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In this issue

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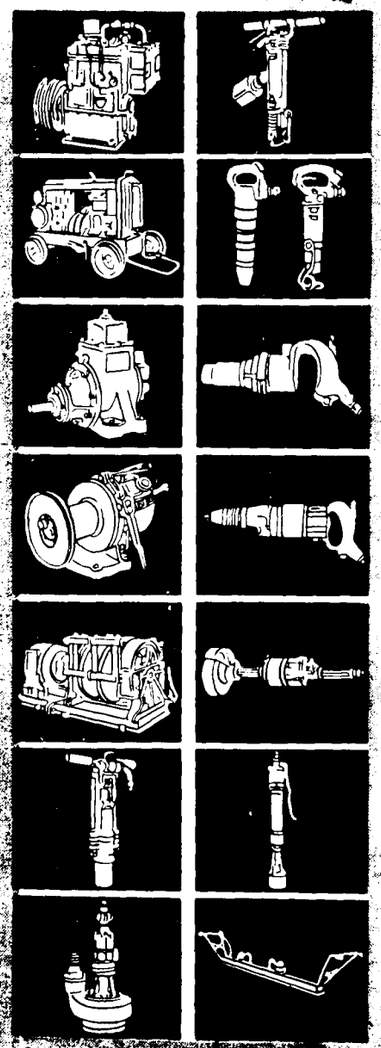

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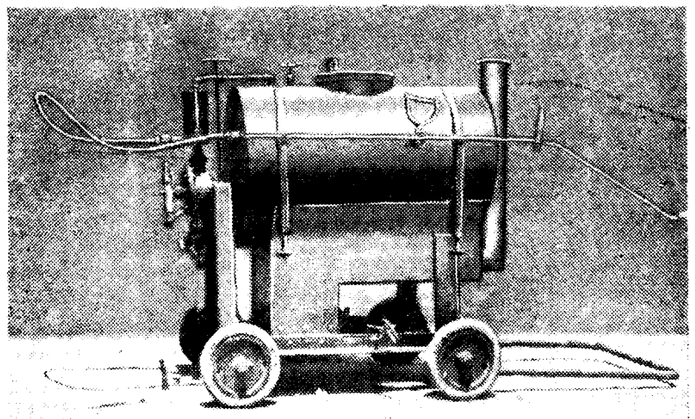

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THE PUBLIC ATTITUDE TO ROADS

An Urgent Need for Enlightenment

(Extracted from 'Highways and Bridges'— Aug. 22, 1951)

THERE is little public interest in roads.

There is a road outside one's front gate, looked after, one supposes rather vaguely, by "the Council," like the drains, and a burden, therefore, on the ratepayer. A country road is merely a part of the general landscape; apparently it has always been there, and it always will be. If you are a motorist, you grumble at the sharp corners and the inadequate width on the occasions when you have a narrow shave, and if you are a pedestrian you curse the motorists when they force you to scramble into the hedge, but these things are accepted as inevitable.

If you are one of those unfortunate people who have to get about in London or any other big city, you sit patiently in the bus, or behind the steering wheel, while you advance a yard or so at intervals in a mile-long traffic jam; but this state of affairs is again accepted as something inevitable and unalterable-like the weather—although an M.P. certainly got cross about it the other day while on his way to take part in an important division. Unfortunately, his indignation failed to ignite the flame of revolution and the London travelling public has remained unmoved in more senses than one.

The Machinery of Transport

Anyone who has submitted to cross-examination by an intelligent child thirsting for knowledge will know that the fresh young mind often makes a direct and logical approach to a problem which we sophisticated grown-ups dodge and dodder over, partly through ignorance and partly through lazy thinking.

Childishly Simple

A child, for example, on being told that a road is something for vehicles to run on, and, witnessing the solid jam of traffic which are a commonplace in any city street, would promptly ask: "Then why don't they run, instead of standing still?" If this example of clear logic is carried a stage further, it will be realized that the road and the vehicle are interconnected parts of the same mechanism. Economical running depends partly on carburettor design and adjustment and partly on road conditions; safety depends very much on brakes, but very much on road design as well; potential speed is greatly influenced by engine design, but *the ultimate controlling factor is often road.*

The thermal and mechanical efficiencies of an engine can be determined from a bench test, but the overall efficiency of the vehicle involves a factor x, where x may be defined as the "road efficiency." *The effect of road conditions is much greater than is generally realized.* In two journeys of comparable length with a specially equipped test car over routes of widely different character, it was found that more than twice as much fuel was consumed per mile on a traffic-infested road with many signal stops as on a road which enabled uninterrupted running to be maintained for comparatively long periods at a uniform speed. Furthermore, it was discovered that the most economical running speed was two and a half times as great as the best overall average obtained on the crowded inefficient route.

Do You Know This?

The wastage of time and fuel on inefficient highways has to be paid for. It is paid for by the city typist every time she buys a bus ticket, and by the housewife every time she makes a purchase. Does the public really appreciate this? Is it generally known that the cost of distribution of ordinary domestic commodities amounts to between 25 and 30 per cent of the retail price, exclusive of purchases tax where this is applicable, and that a very high proportion of the cost of distribution is for transport?

Why Tax Transport?

It does not seem to be realized that a tax on commercial transport, whether in the form of a fuel tax or a vehicle licence, is a tax on the goods which the vehicle is carrying. It is, in fact, a purchase tax. Motor fuel has been regarded by a succession of Chancellors as a legitimate source of revenue, although it is just as essential to our national existence as the coal and water used by the steam locomotives on the railways.

Road transport must continue, just as rail transport must continue, but motor fuel is classed for taxation purposes with such things as wines and spirits, tobacco and playing cards. Apparently the Government regards the conveyance of foodstuffs in motor lorries, the use of a motor car by a doctor or a district nurse, or even riding in a bus as a taxable luxury like drinking, smoking and card playing.

The taxation of transport is wrong in principle unless the proceeds are devoted to making transport cheaper, and the diversion of motor taxes to the general Exchequer is an iniquitous betrayal of a political promise originally made in good faith.

Unpaid Tax Collectors

Any source of fuel wastage caused by inefficient roads is a direct incentive to the Government to hold up any attempts to get the roads improved. Every traffic signal, for example, is an unpaid tax collector. Signal installations may provide the only possible solution to traffic control problems at certain locations, but hundreds of signals are retained as a makeshift method of regulating traffic at points where they are unsuitable and where reconstruction would provide a far more satisfactory alternative.

Investigations have shown that at one junction alone on a busy arterial road the effect of signal stops must add at least £ 3,000 per annum to the Exchequer in the form of tax paid on wasted fuel. This junction is so badly overloaded that signals cannot cope with the traffic without causing excessive delays, yet the levels at this point are admirably suited for a combined roundabout and a short subway which would give uninterrupted traffic flow without requiring the demolition of a single building or the acquisition of additional land.

Public Should be Told

There is nothing more disheartening than trying to drive home facts into non-receptive minds, and bored indifference is a far worse thing than active opposition. As far as roads are concerned, there is no sign of public interest or indignation, even at the disgraceful toll of accidents. It is not the highway engineer's job to run an advertising campaign for better roads. He cannot adopt the methods of the circus tout outside the fat lady's tent, but the public will only sit up and take notice if sufficient noise is made Who is going to make the necessary commotion? Can roads—and transport generally—be made a political issue at the next election?

These are not frivolous questions. They have a very direct bearing on the national welfare.

—o—

OUR CANADIAN DELEGATES

The following is an extract from a letter received from Canada by our road-engineer delegates on their recent return to India:

".....It was a great privilege to have you as our guests and the memory of my association with you will remain as one of the most momentous and outstanding events of my civil service career....."

—o—

LUCKNOW RESEARCH STATION

Work Done in 1950-51

THE State Research Station has recently received equipment worth about Rs 1,50,000 from the U.S.A. and is now well equipped to carry out research on soils, bitumens, concrete, and aggregates, and to investigate problems pertaining to buildings and roads.

With the installation of a constant-temperature room facilities for temperature control have now also become available. Arrangements for supplying gas to the laboratories are nearing completion.

During the year under review tests were carried out to ascertain :—

(i) Physical and Chemical properties of soil samples ;

(ii) Suitability of soils for stabilization or for brick-making ;

(iii) Affinity of aggregates for bitumen or tar ; and

(iv) Percentage of bitumen and aggregates in samples obtained from painted surfaces.

Besides this, tests on samples of aggregates, kankar, lime, and cement received from various Public Works Department divisions were carried out to determine their acceptability according to specifications. Samples of mortar and concrete were analysed to determine the proportions of their ingredients. All these tests proved very useful in judging the quality of materials used on works.

Failure of Concrete Roads

In order to investigate whether expansion caused by cement-aggregate reaction was responsible for the failure of cement concrete slabs on the Lucknow-Bareilly Road (miles 60 - 63) and the G.T. Road (miles 843 - 70) the laboratory carried out petrological examination of the aggregates used and of concrete specimens cut from these roads. No trace of reactive minerals was found in these samples. It was, however, noted that disintegration was the most serious in those regions where there were heavy deposits of ' REH ' which contains 60 to 70 per cent of soluble silica. Further investigations are in progress.

The literature available on the subject of cement-aggregate reaction has been studied and a note giving an outline of the existing knowledge on this subject has been prepared.

Samples of coarse and fine aggregates generally used in Uttar Pradesh have been collected and chemical tests for reactivity taken in hand.

Full investigations will include (1) chemical tests of aggregates, (2) mortar bar expansion test, (3) petrological tests of aggregates, and (4) chemical analysis of cement to determine the sodium and potassium content.

Linseed Cake As Soil Stabilizer

Experiments were carried out on methods of waterproofing subgrades and, after various tests on different oil cakes, it was found that a small addition of linseed oil-cake helped a great deal in arresting the rise of moisture in the subgrade. A report of the preliminary work done in this laboratory on water-proofing fine-grained alkaline soils has already been published in the Journal of the Indian Roads Congress (Volume XV-3) and in this Review for January 1951.

Investigations relating to the theory of waterproofing are in progress at present. An important application of the study has been the evolution of a non-erodable water-proofing plaster for the protection of mud huts. The new process is now being tried under varying climatic conditions.

