectacular and tragic impulses, to make marine transportation of passengers and goods reasonably safe and efficient

Corresponding services are operated in connection with railroad transportation There is the organized car and air-brake inspection, the signal service, the railroad telephone and telegraph, the use of safety devices on the permanent way, a complicated financial and accounting service, and the greater part of the Interstate Commerce Commission which is devoted to railroads The railroads could operate trains without any of these auxiliary services, and did so for years until there developed a really hostile public sentiment But in the interests of safe and efficient operation, all of these appurtenant details have been added with great improvement to rail transport

The same process is going on in connection with air transport There is the established beacon and signal service including radio direction control, meteorological service, and an increasing set of requirements for safety devices and a more rigid inspection Air transport service, however, is comparatively new, but as it expands it is exemplifying the same course of development as the others with respect to appropriate adjuncts to promote safety and efficiency

There can be no doubt that in connection with highway transport corresponding auxiliary activities will be provided on an equivalent scale, and eventually become just as permanent and integral a part of this method of communication as these varied services are a part of the other accepted and established modes of transport The fact that many States are in more or less close agreement as to the prerequisites and have in many cases established the nucleus of some of the

services that appear worth while is evidence of the inevitable tendency.

It will be interesting to examine for a moment the cost of some of these side lines to safe and efficient transportation and point out the sources of revenue for meeting the charges

Considering those auxiliary services associated with marine transport, we find first the Coast and Geodetic Survey with an operating plant costing, with ships and real estate, approximately \$6,550,000, and an annual operating charge, averaged over the last five years, of \$2,675,000 The Hydrographic Office of the Navy Department spends about \$550,000 a year and has a relatively small amount of plant which I have neglected The Bureau of Lighthouses has a capital investment difficult to determine, but it seems to be approximately \$50,400,000 and requires an average annual maintenance and operation charge of \$9,500,000 The Bureau of Marine Inspection and Navigation, handling steamship and boiler inspection, has a small plant investment of \$300,000, and an annual charge averaging \$1,500,000 What we know as the Marine Hospital Service runs a plant costing \$25,400,000, at an annual cost of \$5,750,000 Originally the charges for marine hospital services were met from so called "hospital money" collected as port dues against ships, and today "light money" is still collected under certain conditions, although such receipts are no longer directly assigned to the upkeep of the lighthouse service

The next adjunct to be mentioned is the Coast Guard, with a total investment on land and sea of \$60,000,000 and an average running cost of \$26,650,000

These services, appurtenant to marine transportation, by no means exhaust the charges that accrue to that mode of transport, but they do cover the larger and more important items

We have in these services a total capital investment of approximately \$142,-

650,000 and an annual operating charge of \$46,625,000. These figures are not exhaustive.

There is a considerable amount of admiralty business in our courts, but it cannot be differentiated as regards costs without extensive analysis. There are the Federal Communications Commission, the U. S. Maritime Commission, Bureau of Customs, Bureau of Narcotics, Immigration Service, and the quarantine stations connected with the Public Health Service, some or all of which agencies may perform duties properly assignable as services auxiliary to marine transportation. No attempt is made to segregate such activities or appraise them.

Turning now to air transportation, we find a similar set of investment and operating costs, but so far on a much smaller scale. There is a mapping service, installation of beacons, *et cetera*, and the capital costs to date approximate \$34,400,000 and the average annual charges are \$1,740,000.

When we consider the rail situation we find a somewhat different set-up, but the purpose and the results are essentially the same as in the cases of marine and air communication. The fundamental difference is that in these modes of transport, practically all the auxiliary services we have been considering are public in their nature—that is, they are maintained and operated at public expense and by public officials. The corresponding services in connection with railroads are installed and operated generally by the public utilities themselves as a direct charge against that form of transport.

