

number, the following are entirely new buildings: six judicial, four post and telegraph, two buildings for public offices, two lunatic asylums, and one miscellaneous.

The most important public buildings in progress during the past year are the extensions to the Lyttelton and Addington Gaols; Lyttelton Police Office; Courthouses at Christchurch, Ashburton, and Invercargill; public offices at Timaru; and lunatic asylums at Sunnyside and Seacliff. The works do not, however, call for special comment. They are all either satisfactorily finished or progressing favourably.

SURVEYS.

General.—Any surveys made on railways portions of which are under construction have been referred to under their respective heads. Those now to be considered are surveys of lines that are as yet only proposed.

East and West Coast Railway.—In compliance with representations made by the residents of Hokitika a reconnaissance survey has been made of the passes in the main range near the head waters of the Rakaia and Hokitika Rivers. Two saddles occur in this locality: the Whitcombe Pass, 4,180 feet high, and the Mathias Pass, 4,230 feet high. Neither of them offers any facilities for railway construction not possessed by the routes farther north, and in the matter of height and distance the advantages are all in favour of the latter. The altitudes of the saddles on the principal routes farther north are as follow: Arthur's Pass, 3,014 feet; Hurunui, 3,150 feet; Hope, 3,230; and Lewis, 2,870 feet. The distance between Brunnerton and Christchurch is 184 miles by the Whitcombe and Mathias routes, as against 142 by Arthur's Pass, 151 by the Hurunui, and 150 by the Hope.

A private company, which is now being floated in Christchurch to make a railway between the East and West Coasts, advocates the Ada Pass saddle as the best route across the main range. This is a mere local deviation of the Lewis or Cannibal Gorge route, referred to at length in my report of 1879. Mr. O'Connor has made a reconnaissance survey of the Ada Pass saddle, and he is preparing a special report on the subject. The result of his investigation is that the route does not present any advantages to counterbalance its extra length and the extra height of the range at the crossing-place. With lines of the same character the Ada route would be 13 miles longer than the Lewis one, and the saddle in the latter case is 2,870 feet as against 3,300, the height of the Ada Pass. It will be seen from my report of 1879 that the chief objection to the Lewis route was its excessive length. The distance from Brunnerton to Christchurch is 76 miles longer by the Ada Pass than by Arthur's Pass, and 106 miles longer to Rolleston and all places south of the Malvern branch.

It may be set down as a general conclusion that a workable gradient cannot be got on the western side of the range on any of the routes without unduly increasing the length of the railway. Therefore, if such gradients are a *sine quâ non*, it is better to get them by making zigzags on a direct route, than by making a long detour through an unproductive country.

A detailed preliminary survey has been made for the Department by Mr. G. P. Williams, C.E., of that portion of the Arthur's Pass route between the Waimakariri Gorge Bridge and the Bealey River. The survey shows the line to be exceedingly rough, particularly for the 11 miles from Camping Gully to Avoca. The earthworks are not extravagantly heavy, but the bridging is altogether beyond bounds and there is a large amount of tunnelling. The survey has been made to $7\frac{1}{2}$ -chain curves, and 1 in 50 gradients. A very large saving could of course be effected by adopting a lower standard, and this is quite permissible, for the steep gradients would be in favour of the heavy traffic. It is possible that a better line could be got, by keeping on the southern side of the Waimakariri all the way from Springfield to the Broken River. This country also seems very rough; but a correct idea cannot be formed of its suitability for a railway till a detailed survey is made.

If a good line is not got down the Waimakariri River, the Arthur's Pass line can be brought to the Canterbury Plains by way of the Rakaia valley. It would leave the Waimakariri Valley at Lake Pearson, and go by Cragieburn Saddle, Blackball Creek, and the Porter River to Lake Lyndon; thence down the Acheron, and along the slopes of Big Ben Range to the Rakaia. A general inspection of this route shows it to be free from the serious engineering difficulties which were met with in the Waimakariri Gorge. A good line can apparently be got at a moderate cost. There is, however, a great objection to it in its excessive length; it adds 15 or 20 miles to the distance between Brunnerton and Christchurch, without materially lessening the distance to the southern districts of Canterbury.

Tapanui-Waikaka Railway.—The survey of the two lines described in my last annual report, has been made by Mr. H. P. Higginson, C.E., for this department. It shows that a good line can be got on either route at a moderate cost. The inland line is a mile longer, and, on account of having to cross the Mataura, it will cost £10,000 more than the one running down the Waikaka Valley. It is, however, decidedly preferable, inasmuch as it opens up entirely new country remote from railway communication.

Waimea-Switzer's Branch.—A detailed survey has been made of this line. As the country is so easy, the permanent survey was made at once. The length of the branch, from the Gore-Elbow Railway at Riversdale to the Township of Switzer's, is $13\frac{3}{4}$ miles; and its estimated cost, including a bridge over the Mataura but exclusive of rolling-stock, is £46,000. The minimum curve on the line is 12-chains radius, and the steepest gradient, 1 in 132.

GENERAL REMARKS.

Number of Men on Works.—The average number of men directly employed on public works in the various districts of the Middle Island since June, 1879, is as follows. The averages for 1880-81 is only for the nine months ended this date; the return for the previous year being made up to 30th June:—