Cracks in Buildings

Several buildings in Banda, Hamirpur, and Jhansi districts were noticed to have cracked. One of the causes of these cracks could be settlement brought about by the shrinkage or expansion of the soil under the foundations owing to varying moisture content. This moisture content changes with the level of the ground water table. The soil in these regions consists of heavy

clays and black cotton soil. The investigations recently taken in hand will, it is hoped, help solve similar problems in black cotton areas. From the data obtained it may be possible to predict moisture content at any depth for a particular level of water table and to correlate this information with volume changes.

Effect of Grading on Stability of Soil Aggregate Mixtures

The specification hitherto followed in the U.P. for stabilized soil road work, for example on the Bani-Harauni road, requires the addition of 40 per cent aggregate. No grading limits are specified. In the U.S.A. such limits are specified both by the American Society for Testing Materials and the American Association of State Highway Officials. American specifications allow reasonably wide tolerances on percentages passing each sieve and, as a result of these tolerances, it would be possible to exclude some fractions completely (" gap grading ").

Tests are being carried out at the Lucknow Station on several admixtures with a view to evolve a suitable specification. The programme includes some mixtures with " gap grading."

Standard Sand

The Indian Standards Institution and the Uttar Pradesh P.W.D. have adopted Leighton-Buzzard sand which is the British Standard sand to be used in testing cement. As this sand is imported from England it is very costly and sometimes difficult to obtain. Efforts have been made by the Alipore Test House to use Nangal-hat sand and they have suggested a formula for gauging the mortar. The Lucknow Station is also carrying out comparative tests with the Nangal-hat and the Leighton-Buzzard Sands in order to develop a substitute for the latter standard sand.

—o—

MODERN LIFE

Speaking as a layman I view the various testing machines with awe and amazement. They remind me of the story of a mother who went into a shop to buy a toy for her small son. The salesman demonstrated one to her and at the end she said, " Isn't that a very complicated toy ?" and the salesman said " Madam, this is an educational toy designed to fit the child to deal with the very complex modern way of life. Whatever way he puts it together it is wrong."

(From a speech by Sir Francis Meynell, at the opening ceremony of the new Structures Laboratory at Buckinghamshire for the Cement and Concrete Association).

—o—

SAYS YOU

The housewife heard the tile-setter grumbling to himself as he worked, so finally she asked what was the matter.

" This work too hard," he moaned, " I think I go back to Italy."

" Well, wouldn't you have to work even harder for a living in Italy ? "

" Whatsamatta, lady, you crazy? Over there we got the Marshall Plan."

TESTS OF HIGHWAY SIGNS FOR UNITED NATIONS

By Charles R. Waters (Mem. ITE) District Engineer
and
Gilbert W. Treble (Assoc. Mem., ITE) District Traffic Engineer, New York State Department of Public Works, Buffalo, N. Y.

(Extracted from ' Traffic Engineering ' – July 1951).

SOME time ago the United Nations appointed a committee of engineering experts on road signs and signals to study the advisibility and feasibility of standardizing highway signs on a world-wide basis. To do this, it was decided to have sets of signs fabricated by one manufacturer in the United States and then distribute similar sets to different United Nations Members for testing.

Each set consisted of 24 signs. The basic signs tested were Curve, Intersection, Railroad, Crossing, and Narrow Pavement. The standards used were United States, European and Central and South African, each with a set of variations of those standards as shown in Fig. 1, " United Nations Test Signs ".

In general, the tests consisted of having individuals in separate cars, each accompanied by a driver and a recorder, ride along the road at specified speeds and give readings as to the distance when the shape and message of the various signs could be comprehended.

Origin of Sign Standards

The origin of the United States and International standards of highway signing was in the middle twenties, the United States standard having been adopted by the American Association of State Highway Officials in 1925. The League of Nations through the international Convention of Road Traffic adopted the International standard the following year. The United States did not approve the International standard which was unified in 1931 at Geneva. The United States standard has been widely used throughout most of the Americas, while the International standard has been employed by nearly every other nation in the world. The two systems are by far the most predominant throughout the world today, although variations of the two are quite extensively used.

The Highway Transport Committee of the International Chamber of Commerce submitted a resolution relating to the world-wide standardization of signs at Paris in December 1946. This was to be done by providing standard colours and dimensions for all highway signs, since the

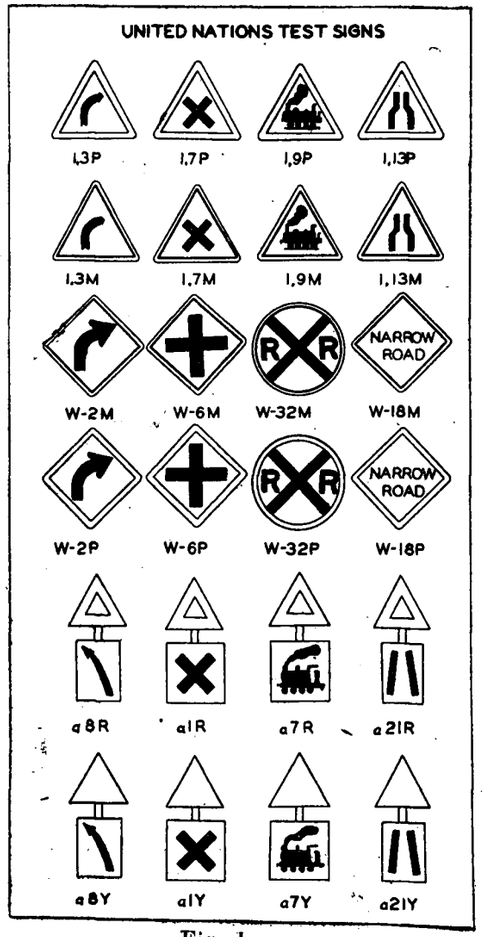


Fig. 1

Committee felt this was the only really effective method by which highway signs would make the greatest contribution to safety on the roads.

The next major step was taken by the United Nations at Geneva in the summer of 1949, when they set up a world-wide conference on Road and Motor Transport. Experts from sixty-eight countries were invited to the conference to take part in attempts to draw up a new set of rules and regulations for highway signs. Discussions were held relative to the possible standardization of traffic signs throughout the entire world. Although the conference was unable to agree on a single standard aceeptable to all countries, it reached somewhat of a compromise. The action taken was the adoption of a proposed "International" system which was based generally on current European standards. A recommendation was made that a special United Nations committee be named for further study in an attempt to adjust differences between the United States and the International standards. It was hoped that a standard might be developed to which all nations would agree.

Differences in Standards

Symbols. One of the main differences between the two standards is that the United States employs both symbols and lettering on its signs, while the International standard uses only symbols on nearly all of its highway signs. The latter method has the advantage of ruling out language barriers, although the general feeling in the United States has been that signs with word messages are often necessary.

Colour. Another difference is found in the colour schemes used. The individual signs of the United States never require more than two colours, including the colour of the background. On the other hand, the International standard employs a rather complicated colour scheme which enables them to use symbols almost entirely. Colours used for the three major categories of danger, regulatory and informative signs are variable.

Shapes. Another basic difference in the standard has to do with the shapes of the signs for various categories. The United States uses diamond-shaped signs for warning and cautionary signs, except that round signs are used for railroad crossings; octagonal-shaped for Stop signs, and square or rectangular for information or regulatory purposes. In the International system triangular shapes are used for danger signs; round signs are used for instruction purposes, and square or rectangular shapes for informative and directional signs. In the current tests not all of these types were used—simply those shown in the illustration.

Sizes and Placement. The overall size of the signs does not show great differences, although there are exceptions. The placement of signs in relation to the pavement height and offset does not vary much between the two standards. However, the placing in relation to existing dangers such as cross-roads and railroads, differs in some cases. The International standard permits Stop signs for intersecting roads to be placed as far as 164 feet from the intersection, while the United States specifies a maximum of 50 feet. The United States standard calls for erection of warning signs from 300 to 500 feet in advance of a hazard, while the International specifies 492 to 820 feet for its danger signs. In the matter of reflectorization of signs, the United States standard requires illumination or reflectorization of all warning signs, most regulatory signs and informative signs, while the International standard allows reflectorizing only in case no dazzle or obscuring of the legibility occurs.

* * *

With this historical background of the differences in the standards, we will describe the test conducted recently by the New York State Department of Public Works.

New York test

For the test, twenty-four signs were used—four representing the European standard; four the European standard with variations; four the American standard; four the American standard with variations; four the Central and South African standard; and four the Central and South African standard with variations. The Central and South African signs are similar to the European, in that both employ the use of symbols. However, in place of the triangle they utilize a triangular target mounted above a rectangle. All of the signs tested were reflectorized with reflective sheeting.

The signs tested in New York State were erected on April 5, 1951, along Touring Route U. S. 20 which parallels the shore of Lake Erie in Southern Erie County. A section of highway about eight miles in length was used for the test section. This length enabled the signs to be spaced so that no two signs were in view at any one time. In order not to confuse the travelling public, a warning sign was erected at each end of the test section (See Fig. 2). To further eliminate confusion, the signs with railroad designations were covered when the test runs were not being conducted. This insured against the possibility of buses stopping for such signs.

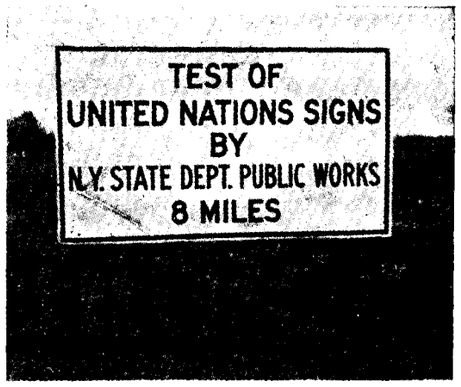


Fig. 2

Method of Test

The twenty-four signs to be tested were divided, and twelve were placed on each side of the road. Therefore a complete test run consisted of travelling south over the section, turning around the proceeding north to the point of beginning. Since the section selected was on a fairly straight horizontal alignment with only slight relief, it was possible to secure long sight distances. In placing the signs, every attempt was made to insure sight distances one-half mile or more in length. A random order of signs was used so that no conclusions could be drawn before the signs were actually sighted. For example, the International standard railroad sign was used, followed by the United States standard curve or crossroad sign, and then the Central and South African narrow road sign.

