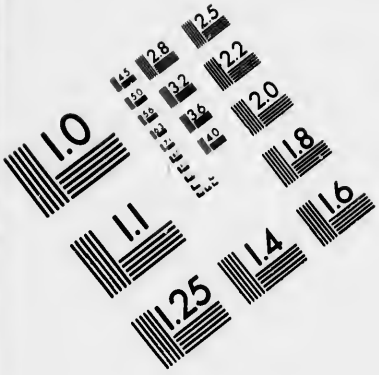


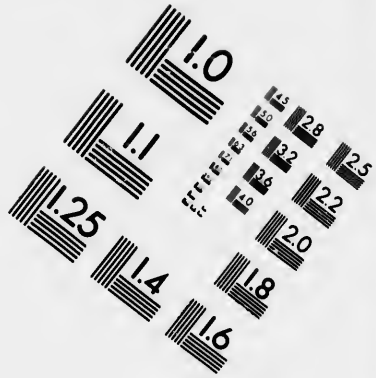


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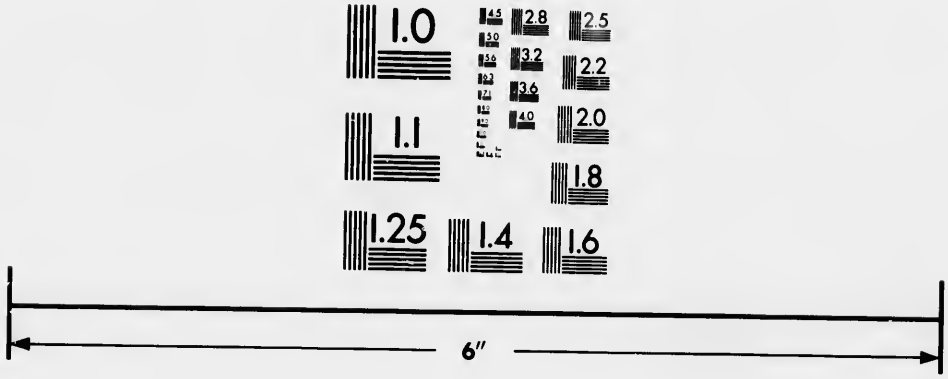


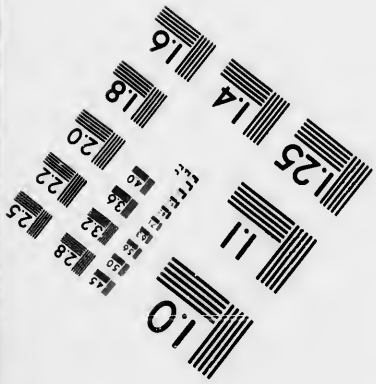


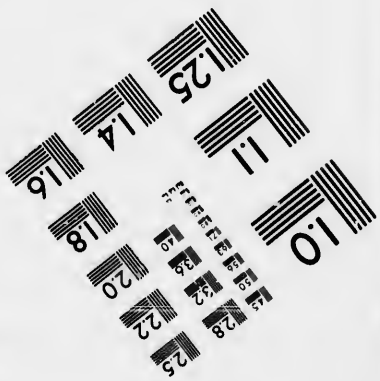


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# SPEECH

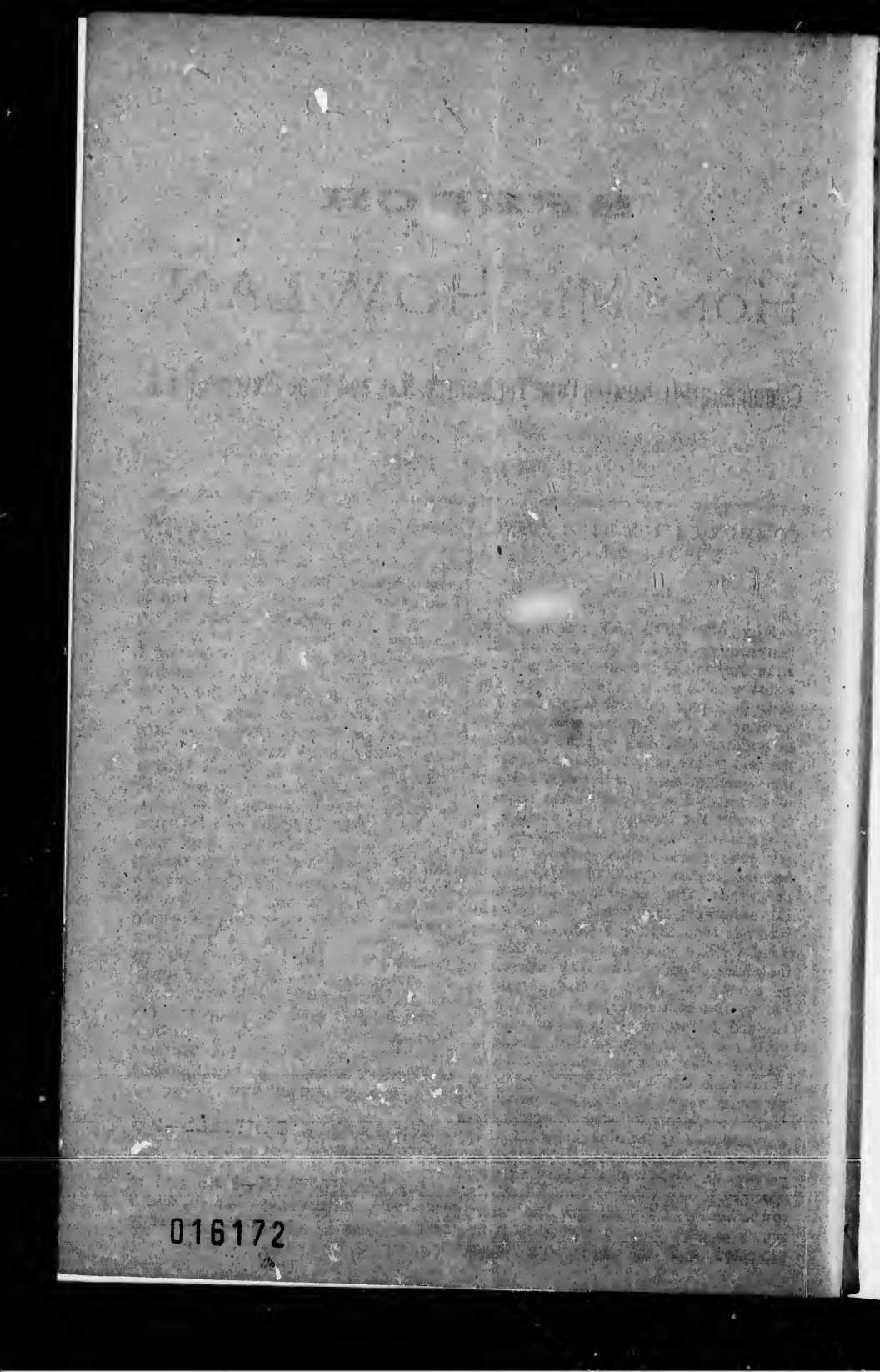
—BY—

# HON. MR. HOWLAN,

—ON—

## Communication between Cape Tormentine, N.B. and Cape Traverse, P.E.I.

*Delivered before the Senate of Canada on the 9th April*, 1885.