These services include first the use of block signal systems for control of train movements. In some cases, these signals were introduced voluntarily, and are now compulsory on first class railroads by law. Track circuits for safety signals and devices have generally been voluntary installations, as have also the introduc-

tion and use of railroad telegraph and telephone lines. The creation by the railroads of special accounting and statistical sections to meet the requirements of the Interstate Commerce Commission has been under legal requirement, while car and brake inspection services have been largely voluntary.

Considering first the automatic block signal system, we find the approximate cost on the mileage at present controlled is \$190,000,000. The track circuits, interlocking and other safety controls represent a present cost of \$177,000,000. Railroad telephone and telegraph installations on owned lines amount to \$113,000,000. These auxiliary services represent in total \$480,000,000.

Annual operating charges are combined for the first two of these items in the only source of information immediately available. For operating the block signals and all track circuits, interlockers, *et cetera*, in 1936, the annual expense was \$41,250,000, for telegraph and telephone operation and maintenance cost, \$13,750,000. Carrying on the accounting and valuation work incident to the requirements of the Interstate Commerce Commission has amounted to an annual average of \$7,400,000 for a 20-year period. Other probably large items cannot be easily ascertained. These include charges for car, locomotive and brake inspection for safety purposes, track inspection, safety campaigns, *et cetera*. The total of the annual charges recited is \$62,400,000.

The illustrations I have used are not for the purpose of comparing probable costs or means of adequately improving highway transport. Obviously, the means will vary as they do among the other modes of communication and be appropriately developed to meet the particular requirements of highway transportation. The railroads have no service which corresponds to the Coast Guard or the Divi-

sion of Marine Hospitals Shipping has no service corresponding to the block system for control of train movements The prerequisites I have cited, which are at the moment accepted by many States as the most promising means of increasing the safety and efficiency of highway transport, have little resemblance to any of those means which are now in advanced development in marine, rail or air transport The cost of corresponding and appropriate auxiliary activities in highway transport may not be indicated by that of the services in the other modes of transport The cost may eventually be greater or less, depending entirely upon what line of growth is followed It will be interesting, however, to follow through some of the lines at present indicated for highway transport and see what the costs may be

Considering our first prerequisite of training and examination for drivers, we find some interesting proposals In Pennsylvania, a plan has been put forward for constructing eight training grounds with a road layout involving much the same variety of conditions met on public roads, such as, curves, sharp turns, narrow roads, and many types of intersections, stop, slow and caution signs, speed signs, and stop and go signals Arrangements are provided in the layout for parking in various ways, and others compelling backing and turning in both wide and narrow spaces There will be a small lecture room in which group instruction can be given and where the essential details of the vehicle mechanism will be taught to prospective drivers

Auxiliary to this field there is proposed a 5-mile section of road with similar variety of conditions including hills and vertical curves, long and short sight distances, *et cetera*, on which the drivers will receive final instructions in driving on the open road It is estimated that these installations will cost \$2,000,000

If we assume that car registration is an index of the number of drivers to be inducted, and if the proposal for eight fields is sufficient and adequate for Pennsylvania, a corresponding development of similar training fields throughout the United States would cost approximately \$29,000,000 In Chicago, a similar training field has been proposed and designed, and without the 5-mile section of open road is estimated to cost \$3,000,000 If maintenance and operation costs are assumed to be ten percent, the annual upkeep will amount to \$3,000,000

In Connecticut, a scheme has been operated in connection with certain town schools, under which initial instruction and training have been given to promising pupils of suitable age If such a plan is followed through, it will mean expanded school facilities, both for equipment and additional teaching staff We will not venture an estimate of cost, but this item in any case would probably not be large

The second prerequisite of adequate vehicle inspection is one on which there is fundamental disagreement as to administration machinery An estimate made in New York for a sufficient and adequate State inspection service with stations and equipment was figured to involve a cost of \$4,000,000 The same service plant for the United States would cost \$47,600,000; and the inspection of 28,000,000 vehicles annually would cost at least \$35,700,000, semi-annual inspections at least \$70,000,000, and quarterly inspections \$140,000,000 Inspections standardized in line with the questionnaire sent out under the auspices of Committee D-7 of the American Standards Association have been used in this rough approximation of costs, but it is questionable whether such short intervals as quarterly, or even semi-annually, are physically practicable I doubt also whether the estimate for equipment and

plant made for New York contemplated a sufficiently large installation to handle 5,000,000 or 10,000,000 vehicles annually, which is the approximate number involved in semi-annual and quarterly inspections, respectively. Perhaps the installation costs should be doubled or quadrupled.