During the progress of the tests the signs were transposed on the posts. Two arrangements of signing were employed in order that no sign would be given preference or be slighted in the rating. This was necessary due to the unfamiliarity of the observers with the International railroad and other signs. To simplify changes, the signs on the west were changed with the ones on the east side of the road. This procedure resulted in an exactly reversed order; thus sign 1 in the first arrangement became 24 in the second arrangement; sign 5 became 20; sign 12 became 13, etc. Half of the readings for each condition were obtained with one arrangement and the other half with the second arrangement. This balanced the reading and gave average results.

Fourteen 100-foot intervals in advance of each sign were marked with a stake with an appropriate number in order that the recorder could quickly establish the distance away from the sign at which the observer first recognised the true shape, and later on the distance at which the sign was readable. The nearer intervals were also marked with an intermediate 50-foot stake.

For the test, three cars were used in order that three observers, one in each car, could be taken over the test run at one time. The drivers were required to maintain an average speed of 50 miles per hour during the day, and 40 miles per hour at night. The observer sat in front beside the driver and called off the shape of the sign when it was recognizable. If the right shape was called off, the recorder sitting in the rear seat noted the distance on a form prepared for this test. In case of a mistake, he waited until the correct shape was given before recording the distance. The same procedure was used for the instant the observer could name the message given by the sign.

During the three week period beginning April 9th, 142 test runs were conducted during varying conditions of

cloudy, rainy, and clear weather in the daytime, and cloudy and rainy weather in the evening after dark. The observers were selected as those representing a fair cross-section of drivers. Among them were mechanics, painters, welders, stenographers, housewives, book-keepers, clerks, school teachers, truck drivers and engineers. All were selected at random, some wore glasses and others did not, and the age spread of the group was from 21 to 60 years.

Some Outstanding Results

Some observations were made regarding the various signs, but at this time it seems best not to draw any conclusions. Three other States conducted tests on the same set of twenty-four signs, and similar tests on similar signs are being run in foreign countries. It can, however, without divulging the final results, be stated that the European and African signs for railroad crossings were often mistaken for a curve sign because of the smoke trailing from the stack of the locomotive (See Fig. 3). The locomotive is black on a white background surrounded by a red border. On the other hand, the round shape of the United States railroad marker was not readily noted at a distance and frequently was described as square rather than round. The double R's on the round railroad sign were not legible at long distances, and thus in a number of instances the cross was described as being an International cross-road sign.

The United States "Narrow Road" in four-inch letters was not easily readable or recognised as quickly as the European or South African symbols for narrow roads. However, the United States curve signs with their heavy arrows on a 2 ft by 2 ft

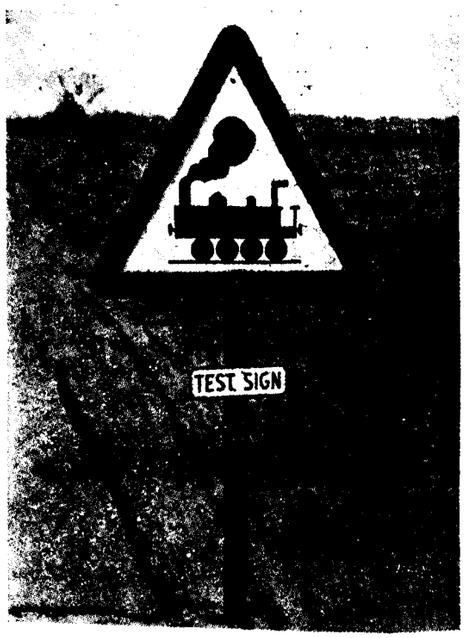
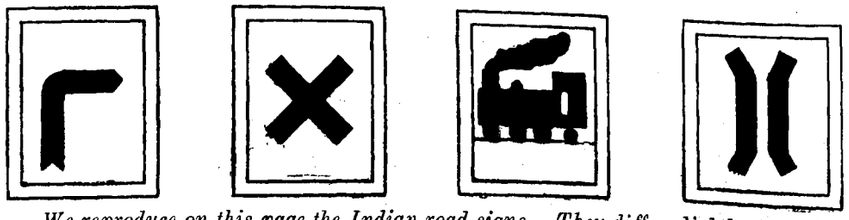


Fig. 3

diamond shape were recognised more quickly than the equivalent sign used by either the European or the South African countries.

It is expected that in the near future the Committee of the United Nations will release a report showing the results of all of these tests. There is considerable work ahead if the United Nations is to gain uniform standards of signing highways, but it would appear that a good start has been made toward rating the merits of the two standards.



We reproduce on this page the Indian road signs. They differ slightly from the signs tested in America. We do not think our Indian railway engine symbol could be mistaken by anyone for a curve symbol. Our existing right and left hand curve symbols also seem to be such that they can be recognised at a long distance. [*Ed.*]

THE WORLD IS GETTING ROAD-MINDED, WHAT ABOUT INDIA?

BELGIUM

BELGIAN CONGO

The Export-Import Bank has approved a loan of 15,500,000 dollars for the building and improvement of roads, the modernisation of waterways and the construction of new power stations in the Belgian Congo. This loan is in addition to the E.C.A. grant of 1,785,000 dollars made at the beginning of the year. The Congo has a Ten Year Plan for transport improvements, which includes ocean and river ports, roads and airports.

The Belgian Congo is one of the principal sources of uranium in the world.

GREAT BRITAIN

The Economic Co-operation Administration has announced that Great Britain will be granted 7,738,000 dollars from Marshall Plan funds for the development of her overseas territories in Africa, South East Asia and the Western hemisphere. This is in addition to the 4,500,000 dollars already granted for British territorial projects.

Over half the grant—4,100,000 dollars—will be used for road construction in Tanganyika, Northern Rhodesia and Nigeria. It is reported that the British Government will provide additional funds equal to, or greater than, the E.C.A. contributions.

Roads scheduled for construction are the link from Broken Hill to Tunduma in Northern Rhodesia, which will connect the copper belt with the agricultural areas; a new road from Morogoro to Iringa in Tanganyika, which will complete an all-weather route from the port of Dar-es-Salaam into the interior; and a road from Kano in Nigeria through Maiduguri to the French-Nigerian border, where it will join the new road from Fort Lamy in French Equatorial Africa.

GREECE

The village of Paleopanagia has been assisted by Marshall Plan dollars in the building of a road for the transport of farm produce to the markets of neighbouring cities. It has been built with voluntary labour under a scheme which was worked out by the Greek Government and the Marshall Plan Mission.

HONDURAS

The International Development Bank has announced a 20 million dollars highway development plan for Honduras, which involves the construction of 1,088 kilometres of access roads.

NICARAGUA

The International Bank for Reconstruction and Development has made two loans amounting to 4,700,000 dollars to the Republic of Nicaragua: one loan of 3,500,000 dollars for the purchase of road building equipment and machinery and the other of 1,200,000 dollars for agricultural machinery.

The road loan will permit the government to import all the necessary equipment and materials for use on eight road building projects, which will improve communications between the principal production and export centres and open up new areas for the cultivation of coffee, cotton, corn and other crops.

The roads to be built total 259 kilometres, will have a width of 7 metres, and be asphalt paved to permit heavy traffic at all seasons of the year. They will be built in a period of three and a half years. Maintenance will be the responsibility of the Ministry of Public Works and Development.

At the present time, Nicaragua has only some 274 kilometres of surfaced roads and a total of 764 kilometres of all-weather roads. Agricultural equipment consists of some 300 tractors.

PERU

The Export-Import Bank has recently approved a loan of (U.S.) 650,000 dollars towards the construction of an 80 kilometre access road to the Pasto Bueno tungsten mine near Pampas, Peru.

SIERRA LEONE

Extensions and improvements to the road system of Sierra Leone are being carried out and work on the surfacing of main roads is now in progress. The P.W.D. has also studied the possibility of replacing a number of the more important ferries by bridges. A Consulting Engineer has been engaged for the pnrpose of surveying the sites and furnishing estimates and plans.

Marshall Plan funds totalling 210,000 dollars will finance the building of ten of the bridges.

[*International Road Federation, Memorandum No. 51*]

ROADS IN THE PARLIAMENT

Assam Access Road.

3rd September, 1951.
Starred Question No : 710
By Shri Jnani Ram.

Will the Minister of Transport be pleased to state :

(a) the time when the Assam Access road was proposed to be constructed ;

(b) the time when the work was stopped and the progress so far made ;

(c) whether the Government of India desire to include it in the list of National Highways ; and

(d) if not, whether the Government propose to give any financial aid for its completion ?

Reply by

The Honourable Shri K. Santhanam

(a) In 1947.

(b) The work has never been stopped. The first phase work has been completed and the road opened for through traffic. The second stage works of providing permanent bridges (to replace ferries at 5 places) and black topping surface where this does not exist, are in progress.

(c) This road already stands included in the provisional National Highway system as N. H. No. 31.

(d) Does not arise.

Road Fund Works in Bihar

6th September 1951.
Starred Question No. 834
By Shri Jnani Ram.

Will the Minister of Transport be pleased to state :

(a) the names of Projects which have been sanctioned or approved of in the State of Bihar and the expenditure on which is to be met from the Central Road Fund allocated to the State of Bihar ; and

(b) the cost of the projects ?

Reply by

The Honourable Shri K. Santhanam

(a) and (b) – A statement giving the required information is laid on the table of the House. *(Printed below)*

Statement showing the details of works in progress financed from the allocations from the Central Road Fund to Bihar.