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# SPEECH

BY

# HON. MR. HOWLAN,

—ON—

## Communication between Cape Tormentine, N.B. and Cape Traverse, P.E.I.

*Delivered before the Senate of Canada on the 9th April, 1885.*

### COMMUNICATION WITH PRINCE EDWARD ISLAND.

INQUIRY.

HON. MR. HOWLAN rose to ask the Government whether after due consideration they will be prepared to recommend a survey to be made between Capes Traverse in Prince Edward Island and Tormentine in New Brunswick, with a view of building a subway or tunnel between the said points, so as to make a "continuous communication" with the said Island in accordance with one of the terms of union with the Dominion of Canada?

He said:—For some time past—I may say ever since Prince Edward Island became part and parcel of the Dominion of Canada—the question of winter navigation between that Island and the mainland has occupied the attention of many minds. The Government from time to time have provided what they believed to be a sufficient answer to that portion of the terms which were made with Prince Edward Island, but it is a fact which I need not go outside of this Senate to establish, that there has been a great deal of dissatisfaction with regard to how that particular service has been performed. It may be surprising to some gentlemen that I should take up the time of the Senate in bringing this matter before it, as it may perhaps be considered a subject affecting specially Prince Edward Island, but it is to the Senate of Canada that the smaller provinces must look to have their rights protected and the agreements made between them and the Dominion carried out. It is to the Senate of Canada that they have to apply, in the first place, as the great bulwark of their rights and privileges. I am aware, at the outset, that I stand in a very difficult position because of the smallness of the population of the province from which I come. I am aware that I am standing in a Parliament composed of representatives from every section of the Dominion, and that the larger provinces of Ontario and Quebec have such a large unit, if I may use the term, in this Parliament, that one coming from a smaller province is disadvantageously situated. If, for instance, New Brunswick, Nova Scotia, and Prince Edward Island were federated into one province, with their population and their intelligence they would possess more influence in this great Confederation than they do at present. I do not say for a moment that this subject will not receive the consideration from the gentlemen representing the larger provinces that its importance deserves, but it must be apparent to everyone who has held a seat in this Parliament ever since the union, as it has been apparent to myself, that if a union had taken place between the Maritime provinces we would be in a better position to promote our interests here.

HON. SIR ALEX. CAMPBELL—It is not too late yet.

HON. MR. HOWLAN—I am glad to hear the hon. gentleman say so, and I hope his reply to my question will be in

accordance with what he has just said. When Prince Edward Island gave up her constitution she had been in the enjoyment of constitutional government for 100 years. During that period I do not think, speaking from a governmental standpoint, that she had anything to complain of with regard to her executive powers in managing the affairs of her own people. For a long time she stood aloof from the Confederation—from 1867 to 1872-73—and one of the principal reasons was that certain ideas, views and opinions which the people of the province entertained with regard to giving up their individuality and self government was that very question of communication with the mainland in winter and summer. When the terms of union were made this question was fully discussed in all its bearings not only at that particular time but in the future, and the gentlemen who made those terms, amongst whom I had the honor to be one, particularly provided for efficient steam communication between the province and the mainland summer and winter. Before I go any further I will read the exact words contained in those terms: "Efficient steam service for the conveyance of mails and passengers to be established and maintained between the Island and the Dominion, winter and summer, thus placing the Island in continuous communication with the Intercolonial Railway and the railway system of the Dominion." It is a notorious fact that that has not been done. The Government may say in answer thereto that many plans and propositions were made, that difficulties arose and that differences existed perhaps between the Island members themselves, as also with regard to the most intelligent way of carrying out those particular terms. Be that as it may, and let those differences have what bearing they may on this question, it is a notorious fact, beyond doubt, that those terms have not been fulfilled as fulfilment was expected at the time they were made. The first step towards carrying out the terms of union was made by the selection of the "Northern Light." That vessel, as is well known, was not specially built for this service, but happened to be at the time on the stocks at Quebec, and, having been designed for contention with the ice in the River St. Lawrence, it was thought she would perform the work which she was called upon to do. She was purchased at a cost of $60,736.79.

HON. MR. PLUMB—Who bought her?

HON. MR. HOWLAN—The Mackenzie Government. The working expenses up to 30th June, 1884, exclusive of her earnings, amounted to $177,849.92, or about an average of $15,000 a year. Time wore on in that way with different communications between the Government of Prince Edward Island and the Government of the Dominion, until 1882, three years ago, when a special committee was appointed by the House of Commons to investigate and report upon this particular subject, and to receive information from those best enabled to give it—in fact, to use parliamentary parlance—they were empowered to send for persons, papers and records. That committee recommended that a new steamer should be built in place of the "Northern Light," and that two other steamers should be built to run between Cape Tormentine and Cape Traverse. The reason why it was suggested to build another vessel like the "Northern Light" was, that Capt. Finlayson, who gave his testimony before the Committee, said that the "Northern Light," in his opinion, from the character of the service she had to perform, would be useless after two or three more years' service. All this, as hon. gentlemen will see, will necessarily lead to a much larger expenditure than that on the "Northern Light." The "Northern Light" cost $60,000, and to build one double her tonnage would involve an expenditure of about $150,000. With the increased cost of the vessel would come increased cost of maintenance and also the cost of two steamers between the Capes. But even after all that, after building another vessel to take the place of the "Northern Light," granting that the new vessel would be more successful than the "Northern Light," and granting that the two small tug boats between the Capes would perform to a very great extent the service assigned to them, it is yet beyond a doubt, that to have complete communication, winter and summer, between Prince Edward Island and the mainland, it is necessary to have some other mode than that given to us by sail-

ing craft or steamers. The question goes without dispute. I propose, as I shall presently show you, a means of communication which will give access every day, summer and winter. We are paying $15,000 a year for the "Northern Light," and $10,000 a year for the two small boats; that would be $25,000 a year for that particular service. Many plans have been suggested with regard to getting over this particular difficulty. Some have said that a tunnel would be the best; others that a bridge should be built; and after paying some attention to this subject, I take up the tunnel question to see what would be the necessary outlay required to construct the tunnel, then with regard to the bridge, and then the course which I propose. In looking at the matter of tunnels, I find, looking at the Globe Encyclopædia, page 334, the following:—