The third prerequisite of a detailed knowledge of when, where and how accidents occur ties in with the other requirement that an adequate highway patrol or police organization be developed. At the present time, all but one State has some form of highway patrol or State police force organized or provided for. On the basis of 24-hour service, the mileage covered indicates that one man is responsible for from 38 to 1,250 miles. The corresponding figures, if present State controlled mileage only were covered, would be, 24 to 1,137 miles per man. These lower figures indicate that in some States more than the so-called State roads are already covered by the patrol system. We may carry this examination a step farther, to cover the latest available mileage figures for all rural roads. We find in this case that the coverage ranges from one patrolman to 78 miles to one man to 28,700 miles. This latter figure is, of course, fantastic, but there are at least 29 States where the coverage on this basis is one man to 1,000 miles or more. This fact is an indication of the great expansion in organization necessary ultimately if all roads are covered.

If we assume that the best present coverage appearing in the above figures represents the end to be sought in a highway patrol organization, we can estimate roughly the cost of such an agency covering the entire United States on the same basis. If we provide for 24-hour service, using in the night shift one half as many men as during the day, that is, using  $2\frac{1}{2}$  men for the 24-hour

patrol of each section, we shall need 31,000 men. The average salary paid a patrolman from our record of 43 States is \$137 per month. Patrolmen alone would cost then \$51,000,000 per year. Most States allow expenses estimated at approximately \$50 per man per month, or \$18,600,000. Captains, Lieutenants, sergeants, *et cetera*, will add to this and at least 10 percent will have to be added for office supplies, equipment, overhead, *et cetera*. This means about \$78,000,000 for a uniform country-wide organization to cover the present patrolled mileage on a basis of one man to 38 miles of road.

If we are of the opinion that 38 miles is too much for a single patrolman to cover, our figures will be raised. In Pennsylvania there is a plan afoot to combine the State police and highway patrol, creating a force of about 1,600 men. Even this force would on the basis assumed require each man to cover 58 miles, as against the best present coverage of 38 miles. If we place the limit at 25 miles, the cost would be \$118,500,000, and if developments required sections as short as 10 miles per man, the cost would be \$296,250,000 per annum.

This last figure is extravagant, but the special traffic officers in the District of Columbia average 33 miles per man, and if we consider the entire police force as active in traffic control as they in fact are when needed, the coverage is only 12 miles. Somewhere between these two figures may be the desired one, and 25 miles to each man is not, therefore, so unreasonable. Should we extend the coverage to all rural mileage as an ultimate goal on the basis of one man for 25 miles, the annual charge becomes \$700,000,000. But no one expects that such intensive policing would ever become necessary.

This is by no means the end of possibilities. A proposal has been made seri-

ously in Michigan to establish special accident squads covering territory so limited that they can operate practically as do the accident squads in such cities as Cleveland and Toledo, Ohio, and Wichita, Kansas. Such squads would require at least two men each, and if they were to operate as indicated, their radius of operation would be not more than 15 miles, or about one squad to an average county. The creation of such a force would probably permit a reduction in the regular patrol force, but this would by no means be so great as to offset the added cost of 83 such squads to cover the counties of Michigan. Such an organization would cost at least \$875,000 per year in that State. A nation-wide organization would cost probably \$26,000,000.

