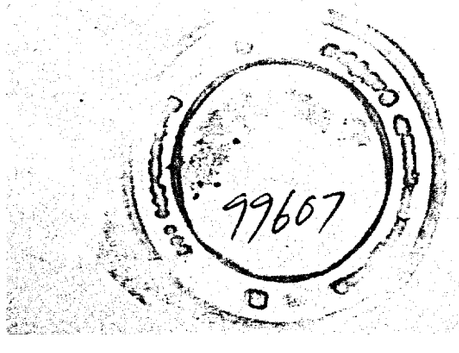
TRANSPORT-COMMUNICATIONS

MONTHLY REVIEW

NOVEMBER 1956—No. 115

INDIAN ROADS CONGRESS, NEW DELHI.



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ALSO: Definitions of Highway Engineering Terms — Top Priority for Transport — Painless Extraction — Engineering as a Stabilizing Influence.

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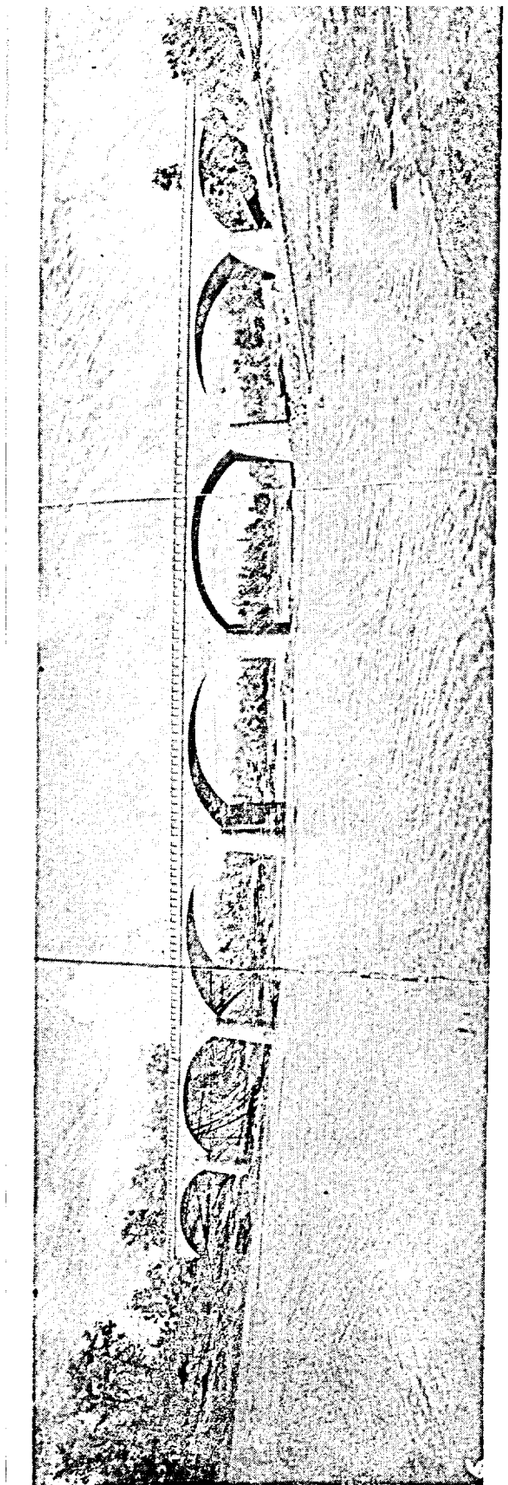
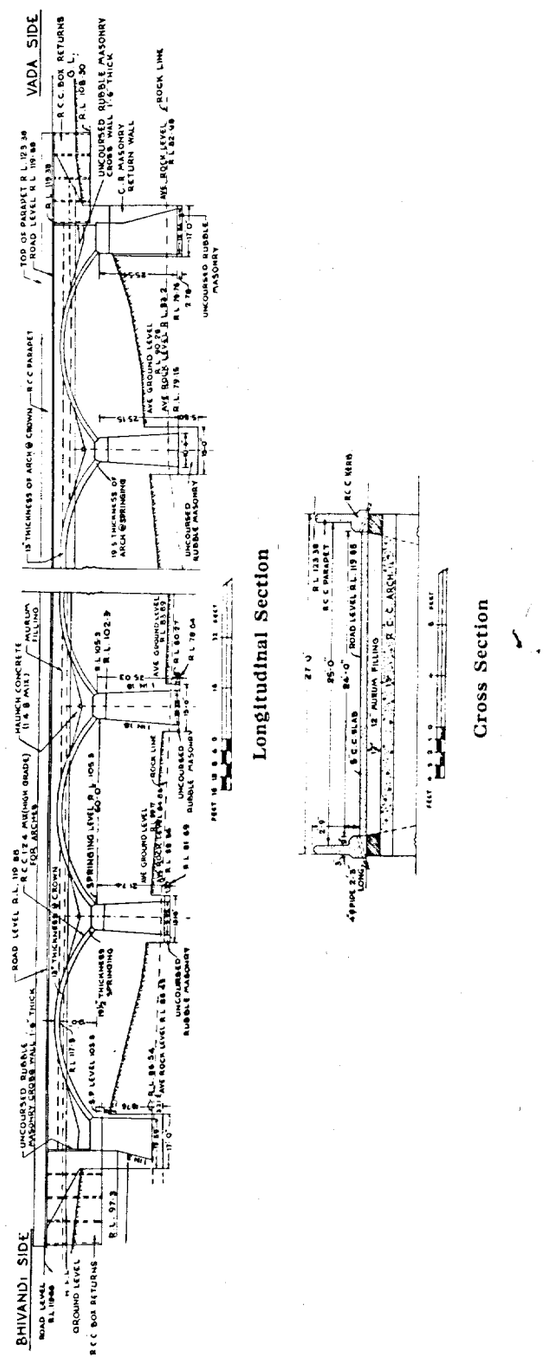


THE VAITARNA BRIDGE



Longitudinal Section

Cross Section

TRANSPORT-COMMUNICATIONS
MONTHLY REVIEW

A REVIEW OF
ROAD ENGINEERING, DEVELOPMENT & TRANSPORT

NOVEMBER 1956

BRIDGING INDIA'S RIVERS

THE VAITARNA BRIDGE

THE Vaitarna river crosses the National Highway No. 8, Bombay-Agra Road, in mile 57/1. A low level causeway existed which was over-topped during the monsoon season at this crossing. Therefore traffic from Bombay towards Ahmedabad was very much inconvenienced and passengers had to be transported in boats. The necessity for a high level bridge was, therefore, keenly felt by the public.

The high level bridge which has now been constructed is sited at about 500 ft downstream of the causeway, where rock was exposed on the left bank.

Hydraulic Features

The catchment area of the river at the site is 230 square miles and the bridge is designed for a discharge of one lakh cusecs. The average rainfall in the locality is 110 in. per annum. During the monsoon of 1952 there were extraordinary floods in the river, reaching a level of 115 on 24-7-52. The discharge calculated for this extraordinary high flood was 120,000 cusecs. At the time the flood occurred, all the piers had been constructed and three of the arches, out of a total of seven, had been laid. Therefore, it was decided to provide graded gravel filling above the haunch concrete with a view to facilitate drainage, should any such abnormal floods occur in future.

Foundations

Hard rock was available throughout the bed at a depth of 2 to 4 ft, and the foundations were taken 2 to 3 ft into rock. The trench that had been excavated was first filled with uncoursed rubble masonry for a suitable depth and the piers were constructed over this uncoursed rubble masonry.

Piers and Abutments

Piers and abutments are constructed in coursed rubble masonry. The piers have a top width of 7 ft 6 in. and a side batter of 1 in 18 with semi-circular cut and ease waters. The abutments are of coursed rubble masonry with a top width of 10 ft and a back batter of 1 in 3 which starts 8 ft below the springing level. The front of the abutment is vertical. No abutment piers were provided. However, the piers have been designed to take the unbalanced thrust of the arch during construction. Box R.C.C. returns are provided at the ends of the abutments.