Mont Cenis Tunnel, which pierces Le Grand Vallon, 15 miles south west of Mont Cenis, was commenced in 1857 and opened as a junction between the Railways of Savoy and Piedmont in 1871. The northern entrance, 3,801 feet above sea level, is situated near Modane, and the southern 4,236 feet above sea level at Bardonneche. The dimensions of the tunnel are: Length, 7½ miles; greatest width, over 26 feet, height at Modane end 24½ feet and 11 inches more at southern extremity. The gradient rises to the centre on the French side 1 in 45 and on the Italian side 1 in 2,000. The tunnel is one mile beneath the summit of the mountain. The Mont Cenis tunnel is straight, lined throughout with brick, and the total cost was £167.12.0 per yard.

St. Gothard Tunnel, commenced in the autumn of 1872, now in progress through the mountain of that name, will, when completed, be 9¼ miles long.

The Hoosac Tunnel in Massachusetts, the longest in the U. S., was commenced in 1856, and after several suspensions was completed in 1874. It is 4¾ miles in length, is lined with masonry, and cost about £180 per yard.

A tunnel 4½ miles to connect the Bristol and S. Wales Railways is at present being driven under the Severn.—the crowning enterprise in tunneling will be the Channel Tunnel which it is proposed to drive from the South Foreland in Kent to a point near Calais in France to join the railway system of England with that of the Continent.

The Box Tunnel on the Great Western Railway between Chippenham and Bath is 3,200 yards long; width, 30 feet; height above rails, 24½ feet. It has 7 shafts brick lined, the deepest being 300 feet.

Woodhead Tunnel near Manchester is the longest in Great Britain, and measures 3 miles and 26 feet. Since its construction a second tunnel has been driven through parallel to it.

Kelsby Tunnel on the London and N. W. Railway measures 2,398 yards and 27 feet by 23½ feet in section. A quicksand was encountered in driving the heading, causing delay and greatly increased expense. The total cost was £125 per lineal yard.

Netherton Tunnel on a branch of the Birmingham Canal is 3,036 yards in length; section 27 by 24 ft., cost only £50.0.0 per lineal yard. Cost of the tunnel alone £89.5.0, and with canal and side walls, £45.5.0 per yard.

The Thames Tunnel under the Thames at Rotherhithe was commenced in 1825 from designs by Sir I. K. Brunel, and after several irruptions of the river completed and opened as a public footway in 1843. It has a double passage 400 yds long, and is now used as a railway tunnel. The cost of construction was £1137 per yard.

The London Metropolitan Underground Railway also furnishes a remarkable example of tunneling on an extended scale.

But all these achievements pale before the Great Alpine Tunnels.

There have been several tunnels built at a small expense through material somewhat similar to that which will be found at the bottom of the Straits. I give those figures so as to satisfy the minds of hon. gentlemen who believe that a tunnel would be better under the circumstances. I take this from Simms' Practical Tunneling. He gives an account of all the tunnels that were built at the time of the publication of his work in 1875. I find that the cheapest tunnel is that from Loch Katrine to supply the Glasgow waterworks. Its length is 2,325 feet, and it cost only £10 sterling per yard. It runs through old red sandstone, but it is not lined. I find that the cheapest lined tunnel is £38. That is what is called the Lindal enlargement. I turn from that to see what a tunnel would cost for our Island, or whether it would be preferable to have a bridge, as some gentlemen have suggested, in preference to anything else. I addressed a letter to Mr. Vernon Smith, a well known engineer, to whom I am indebted for many favors, a gentleman well known for his engineering skill and capacity, both in this country and in Great Britain, having been a pupil of the great Robert Stephenson, and asked him for information on this subject. His reply is as follows:

PROPOSED SCHEME FOR CROSSING NORTHUMBERLAND STRAIT, AS COMPARED WITH EITHER A BRIDGE OR TUNNEL.

1st—Tunnel. The shortest distance across the strait is 8½ miles, and the deepest water,

which is near the middle or, say 4 miles from the nearest end, is about 90 feet. The bottom is sand for a few feet and then it is believed to be the soft sandstone rock of the upper carboniferous formation. In this material and with the probability that the loose sand is the deepest where the water is the deepest, and the surface of the bottom the lowest, it would not be prudent to put the top of the tunnel less than 45 feet from the lowest soundings, say 140 feet below low water in the middle. Nor would it be prudent to put the shaft at either side at less than 1,000 feet from the usual water level, or about ¼ of a mile from the low water line, making the distance between the shafts on either shore 9 miles, or say 47,500 feet. To drain the tunnel it would need to be put down on a grade of at least 1 in 400, making the shafts 60 feet at least, lower than the middle or highest part of the tunnel, and if we assume that the shafts are only 25 feet above low water mark on the shore where they would be sunk, their depth would be 225 feet, up which every gallon of water and ton of excavated material would have to be lifted.

Such a tunnel, under favorable circumstances, could be driven and properly lined for $100 per foot forward, at all events for the greater part of the distance, and ought to progress at each end, say 10 feet per day, working 24 hours, at which rate the tunnel proper could be completed in something less than 8 years. Assuming the same gradient to be employed 1 in 50, from the bottom of the shaft at either end to the railways connecting the tunnel with the main line, the 225 feet of the depth of the shaft would require over two miles of tunnel at either end, say 11,250 feet, making the total length of the tunnel from the outer end of these approaches, 70,000 feet, or over 13 miles, and its cost, at $100 per foot, $7,000,000, besides the fixed plant, shafts, pumping and ventilating machinery. Tunnels in similar material have been driven for less than this sum, but not where the depth is so great, and where the quantity of water has to be dealt with, that would undoubtedly be found in this stratification, and with 8 miles of water within a few feet over head, and it is doubtful whether this tunnel could be contracted for at that price.

Another serious item in all tunnel work is the ventilation, and the difficulties on this head increase in an alarming ratio as the length increases. In this case there is no ventilation to be obtained in the nine miles of distance between the shafts, so that special and expensive arrangements would have to be made, not only for the prosecution of the works, but for the safe and efficient operation of them afterwards. A tunnel seems, therefore, apart from its great expense, a dangerous and not a feasible means of overcoming the difficulty.

With the last remark I quite agree—that to come to this Parliament and ask consideration of any scheme like that, would, in my opinion, be out of the question. He next proceeds to give the cost of a bridge. A bridge, however, would be such a complete stop to navigation that I do not think I will weary the House with the details.