S. No.	Particulars of scheme	Estimated Cost Rs
1.	Patna-Nawadha Road – (a) Improvement of the Bakhtiarpur-Bihar Road ; & (b) Additions and alterations in bridges Nos. 3, 4, and 6 in connection with (a) above.	4,54,994/-
2.	Link road from Daltonganj-Hariharganj road to North Keol bridge at Garhwa road station.	2,72,471/-
3.	Additional bridge over Mahura Channel on the Chapra-Sonepur Road	15,365/-
4.	Entertainment of special establishment for the preparation of detailed projects of road development.	15,000/-
5.	Cost of special establishment required for the preparation of project and detailed estimates of road schemes in connection with post-war road development in Bihar.	3,32,443/-
6.	Construction of two lengths of 5 miles each of trackways in Bihar.	1,00,000/-
7.	Converting the Tinpahar-Rajmahar road into an all-weather road.	45,390/-
8.	Metalling 9 miles of the road from Jamshedpur to Tiring of the Chaibassa-Jamshedpur road	1,13,791/-
9.	Improvement of the Barha-Mokammah section of the Patna-Mokammah Road.	6,96,021/-
10.	Experimental work on Motihari-Madhubani Ghat Road	2,21,200/-
11.	Experimental work on Nasriganj-Bikramganj Road.	81,200/-
12.	Contribution from the Central Road Fund towards the additional cost of motor transport in Bihar.	23,717/-
13.	Preliminary survey and boring work in connection with the construction of a screw pile bridge at Sulaimanghat on Kamtul-Banipatti Road in the District of Darbhanga.	1,620/-
14.	Metalling the road from Motihari to approach of Lalbagia bridge on Motihari Dhaka Road.	26,155/-
15.	Construction of a screw pile bridge at Jhatmalpur in Darbhanga District.	4,07,000/-
16.	Construction of a bridge on river Gumani on Barharwa--Burhait Road in Santhal Parganas District.	7,36,600/-
17.	Improvement of Bihar-Barbigha-Sheikhpura Road in Patna District.	21,01,424/-
18.	Improvement of Chapra-Sonepur Road in Saran District.	30,58,396/-
	Total :	87,02,787/-

Churaibari – Agartala Road.

3rd October, 1951.
Starred Question No. 1496.
By Shri G. S. Ghua.

(a) Will the Minister of Transport be pleased to state what further progress has been made in the construction of the projected Churaibari-Agartala road ?

(b) What are the main causes of the delay in the completion of the road ?

(c) What is the total estimated cost ?

Reply by

The Honourable Shri K. Santhanam

a) & (b) The formation of the road is nearing completion and Construction of semi-permanent bridges and armco culverts is in progress. The progress is not, however, quite up to the mark owing to the following main difficulties :—

(i) Disturbed conditions and insecurity created by undesirable elements in the vicinity of the road.

(ii) Shortage of labour.

(iii) Materials required not being readily available and difficulties in transporting them.

(iv) Difficulties in supply of rice rations to labour.

(c) About Rs 3 crores for the first stage of the work.

LIES

[A misogamist of our acquaintance suggested we should publish some poetry. Among the samples he gave us was the following couplet which, we are afraid, does not truly represent what the poet actually said. – Ed.]

"The light that lies in woman's eyes
And lies, and lies, and lies, and lies."

ADVICE TO YOUNG ENGINEERS

(*Extracted from 'The Surveyor'—June 23, 1951*)

THE severest test awaits him (the young engineer) when he secures his first appointment involving administrative responsibility, such as chief, deputy or departmental officer, according to the size and set-up of the particular department.

Whilst appreciating that the hard school of experience is the best, a few hints may be the means of avoiding many of the pitfalls which some of us, who were not born administrators, may otherwise have avoided.

It should be remembered that members of local authorities are drawn from all classes and sections of the community, and it is therefore to be expected that they will have by no means a common approach to any particular problem which comes before them. After a brief experience of the members with whom he is dealing, the officer should be able to anticipate, and so prepare for, the reactions of the individual members to a particular line of approach or proposal. Whilst the council must remain as a corporate body responsible to the burgesses for policy, they will rely upon the officials for guidance and intelligent anticipation before reaching a decision. Such advice within the committee should be candid, whether or not it is likely to please or displease particular individuals. The council having once determined their policy, it remains for the official to put it into operation to the best of his ability, whether or not his advice has been accepted. In fact, if the decision is contrary to his advice, the officer should put forward an even greater effort to see that the council's wishes are fulfilled.

It should always be borne in mind that an individual councillor has no authority to give instructions and any matter to which attention has been drawn between committees should be dealt with according to clearly established principles; if it is one of policy, it should be brought before the next meeting of the committee; if it is a matter of urgency, the official should use his own reasoned judgment in anticipating, from previous precedents and experience, the probable decision of the committee. Some officials are constantly referring matters to their chairmen, but this continual running after chairmen soon comes to be recognised for what it is—passing the responsibility rather than having the courage of one's own convictions. Much, of course, must depend upon the outlook of the particular chairman with whom you are dealing.

It is necessary to be on your guard against the type of councillor who considers it his duty to press a case on behalf of an individual. There is no justification for giving any priority in such circumstances and, even if there is only the remotest possibility of legal action, his inquiries should be dealt with in the same guarded manner as if it were the litigant himself.

It is unfortunate that many members of the council do not realise whilst pursuing such inquiries on behalf of an individual that so often they are damaging the interests of the remainder of the electorate.

Different Reactions

When you have gained experience of the workings of several local authorities, you will no doubt be struck by the different reactions of committees to their officials, not always depending upon the measure of confidence the official has warranted, some will regard them as employees to carry out their instructions, whether they be good or bad. The more enlightened authorities will look upon them as their advisers, welcome their criticisms and advice and, having reached a decision, will leave them to put into operation, without interference, the designs and constructional works and matters of normal day-to-day administration.

Have the courage of your convictions and make all your reports in writing; be brief; discriminate between policy and technical advice; in the former case, give the different points of view which occur to you; in the latter case, be decisive.

It is in the best interests of the local authority, and the officials themselves, that personal pride and prejudice should be put in the background and every effort made by each official to appreciate the other's points of view.

* * *

A practice which I can recommend, which took a war with the bombing of the civilian population to produce, is a meeting of the chief officials once a week for coffee. Although this is often regarded as a purely social occasion, it is astonishing the amount of business which can be and is transacted at such a meeting.

I would particularly stress the importance of chief officials presenting a united front before a committee. There are bound to be disagreements amongst them, but let these differences be resolved outside the committee room, and do not get caught up in an argument with one of your colleagues in the presence of a committee.

Beware of the councillor who commences to criticise one of your colleagues and treat him with the assurance that he is just as likely to adopt a similar attitude to you in your absence. Any councillor who tries to drive a wedge between chief officials is only a mischief maker. The good councillor knows that teamwork is just as essential with the officers as it is with the council if the whole administration is to succeed.

Delegation

Although local authorities and their officials were constantly pressing the Central Government to give a greater measure of delegation, it was not always appreciated by chief officials that they, in turn, should give the greatest measure of delegation to members of their staff. In this way the staff would learn to accept responsibility and in very few instances would it be found that such confidence had been misplaced. The staff should be encouraged to work as a team, with the chief officer as captain, and every effort made to avoid or smooth out personal differences. Delegation necessitated a measure of confidence; nothing could be more irritating to an assistant, who had probably spent months on a scheme, for a few unimportant details to be amended by his chief solely for the purpose of indicating that the final word still rested with him.

* * *

Telephone messages from Government Departments must be treated with the greatest caution, particularly where finances were concerned. There was a growing tendency in recent years for the recipient of a letter written to a Government Department to assume that a telephone conversation could provide an adequate reply to the letter. Absence of authority or evasion rather than speed might be the reason for this method of reply, and discretion would be required by the officer who found himself faced with this type of reply. In case of difficulties at a later stage, telephone conversations were not likely to be of much assistance.

* * *

Through Proper Channels

When a senior officer visited a site, his instructions for variations should only pass through the works supervisor. It might look important to visit a site occasionally and give men fresh instructions direct or cancel existing ones; it could only lead to doubt and uncertainty in the minds of the men and to lack of confidence in the person from whom they usually received their orders.

Finally, discussing the attitude of the general public to local government service, the speaker emphasised that too much trouble could not be taken in replying to complaints received from the general public, so often based on limited information on the matter at issue. The Department might be judged outside the council chamber by the attention, or lack of it, given to matters which were in the public eye—the blocked road drain, the pothole in the road, or a personal service like house refuse collection.

* * *

[*From the Presidential address at the Annual Conference of the Institution of Municipal Engineers, United Kingdom, June, 1951*]

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HERE AND THERE

1. IRISH INGENUITY

A golf club (in Ireland) decided to remove several large rocks which were embedded in the fairway and were a source of annoyance and potential danger to players. An engineering firm was consulted and they took drillings of the rock. Eventually an estimate for the work was received, but the cost was more than the club could afford.

A local handyman, hearing of the difficulty, offered to do the job for 280 dollars. His offer was taken up although regarded with some scepticism. The handyman duly arrived on the scene with a donkey and cart, loaded with turf, which as you know is largely used here as fuel, and is perhaps better known in America as peat. He proceeded to pile the turf around one of the big rocks, set it on fire, left it to burn and returned a couple of days later. The rock was found to have split up into easily handled pieces, which were removed by the same donkey and cart. Later this enterprising gentleman sold the stone to the local council for roadmaking, thereby being paid twice for this work.

(From 'Excavating Engineer'—August 1951).

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2. AUTOMATIC TELEPHONE

Manufacturer: Electronic Secretary, Inc., Milwaukee 4, Wis.

Claims: Automatic telephone for contractor field offices answers the phone automatically, takes messages and also tells the caller when contractor will return. In case of an emergency at night, the caller is told where his party can be reached. The Electronic Secretary is easily installed as it is not connected to the phone. And the unit serves as a handy portable dictation machine.

(From 'Excavating Engineer'—August 1951).

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3. COFFEE TO PREVENT ACCIDENTS

FREQUENT "coffee stops" along highways in same leisure spirit that "coffee breaks" prevail in business and industry would go far to eliminate tension that figures in traffic mishaps, according to Irmagene Nevens, Educational consultant to Greater New York safety council.

