ELECTRICAL DEVELOPMENTS IN MADRAS

IN a paper published in the *Electrician* of August 1, by J. Meek, the resident electrical engineer to the Madras Presidency, interesting projects are suggested about new developments in the Madras Presidency. This Presidency covers an area in South India of 142,000 square miles and supports a population of about 48 millions. An idea of the size may be obtained by comparison with that of England, which has an area of about 50,000 square miles and a population of about 38 millions. The people in the Presidency are mainly engaged in agriculture, and most of them live in villages. The capital, Madras City, has a population now approaching 800,000, but the next biggest town, Madura, has a population of less than 250,000. Four main languages are spoken—Tamil, Telugu, Canarese and Malayalani—and efforts are now being made by the Congress Government to introduce Hindi with the ultimate object of providing India with a common language. Among the educated classes English is widely spoken.

Some idea of the climate of Madras can be obtained from the following significant clause which usually appears in Madras Government electrical specifications: "The temperature in the shade will vary from 50° F. to 110° F. The max. temperature in the sun may be assumed to be 150° F. The relative humidity will vary from 60 to 80 per cent."

Although for the greater part of the year there is very little rain in most parts of the Presidency, there is considerable rainfall during the south-west and north-east monsoons, especially in the eastern and western Ghats, where more than 400 in. is registered in some places.

Until comparatively recently the only supply system of any importance was that of the Madras Electric Supply Corporation, which has held a licence from the Government for the generation and distribution of electricity in Madras City for the last thirty-one years. This Corporation has a steam-turbine power station with a capacity of more than 53,000 kva. The Presidency has no coal or oil deposits but is fairly well provided with water-power in the south. In 1924 the Madras Government decided to take charge of all hydro-electric surveys and projects and bought back concessions previously granted to private concerns which had not been developed.

The Pykara Scheme in the Nilgiri Hills was taken up first. It is situated at a distance of 280 miles to the south-west of Madras. Pykara is a high head scheme with storage utilizing a fall of 3,000 feet. When the great Mettur Dam was built some years ago for irrigation control, hydro-electric pipes were left ready in the dam, and this development was the next to be taken up about five years ago. The present installed capacity of plant is 37,500 kva. operating on a head which varies from 60 to 160 feet. In addition to these schemes the Madras Government has provided two steam stations in the north. There are many miles of feeder lines and also a considerable mileage of 33 kv. and 11 kv. The length of these transmission lines has necessitated the introduction of synchronous condensers at Trichinopoly and Madras.

The demand for power has greatly exceeded the most optimistic estimates, and additional plant and extensions to lines and substations had to be installed several years in advance of the original programme.

The grid supplies power direct to many tea factories, ginning factories, oil mills, chemical works, and even to farmers in outlying districts. More than a thousand small pumping sets are connected to the systems for pumping water from wells into the fields. The ryot has found it cheaper and more convenient to water his fields by means of electricity than by using bullocks as his forefathers have been doing for centuries.

UNIVERSITY OF THE WITWATERSRAND

NEW ENGINEERING BUILDING

ON June 18 at the University of the Witwatersrand, Johannesburg, General the Right Hon. J. C. Smuts, Prime Minister of the Union of South Africa, opened the new Wolf and Hirsch Hillman Building, which forms an important and substantial addition to the accommodation provided for instruction in engineering. Its site, lying to the west of the central block and south of the older engineering block, stands higher than these, and in its lay-out this has been utilized to permit of the formation of terraces and rock-gardens and the provision in an economical manner of a range of garages.

The building consists of two wings running east and west, the larger, about 210 ft. long, being devoted to laboratories and placed on the north side so that it receives the maximum light. The shorter south wing, about 130 ft. in length, provides accommodation for a model analysis laboratory, drawing halls and lecture theatres. The east wing connecting these other two contains the entrance hall and staff offices.

The Department of Civil Engineering provides a four-year course for the degree of B.Sc. (Engineering) which is recognized by the Institution of Civil Engineers as exempting its holders from Sections A and B of its associate membership examination. In the Union, it offers a qualification for those entering the higher technical services of the Irrigation and Public Works Departments, National Road Board, South African Railways and Harbours and other equally important administrations and undertakings.

The new Hillman Building will greatly enhance its facilities by providing spacious and well-equipped laboratories with workshops and stores and ample accommodation for lectures. It has been designed to serve a threefold purpose: (i) to promote the course of training already referred to; (ii) to provide for research into fundamental problems of civil engineering; and (iii) to assist in the solution of problems arising in practice.

The main features of the Hydraulics Laboratory are a level flume, 3 ft. wide, 2 ft. 6 in. deep, with an overall length of 82 ft. and glass sides to allow of easy observation; a smaller flume with one end capable of being given a maximum tilt of 1 in 20; a river model table 10 ft. wide and 70 ft. long for the study of river and tidal flow; and a general purpose bench for experiments on the flow of water in pipes.