HON. MR. BOTSFORD—What is his estimate of the cost?

HON. MR. HOWLAN—His estimate of the cost is about $11,000,000, and it would take a very long time to build it, and the difficulty would be that the unfinished portions each year would be damaged to a great extent, so that I need not weary the House with the details of such a project. The tunnel is entirely beside the question, and in my judgment it is outside of what is called practical politics. We come now to the consideration of subways which, in England, are taking the place of tunnels, and I may be asked what a subway means. A subway is a cylinder of wrought iron which may be any diameter—8, 10, or up to 15 feet—15 feet is the largest wrought iron cylinder subway that has yet been constructed in England or Scotland. The Tower Hill tunnel under the Thames is one, and there is a subway from Scotland Yard across the Thames into Middlesex, the same diameter of cylinder, 300 feet long, wrought iron and filled around with concrete to sustain the weight of the earth and traffic on top. It is laid down at a depth of 45 feet from the surface.

HON. MR. HAYTHORNE—Can my hon. friend state to the House the dimensions of that cylinder? Is it used for foot passengers only or for horses and carriages?

HON. MR. HOWLAN—It is the same size as the subway I propose—15 feet. One subway has the 3 feet 6 gauge track that we have in Prince Edward Island, and the other has got the 4 feet 8½ gauge track. I notice that before the Imperial Parliament at the present time there are several Bills for the incorporation of subway companies. I quote from *Engineering* December 5th, 1884, in which I find under the heading of "Private Bill Legislation," that the number of projects for which plans have been deposited at the Private Bill Office, is 199, of which 74 are

for railways, 21 for tramways, 59 miscellaneous, including subways, and 45 for works for which provisional orders will be sought. The following descriptions are given of some of the proposed subways for which the promoters are seeking to obtain charters from the Imperial Parliament :—

The Central London Subway, to construct which a company is to be incorporated, is evidently, as are many others afterwards to be referred to, a result of the success of the City and Southwark scheme of last session, for which powers were granted to construct between the Elephant and Castle and King William Street, city a subway consisting of two lines of brick or iron tubes 10 feet in diameter, along which a frequent succession of vehicles resembling tram cars were to be drawn by cable traction on the Hallidie system. The present scheme is the construction of two lines of similar tubes between King's Cross and Charing Cross. Commencing at Liverpool Street, they pass along the south side of the Euston Road, but inside property, to Gower Street Station. Thence they turn to the south and are carried down Gower Street and Bloomsbury. Thence they take the course of the new street already described as far as St. Martin's Place, from which point to their termination opposite Craig's Court existing streets are followed. A short spur near Mabledon Place permits of a depot being formed clear of the subway. The total length is about two miles. The maximum depth below the surface is about 40 feet. The gange is to be 3ft. 6in., and during the construction of the works, temporary openings may be made in the streets.

The working of the subways is to be on the above mentioned cable traction system, or by some other means. other than steam locomotives, which may be sanctioned by the intended Act or by the Board of Trade.

The remaining rival scheme is also independently promoted and is called the King's Cross, Charing Cross and Waterloo Subway. It commences within the property of the London and South-Western Railway Company, on the north-west side of Waterloo Station, at a point about a chain south-east of York Road, opposite Vine street; it traverses that street and College street, then crosses the Thames to Northumberland Avenue, along which it is taken to Charing Cross; thence it is carried under St. Martin's Lane, Long Acre, Little Queen street, Theobald's Road and Gray's Inn Road, and terminates at the north-west corner of Liverpool street, near King's Cross Station. The works consist of two tunnels, each about 2¾ miles in length, and 10 feet in diameter, in some place laid alongside, in others one is above the other. The greatest depth is at the Thames crossing, where the tubes are 72 feet below high water; elsewhere the depth is about 60 feet below the surface of the ground. The maximum gradient is 1 in 17, and the gauge is to be 4 feet 8½ inches. Land, apparently for station purposes, is taken at the commencement and the termination of the line, and at Hemming's Row, Drury Lane, Little Queen street, and at the corner of Gray's Inn Road and Theobald's Road. Powers are also to be taken to enable the Great Northern, Midland, Metropolitan and South-Western Railway Companies to enter into agreement for the construction, maintenance and working of the subway, the latter of which is to be, as described in the preceding case, by cable traction or other means excluding steam locomotives.

The improvement of the communication between the city and west end is also proposed to be obtained by the construction of subways similar to those last executed from Hyde Park to the Royal Exchange by an independent company; the scheme is called the Marble Arch, Regent Circus and City Subway. Commencing opposite the Marble Arch, it traverses Oxford street for its whole length, Holborn (avoiding the viaduct by making a detour along Charterhouse street and Snow hill), Newgate street, the Poultry, and terminates in Cornhill, opposite the centre of the Royal Exchange. The length is about 3¼ miles; the subway is formed of two tunnels 10 feet in diameter, laid as described in the preceding scheme; the greatest depths are 70 feet, 67 feet, and 62 feet; the maximum gradient is 1 in 20. Land, apparently for station purprses, is included at Regent Circus, Totenham Court road, Southampton row, Great Turnstile, Farringdon street, St. Paul's Churchyard, and at the commencement and termination.

The gauge is to be 4 ft. 8½ in., and the working is to be as mentioned in the description of the London Central Subway, and similar clauses, with the exception of that relating to easement and that relating to property, are to be inserted in the Bill.

Another independent company is to be formed for the purpose of constructing the Islington (Angel) and City subway, which commences opposite that tavern in the city-road, is carried along the latter for its whole length, and thence along Finsbury Pavement and Moorgate-street, and terminates at Lothbury. The length is about 1¾ miles, and it is formed by two tunnels 10 feet in diameter, laid as before described; the maximum depth is 48 feet below the surface. Stations will probably be placed at Macclesfield street, Nelson street, Old street, and Ropemaker street, and at the "Angel" and the bank. The gauge is to be as mentioned in the description of the London Central Subway, and clauses similar to those in the last described scheme are to be inserted in the Bill.

The only subway or railway scheme relating to the south side of the metropolis proper is that called the Clapham and city subway, which is proposed to be an independent extension of the authorized city and southwark subway before alluded to, along the

Kennington and Clapham roads to Clapham common, a distance of 2¾ miles. The tunnels, two in number and 10 feet in diameter, are to be laid as described in the three last mentioned schemes, the greatest depth being 56 feet. The gauge and method of working are also the same as in those schemes. Powers are to be taken to enable the city and Southwark Subway Company to construct or work the proposed subways. Stations will be placed at Clapham Common, South Lambeth road, South Island place, Kennington road and lower Kennington lane.