Photo 1. **Excavation for pier No. 5.**

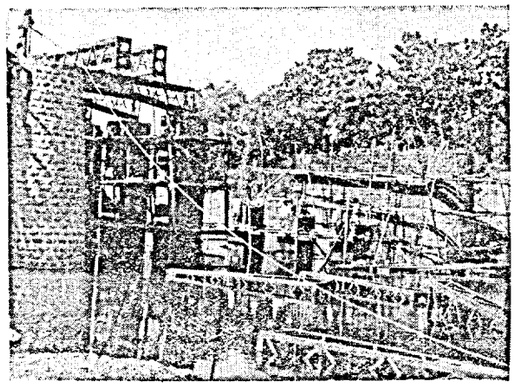


Photo 2. **Masonry for the piers in progress.**

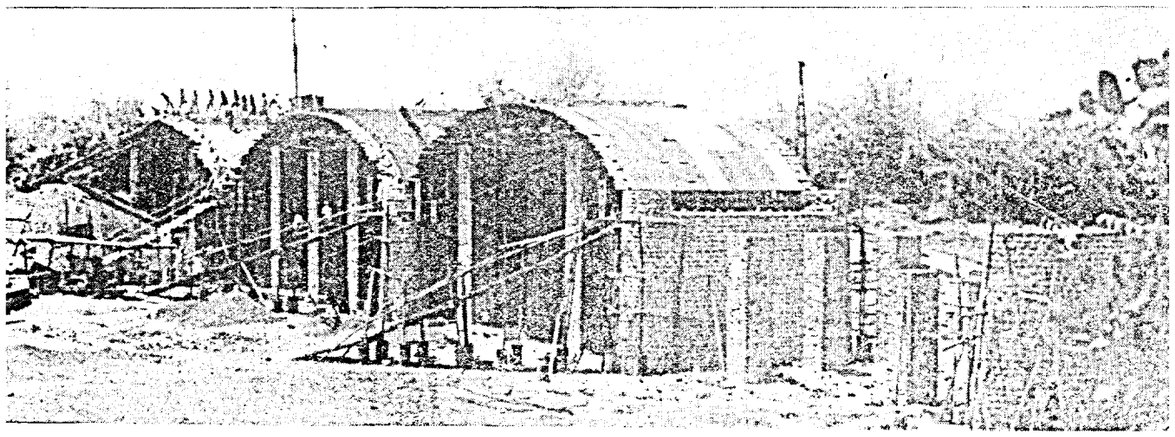


Photo 3. **Centering for some arches in position.**

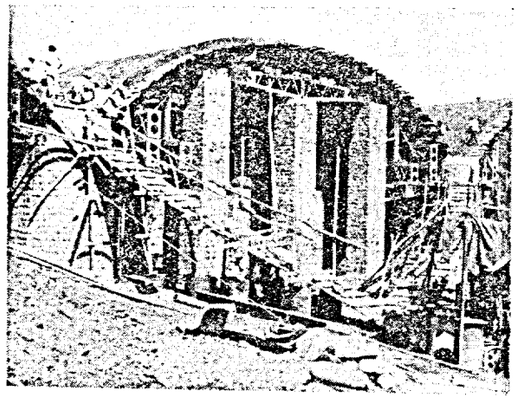


Photo 4. **Centering for the arches.**

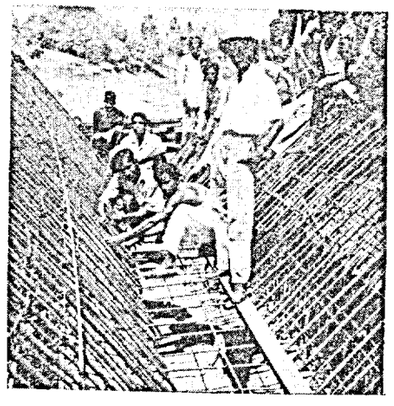


Photo 5. **Reinforcement for the arches.**

Superstructure

The bridge was designed for two lanes of I.R.C. Class A or one lane of I.R.C. Class AA loading, whichever produced the worst effect. The superstructure consists of 7 spans of 60 ft clear each with R.C.C. spandrel-filled parabolic arches with a rise span ratio of 1 : 5. The arched type of construction was chosen because such a construction fitted admirably in the landscape of the locality. The reinforced concrete arch sheet is 13 in. thick at the crown and 19½ in. at springing. Reinforcement for the arches consists of 7/8 in. diameter bars at 7½ in. centres with ½ in. diameter bars at 7½ in. centres in between. Thus there are bars of ½ in. and 7/8 in. in diameter alternately at 3½ in. centres. The reinforcements are embedded into the pier cap. Needle vibrators were used for the compaction of concrete in the arches.

The centering for the arches consisted of wooden planks which were supported on girders placed transverse to the central line of the arch. These girders rest on horn-beams supported on 4 ft by 4 ft masonry pillars six in number for each span. For the 2nd span on the Bombay side, however, nine pillars were used. Photos 3 and 4 shows the centring arrangements.

The haunch filling is of 1 : 4 : 8 concrete and, as mentioned above, graded gravel filling up to the high flood level. There is a moorum cushion of 12 in. above the crown of the arch.

The roadway is 24 ft clear between the kerbs which are 9 in. by 9 in., and the wearing surface is 6 in. thick cement concrete slab 1 : 2 : 4 with a camber of 1 in 60.

The longitudinal section and cross section of the bridge are shown in the frontispiece.

Costs

The cost of the bridge is Rs 4,31,500 and works out to Rs 925 per running foot.

DEFINITIONS OF HIGHWAY ENGINEERING TERMS

WEAVING: The crossing of streams of traffic moving in the same general direction accomplished by merging and diverging.

WEAVING DISTANCE: The length of a carriageway, between adjacent radial routes at a rotary intersection, in which weaving occurs.

TOP PRIORITY FOR TRANSPORT

In view of the acute shortage of capital for development and the very high import content of railway investment, attention should be given first to the possibility of improving the operational efficiency of railways and of ***encouraging road transport*** *and coastal shipping; the latter, between them, should be capable of making a considerably larger contribution than at present. I think that transportation could appropriately be regarded as top priority for any bank financing that may be devoted to the Second Five Year Plan.*

—Eugene Black, President, World Bank, in his letter to the Union Finance Minister of India.

ROADS IN EGYPT

Early Development

TILL the end of 1912 the Egypt had few roads and these were in charge of the Irrigation Inspectorate of the Ministry of Public Works. In that year a Roads Department in the Ministry of Public Works was established. In 1919, this Roads Department was put under the newly formed Ministry of Communications and 528 miles of embankments adjacent to irrigation and drainage canals were taken over by this Department. It may be said that road development in Egypt commenced only after 1936 with the signing of a treaty with the British. The treaty included provisions stipulating the construction of a network of strategic roads.

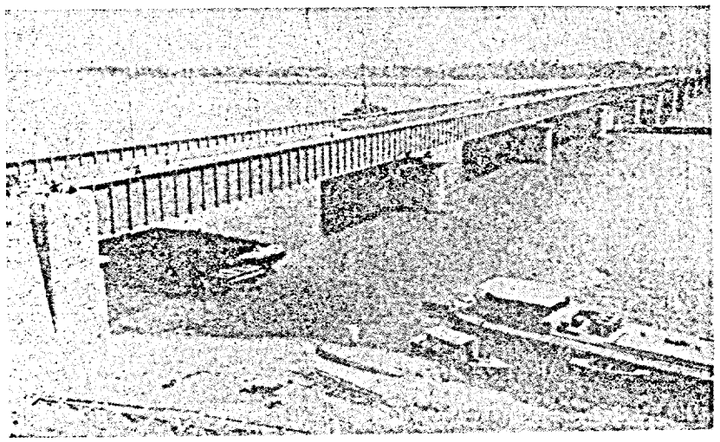


Photo 1. Sohag Bridge on the Nile

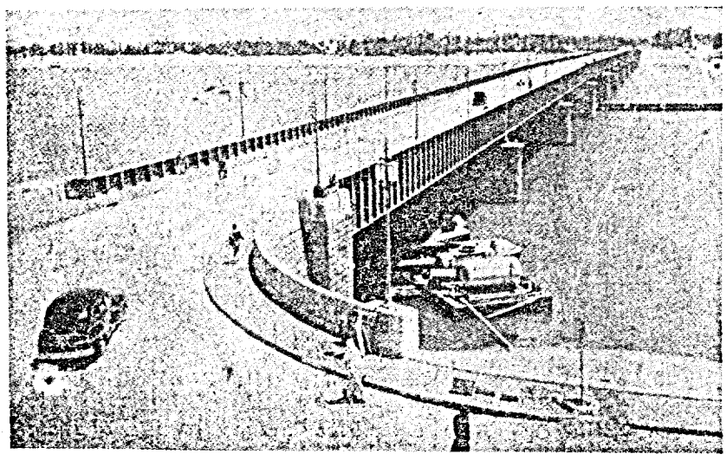


Photo 2. Another view of the Sohag Bridge

After the Second World War, the construction of roads received a setback and the few roads that were constructed were not given careful study. The result was that the standard of such construction was very low.

After July 1952, the new Government realised the important role of the roads in increasing the standard of living of the people. Therefore, the permanent Council for the development of national production which was created to plan and supervise various productive works, assigned a high priority to the construction of a network of good roads as they not only helped the other nation-building activities but also provided employment for a considerable number of engineers and labourers.

Planning

A comprehensive programme envisaging the construction of 2,480 miles of roads in Lower Egypt, 1,240 miles of roads in Upper Egypt, improving 620 miles of roads along the Red Sea coast, construction of a number of roads between Kena and Aswan, and constructing 5 major bridges over the river Nile, has been drawn up. This programme was to be put into effect in three stages. The first stage consists of a 3-year programme involving an expenditure of approximately £E 1.5 crores (Rs 20 crores.) The second stage is a 5-year programme involving an expenditure of about £E 1 crore (Rs 13.5 crores). The third stage is also a 5-year programme involving an expenditure of about £E 3 crores (Rs 40 crores)

The Table gives the growth of road milage, the expenditure on roads, and the number of motor vehicles.