[New England Construction, July 15, 1951]

[In our October issue we published brief particulars of the use of "Yoga" to curb road accidents. We are glad to be able to suggest this easier and more welcome remedy for those who can not be "Yogis".....ED]

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4. ROAD RESEARCH LABORATORY STAFF

MR R. Winterbottom asked the Under-Secretary of State for the Home Department, as representing the Lord President of the Council, how many people are employed in the Road Research Laboratory of the Scientific and Industrial Research Department.

Mr. de Freitas: 270 non-industrial and 151 industrial.

(From 'Highways and Bridges' —July 4, 1951).

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5. RUBBERISED ASPHALT ROAD CONSTRUCTION

Leicestershire and Leeds Experimental Sections

LEICESTERSHIRE County Council have constructed a stretch of rubberised asphalt on one of the principal trunk roads (A.447) through the county. Four sections of road have been laid: (1) a normal road to serve as a control; (2) a similar road with the addition of rubber powder; (3) a normal road, but with a deficiency of binder; (4) a road with a deficiency of binder, but with the addition of rubber powder.

The purpose of the sections deficient in binder material is that the life of the road will be shortened, so that the advantages, if any, of the rubberised section will be apparent much sooner than if normal road surfacing material had been used. The road material used on all four sections will be a standard hot mix, cold asphalt.

The Leeds experimental stretch consists of a spray coating of bitumen and chippings over the worn surface of the existing roadway. The bitumen contained two-and-a-half per cent of flocculated latex crumb, or rubber powder, blinded with a dressing of ¾ in. whinstone chippings, rolled in the normal way. At the same time, a similar stretch of adjoining roadway was spray-coated with a normal, non-rubberised bitumen mixture to serve as a control.

(Extracted from "Surveyor"—August 25, 1950.)

[A more detailed article on this subject appears elsewhere in this issue.....Ed.]

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6. SOIL CEMENT ROAD

Building and Roads Research Laboratory, Karnal. (Punjab)

USE of cement-soil study has been made in case of emergent road construction and at places where blending of soil is not possible. One mile of such road has been constructed, keeping, in view that the quantity of cement added is such that the resultant mass can resist softening action of water in the base course and at the same time has fairly high compressive strength. This road was surface treated and is behaving very well under traffic.

[Extracted from the Annual Report of the Indian National Society of Soil Mechanics and Foundation Engineering—1949–50]

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7. EFFECT OF OVERLOADING ON PAVEMENTS

TEST was conducted on a one-mile two lane section of Route No. 301 under the supervision of the Bureau of Public Roads to determine the relative effect of 18,000 and 22,400 single axle loadings, and 32,000 and 44,800 tandem axle loadings on a concrete pavement. Briefly it was found that 22,400 axle load, which, incidentally, prevails legally in New York, caused six times as many pavement cracks as the 18,000 pound load. Tandem axle loadings of 44,800 pounds caused eleven times as many cracks as did the 32,000 pound axle load. Similar relative effects were found in other types of highway damage from the same loadings.

In one test in this State in the summer of 1950 during which 1,062 trucks were weighed, 146 or 13·7 per cent were found to be overloaded.

According to figures released by the Bureau of Public Roads in 1950, light trucks are fully loaded for 36·7 per cent of their mileage, light medium trucks for 52·8 per cent, medium heavy trucks 55·2 per cent and heavy trucks 66·5 per cent.

[Extracted from "Truck Taxation in New York State" by George T. Manning in the Traffic Quarterly for July 1951.]

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8. 275 FT SPAN PLAIN CONCRETE ARCH

THE reconstruction of the Lessart viaduct over the Rance, which was destroyed by the Germans in 1944, has involved the construction of a large arch of plain concrete with a span of 274·86 ft and a rise of 76·42 ft. The viaduct is carried on a spandrel superstructure over a length of almost 125 ft in the middle of the arch, and on three semicircular arches, each of 25 ft span, on either side.

The arch was cast on timber centering supported at each abutment on substantial temporary abutment frames of reinforced concrete. The centering had a span of 255·2 ft and a rise of 73·4 ft and was 8·8 ft in depth and 19·7 ft wide. It consisted of eleven similar arch trusses, 1·96 ft apart, cross braced on the inner surface by a grillage of beams, and on the outer surface by the planking forming the arch shutters. The planking consisted of a double bed of 27 mm planks, placed perpendicular to each other at 45 deg. to the axis of the centering.

The main concrete arch varies in thickness from 12·46 ft to 6·56 ft and was cast in three stages. The centering was strong enough to carry only the weight of the first stage. The second stage was cast on the first, which supported it, and the third on the first two.

The Lessart viaduct is the largest non-reinforced concrete arch in France.

(*Extracted from 'The Engineer'—July 20, 1951*)

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9. "WASTEFUL EXTRAVAGANCE" OF ROAD NEGLECT

SPEAKING at the annual meeting of the Roads Improvement Association in London last week, Mr. J. S. Killick, MICE., said it was not economy to starve the roads —it was a wasteful extravagance. To neglect roads was to neglect the first need of communal life; and the public had to pay accordingly. They now paid, and paid heavily, for road neglect in extravagant transport costs; excessive wear and tear of their vehicles; delays and wasted time; and in road casualties involving an incalculable amount of human misery in addition to financial losses. And everyone knew that these payments totalled many times that of the requisite expenditure to put the roads in reasonably good order.

(*Extracted from 'The Surveyor'—June 16, 1951.*)

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10. ETERNAL TRUTHS

THE "old man" came into the office just as a surveying party was starting out. "When you boys come back," he said, "I will show you a translation of that Egyptian document, written on papyrus, about 4,000 years ago. It is a report to the Pharoah of that time."

This was the translation:

"Know, O mighty Pharoah, that I have made inspection of the works of the upper Nile. I found the builders to be a most strange breed. First cometh men with a three legged prong with which they make diverse observations. When they approach a village the maidens fleeth and the villagers bewail exceedingly because they always aim the prong at a house, saying "it must be moved," although the desert stretcheth for miles around desolate. Sometimes the prong men drive little stakes in the ground. They play a game and wait until someone knocks down one of the stakes, and then the prong men jump in the air and shout and tear their hair and call on Raa and Osiris and Isis and Set and Horos and all the lesser gods, and they become exceedingly wroth. All about a little stick. They also make many hieroglyphics, many of which they do not themselves understand.

"Then cometh the contractors. They are a class that have many possessions and ride in fine chariots, but they easily

run to bitter tears, and they runneth down the work to be done, to each other, that they may make the other afraid and he add much expense to his calculations.

"Then cometh the material men clad in fine raiment and the maidens meet them with gleeful smiles, as they have something magic called an 'expense account.' They are all worshippers of the Sacred Bull. Every morning they chant 'O Sacred Bull, Keep us full of thy substance because only with thee can we make our living.'

"Then cometh the letting of the contract. Whereat one contractor draws the prize, and the rest of the contractors beat their breast and pour ashes on their heads, and say with a mighty shout, 'He can't dot for the money.' Always have they said this, and always to the end of time will they say it, even until the stars grow cold.

"But the low bidder he smiles and is pleased with himself, wise in his own conceit, and he hunteth up the three-prong men and taketh them to dine with him, and handeth the cheque to a material man."—Courtesy Bill Baird, Southland Company.

(*From 'American Highways'—July 1951*)

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11. POLICIES THAT SHOULD NOT BE REPEATED

IN the field of highways and highway transport, out of our past experience there are two policies characteristic of the war period that would be disastrous if repeated now. The first of these was the inclusion of highways in the order to cease construction unless certified by control authority. The second was the disregard of State legal load limits, particularly axle weight concentrations for military hauling or claimed military cargoes. Each of these two policies was advanced on the theory of aiding the defence programme.

(*From an article "Relation of the Highway Programme to the National Economy" by Thos. H. MacDonald—'American Highways'—January 1951*).

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12. DO THE PLANNING COMMISSION KNOW THIS?

THE fundamental principle emerges that in every dollar of national income there is an increment of transport. To hold national income at current levels it is necessary to hold transport at the same levels. To increase national income it will be necessary to increase transport. This does not mean transport of one type, but transport of all types. This statement of course includes both the traffic demands created by the upward trend of national production and the multiplied activities of the defence establishment. There are sufficient evidences all about us that the whole of transport as now operated is not adequate to absorb an increasing transport consumption. The symptoms are recognized but the disease has not been diagnosed. An initial allocation has been made by the National Production Authority of steel for the production of new freight cars at the rate of 10,000 per month.

(*From an article "Relation of the Highway Programme to the National Economy" by Thos. H. MacDonald—'American Highways'—January 1951*).

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13. THE ARMY IN A DEMOCRACY

ANOTHER recent development should be of interest to highway officials everywhere for it concerns the movement of military materials along our highways. The newly announced policy of the Department of Defence contains these very significant statements by its Military Traffic Service—

"(a) Except in instances of overriding and urgent military necessity, no vehicular movement which exceeds any legal weight or size limitations will be undertaken over public highways by or for agencies of the Department of the Army, the Navy, or the Air Force unless prior permission is granted by the State or States concerned upon request of authorized representatives of the Military Department. Permits for movement of commercial vehicles will be requested only after determination has been made that military necessity requires movement by the mode and manner selected.

"(b) Only authorised representatives of the Military Department may request permits from the State or States concerned when size and weight limitations are involved. Under no condition shall a carrier be authorized to contact State authorities for such permits.

"(c) In each instance of overriding and urgent military necessity in which an oversized or overweight commercial movement is made, report will be made to the Director of the Military Traffic Service. A full statement of the circumstances and justification will be supplied."

* * *

(From an article "America's Highway Problem" by Major General Philip B. Fleming — 'American Highways'—Jan. '51)

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EDUCATION

Local M. P. *After seeing an American Educational film: "Education—that is a wonderful thing. Every school should have it."*

THE STATISTICIANS ARE HERE

A professor who taught statistics had a large family. One evening his wife left him at home to look after the children. Two or three children came in from next door and the professor had a busy time.

When his wife came in rather late he told her he had, with some difficulty, put all the children to bed. He added thoughtfully that there seemed to be more of them than he had expected.

CORRESPONDENCE

SOIL MECHANICS LABORATORIES IN INDIA

To,

The Editor of the
Transport-Communications
Monthly Review.