The editor describes other projects of the kind, and I have only read those to show to the House that this subway is no new project; that it has been tried before, although not upon as long a reach as I propose to adapt it to. It may strike some hon. gentleman as a new feature in engineering; but if we were to stop at all new features, the world would retrograde. We boast, with some degree of truth, that there is no portion of the world in which civilization is so rapidly extending, and in which science has been so successfully brought into operation to remove physical difficulties in the way of engineering as in Canada. It has just occurred to me that building houses of brick is not more than 200 years old. If my memory is correct the Earl of Arundel was the first to build a brick house, about 200 years ago, and he was looked upon as taking a step in advance. But in this Dominion of which we are so proud, we can admire the grandeur of nature which is stamped on every hand. Look at those massive buildings we occupy, perched on the mountain walls of the fair Ottawa River! Look at the influence of such gems of architectural beauty on the Church architecture of this city, as well as its many handsome private mansions. Look at the railway bridge, and the Suspension bridge across the Chaudiere Falls; the gigantic lumber industries which greet one's eye at the city of Hull, where is heard the "hum" of the busy wheels of one great branch of our commercial industry. Go farther down the St. Lawrence to the wealthy city of Montreal, and there you behold one of the grandest works of the age in the Victoria Bridge, which spans that noble river; and then think of the magnitude of the Canadian Pacific Railway enterprise, now so near completion, and one's mind becomes impregnated with large ideas, which find a quiet resting place in the contemplation of out great canals. I have asked myself many times when contemplating those great triumphs of the age, whether our winter navigation might not be improved, and I do think that my present proposal will intelligently meet this difficulty. But if this mode of establishing communication under the Severn and Thames has been a success there, there is no reason why it cannot be done over this four or five mile stretch between Prince Edward Island and the mainland. What I propose then is to build a subway between Capes Tormentine and Traverse, utilizing the wharves and approaches that are now proposed to be built at both capes, only making them longer. The Dominion Government have built a short branch from the Prince Edward Island Railway to Cape Traverse, and at Cape Traverse they have reported in favor of building some 2,100 feet of pier extending out into ten or twelve feet of water. It is also proposed to build a pier in conjunction with the Prince Edward Island and Cape Tormentine Railway, at Cape Tormentine. That pier will reach out from the shore some 2,100 feet. I propose to extend those two piers. For instance I propose to go out on the New Brunswick side 10,000 feet. That would be nearly two miles. It would be about 8,000 feet of an extention on the New Brunswick side further than is now proposed.

HON. MR. KAULBACH—How much water would that give you?

HON. MR. HOWLAN—That would give about thirty feet. The reason I make it thirty feet is that vessels on going through the straits do not draw generally more than about twenty-eight feet, and that would leave the subway low enough to avoid any possible obstruction to vessels. On the Prince Edward Island side I propose to extend the pier 2,000 feet, to the same depth of water. This would leave the gap to be filled by subway, of between four and five miles. I have provided for five miles, as there is some difficulty about the charts, one authority calling it eight miles, and another seven and a-half miles, Bayfield calls it seven nautical miles. The iron cylinder would be fifteen feet in diameter.

Not being an engineer myself I applied to Mr. Vernon Smith and asked him to give me his report upon that particular question, and as he is an authority upon the matter I had better read you what he says:

"In reply to your letter of the 10th inst. asking for some information respecting the cost and feasibility of a subway under the Northumberland Straits, I have examined the charts and other sources of information in the Department of Marine and have constructed from them the accompanying profile of the sub-aqueous surface of the ground which is probably sufficiently correct for the present preliminary estimate. The bottom of the Straits is marked in the charts "sand and gravel," but Mr. Ells of the Geological Survey who has examined the locality, is of opinion that the covering of sand and gravel is no great depth, and that it is generally the soft sandstone rock of the carboniferous formation for a considerable distance vertically, of the same general rocks as the Island itself, the Straits being a denudation of the upper and softer portions.

"The shortest distance across the Straits and apparently the best route for the communication proposed, is that now followed by the ice boats from Cape Traverse to the cove north of Cape Tormentine across the Jourimain Shoals on the New Brunswick side. The total distance is roughly 8¼ miles, and the deepest water is 90 feet, which occurs about 4 miles from the New Brunswick shore extending probably for half a mile; it sheals gradually and regularly from this to the Island, at about 20 feet to the mile, and for about a mile at the same gradient on the New Brunswick side. It then rises abruptly 40 to 50 feet in half a mile, and then shoals at a low angle over the Jourimain Flats to the Cape Tormentine shore. The distance between the 6 fathom lines on either side is about 5 miles, and between the 4 fathom lines about 6 miles, whilst ½ a mile on the Island side, and 1¼ miles on the west shore is not over 12 feet in depth at low water. The tide runs with no great velocity, probably 2 knots an hour, and the tides round the north and south ends of the Island meet off the Tryon shoals, only 4 knots from the proposed crossing. The rise of tide is 6 feet at the spring and 3 at neaps, and averages about 5 feet, which I have marked in the profile by the dotted black line for low and the full blue line for high water. This appears to vary somewhat according to the direction of the wind, and in certain conditions of the weather the rate of the tidal flow and the height of the tides varies widely from the normal condition.

"There appears to be very little reliable information about the ice, but from all I can gather there is nothing below—say 10 feet, to damage the works, and even the worst accumulation is generally broken up and loosely piled together, very annoying undoubtedly for navigation, but not, as a rule, dangerously destructive to a fairly substantial bridge or wharf structure. The fact that the submarine cable has been so little damaged with such a long expanse of shoal water is tolerably good evidence that the ice is not so dangerous as might be supposed, with the quantity that undoubtedly accumulates every winter. Although the Straits are navigable for any sized vessel, it does not appear to be very much frequented by the largest class, and I have assumed that a clear depth of 25 feet at the abutments would be sufficiently deep to be safe from a vessel striking the top of the subway. As this dips at the rate of 1 foot in 50 at the New Brunswick side, and probably 1 in 200 at the Island side, there is ample water at a short distance from either end of the subway, and as the total space is 5 miles the proposed works form no obstruction to ordinary navigation.