Year	Milage of roads	Expenditure on new road construction Lakhs Rs	Number of Motor Vehicles
1913	547		
1915	2317		
1920	2610		
1925	3057		
1930	3959		
1935	4527		
1940	6189		33465
1945	7566	30.01	34233
1950	10120	91.6	77820
1951	10437	149.1	85517
1952	10635	410.3	87443
1953	10842	410.3	92443
1954	11030	547.0	97524

The standards for the programme outlined above are drawn up by a Technical

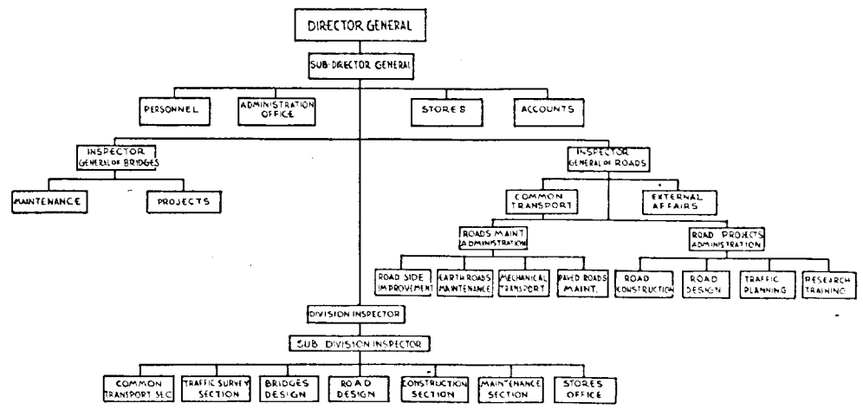


Fig. 1.

Committee consisting of representatives of the Production Council, the Roads and Bridges Department, and Specialist Professors in Universities. It is expected that this Technical Committee will study in detail the requirements of the country in relation to agriculture, industries, distribution of population, etc., and make recommendations for the second stage of development of the comprehensive programme mentioned above.

Organization

After 1952, the Roads and Bridges Department has been reorganized with a view to get works planned and executed in an efficient manner. An Organization Chart of the revised set-up is shown in Fig. 1. Before 1952, the work of supervision of any project was entrusted to a single government engineer for one project. It has been found that with the best of specifications and legal conditions, the execution of the project was not satisfactory. Therefore, on the recommendation of the Technical Committe, the following set up is being followed for execution of big projects. A Resident Engineer will be in overall charge of a project and it will be his responsibility to see that the project is executed efficiently and expeditiously. He will be assisted by an Assistant Resident Engineer. There will be a Materials Engineer who will be responsible for examining and checking all the materials that are required for the project. There will be an Executive Engineer, an Assistant Materials Engineer and an Assistant Executive Engineer and a Foreman of Works who will be responsible for supervising all the works.

—(*From Roads under New Regime—National Production Council September 1955*).

Fools say they learn from experience, but I would perfer to learn from others' experienee.

—*Bismarck.*

PAINLESS EXTRACTION

"Of course women are as capable as men," said the wife to her husband. "Why, I know a girl of 21 who gets the salary of a sales manager in a big business house."

"I believe you, my dear," replied the husband. "When did she marry him?"

THE NATIONAL HIGHWAYS BILL IN RAJYA SABHA

(*Continued from page 11 of October 1956 issue.*)

Shri B. B. Sharma (Uttar Pradesh) suggested that the National Highway No.27 from Mangawan to Allahabad might be extended to Azamgarh and Doharighat via Jaunpur. Also, the proposed road bridge across the river Gogra at Doharighat might be a road-cum-rail bridge. Such an arrangement would enable extending the railway line from Doharighat to Gorakhpur and thus open up a new area. He supported the suggestion of Shri Rajendra Pratap Sinha that attention should be paid to road development in the border areas.

Shri J. S. Bisht (Uttar Pradesh) urged that a highway connecting Nainital in Kumaon hills with Srinagar in Kashmir traversing the Himalayan region should be declared as a National Highway. These hill regions were desperately poor mainly because of deficiency of good and cheap communications. Unlike the plains where different modes of communications such as railways, roads, inland waterways and coastal shipping are available, in the hills millions of people are entirely dependent only on roads. In this area even though there are roads connecting individual regions with the plains, such as the road from Simla to Ambala, the road connecting Kangra with the Punjab, the road connecting Pathankot with Srinagar, and the road from Nainital to plains, there was no highway interlinking these areas. It was said that the Chinese Government have built a highway connecting Lhasa with Sinkiang in a very difficult country, and there was no reason why this road even though it traverses a difficult country should not be undertaken. Such a connection was necessary from the strategic point of view and, what was more important, for uplifting the people of these regions where industries such as fruit growing, potatoe growing, etc., can make headway.

Dr. W. S. Barlingay (Madhya Pradesh) thought that as far as possible the road system of the country ought to be developed to a geometric pattern resembling a cobweb. He also made the suggestion that these roads, as far as possible, be aligned parallel to airways routes so that in an emergency planes could land on these roads. He urged that fruit-bearing trees should be planted along the roads.

Citing the example of the bridge across Narmada at Hoshangabad, Dr. Barlingay was of opinion that the construction of combined road-rail bridges would save considerable sums of money. Because National Highways passing through municipal areas were generally congested and in order that there was as little obstruction to highway traffic as possible, it was desirable that ring roads round towns should be constructed.

A highway connecting Gwalior and Jhansi should also be declared as a National Highway and missing links, if any, along this route should be constructed. The construction of missing links on the Nagpur-Hyderabad section of National Highway No. 7 should be taken up immediately.

For a country of the size of India, 13,800 miles of National Highways were meagre. A Master Plan for highways for whole of India should be drawn up as early as possible.

Shri Kishen Chand (Hyderabad) enquired if buses plying on National Highways and traversing more than one State were required to pay the road taxes in all the States through which they operated. Owners of motor vehicles had to pay a very heavy charge at the time of registration. Also, the excise duty on petrol was also a tax for road use. Therefore levy of any charge for use of the National Highway was not desirable. Shri Kishen Chand

(*Continued on page 12*)

fiscal year following that in which apportioned.

Study of Equitable Tax allocation- The law directs the Secretary of Commerce in co-operation with other Federal agencies and the State highway departments to study and investigate :

(1) The effects on the design, construction and maintenance of Federal-aid highways of the use of vehicles of different dimensions, weights and other specifications, and the frequency of occurrences of such vehicles in the traffic stream ;

(2) The proportionate share of costs attributable to each class of persons using such highways, and

(3) Any direct and indirect benefits accruing to any class which derives benefits from Federal-aid highways, in addition to benefits from actual use of such highways which are attributable to public expenditures for such highways.

(*From 'Traffic Engineering' August 1956.*)

(*Continued from page 9*)

thought that the southern region of the country was not well served by National Highways.

Shri B. K. P. Sinha (Bihar) said that National Highways are arteries of trade and commerce. The railways were overcrowded and were not in a position to cope up with the demand of traffic. Inland water transport is not yet fully developed in the country, and therefore due attention should be paid to the development of roads. He agreed with Shri Rajinder Partap Sinha from Bihar that a fresh plan, taking into account the accelerated development of the country that has taken place in the first Five-year Plan and that envisaged during the second Plan, should be drawn up.

Referring to Clause 2 of the Bill, which excluded the highways within the municipal limits from the National Highway scheme, Shri Sinha said that such an arrangement would cut the National Highways into bits. He thought that there was some conflict between Clause 2 and Clause 8 of the Bill.

(*To be continued*)

TIMBER BRIDGES IN NEW SOUTH WALES, AUSTRALIA

NEW SOUTH WALES is favoured in possessing large supplies of high quality hardwoods. As a result, timber bridges* have been extensively used throughout the State in the past, and are still being built, although to a lesser extent than formerly.

In the case of larger streams, timber trusses were used, often with wrought-iron or steel lower chords, but the great majority of timber bridges in use are girder spans of about 30 ft in length, with 5 in. thick timber decking placed transversely ; the substructure usually consists of driven pile trestle piers and driven pile sheeted abutments.

In early designs, the transverse timber decking was spiked directly to girders, but in later designs a plank was bolted on to the top of each girder and the decking was spiked to this plank, Fig. 1; this avoided any undue splitting of the girder.

Timber decks comprised of transverse spiked planking have proved to be increasingly unsatisfactory because the planks rapidly loosen as a result of the horizontal push given by the driving wheels of vehicles. This not only results in noise, but also brings about movement and wear of the planks themselves, and in the spiking plank or girder beneath them. Further, transverse planking, particularly when worn, provides poor riding qualities, and this is not only unpleasant for travellers but results in impact which, in turn, causes deterioration of the bridge structure.

A variety of means has been considered to overcome these difficulties. One of the first means adopted was to eliminate spikes and bolt the planking down by long bolts attached to transverse members placed beneath the girders. This proves reasonably effective in reducing noise, provided the bolts are kept tightened up to overcome the effects of shrinkage. Tightening up is not always easy, as the nuts being beneath the deck are difficult to get at, Fig. 2. Moreover, the nuts work loose as the timber shrinks, and frequent maintenance attention is necessary to keep the bolting efficient.

An improvement has been to use a specially designed bolt assembly which can be tightened up from the surface of the bridge deck and which incorporates a locking device to prevent the nut turning, Fig. 3. However any form of transverse decking exposed to traffic has disadvantages. During recent years the Department of Main Roads has constructed a number of experimental decks on timber bridges, designed to give a longer life and a smoother running surface for traffic. They comprise the following :

(1) A deck of laminated timber on edge, the individual planks being spiked together and the timber being covered with a layer of bituminous material. This type of deck takes the place of both girders and planking Fig. 4. It is intended for use chiefly where seasoned sawn timber of good quality is readily available. The bituminous surfacing is intended not only to provide a smooth surface but also to protect the timber from wear and to some extent from wetting and drying, thereby extending its life.

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* Detailed drawing for timber bridges—spans 12 to 18 ft are available in the Library of the I.R.C.

