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BY

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IWE. 1-45 ...	10	Annual Report (Technical) of work done during the year 1945 by Rao Bahadur D. V. Joglekar and staff at Khadakwasla.	...	Under print.

**ADDENDA AND CORRIGENDA FOR ANNUAL REPORT
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90	4 from top	d_{er}	d_{er} .
90	17 from top	at end of throat D_1	at end of throat to D_1 .
97	7 from top	$K = K_{10} (1 + 0.0845 [T - 10] \sqrt{d_e})$.	$K = K_{10} (1 + 0.0745 [T - 10] \sqrt{d_e})$.
97	Table 3 XVI-ii	Bore of allotted screen	Bore of slotted screen.
97	Table 3 XVI-ii	Length of allotted screen.	Length of slotted screen.
98	2 from top	open	upon.
	Fig. 4/XVI-ii opposite page 98. Heading of bottom figure.	Infiltration gallery in right bank.	infiltration gallery near the right bank.
99	Under para. 2 "Model Scale Ratios".	...	<i>Add</i> "The model extended equivalent to $8\frac{1}{2}$ miles upstream and $6\frac{1}{2}$ miles downstream of the proposed barrage".
107	(4) Slope scale 3rd line from bottom.	= 6.33 with V.E. =	= 6.25 with V.E. =.
132	5 from top	Analyses	Analysis.
134	37 from top	$6\frac{1}{2}$ cusecs	$6\frac{1}{2}$ lakh cusecs.
136	12 from top	contant	constant.

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2. Godavari Right Bank and Left Bank Head Regulators—Prevention of scour downstream of the—	" 1937-38

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3. The sluices of the Bhimgoda Weir across the Ganges at Hardwar (U.P.)—To ascertain how best to prevent jetting and abrasion of the downstream pavement.	58 (1938)
4. Protection of bridge piers against scour.	CIHR 1938-39 " 1939-40 " 1940-41 IWES 1945
5. Girna Canal Aqueduct No. 4 (Bombay Presidency),—Prevention of scour downstream of the—	" 1939-40
6. Estimated scour at proposed Damodar Bridge at Burdwan (Bengal).	" 1939-40
7. Son Anicut at Dehri (Bihar), Scour at noses of divide walls upstream and downstream of Anicut and undersluices.	" 1940-41
8. Scour downstream of Sarda River at Banbassa (U.P.)	" 1940-41
9. Scour at spurs in river models	" 1940-41
10. Protection of bridge piers against scour and minimum safe level at which to lay stone around piers.	" 1941-42
11. Effect of high level bridge pitching laid round bridge piers on the downstream scour.	CIHR 1941-42
12. Scour round piers—Influence of upstream bed level and material of bed on maximum scour at pier.	" 1941-42
13. Failure of piers on the bridge under construction over the Ajoy River in the Santal Parganas, Bihar, during 1942 floods.	" 1942-43
14. Maximum scour profile between the guide banks of the Ganges at the Hardinge Bridge.	CIHR 1942-43
15. Experiments with the model of the Rice Canal (Sind) in connection with protection of the Railway Bridge at R. D. 75,000.	" 1942-43
16. Prevention of collapse of Rohri-Multan Road Bridge over Rohri Canal at R. D. 52,000.	IWES 1943
17. Son at Dehri, Bihar, Protective measures below the new Undersluices.	" 1944

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18. Deep scour downstream of the N. W. Railway Bridge over the N. W. Canal at mile 18/13-4 near Ruk (Sind).	IWES 1944
19. Experiments carried out to evolve a suitable design of pavement and side expansion to induce accretion.	" 1944
20. Effect of shortening Sukkur Barrage on retrogression and accretion in the Indus.	" 1944
21. Protection of retaining walls from scour by means of repelling spurs (Baluchistan).	" 1945
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1. Discussion by C. C. Inglis, Punjab Engineering Congress Paper No. 147 on "Damaged falls on the Khadir Branch of the Pakpattan Canal".	...	IRD 116 (1931)	...
2. Experiments with the model of super-passage 2-A and 8-A on the Nira Left Bank Canal and Deck Bridge below, to dissipate energy.	...	IRD 71 (1931-32) IRD 116	...
3. Flume Meter Baffle Fall: Standardization of—	IRD 1931-32 " 1935-36 IWES 1944
4. Stability of Baffles constructed downstream of flumed falls.	...	IRD 78 (1933)	IRD 1934-35 IWES 1941-42
5. 10 ft. Fall on Sarda Deoha Feeder (U. P.).	...	IRD 78 (1935)	IRD 1934-35
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8. Experiments with a model of the Sukkur Barrage to show the most suitable design of baffles and arrows to control standing wave and to prevent scour downstream.	" 1935-36
9. Design of a Proportional Standing Wave Flume Meter Fall at R. D. 40, 250, Montgomery-Pakpattan Link (Panjab).	CIHR 1937-38 " 1939-40 " 1940-41
10. Dissipating energy below the masonry waste weir of the Tuiba Tank at Harsol, (Dist. Ahmedabad).	" 1937-38