In the Structures Laboratory, a 350,000-lb. precision hydraulic testing machine has been installed for compression and bending tests. This is fitted with an automatic loading device giving ten different rates of loading and reading to the nearest 10 lb. A 75,000-lb. machine for tensile tests and permitting of compression and bending tests on short struts and beams is on order and will have autographic load-deformation recording apparatus. There are also several test-beds for testing members and structures, and the accessories provided are of the latest types.

The investigation of structural problems by various methods of mechanical analysis employing small-scale models will be carried out in the Model Analysis Laboratory, the equipment of which includes a Continostat apparatus for the experimental determination of influence lines using spline models and a Lobban deformeter. In the Highway Engineering and Materials of Construction Laboratory the main space has been divided into three sections: (1) tar, bitumen and asphalt; (ii) soils and aggregates; (iii) cement and concrete. Each has been suitably provided with apparatus and equipment which will enable tests and investigations to be carried out in conformity with present-day practice in this field, in which there is so much scope for development.

IRISH SALMON, SEA TROUT AND EELS

THE Fisheries Branch of the Irish Department of Agriculture has published a brief summary of the catch of salmon, sea trout and eels in Eire between 1927 and 1939*. Alternate years only are given, the figures are neither averaged nor compared, and no comments are made or inferences drawn. But the statistics themselves are of no small interest, as the following epitome of part of them is enough to show.

	1927	1929	1931	1933	1935	1937	1939
Salmon							
Total catch (wt.)	100	48	75	68	78	45	46
do. rod only	100	24	53	31	50	38	34
Average wt. per fish (lb.)	12·9	13·5	9·7	11·8	9·8	10·7	10·2
	100	105	75	91	76	83	79
Value per rod (shillings)	189	77	85	66	84	69	72
	100	41	45	40	49	37	38
Sea Trout							
Total catch (wt.)	100	101	101	91	100	96	101

The period is not long enough, nor the data complete enough, to let us speak of any lasting *trend*; but it is clear that the catch of salmon has greatly diminished of recent years. Since 1927, the annual catch (as shown in alternate years) has never reached 80 per cent, and has three times out of six been less than 50 per cent, of that year's catch. The catch by rod is worse still; for it has been so low as a quarter, and has only once been more than a half, of the catch of 1927. On the other hand, the catch of sea trout, while it has its ups and downs in the various rivers, averages out over all to a nearly constant total, year by year.

More remarkable than the diminished catch of salmon is a diminution in the average weight of the same fish. From 1931 onwards the average weight has been much below that of 1927–29; and in the last five annual periods it has only averaged about four-fifths of the weight in the first two.

The returns from the several rivers or fishery districts show many interesting things. We have seen that the salmon catch of 1939 was only 46 per cent of that of 1927; but the decrease, though it extended well-nigh all round the coast of Eire, was very far from uniform. The three contiguous east coast districts, Dundalk, Drogheda and Dublin, had in 1939, 90, 99 and 90 per cent of the catch of 1927; but the next succeeding regions, on the south-west and south coasts, namely, Wexford, Waterford, Lismore, Cork and Bandon, show only 34, 38, 26, 21 and 19 per cent, in the same comparison. The commercial importance of all these statistics is, as usual, the least interesting part of them. D. W. T.

* Eire: Roinn Talmhaidheachta (Department of Agriculture), Brainse Iascaigh (Fisheries Branch). Statistics of Salmon, Sea Trout and Eels captured during each of the Years 1939, 1937, 1935, 1933, 1931, 1929, 1927. (P. No. 4658.) Pp. 20. (Dublin: Stationery Office, 1941.) 6*d*.

ELECTRIC STRENGTH OF SOLID DIELECTRICS

IN a paper, by W. G. Standring, of the National Physical Laboratory, which is published in the Power Engineering Section of the *Journal of the Institution of Electrical Engineers*, of August, a discussion is given of the behaviour of a number of insulating materials under disruptive voltages. Experiments were carried out with the object of filling large gaps in our knowledge in a field which has only been partially explored. At the present time, a knowledge of electric strength is of twofold interest. It is of fundamental importance to the engineer, and values of electric strength should provide guidance to the mathematical physicist in developing theories to explain the mechanism of electric breakdown.

Measurements of the electric strength of solid dielectrics have been made on samples up to a few millimetres in thickness. The values obtained are of the same order as those maintained on thin samples under maintained voltages. They indicate that a solid dielectric has a characteristic strength or gradient which causes breakdown, independent of thickness and not greatly dependent on the rate of application, or on the duration of the stress. Continental physicists have formed a similar conclusion for liquids.