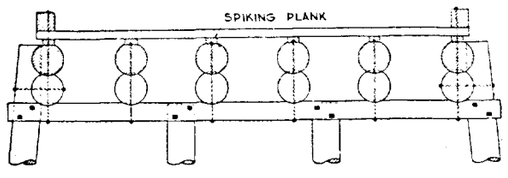


FIG 1

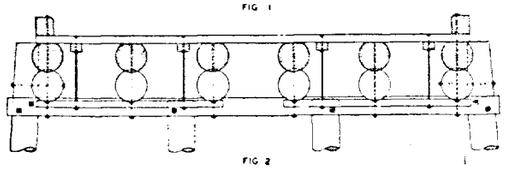


FIG 2

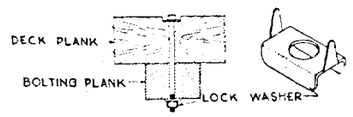


FIG 3

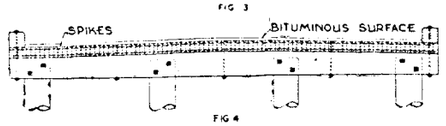


FIG 4

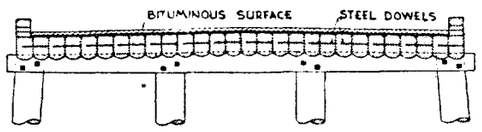


FIG 5

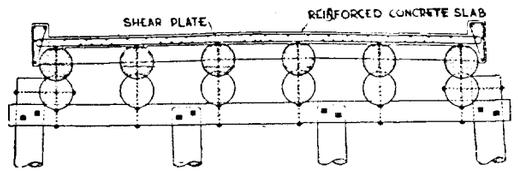


FIG 6

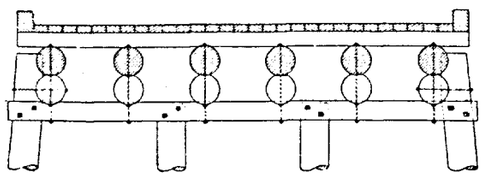


FIG 7

(2) A series of hewn or sawn timber girders, trimmed and placed side by side touching one another and dowelled together; on which a bituminous surfacing is placed. This arrangement also takes the place both of girders and planking, Fig. 5. This type of design would be applicable to localities where round timber is obtainable but sawn timber is not readily available. In one small experimental work of this type a plastic covering has been placed between the timber girders and the bituminous surfacing with the object of completely excluding moisture from the tops of the girders. Regular moisture readings are being taken.

(3) A reinforced concrete slab placed on timber girders, generally resembling a type of design which has been used in Queensland, Fig. 6.

(4) Timber girders with transverse beams above, which support planking placed longitudinally. This is generally similar to a design which has been in use in Victoria, Fig. 7. A bituminous surfacing may be placed over the decking to exclude moisture.

(5) Longitudinal sheeting 2 in. thick placed over transverse planking 4 in. thick. This type of decking is self bracing and gives a stronger deck than a single thickness of transverse or longitudinal planking. Bituminous surfacing may be placed over the timber to exclude moisture. This method has been used mainly for improving the smooth riding qualities of existing transverse decking bridges.

—(*From "Main Roads," June 1956.*)

A REVIEW OF PAPERS PRESENTED AT THE FIFTH CONGRESS OF THE INTERNATIONAL ASSOCIATION FOR BRIDGE AND STRUCTURAL ENGINEERING, LISBON

THE 5th Congress of the International Association for Bridge and Structural Engineering was held at Lisbon and Oporto from 25th June to 2nd July, and was attended by over a thousand delegates from 34 countries.

Six working sessions were held at Lisbon, after which the Congress moved to Oporto for the closing session and the symposium on loading of highway bridges.* A brief summary of some of the many Papers presented is given below :

Loading and Strength of Bridges and Structures

In this section Papers on the behaviour of materials and structures under both sustained, static and dynamic loads were discussed with general reports by Eng. J. A. B. Carmona and Prof. F. J. S. C. de Araujo.

Eight Papers were considered under static loading, the majority dealing with some aspect of creep phenomena in relation to long-term loading. Seven Papers on dynamic loading and its effect on structures were considered. Since in each case the contributions ranged over such a wide field it was generally only possible to highlight the important aspects of each subject as presented.

Prof. Frudenthal discussed the general creep sensitivity of reinforced concrete structures as a result of his work at Columbia University. Methods of analysis were related to the actual response of the concrete to sustained loads and illustrations were given of the effects of the non-linearity of this response. An Italian contribution dealt with prefabricated arch bridges and arches with stiffening beams in which creep modifies the initial stress conditions, and numerical values were given for the solution of the general formulae. The results of experiments on composite constructions by the French Railways included examples where the concrete floor systems were of single span and of continuous beams. Further contributions on creep of steel by Prof. F. Campus and the deformations in concrete observed in the Lessart Viaduct by L. Charpentier were given in the discussion. R. Pelter described experiments on accelerated creep in concrete with power presses. Concrete cylinders were subjected to permanent loading for periods of time of up to one week, the loads applied always being greater than one half the collapse value, a range not normally explored by research workers beyond the normal working conditions. He found rather unexpectedly that failure occurred under permanent loads approximately equal to only two-thirds of the compression test collapse load, and as this phenomena may be of importance for flat arch bridges and arch dams subjected to high permanent loads it is being systematically investigated.

In presenting a rheological model for concrete, Prof. Torroja and A. Paez discussed the importance of knowing the rheological behaviour of concrete, both reinforced and prestressed, in its relation to permanent set, creep, shrinkage, moisture and thermal movement, and their definition by analytical expressions represented by the behaviour of mechanical models assembled in series or in parallel. Z. Migirdicyan discussed the behaviour of structures in the different stages of equilibrium depending on the loading and the energy of resistance. He showed a method of analysis which enabled not only statically indeterminate structures and

* Pages 12 to 15 of October Issue.

their various boundary conditions to be studied such as grillage beams frames, trusses, composite beams, etc., but also, their stability range.

In order to obtain a more complete knowledge of the deformation of structures further full scale tests are necessary to compare the results with those given by the simple plastic theory. In the Paper by Prof. J. F. Baker and K. G. Eickoff a description was given of the tests carried out at Cambridge on a steel portal frame with pitched roof, which though common in building construction is somewhat more complicated in analysis than the rectangular frame, due to the thrust in the rafters and the differential sway of the stanchions. The portal of 16 ft span, 8 ft stanchion height and a roof slope of 22½ deg. was loaded to destruction, deflections during loading and at collapse being recorded. The observed behaviour of the frame is analysed according to the elastic and simple plastic theories and the observed collapse load and mode are shown to be in good agreement with those predicted.

Dealing with dynamic loading the reporter emphasized that the problems presented were so varied and numerous that classification is extremely difficult. In suggesting two divisions, one dealing with the problems arising by the external dynamic loading and the other with the response of the structure to that loading, he showed that the experimental means to determine the behaviour of the materials and structures has increased and that more knowledge is now available of the response to such loadings. The complex mathematical analysis of dynamic problems is being progressively extended and with further international co-operation progress will be maintained.

Dr. F. Borges dealt statistically with the estimation of earthquake loadings and showed how it was possible to calculate the probability of a given structure undergoing displacement greater than a given value. Dr. B. Bruckmann's Paper on the vibrations in bridges under the action of moving loads gave a method of computing the vibration coefficient taking into account the mass of the bridge, the applied loads and the effect of damping. M. Diven described fatigue tests carried out on cement mortar and Prof. A. Hirai discussed the aerodynamic stability of suspension bridges under wind action.

Fatigue of materials in structures under dynamic loading was discussed by Prof. E. Rauch. Due to fatigue, the resistance of building materials to simultaneous static and dynamic loads is smaller than their resistance to simple static loads. The permissible stress assumed in design is therefore generally smaller in the first case, and its value depends on the ratio of the static stress component to the total stress for a given factor of safety. When determining the stresses or dimensions of the cross-sections, the maximum permissible stress is therefore variable, and to avoid this complication Prof. Rauch shows how a simplified calculation can be made by means of a fatigue coefficient, which he suggests may be 3 for permanent dynamic loads, but may be 2 or 1.5 for temporary or occasional loading.

A. Rinkert presented an interesting Paper on the ability of bridge parapets to withstand the impact of vehicles in the light of his experience of practical trials in Stockholm. Bridge parapets, designed to withstand the impact of a 15-ton bus driven at right angles to the parapet at a speed of 50 km. per hour, weigh only about 17 per cent more than those previously in use. The energy of motion which the parapet can absorb is about six times greater due to the increased section of the handrail and by increasing the length of parapet collaborating.

Measurement of strain under dynamic loads by means of stretched spring strain gauges was described by J. Bellier and G. Jacobowitz, which enable long time comparative observations to be made without loss of accuracy.

Further contributions to the theory of the resistance to long-term loading and the results of tests on steel, reinforced concrete, cast-iron and masonry arches were presented in the discussion, with details of fatigue tests on prestressed concrete beams and the impact resistance of masts, by Dr. P. Abeles. A contribution from A. Seddon on destruction tests on thin walls was included, to

determine the effects on wall strength of varying the slenderness ratio and length of the wall, the strength of the concrete, the eccentricity and concentration of the applied load and on the contribution of reinforcing steel to wall strength.