"Taking therefore the 6 fathom line as the face of the two abutments, between which the subway proper extends, there is a distance of 5 miles, or more exactly of 25,200 feet, as shewn by the charts to provide for, and this I would propose to cover by an iron and cement tube to be lowered in lengths from the surface and joined together below the water, resting either on the bottom direct or supported upon concrete blocks at distances of about 150 feet apart. As this tube is the important feature in the scheme, it may be well to describe it more minutely. The outer shell or case is of wrought iron boiler work, ⅜ of an inch in thickness, 15 feet in diameter, rivetted together in the ordinary manner, and weighing 800 lbs. to the running foot. The tubes would be put together on the shore in lengths of about 300 feet, which fitted with temporary ends would be floated to the spot where they were required and then sunk. When complete there would be inside this casing a ring of concrete 2¼ feet in thickness, leaving an opening through the tube of 10 feet in internal diameter. The strength of this concrete being ample to carry all the strains of the traffic and the water, should from any cause the outer iron casing ever be removed, being when finished a solid monolith of stone impervious to water, strong enough to carry any weight that can be placed within it, and heavy enough to withstand any upward or sideway strain that ice or anything else could bring against it.

"Concrete as a material for building, and especially under water, has not received the attention on this side of the Atlantic that it deserves, and has not been made use of to the same extent that European and especially French engineers have employed it. The Pont Napoleon, a bridge carrying a double track railway across the Seine, with clear spans of 115 feet, is simply a block of cement of no greater thickness than would be usually allowed for first-class masonry. The Pont d'Alma, also carrying a railway, has arches varying in span from 126 feet to 141 feet in the clear, entirely of cement and less than 5 feet

in thickness in the centre of the span. Nor is the use of cement where strength and tenacity is an object, at all a modern application, the dome of the Pantheon at Rome nearly 2,000 years since, was built of this material entirely, it was 142 feet in diameter and had no artificial or external support excepting its own strength to withstand the thrust of the arch, whilst the dome of St. Paul's in London, under precisely similar circumstances, has an enormous chain round the base to resist the strains due to the shape of the dome. As a material under water, or for bad foundations, it is now regarded as almost a necessity, and the huge dock at Touion rests on a bad water soaked foundation one great monolith of cement. The material therefore of which these tubes would be constructed is perfectly reliable, and if they once get into their place no ordinary catastrophe will destroy their strength or utility, they will be as strong and durable as a tunnel under the solid ground, and they will be free from the filtration of water which finds it way through the best of brick or stone linings. The totalweight of a 300 feet length of such a tube, with a 2½ feet cement lining, would be about 4,750,000 lbs., or 2,375 tons, and its displacement would be approximately 3,300,600 lbs, or 1,650 tons of water, so that its weight in water would be something over 2 tons to the foot forward or 725 tons altogether, besides this the weight of rails roadbed and ballast would bring up the total weight of the tube in water to about 3¼ tons per running foot as a resistance to any lateral or vertical displacement. In practice the tubes would be when launched only partially lined with cement, and would be floated to the point where they were to be sunk with a ring of 18 inches of cement only. The weight of the tube would then be in round numbers 1,620 tons, and it would require an additional weight of 30 tons to sink it. This would be added by an ordinary set of water ballast bags, a line of which 24 inches in diameter would sink the tube and at the same time keep it from turning out of the position intended to be the bottom. These bags in communication with a steam pump on the sinking barges would enable the tube to be raised, lowered or handled in the water as easily as a very much less weight by any other mechanical arrangement on the land. The ends of the two tubes would have a spigot and faucet arrangement slightly tapering and the socket end lined with wood, on the method nsually adopted to keep the screw propellers water tight in the stern of a vessel. When the end of the following tube was once entered into the taper end of the one previously fixed, the opening of a valve in the false end of the one already in position would bring the whole hydraulic pressure due to the displacement of the tube to force it into its position, and make a perfectly tight joint. The subsequent ring io cement after the two false ends were removed would make this portion of the tube just as strong and watertight and reliable as any other portion, whilst the subsequent ring of one foot in thickness through the whole of both tubes would make one homogenous mass of the tube from end to end.

"The deepest part of the strait as before mentioned occurs about four miles from the New Brunswick shore, and one and one-half miles from the New Brunswick abutment. At this point it would be necessary to sink a pumping and ventilating shaft, and from this towards both shores the tubes would be laid so that all the water would run to this common receptacle from which it would be pumped up to the surface, and by this would the workmen find access to their work for fixing and lining the tubes. Whether it would be necessary to retain this as a ventilating shaft after the work is complete may be left to subsequent experience, but I think it will be found necessary for ventilating purposes, and perhaps occasionally for pumping, as more or less water may find its way down the slopes from the two ends, and of course in case of an accident it would be essential to have it maintained in a permanent working condition. The sinking and arrangement of this vertical tube would be nothing more than is usual in such works as the Forth and other places where cylinders and caissons are being largely used as fonndations in masonry and bridges. It would be cement-lined like the tubes, and to exclude the water percolating through the porous rock foundation, the bottom length would be formed of solid concrete. It would also need to be enlarged considerably in diameter at the base, as the rock there will in all probability be but very slightly covered with loose material, to give sufficient stability to a structure so high, and exposed at the top to constant and sometimes excessive strains. This shaft would also contain the pumping and ventilating machinery, and be the point from which the laying of the tubes in either direction would commence."

In looking at my model a great many gentlemen who have paid some attention to this subject thought that the central shaft was a weak point, that the ice floating up and down the strait would destroy it—in fact that it was the weakest part of the project. That being the case, I had a conversation with a very eminent engineer to whom I explained the difficulty. He said that it could be remedied —that by running out some 600 feet or more on the New Brunswick shore we can get 38 feet of water where the pumping gear can be put and the ventilating shaft can be constructed by altering the gradient coming from the New Brunswick side. As proposed on the plan here, the gradient would be about 1 in 50, starting from the Prince Edward Island side, and running down to 1 in 1,000, and then

rising 1 in 50 on the New Brunswick side, so that the water would be all running that way. We would be able to put the pumping machinery and ventilating shaft on the New Brunswick side, thus relieving the project of one of the greatest difficulties that surround it. I am not an engineer, and I do not presume to say that the statements which I make are absolutely correct, but I have the statement of Mr. Vernon Smith, who has the reputation of being a first class engineer, who made those plans.

HON. MR. KAULBACH—What is the maximum current?

