fine Buildings but the streets all need completely remodelling. They have a very good Electric car service and Electric light system. Victoria is a Stiring City in fitting out parties going to the Gold Region and it is a very fine climate—the coldest time last winter was 10° Frost and now the Grass is green—the Flowers are out in full bloom and trees partly out in leaf most of the Grain is sown now and some are coming up through the ground. Please send Canadian Engineer to Wm. B. Ferguson, City Engineer Victoria B.C. and oblige—I will write you mor later on.

Yours

W. B. FERGUSON.

P.S.—I enclose cliping from a local Paper—the gentleman says the he frequently had occasion to see me in my earilier days when I was working hard at my calling and also—when I was attending the Military College—and that he will be here in about a month and call on me I am given to understand that my appointment was unanimous in the council. W. B. F.

"Among the arrivals from the East who registered at the Dominion last evening was W. B. Ferguson, C.E., of Toronto, Victoria's newly elected city engineer. Mr. Ferguson is a veteran in his profession and has had long experience in sewerage, waterworks and kindred municipal problems. He is prepared to enter upon the duties of his new position immediately."

Victoria, April 5th, 1899.

Editor Canadian Engineer

Toronto

Dear Sir

Things are not what I would like here and so I sent in a commucation to the council declining to accept the Position of City Engineer here under the Existing Conditions unless the Conditions are greatly modified and changed—the terms are such that—an Engineer to have charge of the work must have controll of the men and here he has not, when I declined to accept the position every one was down on me then—because—by me wanting to have entire control of the men—deprived the alderman from power of putting on men whenever they wished so I seen I was going to have trouble so I quit—so post nothing up here to me at present I am now going north up the Island and will write you then—later on—I remain you

W. B. FERGUSON.

METAL IMPORTS FROM GREAT BRITAIN.

The following are the sterling values of the imports into Canada from Great Britain of interest to the metal trades for the month of March and the three months to March, 1898 and 1899:—

	Month of March,		Three Months to March,	
	1898.	1899.	1898.	1899.
Hardware	£2,032	£1,733	£5,270	£4,387
Cutlery	2,947	3,368	9,559	11,188
Pig iron	689	284	2,541	1,046
Bar, etc.	411	545	1,823	1,791
Railroad	..	..	6,922	..
Hoops, sheets, etc.	697	2,287	3,450	4,030
Galvanized sheets	1,875	741	4,393	1,561
Tin plates	6,722	9,658	24,599	21,205
Cast, wrought, etc., iron	1,981	1,904	5,552	4,344
Old (for re-manufacture,	323	..	403	..
Steel	5,295	2,774	15,922	8,463
Lead	1,090	1,505	2,608	2,527
Tin, unwrought	1,838	2,274	2,758	4,907
Alkali	2,593	1,924	5,457	4,320
Cement	81	508	1,955	759

CULVERTS AND BRIDGES.*

BY A. W. CAMPBELL.

The majority of Canadians, when visiting Europe, are impressed with the durability and solidity which characterizes the structures of that country. Private residences are built to withstand the wear of centuries. Cathedrals, public halls, libraries, and similar civic institutions are constructed, not merely for the present, but for future generations. Among the works marked by this durability are to be classed the public highways with all that pertains to them. Canada, in this regard presents a very unfortunate contrast.

It can justly be argued that Canada is a very young country, and that England is a very old country; that Canada is not a wealthy country, and that England is a very wealthy country. While England is, in a way, a very old country, yet it is not so much older than this country in the arts of civilization, which should teach our citizens and municipal councils the necessity for and the means of wisely spending money in permanent improvements. And while England is a richer country than Canada, that greater degree of wealth has been brought about, to some extent, by the very durability which we have so long avoided. Permanent improvements are the cheapest. Structures which need props and repairs within a year or two after they have been built, seem to be in a chronic state of starvation, with a ravenous appetite for money. Canadians have not yet outgrown the idea that they live in a pioneer land where the needs of the present entirely overwhelm the future. In nothing is this temporary building more apparent than in our highways; and in no detail of our highways is it more striking than in the matter of bridges and culverts. At the same time there is no portion of the making of a road that offers more scope to the road maker than in providing substantial and permanent waterways. Instead of the handsome stone and concrete arches that span so many of the streams intersecting the highways of England, there are to-day in this country scores of wooden boxes and trusses—flimsy, disjointed, unsafe; the constant source of accident, and the bottomless pit into which councils are annually throwing money in a vain endeavor to keep them in repair.

Considerable attention is generally paid to the selection of a good site for a bridge, and an effort is made to decide in the interest of economy, usually with a considerable measure of success. There is, however, a tendency to cling to the line of original survey, rather than deviate the road slightly, when by doing so, much would be gained in lessening the dimensions of the bridge, securing firm foundations for piers and abutments, reducing cuts and fills of the approaches of the bridge; all of which, while they may not decrease materially the first cost, very frequently are of the utmost consequence with regard to maintenance, and may decide for good or bad, the usefulness of the entire roadway. The utility of a road with respect to hauling heavy loads, is not governed so much by the condition of the best section as by the worst; not so much by the level portion as by the steepest grade. Bridges, forming, as they do, a means of crossing valleys, are intimately associated with the problem of judiciously choosing between directness of route, easy gradients, and details of construction. The location of culverts is a matter of very common error. Water should be disposed of in small quantities, along natural watercourses, before it gathers force and headway. Instead of this principle being followed, water is frequently carried long distances by the roadside, past watercourse after watercourse, rather than build a culvert or culverts to carry it away without injury to the road. Where culverts are needed, they should pass directly across the road and carry the water away from it.

The size of bridge or size of culvert involves nice discrimination, in which local circumstances and the class of construction introduce various factors. For the size of waterway, no hard and fast rule can be given. Many existing culverts and bridges were at one time of sufficient size, but the clearing and draining and cultivating of the land now permits the water, after a rainfall, to reach the watercourse in a shorter time with increased volume, causing submerged roadway and flooded roadsides, while culverts and bridges are swept away. The best guide to a proper size of waterway, is an intimate acquaintance with the locality or the evidence of others who are, with respect to maximum rainfall, height of water line, previous experience as to floods, form and inclination of the stream and area to be drained, kind and condition of the soil, and similar details. Talbot's formula, proposed more as a guide to the judgment than as an unalterable rule, is at times very useful:

Area of waterway in sq. ft. $= C\sqrt[4]{(\text{Drainage area, in acres})^3}$

C. is a variable co-efficient, and the values given are: "For steep and rocky ground, C varies from 2-3 to 1, etc. For rolling agricultural country subject to floods at times of melting snow, and with the length of valley three or four times its width, C is about 1-3; and if the stream is longer in proportion to the area, decrease C. In districts not affected by accumulated snow and where the length of the valley is several times the width, 1-5 or 1-6, or even less, may be used. C should be increased for steep side slopes, especially if the upper part of the valley has a much greater fall than the channel at the culvert."

*Extracted from a paper read beford the Associat ion of Ontario Land Surveyors.