Slabs and Curved Structures

Ten Papers were presented in this session with a general report by Prof. P. Lardy of Zurich. The majority of the Papers dealt with shell construction incorporating the results of experimental investigations of model shell roofs and theoretical analysis for specialised shell forms, a contribution from Great Britain being provided by Prof. W. T. Marshall, who described the early research work carried out at Aberdeen.

Two Papers affecting bridge design were included in this session. The first by Prof. M. Narvoka and H. Yonezawa dealt with steel highway bridges. In normal design the main girder, floor beam stringer and slab are calculated individually as independent members whereas actually these members resist the load by operating together. The stresses calculated by normal design methods differ considerably from the actual stresses as measured in loading tests. The Authors show by means of tests carried out on a through plate girder, the stringers of the floor system of a truss bridge and the main beams of a composite bridge that the theory of the orthotropic plate is very effective in the analysis of girder and floor systems for bridge structures. The second Paper by G. Little, R. E. Rowe and P. B. Morice dealt with the elastic analysis of right bridge decks subjected to concentrated loads and particularly their development of the distribution coefficient method incorporating the Poisson's ratio effect. The main portion of their Paper is devoted to descriptions of tests on bridges and models, and a comparison of the results actually obtained with those calculated by the distribution coefficient method.

The bulk of the discussion dealt with steel design but included contributions from F. Samuely on folded slab constructions in both steel and concrete.

Structures in Steel and Light Metal

This section dealt almost exclusively with welding and welded structures. Dr. C. Popp reported the results of experiments in welded bridge construction, and in particular the resistance to fatigue of butt welds. Making use of previous data he was able to plot resistance curves and recommends higher permissible fatigue stresses for welded railway bridges than are at present allowed. Prof. G. Wastlund and Dr. L. Ostlund discussed shear stresses in fillet welds. They found that the effect of the normal stresses at right angles and parallel to the longitudinal direction of the weld is negligible when it is submitted to tensile forces. For long welds the maximum shear stresses take place at the ends of the welds.

In the second part of the various structural steels used for welded structures in France, United States, Germany and Great Britain were compared and showed great similarity of chemical composition as well as the prescribed tests on the material.

The third part dealt with welding methods. D. C. C. Dixon and J. D. Thompson after referring to the economic aspect of the question, dealt also with the practical side of manual semi-automatic and automatic welding processes which are preferred to manual welding whenever possible. The advantages of contact electrodes are given, and welding processes are considered in relation to cracking, fatigue failure, structure deformation, residual stresses, porosity and pre-heating. It is emphasised that new tests are required to measure notch ductility in parent metal, and that homogeneity in this parent metal is of great importance.

Dr. Kollbrunner's Paper is mainly concerned with manual welding, but he reports the increasing use of automatic welding in Switzerland. He dealt with the causes of defects in welds and suggested remedies in the adaptation of the electrodes to the basic material, and recommended the use of high thermal efficiency and penetration electrodes so as to obtain a reduction in cost.

(*Continued on page 23*)

HERE AND THERE

1. ROAD CONSTRUCTION IN HOLLAND

By-pass round the Hague

THE road which joins the two largest towns in Holland, Amsterdam and Rotterdam, runs through the country's third city, The Hague. The link between the two motorways Amsterdam-The Hague and The Hague-Rotterdam is therefore formed by the streets of The Hague, where traffic is held up by numerous crossings, traffic lights, etc. This means considerable delay for through traffic between Amsterdam and Rotterdam. For this reason a by-pass has been proposed round The Hague.

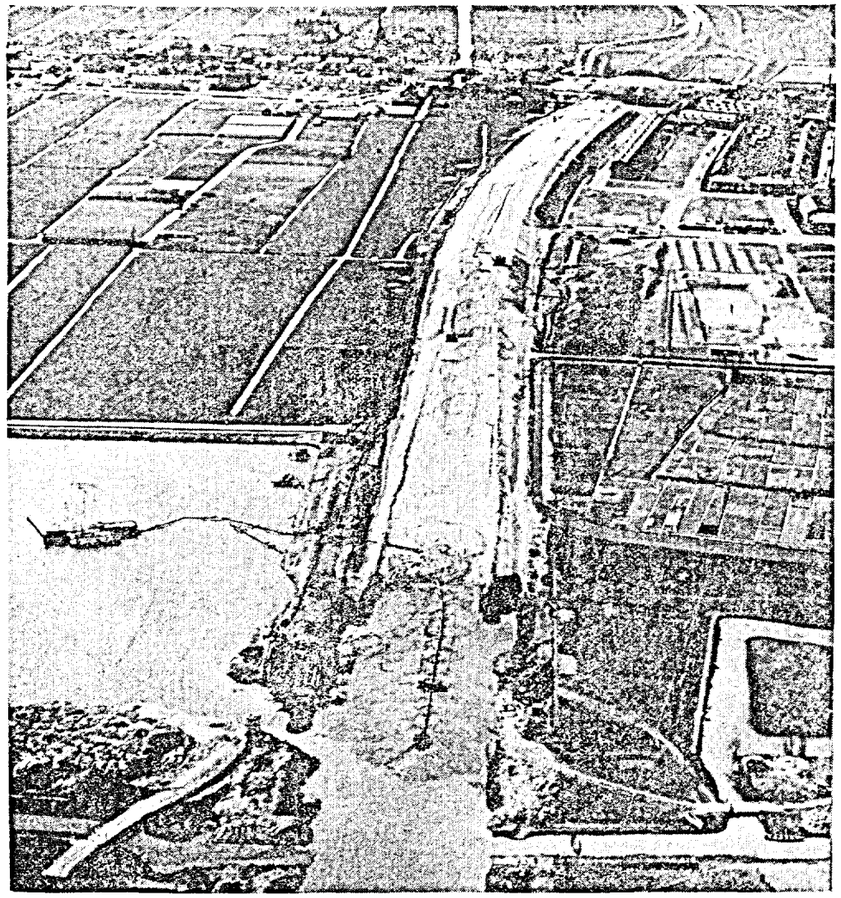


Photo 1. The road under construction. In the background: a completed section of the "earth track"; centre: work in progress on the "earth track"; in the foreground: the trench has filled with water after excavation; left: the sand pit with sand pump and delivery line for filling the trench with sand

The total length of the new road will be about 20 miles, 6 miles longer than the old route. Consequently, when the new road is opened a considerable saving of time will be effected, not only because the town traffic in The Hague is thereby avoided, but also as a result of the shortening of the route.

Soil Conditions

The drawing up of the plans for the new road necessitated extensive soil investigations, as a result of which it was found that large-scale improvement of the subsoil would have to be carried out. The soil along the projected new road consists largely of layers of soft peat several metres thick which are unsuitable as a foundation for the road. Consequently, in order to prevent serious subsidence it is first necessary to dig a broad and deep trench which must then be filled with sand to form an "earth track" on which the road can be built.

The Execution of the Work

Altogether about 4 crore cubic feet of soil will have to be removed for the improvement of the ground in connection with the building of the new road. Some 7 crores cubic feet of sand are required for the earth track. As a result of the removal of the peat and soft clay with the aid of excavating machines and the influx of water into the trench, a canal will be formed which will subsequently be filled with sand. The sand for the earth track will be obtained from several nearby sand pits which will partly be filled in again with excavated soil, Photo 1.

The road will be entirely surfaced with cement concrete. A temporary brick paving will be provided at points where subsequent further ground movement is expected.

The road will have two carriageways, each 24 ft 3 in. (7.25 m.) wide, with a central dividing strip 14 ft 9 in. wide. It will have metalled shoulders 9 ft (2.75 m.) wide for parking and, finally, grass verges with a width of 5 ft 9 in. (1.75 m.)

A Section of the road which was completed is shown in Photo 2.

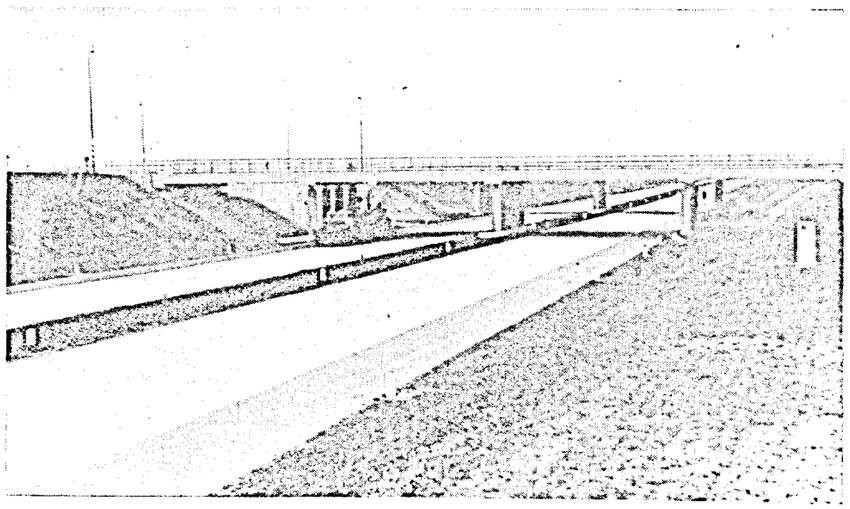


Photo 2. A completed section of the road.

Intersections

23 viaducts and fixed bridges will be built on and over the road, as well as numerous tunnels and culverts. A bascule bridge will be built across the Oude Rijn.

