columns, the maximum negative moment between the columns and the maximum positive moment at the centre of the slab for m, 2, 3 and 4:

	Maximum negative moment over col.	Maximum negative moment between col.	Maximum positive moment at centre.
m = 2	$\frac{gl^2}{16}$	$\frac{gl^2}{32}$	$\frac{gl^2}{19}$
m = 3	$\frac{gl^2}{18}$	$\frac{gl^2}{28.8}$	$\frac{gl^2}{22}$
m = 4	$\frac{gl^2}{19.2}$	$\frac{gl^2}{27.4}$	$\frac{gl^2}{23}$

RAIL FAILURE STATISTICS.

In a report recently submitted by the Rail Committee of the American Railway Engineering Association, statistics concerning rail failures in the United States for the year ended October 31st, 1912, are published. The data shows wide variation in results, which the committee claims must be due, to a large extent, to the lack of uniformity in the performance of different mills, and also to a lack of uniformity in the product of any individual mill.

The report shows also that the average performance of the heavy sections (85-lb. to 100-lb.) is not quite so good as that of the lighter sections (72-lb. to 80-lb.). The average rate of failure in the open-hearth rail is lower than that of the Bessemer, although both are higher than last year. The rate of failure of the open-hearth rail in 1912 was 22% higher than in 1911, and 40% higher than in 1910. The rate of failure of the Bessemer rail was 68% higher in 1912 than in 1911, and 56% higher than in 1910.

The rate of failure of the Bessemer rail was, in 1912, 116% higher than that of the open-hearth in 1911, was 58% higher, and in 1910, 94% higher.

A higher percentage of failures has occurred in rails from the upper part of the ingot than in those from the lower positions.

For the past four years, head failures have predominated except in 1912, in which year there was a slightly higher percentage of broken rails. It will be remembered that the early part of 1912 was marked by exceptionally severe weather which was accompanied by an epidemic of broken rails. The committee regards this as an abnormal condition, however, and maintains that the majority of failures are head failures, such as split or crushed heads, and are due not to imperfect track conditions, but to defective material in the rail.

The appropriations for the Panama Canal for the year ending June 30th, 1914, amount to $16,265,393, and include the cost of drydocks, wharves, warehouses, a quarantine station, as well as two colliers of 12,000 tons capacity each, to be built in the United States. In addition to the above, $4,870,000 are appropriated for fortifications of the Canal, including $2,635,000 for sea-coast batteries, $173,000 for electric light and power plants, $285,000 for searchlights, $180,000 for filling in the swamp behind the military works on Margarita Island, and $1,000,000 for cannon and equipment and one 16-in. gun and carriage, etc.

WINNIPEG RAINFALL.

By F. Hill Parr, C.E., M.Inst.C.E., M.R.San.Inst.
Engineer to the Rural Municipality of Kildonan.

RAINFALL and the precipitation of snow forms an interesting and essential part of a municipal engineer's study, and it is only by the careful comparison of precipitations extending over years that an appreciative knowledge can be obtained.

The Dominion Government has established meteorological stations in many centres, and from these information is carefully and accurately conveyed by code daily, and by monthly and annual reports.

The attempt to set the following tables before those interested is a plea in the first instance for the further provision of these stations; in the second for the annual distribution of tabulated data, and in the third for the recognized establishment of stations in every municipality. For general information it would be difficult to find a more concise and better form than that in use known as "British Rainfall," edited and published by Dr. H. Mill, of London, England.

Table of Rainfalls, Municipality of Kildonan, 1906-1912, Inclusive. Rainfall up to and Including 0.19 Inch.—Table I.

Year	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Totals
1906	...	.12	.29	.30	.22	.22	.23	.07	.17	1.62
1907	...	.50	.42	.43	.39	.82	.20	.40	.17	3.33
1908	...	.17	.49	.88	.17	.29	.45	.17	.06	2.68
1909	...	.13	.41	.51	.13	.16	.15	.38	.05	1.92
1910	.29	.34	.63	.53	.28	.24	.15	.18	.10	2.74
1911	...	...	.40	.87	.41	.66	.33	.27	...	2.94
1912	.01	.23	.71	.47	.83	.36	.52	.18	.01	3.32
T't'l in.	.30	1.49	3.35	3.99	2.43	2.75	2.03	1.65	0.56	18.55
No. of precipitations	7	18	43	55	51	51	38	31	12	306
No. of traces	6	9	15	17	17	21	9	11	...	...
Average per month	.04	.21	.48	.57	.34	.39	.29	.23	.08	2.67

Average 0.06 per rainfall.

Humboldt assigned rainfall as varying with the latitude, the greatest being at the equator and diminishing towards the poles, in the following ratio: equatorial zones, 96 inches; at the 20th latitude, 80 inches; at latitude 45°, 29 inches; and 17 inches at latitude 60°. Again, this may vary throughout districts in the latitudes, owing to their positions in relation to the sea, large areas of water and the general configuration of the land surfaces.

Rainfalls From 0.20 to 0.30 Inch, Inclusive.—Table II.

Year	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Totals
	...	...	.28	.26	.24	...	...	...	...	...
1906	...	.25	.25	.28	.28	.27	...	...	.21	2.32
	...	...	...	...	...	.22	.27	...	...	...
1907	...	...	.23	...	.27	.26	.22	...	...	1.47
	...	...	...	.22	...	...	...	...	...	...
1908	...	...	...	.26	.20	...	.30	.29	...	1.27
	...	...	.21	...	...	...	...	...	...	...
1909	...	...	.22	.25	...	...	...	...	...	.68
	...	...	.23	...	.24	...	.30	...	...	...
1910	...	.21	.20	.25	.28	...	.21	24	...	2.16
	...	...	...	...	.20	.26	.20	...	...	...
1911	...	.20	.20	.28	.28	.24	.24	.20	...	2.77
	...	...	...	...	.24	...	.23	...	...	...
	...	...	.30	...	...	.30	.25	...	...	...
1912	...	.28	.26	...	...	.23	.26	...	...	1.88
T't'l in.	...	.94	2.38	1.80	2.23	1.78	2.48	.73	.21	12.55
Average per month per year		.13	.34	.25	.32	.25	.35	.10	.03	1.36
No. of Falls		4	10	7	9	7	10	3	1	51

Average 0.246 inch per rainfall.

As to the cause of rainfall, this does not call for any explanation here and as to evaporation and percolation, also falls without the province of this article; but again, conditions vary under each head to such a degree that for reliable figures for this continent the subjects should be diligently studied.