outlet mechanism, was $8.50 per yard. The expected unit cost for the completed dam is $6.30.

Salmon Creek Dam, Near Juneau, Alaska.—This dam is built by the Alaska Gastineau Mining Company for the purpose of storing 18,000 acre-feet of water. The catchment area is only 7.5 square miles, but the precipitation is more than 100 inches per annum, giving a run-off of about 7.3 second-feet per square mile.

Fig. 3 shows the plan and section of this dam, 168 ft. high above the river surface, containing 52,000 cu. yds. of concrete, having 1.25 barrels of cement and 5 per cent. of hydrated lime per cubic yard. The unit cost of this dam, including everything, was very nearly $7.50 per yard.

As can be seen from the contour map, the sides of the canyon form an unusually regular V, and therefore all the different arch centres could be located on one common centreline. The crest width of the dam is approximately 550 ft., measured in a straight line, and the arch at this elevation subtends an angle of 113°. The centres and the lengths of the upstream radius are shown for various arch slices 12 ft. apart in elevation, and the unit axial stresses are given in the table adjacent to the section of the dam (Fig. 3).

To provide better accommodations for the spillway, the curve for the top 12 ft. of the dam was struck from the same centre, therefore the warping of the faces commences 12 ft. below the crest, and continues down to the foundation. The form work for this type of dam is no more difficult than for an ordinary arch dam, as far as the carpenter is concerned; he gets his points about every 10 ft. apart, and it makes no difference to him whether he builds up the face of a cylinder or an inverted cone (approximately). The surveyor, however, has to be more careful than with the layout of an ordinary arch, as, in the present case, there are more calculations to be made and to be followed.

From the table on Fig. 3 it can be seen that the length of the longest upstream radius is 333 ft., and the length of the shortest 147.5 ft., the ratio between the two being $\frac{333}{147.5} = 2.26$. Had the length of the upstream radius been kept constant, the thickness of the dam at the bottom would have had to be increased 2.26 times for approximately the same axial stresses. Relative to this, it should be noted that the arch stresses in the table assume the arch to take the total load, but in reality the stresses are somewhat smaller, as the cantilever takes part of the load. The triangular piece, 10 ft. wide at the bottom, is not considered in the table giving the arch stresses. This is added to the lower part of the dam on the downstream side for the purpose of stiffening the cantilever where it is highest.

To have kept the subtended angle constant at 113° at all elevations would have necessitated a greater ratio than 2.26 between the length of the two upstream radii already referred to. Had this ratio been increased the structure would have been overhanging too much in places, and therefore this increase could not be made. This simply shows that it is not always possible to make theory and practice coincide exactly. To have kept the central angle constant at 113° in this case would have required greater bottom width of the site. The saving of this type of dam compared with an ordinary arch dam for this site was somewhat over 20 per cent. The construction material was gravel from the reservoir bottom in the immediate vicinity of the dam. This gravel was scraped into a hopper by means of a drag bucket. From there a 24-in. belt conveyer elevated the same to a screen, where it was separated into sand and pebbles in order to be remixed later into correct proportions. The oversize pebbles were delivered to a crusher and after crushing, returned to the screen. Two 18-in. belt conveyers carried the sand and pebbles respectively to the mixing house located near the central hoist. After leaving the mixer the concrete was hoisted, say, 50 ft. above the dam level and distributed by gravity through steel chutes to the different parts of the works. Ordinary good progress was 400 cu. yds. per day. This dam is provided with two expansion joints which was deemed sufficient on account of the fairly slender, and therefore more elastic, body.

The structure has been in use for two seasons and only one crack has developed, located near the spillway. Cubes made from the concrete were crushed from time to time and results obtained were about as follows: 1,100 lbs. per sq. in. at 28 days, and 1,800 lbs. per sq. in. at 60 days. This dam was not plastered on the upstream side, and experience has proven that this is not necessary, either.

HUDSON BAY ROAD

The acting minister of railways, Hon. Dr. Reid, recently gave the House at Ottawa some information respecting the Hudson Bay Railway. Up to the end of last year, the expenditure upon this road, which will be an everlasting tribute as to what politics can thrust upon a country, was $15,465,304. The length of the line from Le Pas to Port Nelson will be 424 miles. As acting minister of railways, Dr. Reid apparently felt it necessary to defend the road from its critics. He did it in a way which makes us believe that away back in Dr. Reid's innermost thoughts where political considerations are not allowed to enter, an opinion exists that the road is a farcical enterprise. He said, among other things, "While I myself may have had grave doubts as to the feasibility of this undertaking, yet I have come to the conclusion . . . that this road will be of value to the country in time to come." There was no doubt in his mind as to the navigability of Hudson Bay and Straits "for several months of the year." "But," he added, "it is true that during the first season, two vessels were cast away right at Nelson under circumstances which have never been satisfactorily explained," and "which have absolutely no bearing upon the practicability upon the Nelson route."

Dr. Reid even allowed his enthusiasm to say that he believed for the amount which the road will cost, it will "in years to come have a military value which will be well worth while," information which should be of interest to the minister of militia. "It is not expected, of course," said Dr. Reid, "that there will be any great rush during the first few years after the completion of this road and harbor." Continuing in the same strain, he says: "It is, of course, unfortunate that this great expenditure was commenced only a short time previous to the outbreak of war."

Dr. Reid's eulogy of the Hudson Bay railroad reads as if he, an unwilling victim, had been thoroughly instructed as to what to tell the House. But he said his piece very badly. However, what can we do when The Graingrowers' Guide, for example, says: "The East may as well understand that the West believes in the Hudson Bay route and will brook no interference with the scheme." Experience sometimes has to be bought dearly.

A surveyor in an English municipality is making investigation as to the growing of osiers on sewage works.