Also worthy of mention is the solution chosen for the intersection of the road with the railway from The Hague to Rotterdam (Hofplein). Since the railway cannot be raised, the road dips and passes under the railway. This involves bringing the road below the level of the low-lying land reclaimed from the sea or river. Consequently, this section of the road has been specially designed and equipped with a pumping station by means of which the water can always be kept at the proper level.

The new road is expected to be finished in the spring of 1960.

2. A MINISTER FOR HIGHWAYS IN NEW SOUTH WALES, AUSTRALIA

A separate portfolio for highways has been created in the Government of New South Wales. This indicates the increasing emphasis placed on the improvement of the road system in that country. In a foreword to the 'Main Roads' (June 1956), Mr. J. B. Renshaw, Minister for Highways, has stressed on the need for a good system of roads for increased productivity. The following is an extract from his foreword:

Roads form one of the most effective means to promote both economic efficiency and social welfare. They are the first requirement for the development of resources. They facilitate the movement of men and goods employed in productive work; connect farms and forests to markets, railways, airports and seaports; and enable finished products to reach the ultimate consumer. The greater the speed and the lower the cost of transport the more the national productivity can be increased, and standards of living improved.

The movement of defence personnel and equipment also calls for roads, as does the transport of the products of our defence industries, and of other industries which will aid in defence.

Good roads result in a reduction in total transport expenditure and can increase production and income. This is necessarily reflected in an expansion of national revenue.

Much money is necessarily needed to achieve roads improved to the standard necessary to serve properly the traffic of to-day, and of the years immediately ahead. Many of our most important roads are deficient in width, and their pavements deficient in strength. We have many old bridges requiring replacement, and we need also a big increase in the milage of gravelling on earth roads, especially in western areas.

(From 'Main Roads', June 1956).

3. PHILIPPINE ROAD DEVELOPMENT

VILLAGERS and small farmers of the Philippines will receive the largest benefits from the $ 29.1 million aid which the United States is providing during the 1956.

Roads are being built to open up new land to farmers. In the island Mindanao, more than 500 miles of new roads are being built to make undeveloped areas more accessible. By the end of fiscal year 1955, more than 250 miles of public roads in the Philippines had been constructed or repaired with the help of U. S. technical aid.

(From 'World Construction', July 1956).

4. AIDS TO TRAFFIC FLOW

One-way Streets

IN towns where a suitable street pattern exists, much relief of congestion can be obtained by introducing a one-way system. Increased traffic speed results, and junctions can be controlled more easily by traffic signals with less time lost by waiting at the signals than with the normal two-way traffic. Safer conditions can also be produced for pedestrians crossing the road. Although vehicles may have to travel more distance, it is doubtful if the running costs of the added distances are greater than the cost of the delays which would otherwise be experienced.

Considerable investigation and thought are desirable before a one-way system is introduced and a prior period of experimental working is an advantage.

Traffic Signals

In general, roundabouts at road junctions are better than traffic signals, but usually in towns they are too expensive owing to the necessity for demolishing property. Signals interrupt the continuity of traffic flow, but do afford better conditions for pedestrians crossing the road.

At a normal two-way intersection turning traffic often produces complications. Vehicles turning right impede following traffic whilst waiting to turn, and opposing traffic when making the turn. Clear and adequate marking of traffic lanes is required, and where turning right traffic is heavy, a three-phase signal system may be helpful. Turning traffic also produces difficulties for the pedestrian.

In certain special cases where there is a main route with less important side roads, it may be possible to arrange a co-ordinated system so that if a driver conforms to a certain speed which is indicated, each signal will be in his favour as he travels through. It operates in Dusseldorf, and very effectively. It is an effective means of controlling traffic speed and thus reducing accidents.

(From The Journal of the Institution of Municipal Engineers, August 1956).

5. ASPHALT DURABILITY

A new instrument that provides the first accurate predictions of the life expectancy of asphalts has been developed by scientists at Shell Development Co.

The instrument—a sliding plate microviscometer—measures resistance to flow under carefully controlled temperatures and shear forces. Its accurate measurements are expected to provide uniformly superior roads by permitting selection of asphalts with proper viscosity and great resistance to change.

The key to precision in the test is that measurements are made on an extremely thin film of asphalt—about a hundredth of a millimeter thick. By using such thin samples, tests can be run under conditions similar to those existing in ordinary pavements.

The chief advantage of the instrument, according to Shell asphalt engineers, is that results indicating the durability of the sample are expressed in absolute physical units—data never before attainable.

To gauge the asphalt's durability, the viscosity of the film is measured, subjected to aging processes, then measured again.

In making the test, a minute quantity of asphalt is put between two polished glass plates and pressed out to form a thin film. One plate then is moved across the other and the sample is sheared. The shearing force and the temperature are carefully controlled and recorded.

The movable plate is attached to a wire that is connected to a simple balance beam pivoted on agate bearings and polished steel knife edges. Weights hung on the beam provide the shear force. Temperature is controlled by a water bath.

An electronic circuit is used to follow the movement of the glass plate. This movement may be measured directly by reading the micrometer on the instrument. It is also possible to mark the displacement of the glass plate on a millivolt recorder.

(From 'Engineering News Record', July 19 1956).

6. MEASUREMENT OF DYNAMIC STRESSES

ONE of the functions of a road is to spread the loads applied by traffic so that the pressures on the subsoil are too low to produce permanent deformation. To design flexible roads from considerations of stress, the stresses developed in the subsoil under roads of various types and thicknesses must therefore be known. The problem is thus to ascertain how much the stress in the soil is reduced by different thicknesses and different types of flexible construction and to determine the part played in this by the various types of layer that make up the flexible road. In the experiments, conducted by the Road Research Laboratory in U.K. the dynamic vertical compressive stresses set up when vehicles are run over the test road are measured using piezoelectric quartz gauges embedded in the road surface and at various depths in the subgrade.

The stress applied by the vehicle wheel to the road surface was found to be 1½ to 2 times the inflation pressure of the tyre, and to be a steep-fronted pulse of short duration. The stresses in the soil are much smaller and of longer duration. The evidence obtained indicates that the stress applied to the road surface depends largely on the inflation pressure of the tyre, whilst that in the subgrade depends upon the wheel load.

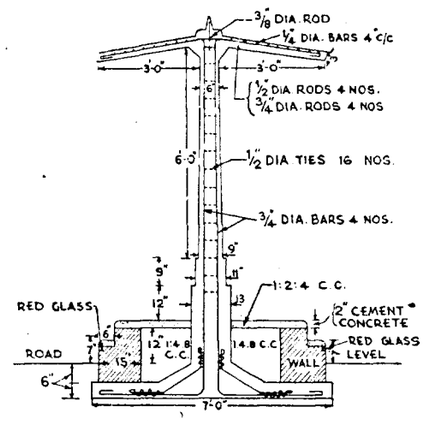
As expected, the stresses in the subgrade were found to decrease with increase in the thickness of construction and with the depth below the surface, and to depend greatly upon the type of construction. The work so far indicates that the stresses in the soil when a hot-rolled asphalt wearing course is used are considerably less than with coated macadam. A tar-coated stone base gives lower stresses than a dry stone base. The stresses in the subsoil beneath the tar-coated stone sections increase with increase in the temperature of the road, but the precise relationship has still to be determined.

(From "Report of the Road Research Board, U.K. 1955").

7. TRAFFIC CONTROL POST

A roundabout is generally adopted where there is a heavy right hand traffic and several roads meet. The Specifications and Standards Committee of the Indian Roads Congress recommended that roundabouts are suitable where intersecting motor traffic is 60 per cent of the total motor traffic on all the roads that meet or where the fast-moving traffic turning right is 35 per cent of the total.

It is not always that roundabouts of suitable size can be constructed in urban areas. In such cases, regulation of traffic by a policeman minimises accidents. In a hot country, the policeman on duty requires protection from the rain and the sun.

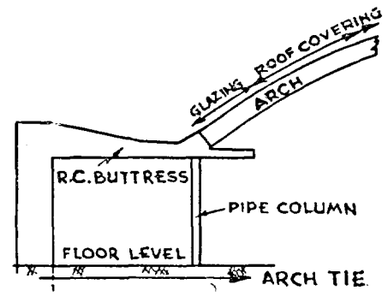


A design for a reinforced concrete traffic post with a canopy is shown in the Figure on page 22.

It consists of a cylindrical vertical column with a sloping circular canopy at the top, and is designed as a cantilever against wind pressure at 30 lb per sq. ft. uniformly distributed load but not to withstand the impact of moving vehicles. The column and the base are built monolithic with the canopy.

8. A NOVEL BUTTRESS FOR AN ARCH ROOF

IN the construction of a roof over a market at Audubon, N. J., U. S. A., with an unobstructed floor area of 113 ft 6 in. by 154 ft 6 in., two-hinged laminated-timber arch ribs are supported by reinforced concrete rigid frames with horizontal top and bottom members and a vertical member that acts as a column for a low exterior wall. The buttresses transmit the horizontal thrust to a tie below the floor slab. The vertical loads are carried by tubular metal columns between the top and bottom members of the frame, forming a low arcade along the sides of the main area, see Fig.



(From 'Concrete & Constructional Engineering', September 1956).

(Continued from page 17)

Structures in Steel and Light Alloys

Only six Papers appeared in this section, three of which dealt with the maintenance of steel structures. Dr. K. C. Rockey's Paper summarises the results obtained from several hundred tests on web plates of model light alloy plate girders to investigate behaviour under pure shear, pure bending and combinations of shear and bending. As a result new formulae are presented for the design of intermediate vertical stiffeners and light alloy web-plates, on the principle that rational safe unit stresses can only be determined by considering their relation to the ultimate carrying capacity of the structure as a whole. The proposed formulae recommend that the web plates of light alloy plate girders should, in certain circumstances, be designed to operate beyond the buckling load.