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11. Waste weir Channel of the Spin Karez Reservoir (Baluchistan) regarding prevention of erosion.	CIHR 1937-38
12. Durani Outfall at Quetta.	..	...	" 1940-41
13. Non-proportional Standing Wave Flume Falls.	...	...	" 1940-41
14. Dissipation of energy below "W" type fall.	...	...	" 1940-41
15. Alternative designs of baffle platform downstream of the Jamshedpur Siphon Spillway for dissipating energy.	...	...	" 1942-43
<i>12. Fluming of Outlets, Bridges and Aqueducts, etc.</i>			
1. Model experiments with a group of Regulators at Oderolal at mile 169 of the Rohri Canal, Sind, by C. G. Hawes and C. C. Inglis.	26 (1928)	...	...
2. Experiments carried out at the Karachi Station on a model of a Flumed Regulator, by C. G. Hawes and H. S. Kahai, with a note by C. C. Inglis.	31 (1929)	...	...
3. Fluming of Aqueduct 23, Nira Right Bank Canal.		IRD 116 (1939)	...
4. Note on Flumed Aqueducts.		IRD-116 (1931)	...
5. "Notes on Flumed Aqueducts and Afflux caused by heading up water at regulators of canal and extent of back water etc." by C. C. Inglis.	42 (1932)	...	...
6. Head sluices of Nira Left Bank Canal — determination of losses at entrance, in barrel, in expansion and at exit, in order to work out a general formula for losses of head.	58 (1933)	...	...
7. Head sluices of Nira Left Bank Canal—providing a bell-mouth upstream and expansion downstream to increase the discharging capacity from 465 cusecs to 720 cusecs.	54 (1935)	...	...
8. Godavari Right Bank and Left Bank Head Regulators—Remodelling the—	CIHR 1937-38
9. Dharma Storage Reservoir—Outlets (Dharwar, Bombay Presidency).	" 1939-40