With all the accumulated data that our field organization would collect, we should simply be swamped unless we had a trained and sufficient office force to handle it and determine what it all meant, and so we come to our accepted prerequisite of a properly maintained record and a system of statistical analysis to disclose the true significance of the information assembled. What this organization would cost can only be guessed. At present the annual cost of maintaining motor vehicle registration and licensing agencies, which also do such statistical work as is done, amounts at present to approximately \$17,500,000 for 32 States. The estimated cost for the United States is \$26,250,000. We are now beyond the point of doing any estimating. We can only guess what an adequate accident recording and analyzing office would cost. Perhaps it would be twice or even three times the above figure, for the amount of material to be handled would be very great, and at the start the most expert statisticians would be required. At least a part of the force would be high salaried and expert in nature.

We need take no more time in presenting details. There would be a great deal of court work and special courts may be necessary. We have the illustration of admiralty cases before us as a part of the development around maritime transport. Special traffic courts already exist in some jurisdictions. These would have to be much more numerous and would sit most of the time.

This whole presentation may appear fantastic to some. But let us summarize the salient facts.

(1) We know that the other commonly accepted forms of transportation of passengers and goods in the course of their development have required certain auxiliary services to make them reasonably safe and efficient.

(2) These services have cost in plant, considering only the outstanding items, sums running into hundreds of millions of dollars. In maritime transport, \$142,650,000, in rail transport, \$480,000,000, and in air transport, \$34,400,000.

(3) The annual operating charges of these agencies represent an aggregate of \$110,765,000.

(4) We are slowly coming to an agreement that certain corresponding auxiliary services are necessary for the safe and efficient operation of highway transport.

(5) These agencies may cost tens of millions to install and hundreds of millions annually to operate.

Assuming a uniform development on a minimum basis, the installation of training fields and inspection stations alone will cost approximately \$76,600,000, and the annual cost of operating these, patrolling the highways, gathering accident statistics and analyzing them will amount to \$169,000,000 annually. If the organization is extended, the figures may be increased to \$124,000,000 for plant and \$366,200,000 for operation.

The problem as it presents itself is First, to determine the particular forms which the auxiliary highway services are to take, second, to ascertain the extent to which these services will be organized and operated, and, third, to decide just how they will be paid for

These services will become a third

grand division of highway costs, added to the present divisions of construction and maintenance Whether these costs are to be met directly from highway user revenues or indirectly from the highway users and others through general revenues will be an important question to be decided at a later time

## DISCUSSION ON ACCIDENT RECORDS AND TRAFFIC REGULATION

MR L W McINTYRE, *American Motonists Association* I think Mr James hit the nail on the head, where are we going to find the money?

CHAIRMAN MORRISON We usually find the money for the things we want—we find the money for movies and we find the money for lipsticks

MR BURTON MARSH Mr James has done something that needed to be done and that is to face something that we must look at squarely and not sidle away from as we appear to be doing. It is going to cost money, but if the public wants these things they are going to buy them

MR J S BURCH, *North Carolina State Highway and Public Works Commission* I think the Chairman was right a moment ago when he said we buy anything we want. Our rather limited experience has demonstrated that so far the people do not want it, and if they do, they do not say so. Individually a man is for safety, but at the same time it is very much like taking a drink, he wants his speed and he wants to have it in comfort and have everyone else get out of the way. I think so far the prac-

tical answer to the question is that the people do not want it just yet

CHAIRMAN MORRISON I wonder if Mr James has reduced any of these figures to cost per passenger

MR JAMES That figure of 124,000,000 dollars for operation means \$5 00 per car

CHAIRMAN MORRISON I mean on marine and air

MR JAMES I did not cover that point with respect to marine transport. The figures I have given after all represent only the part paid by the United States for marine transport. We take care of the marine transport of the world so far as it comes to our coast, and the other large maritime nations are also providing similar services. If you wish to get the entire figure you must add these foreign services to the cost that I have set up here for marine transport. You would not do so for railroads, of course, but for marine transport there are corresponding charges by the other countries which in large part should be added to these figures. Because of our tremendous coast line, our marine services lap those of other nations and the reverse also is true