Sir,

In the issue of "Transport-Communications Monthly Review" No. 54, for the month of October 1951, on page 4, it has been stated that the Soil Mechanics Laboratory of the Buildings and Roads Branch at Lucknow—is "being developed; not yet well equipped"—I regret to point out that this report is now out of date, because the information was, perhaps, given in 1949. **The present position is that the laboratory is fully equipped and is in a position to carry out all types of tests.**

Yours faithfully,

M. A. MIRZA,

Personal Assistant to the
Chief Engineer, U. P.,

P. W. D., B. &. R. Branch.

[We are glad to publish this for the information of our readers. The information objected to was stated by us to be extracted from an Annual Report for 1949-50. Another article on the Lucknow Research Station appears elsewhere in this issue .....Ed.]

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PRAISE FOR THF NAGPUR "GRID-AND-STAR" FORMULA

The visit of so many eminent statisticians to India in December 1951 reminds us of a meeting that was held as long ago as the 1st March 1945 when India asked the world famous statistician, Prof. R. A. Fisher, to comment on the "Grid-and-Star" formula proposed in the Nagpur Plan. The following are extracts from the minutes of the meeting recorded at that time:

*"*******The grid pattern taken at Nagpur appeared to be a remarkably good guess of the relative productivity of agricultural and non-agricultural areas and brought the relationship between actual productivity as obtained from the statistical abstracts and that allowed for in the Nagpur formula remarkably close together.*

"Prof. Fisher gave it as his opinion that the Nagpur formula was an eminently useful piece of constructive imagination and that it might well prove a reasonable yardstick for assessing road requirements. It was certainly better than the alternative which had been suggested, namely, an integration of the opinion of what the road requirements should be in hundreds of different districts throughout the country as given by hundreds of different district officers. He was not prepared offhand to suggest an alternative to the Nagpur formula. He quite appreciated the point that the Nagpur formula was a yardstick for the total relative requirements of Provinces and States and did not affect or influence road layouts and types within the units."

UTTAR PRADESH BUDGET 1951—52

The following extracts relating to Civil Works Budget have been taken from the U. P. Budget for the year 1951—52.

	(Rs Lakhs)		
	Actuals 1949–50	Revised Estimates 1950–51	Budget Estimate 1951–52
I. Revenue (Civil Works)			
1. Rents	1.45	1.74	1.74
2. Ferry receipts	17.24	20.05	20.05
3. Tolls or roads	0.13	2.62	2.62
4. Recoveries of expenditure	1.86	.78	.78
5. Transfer from Central Road Fund A/c.	5.71	7.70	84.27
6. Miscellaneous	15.77	4.70	4.70
7. Deduct—Refunds	—.14	—.13	—.13
Total	42.02	37.46	114.03
II. Expenditure (Civil Works)			
1. Original works	25.97	26.54	34.06
2. Repairs	245.06	232.86	203.18
3. Tools & Plant	2.42	3.71	3.33
4. Suspense	—1.95	—	—
5. Establishment	12.69	28.85	25.43
6. Grants-in-Aid	46.98	24.41	25.09
7. Improvement of Communications from Central Road Fund Account.	5.71	7.70	84.27
8. Capital outlay met from extra-ordinary receipts	198.25	—	—
Total	535.13	324.07	375.36

In addition to the above, the following expenditure was incurred from Capital Account (outside the revenue account).

III. Expenditure (Communications)	390.75	144.38	215.06
(a) **Met from Revenue.**			
1. Original works	5.24	2.62	3.51
2. Repairs	228.74	216.90	187.02
3. Improvement of Commnications from Central Road Fund Account	5.71	7.70	84.27
Total	239.69	227.22	274.80
(b) **Met from U. P. Road Fund.**			
1. Original works	4.69	88.81	74.99
2. Repairs	0.10	0.06	0.06
Total	4.79	88.87	75.05
(c) Capital Expenditure (Outside revenue A/c).	355.60	—	79.00

	(Rs Lakhs)		
	Actuals 1949–50	Revised Estimate 1950–51	Bdget Estimate 1951–52
IV. Revenue from Roads			
1. Ferry Receipts	17.24	20.05	20.05
2. Tolls on Roads	.13	2.62	2.62
3. Receipts under the Motor Vehicles Acts*	52.83	55.90	58.30
4. Taxes on sale of motor spirit	22.70	20.39	18.10
Total	92.90	98.96	99.07

A BRIEF REVIEW OF THE U. P. BUDGET, 1951-52.

(With special reference to Civil Works).

The total revenue receipts of U. P. for 1951–52 are estimated at Rs 61,25.66 lakhs and revenue expenditure at Rs 61,50.59 lakhs with a consequent deficit of Rs 24.93 lakhs. The revised estimates for 1950–51 indicate a bigger deficit of Rs 135.98 lakhs with the revenue receipts amounting to Rs 52,05.56 lakhs and revenue expenditure to Rs 53,41.54 lakhs. The Budget estimates of 1951–52 are higher than the corresponding revised estimates for 1950–51.

Revenue expenditure on civil works forms 6.1% of total revenue expenditure both according to 1951–52 (estimates) as well as 1950–51 (revised estimates). The amount of expenditure on civil works provided in 1951–52 is Rs 375.36 lakhs against Rs 324.08 lakhs in the previous year.

Expenditure on Communications under the heads Original Works and Repairs and including that met from Central Road Fund during 1951–52 is estimated at Rs 274.80 lakhs which forms 85% of expenditure on civil works under the corresponding heads. The corresponding percentage for the previous two years was nearly the same. Of total State expenditure, expenditure on communications formed 4.5% in 1951–52 (estimates) and the corresponding figure for each of the two preceding years was 4.3%.

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NO WOMEN

Wife: *"How helpless you men are! What would you do if there were no women to sew on your buttons for you?"*

Husband: *"Has it occurred to you, my dear, that if there were no women that we men would need no buttons?"*

* Of the amounts mentioned against this item, the following amounts were credited to the U. P. Road Fund.

31.78 80.85 53.28

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TECHNICAL INFORMATION

(i) DESTROYING RUST

(Extracted from 'Machinery Lloyd'—July 7, 1951)

FOSCOTE R. S. is primarily a destroyer of rust. It converts rust by normal chemical action into a mixture of compounds which can conveniently be called iron phosphates, hence the title "Foscote", implying phosphate coating. The letters R. S. are merely for identification but have a descriptive interpretation, e.g. Rust-Sealing, Rust-Suppressing, Rust-Solvent, Re-Surfacer.

* * *

Rust Inhibition

It is well known that phosphate coatings, obtained by any process, are good surfaces to have under paint. They provide an absorbent coating which is non-metallic, chemically neutral, and which preserves the life of paint finishes.

* * *

There are many products for ordinary de-rusting. These merely dissolve and soften rust which allows it to be wiped off. Foscote R. S. is brushed on and left on. The rust, instead of being removed, is converted into a useful product. The end result of such a treatment is the formation of a rust inhibiting surface which is a far better one than if all the rust had been removed and paint applied to a completely rust-free surface.

* * *

The method of using Foscote R. S. will now be described. Loose and heavy rust should first be removed (by light-wire brushing), not because Foscote R. S. cannot convert it, but for the very reason that it does. Loose rust will be converted into a loose phosphate coating which is a bad surface to receive paint. Heavy rust will have the top layer converted, leaving loose rust beneath.

Optimum Wire-Brushing

It is not necessary to wire-brush too hard since this may be as bad as not wire-brushing at all. What is wanted is a thin adherent film of rust, which will be converted into a useful thin adherent film of iron phosphate.

By using Foscote R. S., the amount of time and energy needed for wire-brushing is greatly diminished. This effects a great saving in costly man-hours. It is only the loose and non-adherent rust that should be removed if Foscote R. S. is then going to be used. This loose rust is precisely that which is easy and simple to wire-brush off.

After such initial preparation of the surface has been done, R. S. is then brushed on just as if it were a primer coat of paint. The less rust on the surface, the less R. S. should be used. It is very economical and only a thin film, just sufficient to give a continuous wetted surface, should be applied. Maintenance painters find its use similar to their normal painting technique and soon learn to judge how much to apply.

Slow Reaction

The conversion takes place slowly, as do most chemical reactions at cold temperatures. After about half an hour, it may appear that the action is complete, because the rust colour will have disappeared. In spite of this change in colour, the conversion is not yet complete and users must not be misled by the quick change in appearance.

So long as enough moisture is present to act as an electrolyte, the chemical reaction will continue. The surface must, therefore, be allowed to dry properly—otherwise one will suffer not only from the ill-effects of painting on a wet surface, but also lose the full value of a treatment which has not been allowed to reach completion.

Because of this slow conversion, care must be taken not to apply too much R. S. This is specially true where rust is thin or indeed on any adjacent rust-free patches, for example when treating areas that are only partly rusted, and partly rusted, and partly still bright steel.

Avoid Excess

Too much R. S. is nearly as bad as too little, as far as visual appearances are concerned. Too much R. S. is very slow in

drying—it may, in fact, never become really solid. A tacky viscous film of concentrated unconsumed R. S. may remain. Even if it does dry out completely, a white powdery deposit may be formed, though this can be brushed off before painting.

One can avoid these undesirable effects of excess R. S. by wiping off with a damp cloth about half an hour or so after application, giving time enough to effect the initial conversion. Obviously the correct practice is to apply only the right amount. Sometimes this is neither practicable nor possible, for instance where a mixed surface of rusty and bright areas has to be treated. In such cases the removal of surplus R. S. by wiping is the best compromise. It is unlikely that the wiping will remove too much from the rusty areas (where more is needed) since they will have absorbed enough R. S. in the first half-hour to retain the quantity they require to complete the conversion.

It has also been found that swabbing-on instead of brushing gives good results, especially on bright rust-free surfaces. A cloth moistened with R. S. may be more controllable than a brush, leaving only a thin film of the requisite thickness.