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<i>13. Modules and Semi-modules including Standing Wave Flumes.</i>			
1. Modules and Semi-modules for irrigation. (Bombay Engineering Congress Paper XLVII by C. C. Inglis).	...	1920	...
2. "An adaptation of the Standing wave principle to hydraulic testing" by C. C. Inglis, Bombay Engineering Congress Paper LXXIV.	...	1923	...
3. Kent 'O' type module.	...	IRD 40 (1924)	...
4. Experiments with Kirkpatrick Flumes.	...	IRD 46 (1924-28)	...
5. "Standing Wave Flumes" by C. C. Inglis, Bombay Engineering Congress Paper No. CIV.	...	1926	...
6. Experiments with Dethridge meter.	...	IRD 45 (1926-27)	...
7. Experiments with Crump Adjustable Proportional Module.	...	IRD 45 (1927)	...
8. "Experiments with the Lindley Type Standing Wave Flume" by C. C. Inglis and D. V. Joglekar.	22 (1928)	...	...
9. "Standing Wave Pipe Outlets" by C. C. Inglis.	23 (1928)	...	...
10. "Notes on Standing Wave Flumes and Flume Meter Falls" by C. C. Inglis.	15 (1928)	...	...
11. Proposal for fixing "Hydrautomat Siphon Module" at heads of Distributaries 8 and 24 of Nira Left Bank Canal.	...	IRD 122 (1930)	...
12. Experiments with 1 cusec spiral modules.	...	IRD 78 (1931-32)	...
13. Theory, Design and Construction of the Gibb Modules.	...	CIHR Publ. 3	CIHR 1933-34 " 1939-40 " 1940-41
14. Experiments to determine the best shape of a skimming baffle in the throat of a standing wave flume, so designed to cause no obstruction at F. S. Q., but maximum afflux at discharges exceeding F. S. Q.	...	IRD 78 (1933-34) IRD 78 (1934-35)	...
15. Coefficient of discharge of the Sukkur Barrage Gates.	...	IRD 77 (1933-34)	...
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18. Experiments with Venturi Flumes.	...	IRD 76 (1935-36)	...
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26. Design of a truncated Standing Wave Flume for Spin Karez Project—Baluchistan.	" 1940-41
27. "Note on the Theory, Design and Construction of Gibb Modules which, without moving parts, give a constant discharge within the working limits irrespective of variations in upstream and downstream water levels" by C. C. Inglis and D. V. Jogtekar.	...	CIHR Publn. 3 1941	...
28. Modularity of 20 cusecs Standing Wave Flume, Jodhpur.	CIHR 1942-43
29. Discharge formula for Jeur Aqueduct on Nira Left Bank Canal, (Bombay).	IWES 1943
30. Standing Wave Flumes and Flume Meter Baffle Falls.	" 1944
31. 40 cusecs Standing Wave Flume for the masonry conduit, taking off from the Haleji Reservoir, Karachi Water Supply Scheme.	" 1944
32. Design of a 500 cusecs Standing Wave Flume in Jodhpur State.	...	"	" 1944
33. Curvature of flow in the throat of a Standing Wave Flume.	" 1945

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4. Siphon Spillway experiments with Ganesh Iyer Volute Siphons; siphons with flared outlets; limiting negative pressure before cavitation occurs.	" 1942-43
5. Permissibility or otherwise of reducing spillway capacity, Berar (Akola Municipality).	" 1944
6. Erinpura Irrigation and Hydroelectric Siphon Spillway, Jodhpur State.	" 1944
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4. To improve the design of the Alandi Weir across the Indrami for the Alandi Water Supply Project (Dist. Poona) in order to reduce afflux.	58 (1938)
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5. Impact losses due to form drag of bridge piers and exposed foundations under axial flow.	" 1942-43
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1. Experiments to determine equivalent size and specific gravity of stones and blocks in a model.	CIHR 1939-40
2. Wave and Surge velocity in tidal and non-tidal channels.	" 1940-41
3. "Hydraulic Models as an aid to Engineering Skill" by C. C. Inglis—Presidential Address, Section of Engineering, 25th Indian Science Congress, Benares.	...	1941
4. Methods followed in fixing model scale ratios and overcoming model limitations.	IWES 1945
<i>19. Dams, Reservoirs and Barrages, etc.</i>			
1. Balancing Tanks and Siphon Spillway at Ozar—Proposals for investigations for additional storage for Pravara.	...	1928