The three Papers on maintenance of steel structures present a thorough treatment of the problem of protection against corrosion for steel structures of all types and in varied locations, and show a large measure of agreement on essential points. The Paper by M. F. Palmer discusses some of the faults in design of structures which lead to serious maintenance problems such as inaccessibility of details, water pockets, unprotected roller nests and inadequate expansion joints. The cleaning and painting of steel work are discussed in detail including wire brushing, grit blasting, phosphating, flame cleaning and pickling in relation to painting, metal spraying and galvanising. All contributors agree on the superiority of welded construction from the standpoint of maintenance. Mr. Palmer also discusses the repairs on Tower Bridge where a limited use was made of a method of repairing rusted rivet heads by thoroughly cleaning the surrounding space and welding the heads to the plate, instead of the more expensive process of cutting out the old rivets and replacing with bolts. Tests which have been made indicate that this type of repair provides the full strength of the original connection.

(To be continued)

–(From 'The Surveyor', 28th July 1956.)

CURRENT LITERATURE

ABSTRACTS

HANDBOOK OF GRAPHIC PRESENTATION by C. F. Schimid. The Ronald Press Company, New York.

THIS book provides information on all aspects of presentation of statistical data by means of charts or graphs. When statistical data are properly presented by means of charts or graphs, they provide a visual impression of the variations which are not apparent in tabulation. The book contains 11 Chapters on various types of presentation. Of particular interest to engineers are chapters dealing with the basic principles and techniques of chart design, drafting techniques, rectilinear co-ordinate charts, bar and column charts, semi-logarithmic or ratio charts, and frequency graphs and related charts. The book is profusely illustrated with examples.

THE SAMPLING AND ANALYSIS OF ROLLED ASPHALT AND COATED MACADAM by C. M. Gough. Road Research Technical Paper No. 36, Her Majesty's Stationery Office, London, 1956.

WHEN a sample of bituminous mixture from an asphalt or tar macadam plant is analysed, two assumptions namely that the method of analysis is accurate and that the sample is representative are made.

The Paper describes the work done with a view to establish the accuracy of the different available methods of analysis and the sampling procedures used. The methods studied are the British Standard method of analysis and the "Rapid" methods of analysing bituminous mixtures. The conclusion is that these methods are capable of giving accurate results on laboratory prepared samples of known compositions. Study of samples of rolled asphalt and bitumen macadam taken from 20 cwt. batches mixed in a commercial plant revealed that errors arise from poor mixing so that the composition of a single mix differs from part to part and from inadequate sampling. The variations in composition arise mainly from non-uniform distribution of stone and generally high stone contents are associated with low bitumen content. When sampling is carried out according to the British Standard requirements, a representative sample is obtained provided that the variations in the mixed material are not excessive.

STANDARD RECOMMENDED PRACTICE FOR WINTER CONCRETING. Reported by ACI Committee 604. Journal of the American Concrete Institute, June 1956.

AIR-entrained concrete and addition of one per cent of calcium chloride by weight of cement are recommended in cold weather. They permit a reduction in the time newly placed concrete should be protected. The use of accelerators and antifreezes, keeping of temperature records, heating of materials, subgrade preparation, protective coverings, heated enclosures, curing, and form removal are discussed for several types of concrete structures and preferred methods are indicated. Supplementary material on the effect of curing temperature on concrete strength are given in an appendix. A list of selected references is included.

STRENGTHENING STEEL STRUCTURES BY MEANS OF PRESTRESSING. BY R. Szilard, The Engineering Journal, October 1955. Published By The Engineering Institute of Canada.

THE structural designer is often faced with the problem of strengthening an existing steel structure which has become inadequate to support increased

dead or live loads. Structural steel has in this respect an advantage over reinforced concrete, since it is readily reinforced by means of riveting or welding. To the designers these methods are well-known. Prestressing can offer new and more economical ways of reinforcing existing steel structures. This article deals with the design equations covering the problems connected with strengthening by means of prestressing.

TRAFFIC ACCIDENTS AND VIOLATIONS—Bulletin 120, Highway Research Board, 2101, Constitution, Washington, D. C.

THIS bulletin contains the following five Papers presented at the 34th Annual Meeting of the Highway Research Board, January 1955.

(1) "Role of Roadway Elements in in Pennsylvania Turnpike Accidents," which presents a few of the results from a two-year study of accidents on the Pennsylvania Turnpike.

(2) "Relation of Accidents to Speed Habits and Other Driver Characteristics."

(3) "The Habitual Traffic Violator," which reports the results of interviewing 300 habitual violators to determine the factors surrounding their violation and to obtain information concerning their psychological characteristics.

(4) "Comparison of Types of Traffic Violations for Different Years."

(5) "Automobile-Crash Injuries."

THE USE OF ELECTRO-OSMOSIS FOR THE DRAINAGE OF NON-SATURATED SILTY LOAM PAVEMENT SUB-BASES. By L. L. Simon, Nettleton and G. Cordingley. New Zealand Engineering Journal, February 15, 1956.

THE stability of flexible pavements is governed to a large extent by the bearing capacity of the subgrade or subbase. It was found that the bearing capacity of silty loam sub-bases of aerodromes could be considerably increased by a small reduction in their moisture content. As normal drainage methods are often impracticable, laboratory and field tests were carried out to determine whether it was possible to reduce the moisture content to the desirable range by the use of electro-osmosis. This Paper gives the outline of the theory involved, and describes the tests, which were carried out jointly by the Roads and Aerodromes Section, N. S. W. Branch, Commonwealth Department of Works, and the Soil Mechanics Laboratory of the N. S. W. University of Technology.

SPECIFICATION FOR STANDARD SAND—Indian Standards Institution, Delhi.

TESTING of cement is a very important part of the control exercised over quality of materials used in construction work. This work has been hitherto hampered by the lack of an Indian Standard Sand which could be used in place of Leighton Buzzard Sand which had to be imported from England. During the war, difficulties in obtaining sufficient quantities of Leighton Buzzard Sand necessitated finding a substitute within the country and this resulted in a large amount of investigation being carried out by the Government Test House, Alipur, and later by the ISI technical committee.

As a result of these investigations, the sand found near Ennore in Madras State was found suitable as a substitute for Leighton Buzzard Sand.

The specification lays down physical and chemical requirements for the standard sand and stipulates a certificate of conformity to the standard from the Concrete Research Laboratory, Chepauk, Madras, which also supplies standard sand to those who require it.

SIMPLE METHODS OF FLEXIBLE PAVEMENT DESIGN USING CONE PENETROMETERS—A. J. Scala, New Zealand Engineering, February 15, 1956.

BECAUSE of the time and cost involved, very few road authorities use a strength test in evaluating the subgrade of a road. The Paper sets out two simple and quick methods of obtaining the strength in the field, using either a static or dynamic

cone. Reasonable correlation has been obtained with field California bearing ratio. Methods of estimating pavement thickness from test results are presented.

LAW AND THE ENGINEERING - THE LAW OF CONTRACT AND NEGLIGENCE AS AFFECTING ENGINEERS—by C. F. Mayson, Chapman & Hall Ltd., 37, Essex Street, W. C. 2, London, 635, Highway Research Board Bulletin 112.

THE book deals with those aspects of English Civil Law—as opposed to Criminal Law—which are essential for Engineers. These include the law of contract, law relating to negligence & nuisance, law relating to employment and the safety rules laid down by various enactments such as Factories Act. The matter is arranged in 3 parts and contains 24 chapters. Part one deals with the English Legal system. Part two which has 14 chapters deals with the various aspects of the Law of Contract. The third part deals with the Law of Negligence. Appendices give extracts from Acts of Parliament and decided cases.

EFFECTS OF TRAFFIC CONTROL ON STREET CAPACITY, Bulletin 112 of the Highway Research Board. Washington, D. C.

THIS bulletin contains four Papers presented at the 34th Annual Meeting of the Highway Research Board.

1. "Capacities of Narrow Streets with Manual Control and Signal Control," discusses a field survey of capacities of some intersections.

2. "Capacities of One-Way and Two-Way Streets with Signals and with Stop Signs," covers a study of traffic at four intersections while the traffic signals were in normal operation and also while two-way stop signs were used in place of the traffic signals.

3. "Starting Delay and Time Spacing of Vehicles Entering Signalized Intersections," reports on an experiment intended to measure some typical values of spacing and starting delay, to examine the variability of these both from intersection to intersection and from day-to-day at the same intersection, and to relate these values and their variabilities to physical and traffic conditions.

4. "Effect of Parked Vehicle on Traffic Capacity of Signalized Intersections," describes an experiment to evaluate quantitatively the effect of a single parked car in an intersection approach.

STEEL FOR PRESTRESSED CONCRETE - PART I. PLAIN HARD DRAWN STEEL WIRE-B. S. S. 2691 - Part I - 1955-British Standards Institution, London, W. 1.

THE standard specifies the process of manufacture, quality, diameters of the finished wire tensile strength and proof stress. Details of a cold bend test and the number of tests to be performed are given.