* * *

(ii) RUBBER TESTED IN BITUMINOUS ROADS

(Extracted from 'Better Roads'—January 1950)

RUBBER may become an important new ingredient of road surfacing materials if tests confirm some of the advantages claimed for the use of rubber admixtures. Three states and four cities in the U. S. A. are conducting experiments in which small percentages of rubber are mixed with bituminous materials used in the construction of asphaltic-concrete wearing courses and bituminous surface treatments.

Experimental sections of the rubberized surfaces will be observed carefully to

Laying hot-mixed bituminous concrete containing rubber admixture on Ohio Route 14 in Columbiana County in the summer of 1949. This experimental section, like others constructed elsewhere, will be observed carefully to compare its durability, smoothness and other qualities with those of comparable sections constructed without the rubber.

determine wearing qualities, relative surface smoothness, anti-skid properties and maintenance expense. On state projects, adjoining control sections have been constructed. The test sections placed so far are short, and are situated in regions having varied climatic and weather conditions. They will be subjected to varied types of service—from high-speed automobile and heavy trucks traffic to city street use.

Advantages Claimed

Why use an expensive material like rubber in a road surface? Experience in Holland and the East Indies indicates that the addition of even a small percentage of rubber noticeably affects the properties of bitumen and bituminous mixtures. Among the advantages claimed for rubber-bituminous mixtures are the following:

1. Better Stability.—Tests conducted in the Netherlands have shown that the addition of rubber powder to bitumen reduces the influence of temperature on the penetration; thus the material is less susceptible to temperature changes than ordinary asphalt. In exploratory tests reported by the Virginia Department of Highways on mixes with up to 15 per cent of rubber, blended at temperatures of from 340 to 375 deg. F., it was found that penetration, ductility and flow decreased and the softening point increased with increasing amounts of rubber.

2. Moisture Sealing.—It is claimed that a seal coat of the rubber-bituminous mix is particularly effective in preventing water from seeping down through the surface. The advantages of this in minimizing frost action and break-up are apparent.

3. Anti-Skid Properties.—Addition of the rubber has been found by Dutch observers to increase the friction between tyres and a bituminous surface, particularly at high speeds. Insufficient study of the resistance to skidding offered by rubberized surfaces has been carried on in this country to permit reporting conclusive results.

4. Reduced Maintenance Expense.—If the addition of rubber produces more stable and waterproof surfaces, maintenance expenses should be reduced, other factors being the same.

5. Dustless Surface.— Bituminous surfaces containing rubber are reported to be clean, and not to become dusty with use.

The tests will indicate whether these claims are justified.

Tests in Holland

The use of rubber in road surfaces is not new. Rubber has been used for years in the United States as part of a bituminous compound for filling cracks and joints in concrete pavements. Before the war, experiments using rubber with bituminous materials were under way in Europe, principally in Holland. Thirty test areas were laid down between 1935 and 1940. Two types of design were used: (1) coarse asphaltic mixtures, with a seal coat containing various types and quantities of rubber, and (2) asphaltic-concrete mixtures with rubber throughout the entire depth.

Following the war, highway authorities reported that the sections seal-coated with rubberized asphalt were in strikingly better condition that unscaled control sections. The test sections with rubber throughout the entire course were in good condition, but no better than control sections of normal composition. Other test sections containing rubber in Java, in the Dutch East Indies, also were reported in good condition following the war. These sections were in an area of heavy fighting, and there had been no maintenance of any kind.

American Tests

In the tests conducted in the U. S. A. (1949) the types of conructions fell into two general classifications: (1) bituminous concrete, sand asphalt or sheet-asphalt mixtures placed in courses of varying thicknesses, with powdered or liquid rubber added at the mixing plant, and (2) surface treatments or seal coats, with rubber added to the liquid asphalt. Natural, reclaimed and synthetic rubbers were used. No essential changes in methods of construction were required because of use of the rubber.

Test sections constructed by the Virginia Department of Highways last year (1949) consisted of (1) a sand-asphalt wearing course, with a small amount of powdered natural rubber added at the plant, laid over a binder course; (2) a wearing course of the same type, but with reclaimed rubber used in the mix, laid without a binder course, and (3) a seal treatment of cutback asphalt containing natural rubber, with a cover of stone chips. The existing roads had old plant-mix wearing courses or broom-drag surface treatments. Identical control sections without rubber were provided for comparison.

The sand-asphalt mixes had a rubber content of 6 per cent by weight of the asphalt. Rubber powder was dumped into the pugmill of the mixing plant along with the dried and heated aggregate. Mixtures were produced at temperatures of 260 to 285 deg. F. The surfaces were laid with bituminous pavers and rolled. Approximate quantities were 63 lb per sq yd. for the section with the natural rubber and 125 lb per sq. yd. for the section with the reclaimed rubber, which had no bituminous binder course.

The Ohio Department of Highways also used rubber in sand-asphalt de-slicking mixes last summer. The mixes were applied with a spinner spreader over an emulsion tack coat, and the surface was dragged.

In placing the seal treatment, powdered natural rubber in the amount of 5 per cent by weight was added to heated cutback RC-2 in a distributor, and mixed by agitation. The rubber-asphalt mixture was applied at the rate of [illegible] per sq. yd. and covered with about [illegible] sq. yd. of stone chips graded from [illegible] down to No. 8, followed by rolling. The distributor applied the rubber-asphalt mixture without clogging of the nozzles or other difficulty.

99523

Too Early To Draw Conclusions

So far, little difference, if any, can be observed between comparable Virginia experimental sections with and without rubber, and no conclusions can be drawn regarding possible improvement in durability characteristics. Stopping-distance tests indicate that small percentages of natural rubber may be beneficial in minimizing the change in resistance to skidding of plant-mix sand-asphalt surfaces when wet. Virginia researchers believe that several years will be required before an evaluation of the effectiveness of the rubber content in the sand-asphalt mixes can be made; conclusions applying to the seal treatment may be available at a much earlier date.

During the summer of 1949 the Ohio Department of Highways experimented with the addition of rubber in hot-mixed, hot-laid bituminous concrete, and in sand-asphalt mixes used for de-slicking. Natural, reclaimed and synthetic rubbers were used, added at the mixing plant. Rubber contents ranged from 5 to 7½ per cent of the weight of the asphalt cement. Bituminous-concrete mixtures were laid by a bituminous paver and rolled; thicknesses ranged from 1 to 1½ in. The de-slicking mixtures, varying in rate of application from 4·8 to 8·8 lb. per sq. yd., were applied with a spinner-type spreader over an emulsion tack coat and dragged with a piece of chain-link fence attached to a light rubber-tired tractor.

The Ohio department reports that it will be some time before significant comparisons can be made from the field installations. Periodic examinations of the surfaces will be made, and it is also planned to run some skid tests. It was observed that the bituminous concrete with the rub-

In addition to rubberised sand-asphalt wearing courses, the Virginia Department of Highways placed experimental seal coats last year with a rubber content. At the top, powered natural rubber is being mixed in a distributor. The rubber was added slowly, stirred with a paddle and agitated by the distributor. No difficulty was experienced in application with clogging of nozzle openings.

ber admixture appeared heavier and more tacky after mixing and after spreading.

The city of Worthington, Minn, also placed experimental surfacing with a rubber admixture last summer, completing work extending over 11 city blocks. A worn-out bituminous mat over a good concrete base was removed and replaced with a 1 in. leveling course, a 1 in. wearing course and a sand-asphalt seal incorporating natural rubber in the amount of 5 per cent of the asphalt by weight. The rubber was added to the heated asphalt before mixing with the sand.

Quiet and Smooth Surface

City Engineer George A. Claydon reports that the surface is very quiet, and roughometer tests have shown that it is exceptionally smooth. The surfacing will be observed carefully—especially for the effect of tire chains on the seal, which has a thickness of ½in. If it doesn't scuff up, many more Worthington streets may be treated with the rubberized mixture, which Mr. Claydon hopes will eliminate the need for sealing every 3 or 4 years. "We are aware," he says, "that bituminous surfacing has a tendency to crack and loose its life outside of the regular tire lanes. Rubber is supposed to preserve its life without respect to its being used as a tire lane."

Work done last year in the borough of Manhattan, in New York city, involved the experimental use of rubber in a maintenance sheet-asphalt mix placed on six stretches of heavily travelled pavement. Rubber was added in liquid form in the main tank at the asphalt plant, and ground rubber was added in the mixer. Normal methods were used in placing the mix. Periodic examinations will be made of the rubberized surfacing material and normal surfaces laid side by side.

What Happens By Adding Rubber

WHAT actually hapens when small amounts of pulverized rubber are added to bituminous mixes? Technologists conr ducting research in the Netherlands report that when rubber is mixed into hot bituminous materials, the Rubber swells with the absorption of lighter oily constituents of the asphalt. The rubber particles expand to five or six times their original volume. This is believed to account for the development of a system resulting in greater hardness in the mix than when the bituminous materials are used alone. Further laboratory studies may be expected to throw more light on these fundamental relationships. Meanwhile it has been shown in a preliminary way, as already indicated, that the introduction of rubber admixtures markedly influences the properties of asphaltic binders affecting the performance of bituminous road-surfacing mixes in service.

Will It Be Economical?

If the introduction of rubber into bituminous mixes does result in improved performance, it will also be essential that the rubberized surfaces prove economical in order to come into general use. Bernard E. Gray, general manager of the Asphalt Institute, believes that "it will take considerable time to obtain any accurate measure of the value resulting from the use of rubber. Rubber is, of course, many times more expensive than asphalt, and it would probably be cheaper to place a light resurfacing every 10 years than to employ rubber, if durability were the only factor

"However, rubber does make for a tougher mix, and our experiments here indicate that a rubber-asphalt cement will produce a mixture having higer stabilities than when asphalt alone is employed. The addition of rubber also tends to produce a dry surface, but whether this is accompanied by a greater tendency to cracking, so far I do not know."

The experimental Virginia sand-asphalt mix had 4·2 lb. of rubber per 1,000 lb of mix, and 62·5 lb of mix per sq. yd. of road surface. On that basis, it would take 4,620 lb of rubber per mile of a 30 ft road. On the basis of an estimated cost of 890 dollers per ton for the powdered rubber used the increased cost of rubber surfacing would be about 5 cents per sq. yd.