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2. Co-efficients of discharge of Khadakwasla Waste Weir Sluices.	...	1928	...
3. "Experiments carried out with various designs of piers and sills in connection with Lyod Barrage at Sukkur" by C. C. Inglis, C. G. Hawes, J. S. Reid, D. V. Joglekar and H. V. Katakkar.	29 (1929)
4. Experiments in connection with the proposed Solani Khadir and Balta Zeel Reservoirs (U. P.).	...	...	IWES 1944
5. Desilting and Dredging of tanks in Sangli State (Bombay).	...	...	" 1944
<i>20. Rainfall and Run-off.</i>			
1. "A critical study of run-off and floods of catchments of the Bombay Presidency with a short note on losses from lakes by evaporation" by C. C. Inglis and A. J. DeSouza.	30 (1930)	...	...
2. Flood run-off from catchments.	58 (1938)	...	...
3. Run-off from catchments in India.	...	...	CIHR 1940-41
4. Discussion by C. C. Inglis on Punjab Engineering Congress Paper 245 of 1941 entitled "Run-off" by S. D. Khangar and N. D. Gulhati.	...	1941	...
5. Discussion by C. C. Inglis on Bombay Engineering Congress Paper No. 195 of (1942) on "Use of graphs for working out information from a catchment knowing the depth and period of flow over a Waste Weir of a lake based on Capt. Garrett's formulas".	...	1942	...
6. Analysis of catchment characteristics.	...	...	CIHR 1942-43
7. Empirical Run-off formulas ...	...	...	IWES 1943
8. Heavy run-off from a small catchment u/s of the bridge of the M. & S. M. Railway, which caused the river to overflow the embankment and railway track, causing an accident.	" 1943
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10. Rainfall and Run-off—Note stressing the importance of shape of catchment in working out the maximum run-off.	IWES 1944
11. What constant in Dicken's formula of discharge would be most suitable for a small catchment area of a river in Santal Parganas, District Bihar.	IWES 1944
12. Advice regarding probable run-off from catchment in Ceylon.	IWES 1944
13. Information regarding run-off formulas and rate of silting of reservoirs required in connection with a scheme on Zambesi River in Transval, South Africa.	IWES 1944
14. Sunspot cycles as a medium of predicting probable dates of occurrence of river floods.	IWES 1945
<i>21. Silting of Reservoirs.</i>			
1. Accumulation of sand and silt in Reservoirs.	CIHR 1940-41
2. Silting of Ekruk Tank (Bombay).	CIHR 1942-43
<i>22. Irrigation in Bombay Deccan Canals.</i>			
1. Duty of irrigation water in relation to the capacity of canals in the Deccan. (Bombay Engineering Congress Paper by C. C. Inglis).	...	1918	...
2. Some important factors affecting the design and working of Deccan Canals. (Bombay Engineering Congress Paper No. LXVIII, by C. C. Inglis).	...	1922	...
3. "Irrigation on the block system in the Deccan Canal Tracts" by C. C. Inglis.	16 (1927)	...	...
4. "Effluent Farm near Poona (1918-19 to 1925-26)" by C. C. Inglis.	17 (1927)	...	...
5. Note on "Appreciation of land values in the area commanded by Godavari and Pravara Canals" by B. G. Isur.	...	1927	...
6. "Outturn and profit from sugarcane crops grown in the Deccan Canal Tracts" by C. C. Inglis and V. K. Gokhale.	21 (1928)	...	...
7. Suitability of soils for different types of crops.	...	IRD 147 (1928-30)	...
8. Prevention of irrigation in isolated areas.	...	IRD 28 (1930)	...

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9. Block System—Introduction of— on Major Canals. Recommendations regarding—	...	IRD 118, (1928); IRD 149 (1933)	...
10. Irrigation Bunds.	...	IRD 118 (1928-33)	...
11. Perennial irrigation within 1/4th mile limit of villages.	...	IRD 118 (1928-33)	...
12. Variety of cane suitable for effluent irrigation.	...	IRD 71, 76 (1931-32) (1935-36)	...
13. Transpiration experiments with canes.	...	IRD 71, 76 (1931-32) (1935-36)	...
14. Factors affecting utilization of effluent.	...	IRD 71, 76 (1931-32) (1935-36)	...
<i>23. Design of canals and distributaries in Bombay (Deccan).</i>			
1. Weeds in Deccan Canals (A supplement to Bombay Engineering Congress Paper No. LXVIII.)	...	1922	...
2. Note on "The Design of Distributaries and their outlets in the Bombay Deccan" by C. C. Inglis.	19 (1928)	...	...
3. Note dated November 1927 on "Model Experiments to ascertain the effect of partial lining of the Malegaon Cut in miles 38 and 39 of the Nira Left Bank Canal" by C. C. Inglis and D. V. Joglekar.	20 (1928)	...	...
4. "Moduling operations of Distributary No. 8, Nira Left Bank Canal and application of the results to other Distributaries" by C. C. Inglis and D. V. Joglekar.	25 (1928)	...	...
5. "Methods suitable for reducing losses from Deccan Canals" by C. C. Inglis, Bombay Engineering Congress Paper.	...	1928	...
6. "Notes on Remodelling an existing Canal and Distributary to pass an increased discharge and distribution of velocities in channels" by C. C. Inglis.	42 (1932)	...	...
<i>24. Soil and Sub-Soil Surveys.</i>			
1. Losses in percolation and absorption from Deccan Canals and lining of Canals.	...	IRD 3 (1916-23)	...
2. "Soil and Sub-Soil surveys in the Deccan Canal areas" by C. C. Inglis and V. K. Gokhale.	13 (1926)