SELECTED RECENT LITERATURE IN ENGINEERING JOURNALS

X. BRIDGES AND OTHER STRUCTURES

1. **American Construction Works—Third Tube of the Lincoln Tunnel, Bridge Tube Phoebus—Norfolk, Lake Pontchartrian Bridge**; *Schweizerische Bauzeitung, Vol. 74, No. 13, 31*, March 1956, pp. 180-183 (in German).

2. **Influence Lines for Reactions of Continuous Trusses**; ANDREW JOHN PYKA, *Proceedings of the American Society of Civil Engineers, Vol. 32, No. ST2*, March 1956, Paper No. 114, pp. 1-16.

3. **Arching Action Theory of Masonry Walls**; E. L. McDOWELL, K. E. McKEE and E. SEVIN, *Proceedings of the American Society of Civil Engineers, Vol. 82, No. ST 2*, March 1956, Paper 915, pp. 1-18.

4. **Load Test on Prestressed Concrete Beam at Sone Bridge**; B. S. MATHUR, *Indian Concrete Journal, Vol. 30, No. 6*, June 1956, pp. 169-174.

5. **Competitive Design of Reinforced Concrete Structures**; S. SHIVADASANI, *Indian Concrete Journal, Vol. 30, No. 6*, June 1956, pp. 192-194.

6. **Prestressed Concrete as Applied to Building Frames**; FRANCIS WALLEY AND HERGH CAMPBELL ADAMS, *Proceedings of the Institution of Civil Engineers, Part 3, Vol. 5*, April 1956, No. 1, pp. 70-104.

7. **The Stanchim Problem in Frame Structures Designed According to Ultimate Carrying Capacity**; MICHAEL REX HORNE, *Proceedings of the Institution of Civil Engineers, Part III, Vol. 5*, April 1956, No. 1, pp. 105-160.

8. **Prestressing with Stranded Wires, the Leonhardt and Losba Systems**; *Concrete and Constructional Engineering, Vol. 4, No. 4*, April 1956, pp. 325-333.

9. **Analysis of a Parabolic Arch of Uniform Thickness**; V. A. MORGON, *Concrete and Constructional Engineering, Vol. LI, No. 4*, April 1956, pp. 335-344.

10. **Joint in Precast Frames**; C. H. DOBBIE, *Concrete and Constructional Engineering, Vol. LI, No. 4*, April 1956, pp. 345-350.

11. **The Theoretical and Practical Basis of Cruciani Centering**; FRIDO CRUCIANI, *Travaux, Vol. 40, No. 257*, March 1956, pp. 117-122 (in French).

12. **Effect of Distortion of a Stiff-Jointed Frame on its Plastic Collapse Load**; J. W. H. KING and DE JENKINS, *Vol. 201, No. 5229*, April 13, 1956, pp. 320-323.

13. **Prestressing Practices in Bridge Building**; J. C. RUNDLETT, *Proceedings of the American Society of Civil Engineers*, July 1955, Paper No. 733.

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ENGINEERING AS A STABILISING INFLUENCE

The engineer works within his own social frame, and as the modern world is organized into national states, his work has to be shaped to suit them and their demands. Within these limits his work is a strong stabilizing influence. On the one hand it avoids the angry discontent which is inevitable when no change seems possible, and on the other the complacency which assumes that everything is after all as good as it can be and that nothing need be done about it. Unlike the fine arts, which are always having to make a fresh start because something has been done so well that it cannot be done again, it moves in an ordered progress in which every new step is a real advance and leads to others beyond it. Such a process satisfies both man's desire for order and stability and his love of novelty.

—*Sir Maurice Bowra.*

BUDGETS AND ADMINISTRATION REPORTS

GOVERNMENT OF ASSAM BUDGET FOR 1956-57

The following extracts have been taken from the Civil Works Budget of the Government of Assam for the year 1956-57.

Revenue (Civil Works)

Heads	(In lakhs of rupees) Actuals 1954-55	Revised estimate 1955-56	Budget estimate 1956-57
Tolls on Roads	0.17	0.35	0.40
Rents	2.62	2.97	3.00
Ferry Receipts	4.89	5.00	5.81
Transfer from Central Road Development Account	83.24	5.64	3.90
Miscellaneous	6.69	4.67	4.70
Recoveries of Expenditure	1.30	0.55	0.57
Contribution from the Govt. of India for construction of certain bridges on the North Bank of Brahamputra	—	4.50	7.50
Contribution from the Govt. of India for construction of Jawai-Badurpur Road	—	10.64	9.86
Contribution from Govt. of India for construction of State Roads of economic or inter-State Importance	—	7.50	8.22
Deduct—Refunds	-0.73	-0.41	-0.41
Total	98.18	41.41	43.55
Expenditure (Civil Works)			
Buildings			
Original Works	61.24	121.83	165.74
Repairs	17.48	18.62	21.01
Communications			
Original Works	239.26	348.79	327.88
Repairs	99.97	150.59	142.29
Miscellaneous			
Original Works	—	0.24	—
Repairs	11.83	0.08	0.07
Stock and other Suspense Accounts	13.09	2.07	2.27
Regrant of Lapses	—	4.00	8.00
Grants-in-aid for Communications	15.91	12.94	12.97
Net Establishment	39.30	60.94	65.87
Net Tools and Plant	6.38	11.80	8.00
Deduct—Recoveries	-24.86	-148.34	-140.87
Total	453.42	583.56	613.23

Heads	(In lakhs of rupees) Actuals 1954-55	Revised estimate 1955-56	Budget estimate 1956-57
Capital Account of Civil Works outside the Revenue Accounts			
Original Works			
Buildings	4.68	18.70	155.46
Communications	80.12	137.18	125.43
Tools and Plant and Establishment Charges etc.	4.43	16.96	21.60
Total	89.23	172.84	302.49
Revenue from Roads			
Receipts under the Motor Vehicles Act	0.07	16.36	16.43
Receipts under the Assam Motor Vehicles Taxation Act	37.19	24.13	31.13
Recoveries of Over Payment	0.02	0.44	0.41
Fees and other Receipts	0.23	—	—
Deduct—Refunds	-0.04	-0.03	-0.03
Taxes on sale of Motor Spirit	23.68	24.45	30.15
Taxes on sale of Lubricants	3.06	3.21	9.51
Total	64.21	68.56	87.60

GOVERNMENT OF ASSAM BUDGET FOR 1956—57

(A brief review with reference to Civil works)

THE budget estimate of the Government of Assam for the year 1956-57 indicates revenue receipts of Rs 2189.85 lakhs against an estimated revenue expenditure of Rs 2554.24 lakhs leading to a deficit of Rs 365.09 lakhs. The revenue estimates for 1955-56 (Revised) placed revenue receipts at Rs 2143.86 lakhs and revenue expenditure at Rs 2241.89 lakhs with a deficit of Rs 98.03 lakhs. Actuals for 1954-55 revealed revenue receipts of Rs 1623.19 lakhs and revenue expenditure of Rs 1921.63 lakhs resulting in a deficit of Rs 298.44 lakhs.

Revenue expenditure on Civil Works for 1956-57 is estimated at Rs 613.23 lakhs which works out to 28.0 per cent of the total State revenue. It was Rs 583.56 lakhs in 1955-56 (Revised Estimate) and Rs 453.42 lakhs in 1954-55 (Actuals) which amounted to 27.2 per cent and 27.9 per cent of the State revenue for the corresponding years.

Expenditure for communications alone (original works and repairs only) for 1956-57 is placed at Rs 470.17 lakhs which is 21.5 per cent of the total State revenue. The corresponding ratios for 1955-56 (Revised Estimate) and 1954-55 (Actuals) were 23.3 per cent and 20.9 per cent respectively.

Apart from the revenue expenditure a sum of Rs 302.49 lakhs has been provided for Civil Works for 1956-57 on account of capital expenditure outside the revenue account which is against Rs 172.84 lakhs for 1955-56(Revised Estimate) and Rs 89.23 lakhs for 1954-55 (Actuals).

LIST OF APPROVED WORKS ON NATIONAL HIGHWAYS

S. No.	Job No.	Name of work	Amount (Rs in lakhs)
		ASSAM	
1.	1638-AS 37	Purchase of a manboat for use at Goalpara Jogighopa ferry crossing on N.H. No. 31 & 37.	0.11
		BOMBAY	
2.	1635-BM 3	Widening and improving the lengths of mile 93 passing through the Basin of Lake Beale.	1.04
3.	1636-BM 3	Widening and improving the lengths of mile No. 94 passing through the basin of Lake Beale.	1.05
		DELHI	
4.	1639-DLH 2	Construction of a bridge over Barapula Nala in bye-pass connecting N. H. No. 1 with N. H. No. 2 from Railway siding to Mathura Road.	5.92
5.	1645-DLH 1	Raising Upper Bela road to the standard of N. H. part III-subhead Bridges & Drainage, N. H. No. 1.	1.50
		HIMACHAL PRADESH	
6.	1641-HP 22	Purchase of jeeps and trucks required in connection with the construction of H.T. Road (N. H. No. 22.)	1.29
7.	1642-HP 22	Construction of 8-ton capacity explosive magazine at Wangtu in Himachal Pradesh.	0.12
		PUNJAB	
8.	1634-PB 22	Strengthening of high level bridge over Sirsini Nadi in mile 9 of Ambala-Kalka Road (N. H. No. 22.)	0.09
9.	1643-PB 1	Electric installation in the Inspection Bungalow at Samalkha and in Munshi Khana and Kitchen attached thereto.	0.02

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