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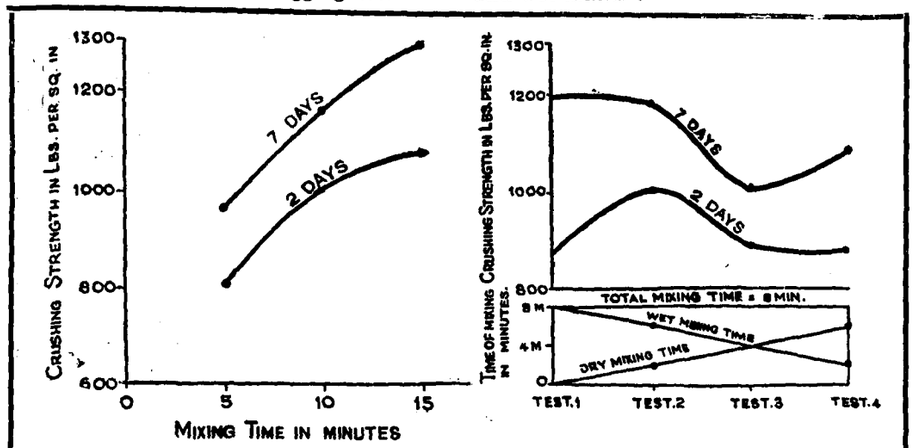
(iii) MIXING AND PROCESSING CONCRETE

(Abstracted from 'Concrete'—May 1951)

THE main function of the mixing operations in concrete manufacture is to obtain a thorough blending of the materials. Any of the mixers produced by most of the reputable manufacturers will give satisfactory results. Rugged construction in a mixer is most desirable and this feature should be kept in mind when purchasing a unit. This quality will ensure minimum of maintenance and loss of time due to shutdown.

In operating a mixer a very important point is to adhere strictly to the manufacturers recommendations regarding capacity and speed. Overloading or increasing the speed may cause serious damage to the machine. Increasing the speed of mixing may affect the rate of setting of the concrete because of the amount to heat which is generated and the grinding action of the cement and aggregates.



EFFECT OF MIXING TIME ON STRENGTH OF CONCRETE.

Batch Mixing Concrete

A long and thorough mixing time is particularly important where a homogeneous mixture of uniform colour is desirable. Considerable difference of opinion exists as to the length of time necessary to coat the particles thoroughly.

For a concrete of semi dry consistency it is very important to dry mix the cement, fine and coarse aggregates for at least two minutes to ensure uniform dispersion of cement through the batch. The required volume of mixing water should then be added and the concrete mixed for the balance of the time required to produce a uniform concrete. For instance, if the total time required for thorough mixing is eight minutes, the dry mixing operations last two minutes and the mixture after water has been added should be mixed for six minutes. The time should be measured after all the materials are in the mixer.

Timing devices should be installed in order to avoid working by guess as the tendency is to undermix rather than overmix the charge. Results of two series of tests are illustrated graphically showing the effect of mixing time on strength (the aggregates were dry mixed for two minutes before adding water) and the effect of mixing action by varying the time of dry and wet mixing.

Results of Tests

The tests indicate an increase in the strength of concrete with the length of time of mixing. However, the strength of the concrete is not directly proportional to the time of mixing so that there is not much to be gained by mixing for too long a period. The size of the mixer and the quantity of concrete required per hour will usually control the mixing time per batch.

A total time of eight minutes per batch (two minutes dry and six minutes wet mixing, gave the best results.

List of Approved Works on National Highways

S. No.	Job No.	Name of work	Amount approved	Remarks
		BOMBAY		
1.	503 BM 8.	Improvements to Navasari-Kathor Section (miles 19/5 to 27/2) of the Bombay-Ahmedabad National Highway.	3,38,000/-	
2.	507 BM 8.	Rubble dumping round the piers of Narmada Bridge at Broach on National Highway No. 8.	1,42,500/-	
		WEST BENGAL		
3.	506 BG 31.	Further improvement (Phase II work) of the Bagdogra-Kamla Tea Estate-Bihar Border section of National Highway No. 31, in West Bengal (10 miles).	2,07,000/-	
		UTTAR PRADESH		
4.	501 UP 2.	Extension of waterway of the Karamansha Bridge in mile 394 of the Grand Trunk Road	2,42,000/-	
5.	509 UP 27.	Improvements to Allahabad-Rewa Road in Allahabad District.	36,299/-	
		MADHYA BHARAT		
6.	505 ST 3.	Widening the Bridge No. 2/2 on Agra-Bombay Road, Indore South, Dewas section.	27,540/-	
		BIHAR		
7.	A-504 BR 2.	Survey for the construction of a bridge across the river Sone at Dehri on National Highway No. 2.	17,721/-	
		HIMACHAL PRADESH		
8.	A.502 HP 22.	Surveying and cutting 2-ft wide trace for new motor road alignment from Luri to Rampur.	12,500/-	
		ASSAM		
9.	508 AS 38.	Providing a black topped surface on Makum-Digboi portion of National Highway No. 38.	5,16,000/-	

List of Books added to the Roads Organization Library during October 1951

1. **The Use and Treatment of Granular Backfill-Bulletin No. 107** by Roy L. Greenman. (Michigan Engineering Experiment Station, East Lansing, Michigan, 1948).

2. **Concrete Manual—Manual No. 821.000** (Department of Highways, Division of Materials and Research, State of Minnesota, May, 1948).

3. **Factual Guide on Automobile Parking for the smaller Cities.** (Public Roads Administration, Washington, D. C., 1947).

4. **Field Engineers Manual on Stabilised Soil Base Course, Bituminous Stabilised Base Course, Bituminous Mat Surface Course.** (Department of Public Works, Bureau of Roads and Bridges, State of Nebraska, 1947),

5. **Traffic Tune Up—How to get much more Traffic Value out of Existing Streets.** (Traffic Engineering and Safety Deptt., American Automobile Association, Pennsylvania Ave. at 17th Street, Washington, D. C.)

6. **Aerodynamic Stability of Suspension Bridges—Bulletin No. 116-Part 1,** by F. B. Farquharson. (University of Washington Press, Seattle).

7. **Notes for Short Course in Design and Control of Asphaltic Mixtures. (ii) Quality Tests for Asphalts—A Progress Report** by F. N. Hveem. (Institute of Transportation and Traffic Engineering, Berkeley - Los Angeles California, 1949).

Publications of the American Transit Association, 292, Madison Avenue, New York 17, N. Y.

8. **Transit Fact Book, 1949.** (2 copies)

9. **Transit Fact Book, 1950.** (2 copies)

10. **A General Survey of the European Engineering Industry.** (United Nations Economic Commission for Europe, Industry and Materials Committee.)

11. **Distribution of Deformation (A New Method of Structural Analysis)** by C. V. Kloucok. (OBRIS Printing, Publishing and Newspaper Co. Ltd., Export-Import Deptt., 37 Narodin, Persha 1, Czechoslovakia, 1950).

12. **Commonwealth Aid Roads and Works Acts.**
    (i) Act. No. 17 of 1947.
    (ii) Act. No. 91 of 1948.
    (iii) Act. No. 67 of 1949.
    (iv) Act. No. 47 of 1950.
    (The Commonwealth of Australia)
    Two copies of each.

13. **Das Verkehrssichere Berhalten Von Strassenoberflachen (The Traffic Action on Road Surfaces)** By Dr. Ernst Zipkes

The Manager of Publications, Delhi.

14. **Report on the Efficient Conduct of State Enterprises** by A. D. Gorwala.

15. **The First Five Year Plan.- (A Draft Outline)** issued by the Planning Commission. 3 copies

16. **Report on the Survey of Minor Ports in India** by S. Nanjundiah.

17. **Indian Word Code (6th edition), 1924** —(Issued by the Indian Posts and Telegraphs Department).

18. **Supplement to the 6th Edition of the Indian Works Code for Foreign State Telegrams (1st edition 1928.)**

19. **Supplements to the 1st Edition of the Permanent supplement to the 6th edition of the Indian Word Code.**

20. **La Ressistance du Beton et Sa Measure (The Strength of concrete and its measurements)—New Series No. 62.** by M. R. L. Hermite. (Annales de L'Institute Technique du Batiment et Des Travaux, Publics).

21. **An Introduction to distribution methods of structural analysis** by R. W. Steed. (Sir Issac Pitman and Sons Ltd., London).

22. **The Inerpretation of Statutes (9th edition)** by P. B. Maxwell. (Sweet and Maxewell Ltd., Law Publishers, 2 & 3 Chancery Lane, London, W. C. 2).

23. **Rank Correlation Methods** by M. G. Kendall. (Charles Griffen & Co. Ltd., 42, Drury Lane, London, 1948).

24 **Quality Concrete** (The Concrete Association of India, 1, Queen's Road, Bombay, 1951).

25. **List of Sugar Mills in India and Pakistan, Working and Projected, 1951.** (Indian Sugar Mills Association, Calcutta).

Publications of the International Academy of Indian Culture, Nagpur.

26. **A Dictionary of English-Indian Terms of Administration** (2nd edition March 1950) by Dr. Raghu Vira.

27. **Hindi-English Dictionary of Technical Terms** by Dr. Raghu Vira.

28. **The Consolidated Great English-Indian Dictionary of Technical Terms** by Dr. Raghu Vira.

29. **Inland Transport and Communication in Mediaeval India** by Bejoy Kumar Sarkar (Calcutta University Press, Calcutta, 1925).

His Majesty's Stationery Office, London, 1950.

30. **The Investigation of Road Foundation Failures—Road Research Technical Paper No. 21,** by W. A. Lewis.

31. **Clay Building Bricks of the United Kingdom,** by D. G. R. Bannel and B. Butterworth.

32. **Study on the Most Economical Methods for the Construction Repair and Maintenance of Roads, Including Standardization and other characteristics and comparative methods of National Financing—No. E/CN. 11/TRANS/17,** by Economic Commission for Asia and the Far East, Ad Hoc Committee of Experts on Indian Transport. (United Nations Economic and Social Council Technical Assistance Administration, New York).

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