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3. Advice regarding soil and sub-soil analysis and water logging in Sind.	...	IRD 114 (1930-31)	...
4. Advice regarding the investigation of the soil and sub-soil conditions occurring in the Barrage area in Sind.	...	IRD 114 (1931)	...
5. Soil protection and reclamation, Sind—Note for Meeting of Officers on Field Research held in April 1931.	...	IRD 116 (1931)	...
6. Experiments to ascertain conditions under which a baffle built on sand will fail and what occurs in a sand column under various pressure conditions and a critical head at which the sand begins to move.	...	IRD 116 (1931-32) IRD 71	...
7. Percolation experiments in mile 31 of Nira Left Bank Canal.	...	IRD 55 (1932)	...
<i>25. Absorption, Regeneration and Water Supply.</i>			
1. Cawnpore Water Supply.	CIHR 1941-42
2. Proposed extension of the Water Supply of Bombay.	IWES 1944
3. Present and Future Water Requirements and Supplies in the Jumna at Delhi.	" 1944
4. Danger of water-logging in the tract to the west of the Eastern Nara, Khairpur State, Sind.	" 1944
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1. "Improvement of Damaged Lands in the Canal Irrigation Tracts of the Bombay Deccan" by C. C. Inglis.	14 (1927)
2. Factors affecting removal of alkali salts and reclamation of damaged lands.	...	IRD 71	IRD 1931-32 1933-34
3. Action of salts and effluent water in several types of drainage pipes.	IRD 1931-32
4. Reclamation studies on soil re- action, movement of water and alkaline salts in the soils— Changes in the soil on applica- tion of mechanical fertilizations with special reference to Baramati Experimental Salt Area.	...	IRD 78 (1934-35)	...
5. Behaviour of soil types under irrigation.	...	IRD 78 (1935-36)	...
6. Relative rise of salt solutions in different types of soil.	...	IRD 78 (1935-36)	...
7. Reclamation of alkali lands: Field and Laboratory experi- ments in connection with the—	...	IRD (1935-36)	...

MISCELLANEOUS

2. *Rain Gauge Station Maps of India, Burma and Ceylon.*

Maps on a scale of 1" = 32 miles, showing raingauge stations in India, were printed in November 1944. The Meteorological Office, Poona, gave this station all the facilities in this connection. There was such a large demand from various Provinces and States for these maps that almost all the copies have been sold out, though a large number was printed. It was, therefore, considered desirable to reprint these maps. These are attached in a separate volume of the Report. An Index Sheet showing the sections 1, 2, 5, 6, 7, 8, 10 and 12 into which the map is divided is also given.

There are about 3,100 stations in India whose rainfall data are published in monthly tables by the Provincial Governments as shown below:—

Assam	...	135
Bengal	...	269
Orissa	...	82
Bihar	...	252
Central India States	...	76
U. P.	...	276
Punjab	...	206
Kashmir	...	46
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C. P. & Berar	...	211
Bombay	...	218
States in Bombay Area	...	83
Hyderabad	...	77
Mysore	...	80
Madras	...	535
		3,082

Rainfall is measured once a day, at 8 hrs. local time, at all these stations. Symon's Pattern of rain-gauge, 5" diameter, is in use at most stations, except in Mysore and Travancore, where a Stanley Gauge of 4.7" diameter is used.

At the time of the first printing of these maps, rainfall stations in Ceylon had not been included. There are more than 400 raingauge stations in Ceylon; and, in order to avoid overcrowding, about 80 stations only have been shown in the map of Ceylon on sheet no. 10. All these stations, however, are indicated in a separate large scale map of Ceylon (Scale 1" = 16 miles), which appears as sheet 10 A in the present series. It may be added that the names of the raingauge stations have been taken from the report on Colombo Observatory (1944) issued by the Superintendent, Observatory Ceylon, Survey Department. This map has been supplied by the Meteorological Office, Poona.

In the first printing, the stations in sheet 10 were found to be crowded; hence while reprinting this sheet, the names of various stations, particularly in Travancore, have been re-arranged to facilitate easy reference; and where the names were too crowded, only serial numbers are shown in the map and the corresponding names of stations are given on one side.

The Station is very grateful to the Meteorological Office, Poona, for the facilities given in this connection.

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