

I may say, hon. gentlemen, that the reason why the six and a half miles line is sought to be investigated at the present time is merely this: that the line, as surveyed last year by the engineers, went from railway to railway, from the mainland to the island. It was a sort of diagonal line, such, for example, as a line run from the extreme corner of this room to the extreme corner opposite. By running the line straight across, instead of in a diagonal direction, it would shorten the distance to some six and a half miles. It is for that reason I have asked the Government whether it is their intention this summer to make similar borings on this six and a half miles line to those that were made last summer on the other line. I also made inquiries of Mr. Greathead, of London, England, who has been building subways somewhat different in plan from that of Hayden H. Hall, and in correspondence with him I found that some of those subways were in course of construction in London. I know that in the minds of many hon. gentlemen they have associated these London subways with the Thames tunnel, but if hon. gentlemen will look at the map of London, which I have in my hand, they will find that the Thames tunnel and Thames subways are both laid down. Four of these subways have been successfully laid and one is in course of construction. I thought it would be advisable to send samples of the borings of the Straits, as well as copies of these plans which were made, and ask for information from Mr. Greathead and Mr. Fowler consulting engineers, from their experience in laying subways in London if such a subway could be built under this plan across Northumberland Straits, and I will trouble the House to permit me to read their reply which will be found in the following letter from Mr. Vernon Smith. He was then in London on some other business, and I asked him to examine this subway, and say how it bore on the subject we were then discussing here.

LONDON, ENGLAND, March, 21st 1887.

*Senator Howlan, Ottawa, Canada,*

Dear Sir,—I am in a position to give you such information about the Subway as will carry the necessary weight to remove all

scepticism as to its cost, durability and the details of its construction.

My friend Mr. Greathead was the engineer of the first Subway built in London now nearly ten years ago, from near the Tower to the Deptford side. This was a small affair, only seven feet diameter, but it was put down very cheaply and has now worked very satisfactorily since it was finished.

For some time it was unknown and unpopular, but for the last seven years an average of 3,000 people per day have passed through it, and it has not cost one cent in repairs. It has been the basis of all the other Subways, and Mr. Greathead has not less than six now in hand all on the same principle.

The best example complete and that can be examined in the City of London and Southwark Subway, (for particulars of which see engineering page 305, April 1st 1887) which when finished for traffic will commence in King William street, and end at Stockwell in the south side of the river. This is ten feet in diameter inside, and consists of two separate tubes each of which will be four miles long or eight miles altogether.

The portion finished is the section under the Thames which was completed from the shaft at Old Swan Pier, North of the Thames to the ventilating shaft of the Survey side, in fifteen weeks, a total length of 2,400 feet, a considerable length of the upper tunnel being only 12 feet below the keels of vessels at low water.

As Old Swan Lane under which it passes is only 16 feet wide, the two tubes are placed one over the other and continue so for about one-third of a mile when the lower one gradually comes to the same level as the upper one, and they then continue side by side. They will have a three foot six inch gauge Railway through them, and be worked by ropes from an Engine House near the Elephant and Castle about two miles from either terminus.

The tube when completed as it now is under the River consists of a cast iron ring one and a quarter inches thick in the thin part, covered with three inches of Roman Cement, laid on like thick grout by hydraulic pressure, and which forms a perfect envelope or covering to the cast iron. These segments are built up from the inside under a wrought iron protection for the men and which is forced forward by hydraulic pressure. Going under the Thames the material was the dense London clay, but there were in places embedded in the clay big boulders of septaria which sometimes went through to the water and took some time in getting out through the tube, and they were not allowed to raise them from the top as it interfered with the navigation. This required them to be broken up sufficiently to pass through the air lock in the shield and delayed them a number of hours each time they were met with. The progress, however, throughout