

Culvert capacity table for corrugated iron pipe, assuming a maximum daily rainfall of $2\frac{1}{2}$ inches and a slope of one in one hundred:—

| Area of Land to be drained | | Size of Culvert required. | | |
|----------------------------|-------|---------------------------|---------------------------------------|----------------------------------|
| Square miles | Acres | Diameter (inches) | Cross sectional area (in square feet) | Capacity (cubic feet per second) |
| .02 | 11 | 8 | .349 | .768 |
| .03 | 20 | 10 | .545 | 1.44 |
| .05 | 34 | 12 | .785 | 2.36 |
| .10 | 61 | 15 | 1.227 | 4.35 |
| .16 | 104 | 18 | 1.767 | 7.42 |
| .35 | 226 | 24 | 3.142 | 16.67 |
| .65 | 415 | 30 | 4.909 | 30.43 |
| 1.08 | 691 | 36 | 7.068 | 50.20 |
| 2.34 | 1,494 | 48 | 12.566 | 109.27 |
| 4.14 | 2,649 | 60 | 19.630 | 200.30 |
| 6.85 | 4,386 | 72 | 28.270 | 322.40 |
| 10.80 | 6,914 | 84 | 38.484 | 500.30 |

ENGINEERING IN WESTERN CANADA AS THE CONGRESS ENGINEER MAY SEE IT.

A GENERAL committee, comprising representative Canadian committees of the British Columbia and Alberta members of the British Institute of Civil Engineers, the Canadian Society of Civil Engineers and the American Society of Civil Engineers, has issued an invitation to members of the national engineering societies of the United States, and others who are arranging to attend the International Engineering Congress at San Francisco, to return through Canada and enjoy the hospitality of resident members in Canada of these various societies.

Arrangements have been made with the Southern Pacific and the Canadian Pacific Railway Companies for special train and steamer facilities over these roads from San Francisco, via Victoria and Vancouver, B.C., and Calgary, Alberta, to Chicago, in order that members of the International Engineering Congress may have an opportunity of a scenic trip through the Canadian Rockies, and of visiting the many interesting engineering works along the route. The committee has issued a circular outlining the extent of these proposed tours of inspection. The following features are noticed, sufficient indeed to warrant at least further inquiry by those of our readers proposing to attend the Congress during the week of September 20th.

It is planned to leave San Francisco on September 25, in time to catch the boat for Victoria, B.C., at Seattle on September 27. Among engineering features in Victoria the Dominion Government breakwater and harbor work will certainly not be overlooked. There is at the most interesting stage of construction here a 2,500 ft. breakwater to shelter a 90-acre water area, and two large docks with berthing spaces 800 and 1,000 ft. long. Some novel methods of construction are being employed on both works, under the direction of J. S. MacLachlan, of the Department of Public Works, Ottawa, engineering staff. The Sooke Lake water supply system, recently completed under the direction of C. H. Rust, city engineer of Victoria, and similar works will make the visit to Victoria a notable one.

A day in Vancouver will be spent in a 16-mile trip up the north arm of Burrard Inlet to the power houses of the British Columbia Electric Railway Company. They are situated on the shores of the inlet at the foot of a

mountain 4,000 ft. high, on the other side of which lies the Coquitlam watershed, connected to the forebay above the power houses by a tunnel $2\frac{1}{4}$ miles long. The design of the new power house has been carefully studied from an architectural standpoint and its massive proportions harmonize with the precipitous mountains which form the background. The trip will be made by water and is very picturesque. The company is generating 84,000 h.p. The generators are driven by Doble-Pelton wheels, operating under a 400-ft. head.

At Ruskin Station a stop of about seven hours will be made to view the development of the Western Canada Power Company, located at Stave Falls on the Stave River, 5 miles from the railway. The works are situated in a valley lying between mountains which rise high above the timber line and are covered with snow and small glaciers. The dam at the foot of the valley forms a lake 18 miles long with a storage capacity of 370,000 acre-feet. The plant operates under a 105-ft. minimum and a 125-ft. maximum head. The installation consists of two 10,000 k.v.a., three-phase, 60-cycle, 4,400-volt generators, driven by two 13,000-h.p. Francis type turbines.

The train, leaving Ruskin, passes through the most interesting portions of the Canadian Rockies in daylight; and arriving at Glacier, the party will remain for a day viewing the magnificent mountain and glacial scenery and the work that the Canadian Pacific Railway is carrying on in driving a five-mile tunnel through the Selkirks to reduce the grade over this divide.

A daylight run will be made from Glacier over Roger's Pass, down the valley of the Columbia River and over the Kicking Horse Divide to Lake Louise, giving an opportunity of viewing the great peaks and glaciers close to Field, as well as the famous spiral tunnel which carries the railroad over the divide between the Atlantic and Pacific Oceans.

Another daylight run through the mountains and down the valley of the Bow River brings the party to Seebe to view the water power development works of the Calgary Power Company, situated at the junction of the Kananaskis River with the Bow. From here to Calgary the train follows closely the Bow River, affording a view of several sites for future developments of a similar type to those at Kananaskis and Horseshoe Falls.

The Bow River is particularly interesting to an engineer on account of the way it is being conserved and used for the generation of electrical energy, and for the irrigation of immense tracts of prairie land further east. Its head waters have been investigated with a view to summer storage and already a regulation and storage dam has been built at the outlet of Lake Minnewanka, near Banff.

The party will leave Calgary for Bassano, 80 miles east. This district has been put under irrigation by the Canadian Pacific Railway and is the largest irrigation scheme in the world. With the two blocks they have available in irrigable land over a million acres. At Bassano the Bow River is dammed and here is situated the head works of the western block. The dam is the Ambursen type, raising the water 40 ft. The C.P.R. officials have extended an invitation to the party to view this work and a stop of sufficient duration will be made to do so. At Brooks, a little further east, the main irrigation canal crosses the railroad on a reinforced concrete aqueduct $1\frac{1}{4}$ miles long. A short stop will be made here to view this. From Bassano the route lies through the great grain-growing districts of Southern Alberta and Saskatchewan.