HON. MR. HOWLAN—I will come to that directly. Mr. Smith continues :—

The abutments at each end would consist primarily of a 40 feet diameter caisson sunk to the bottom and lined with concrete. In this would be rivetted at the proper angle, a section of tube corresponding to the main tube, and projecting beyond the abutment for a distance of 3 feet, so as to form a socket for the tubes from it in either direction, the depth of this tube at the straits end at either abutment would be 25 feet clear from low water, and the connecting tube in the abutment would be at an angle of 1 in 50. At a point 500 feet from this outer caisson, but 300 feet from the centre line of the tube and consequently shewing 400 feet longitudinally of the plan, would be sunk two caissons each 15 feet in diameter, and of course 600 feet apart across the tube, and between each of these caissons, and the large outer caisson would be a wharf 10 feet wide of wrought iron filled with cement blocks. These three caissons with the intervening wharves would thus shew an enormous triangle 500 feet long on each of the sloping seaward sides and 600 feet wide at the base, which when filled up with earth would form a structure strong enough to resist any ice that is likely to occur in the Northumberland strait. Through this mass the tubes would be laid supported by cement blocks, and at the shore end ot this structure they would be 17 feet only below low-water. At a distance of 1000 feet back of this a second structure 1400 feet in length, 60 feet wide and strengthened at its outer end by a T piece 400 feet long and 100 feet wide would support the end of the tube as it emerged from the water, and form at the same time a wharf where vessels could load and discharge their cargoes for the accommodation of which sidings from the railway on either side would be provided. Between this wharf and the outer abutment, the tube rising at a gradient of 1 in 50 would be protected by a series of iron piles 5 feet in diameter in pairs between which it would be supported. In this 1000 feet the tube rising at the 1 in 50 gradient, would be above low-water 3 feet at the top, and 12 feet below it at the bottom, a roadway, supported by the wrought iron piles being over the top of it and protecting it from injury from vessels. At a distance of 200 feet from the outer end of the wharf the tube would cease to be a closed tunnel, the sides being carried up vertically and being open at the top, a wall 5 feet in height around this open part protecting the traffic passing to and fro on the wharf from falling into the space thus left. At 100 feet from the inner end of the wharf, the rails being now 6 feet above high-water the wall and wrought iron structure would cease, and the communication with the shore forward being by a bridge or embankment as may subsequently be determined.

The only point remaining to refer to is the support for the tube along the bottom of the straits. It is difficult to form an estimate of the quantities in these as each one might vary in height and some may require dredging. It is reasonable to suppose that for a large proportion of the distance the tube will rest nearly upon the bottom. In this case if the bottom is of sand likely to be washed or undermined, it will be necessary to sink whenever the supports are necessary what the French call "mattrasses," which consist of a tarpaulin bag about a foot in thickness, ten feet wide, and perhaps twenty long, filled with concrete, and laid upon the surface of the sand. In a couple of hours this will set taking the shape of the tube, and for ever afterwards be a slab of stone, the sand under which will never be disturbed. Near the Island abutment some dredging will be necessary, and in the channel thus dredged the sand itself will soon form all the support necessary. At other places where the tube is some distance from the bottom, and probably near to the pumping shaft, piers from four to fifteen feet may be necessary. Each of these would consist of a cement block, probably eight feet wide and twenty feet long across the line of the tube, with the top hollowed out the proper shape to receive and retain it. These piers in most cases could be got into position before the tube was sunk. In other cases they might be left till the tube was in place, a wood or iron box the shape of the intended piece being placed under it after it was in position, and these filled with concrete from the surface, the material being simply shovelled from the floor of the barge into a wooden or canvas spout so as to reach its final resting place without having its cementing material washed out by the water in passing loosely through it. With respect to the material for this concrete, I would suggest using only the best Portland cement without the admixture of any lime whatever, similar to what the French engineers call "beton," to one measure of which two of clean sand, and from three to four measures of broken limestone rock, such as Mr. Ells tells me can be procured from Cape Tormentine, might be mixed. This would be

sufficient for the abutments and piers. For the linings of the tubes I would suggest two of sand and two of gravel, or limestone spalls; but the exact proportions should be determined by experiment when the quality of the sand, gravel and limestone would be exactly tested. In any case the materials should be incorporated, and thoroughly mixed by machinery and used quite fresh.

Before I read the cost of it, I will read to you a statement of Mr. Smith of the time it would take to build and complete it. Speaking of the comparison between a bridge and a tunnel and a subway, I have already read what he said about a tunnel. The bridge I do not think it necessary to trouble the House with. He says :—

In one respect the proposed structure would have a singular advantage over either of its competitors, each portion as finished would be of use, would mitigate the difficulties and objections of the passage, and reduce the length of inconvenient or dangerous transit. Whatever was commenced each season would be finished before the season ended and would reduce for the next winter the labor and difficulty of the passage. For instance, supposing for the first season it were determined to finish the New Brunswick abutment and to connect this by bridge with the shore, there is nothing to prevent this being accomplished within the season, and the next winter the usual ice boats would have two miles of bad passage less to make and the railways at either end would be so much the nearer. Another season a similar work at the Island end would narrow the Straits to five miles and make the passage that much better and nearer. The same season, or another, the completion of the ventilating shaft and its connection with the New Brunswick side would bring this to about three miles, and this last gap could easily be completed within the space of one season. The operations of rivetting up the tubes and their preparation is work necessarily done under cover, and may be proceeding all winter. It is the most tedious process of the lot, requires the most time, and would be best done by continuous labor winter and summer. The first layer of cement would take probably a fortnight to put into the tubes, and they would be the better of another fortnight drying and setting before being put into the water. In a month from commencing the cement, which I think should not be begun before the 1st of May, the tubes would be ready for sinking, and by that time the winter's ice would be disappearing. There would be about 90 of these tubes across the Straits, each 300 feet long, and after everything was in working order each tube ought certainly to be put down, made watertight and secured within the 24 hours. If three per week, or half this performance, were put down this portion of the work would occupy 30 weeks, and at this rate of progress it would not be necessary to have two sets of plant for this purpose, and the whole could be laid from one end, and by one party, if the work were in other respects ready to receive it. These tubes would all actually be laid from the ventilating shaft in the middle, and in practice probably those to the New Brunswick shore would be all that could be undertaken during one season. But there would be nothing to prevent the whole work being completed in two working seasons, an advantage over either a continuous bridge or a tunnel that should not be lost sight of.

That is his opinion with regard to construction. Now with regard to the cost he says :—

The following estimate of cost is necessarily only an approximation as no surveys have yet been made, and the nature of the difficulties to be encountered are in some cases unknown. But I assume that in a work of this magnitude the best plant will be used and everything be done on the best and most economical system.

| | | |
|---|---|---|
| Tubes—$\frac{3}{8}$ plates, about 800 lbs to foot forward, say at 3 cents per lb, equals per foot ..... | | $24 00 |
| Concrete—10 feet inside diam. 15 outside=ring of 2½ feet thick, area 98,275 super feet=11 cubic yards per yard in depth=3.67 c. yds. per foot @ $6.00..... | | 22 00 |
| Launching and sinking..... | | 4 00 |
| Makes total per foot forward. | | $50 00 |
| Total length of tube, including abutment 29,000 feet, from station 105 to 395, $50.00 per foot ..... | | $1,450,000 00 |
| Central caisson—Iron 154,000 lbs..... | $4,620 00 | |
| Concrete 850 yards @ $6.00 ..... | 5,100 00 | |
| Sinking ..... | 2,280 00 | |
| | | 12,000 00 |
| Abutment—Iron in one 40 foot and two 15 feet caissons, with iron wharf between, 185,000 lbs..... | 5,550 00 | |
| Concette—600 yards | 3,600 00 | |
| Sinking and sundries | 850 00 | |
| | | 10,000 00 |
| Abutment—Opposite side.... | | 10,000 00 |
| Wharf—Iron, 120,000 lbs..... | 3,600 00 | |
| Concrete, 400 yards | 2,400 00 | |
| Earth filling and rock.....20,000 00 | | |
| Crib work and filling | 4,000 00 | |
| Iron piles and supports for tubes..... | 8,000 00 | |
| Sundries ..... | 2,000 00 | |
| | | 40,000 00 |
| Wharf at other end.. | | 40,000 00 |

| | |
|---|---|
| Iron piling 2,000 feet between abutments and wharves, say 20 pair piles, with cement filling complete..... | 20,000 00 |
| Concrete piers to support tube, say 140 altogether @ $1,000 each..... | 140,000 00 |
| Plant–launching ways shops, steamers and tools generally.... | 150,000 00 |
| Permanent pumping plant..... | 18,000 00 |
| Contingencies, 10 p. c. | 190,000 00 |
| | $2,080,000 00 |

HON. MR. KAULBACH—What are the piers or wharves to be built of?

HON. MR. HOWLAN—The bridges are to be built of wood and the wharves of iron filled with concrete.

HON. MR. KAULBACH — Trestle works?

HON. MR. HOWLAN—No, a solid pier of wood. The first thing that strikes a practical man is ⅜-inch iron might not rust out, and if it rusted out whether it would not destroy the whole affair. Having that contingency in view, I wrote to Mr. Smith asking his opinion on the subject, and I will read his reply :—

In reference to the protection of the outside iron plates of the tubes proposed for the Northumberland Straits sub-way, there are a number of paints and protective coverings in use, any of which last for a long time in salt water, and some of them as the Torbay mineral, the Silicate Oxide, and Bell's preparation of Asbestos claim to be indestructible, and certainly these all seem to fulfil the purpose intended. Iron steam vessels so protected have been running for 25 or 30 years, such as the Great Eeastern, which has never been docked since she was launched, and so far seem none the worse for their long immersion in salt water, so that there is no doubt that the well known preparations already before the public will protect any of these iron structures.

A second consideration is that it is by no means proved that salt water does so utterly destroy ordinary wrought iron as to make it useless for a protection to a cement backing, and when honey-combings or even a hole eaten through it would be a matter of perfect indifference. Long before any important change of this kind can have taken place, the internal dampness of the cement will have partially oxidyzed the iron in contact with it, and the chemical incorporation of this iron oxide with the cement produces one of the hardest and most indestructible materials in existence, the iron cement used for joining together the flanges of cast-iron pipes. The cylinders upon which Hungerford bridge rests crossing the Thames are of precisely the same construction as here proposed: a thin wrought iron skin, backed with Portland cement concrete. Any protecting coverings or paint must have been rubbed off within a very short time of their being placed in position from the warping of ropes round them, and the working of barges and boats against them. They have now been in their places for a quarter of a century, exposed to the terrible weight of one of the busiest railways in the world, and carrying four lines of railway across them close to a busy London terminus. It is of course as impossible to repaint these tubes as it will be those under Northumberland Straits, but it is apparently as perfect as it ever was and no symptoms of dissolution or destruction are visible. The same thing is observable in pontoons and wharves both on the Thames and Mersey, and in fact after a certain amount of oxydation has taken place, the very film of rust itself seems to act as a preservative against further decay.

"A third and still more important consideration in connection with the Northumberland Straits structures and especially in the submerged tubes is that no permanent dependence is placed upon this outer skin at all. It is essential in the construction of the work, it is necessary as a protection during the process of sinking and fixing, and for the jointing of the tubes, and it is necessary to protect from washing or injury the softer portions of the cement during the chemical changes which transform the soft mass of concrete into the dense compact stone which it ultimately becomes. This chemical change is slow in its operation, and takes probably twelve months to thoroughly complete, but after this has taken place the iron skin is no longer essential, and as I remarked before in my previous letter, if entirely moved it would not destroy the solid mass of stone that would then be left. The Thames tunnel built fifty years since by the elder Brunel is so near the bed of the river that subsequent dredging and deepening has left it all but exposed directly to the water and there is no doubt that in many places the salt water has now direct contact with it, and exerts its pressure immediately upon it. Yet it stands without any iron skin at all as a protection, and carries one of the busiest railways on the metropolitan system. On the same railway another structure of brick work and cement carries the traffic under the St. Catherines docks, where there is scarcely six feet between the bottom of the water and the top of the tunnel, without any protection whatever but the cement and concrete of which it is constructed. In both these cases the bricks used

are an inferior material to the indurated limestone and granite rock that it is proposed to use in this concrete, which are impervious to water, and not liable to retain or transmit it. In both the Thames tunnel and the St. Catherines dock work, there has been no difficulty or leakage and neither of them have required any repairs since they were completed. As I stated in my previous letter, if your subway is once finished to the strength and with the material proposed it will never give any further trouble, whether the iron is rusted away or not.

I think that puts the danger of rust altogether outside of the question. It was necessary to get the facts as several gentlemen like myself thought it might be a serious obstacle. The next difficulty was to ascertain whether the bed of the strait was of such a nature that it could be dredged or a tunnel could be successfully laid in it. The first thing to be ascertained was whether the bed of the strait was sufficient to lay the pipes in, and whether the ice would endanger the works. I shall now attempt to address myself to those two points of the subject. First with regard to the bed of the strait; I find the soundings given by Bayfield's charts of the straits on a straight line drawn between Cape Tormentine and Cape Traverse to be thus—commencing at Prince Edward Island it is given in fathoms to Cape Tormentine, and the shape is like a saucer. Commencing at Cape Traverse the depths are 2, 3, 6, 7, 8, 10, 14, 8, 6, 4, and 2 fathoms to the shore again; so that the deepest water across the straits is 14 fathoms, a little under 90 feet. That is for about three-quarters of a mile. Bayfield, in his book on sailing directions for the Gulf of St. Lawrence, says that "the bottom is of sand with clay underneath," whilst Captain Phillips giving his testimony before engineer McLeod says it "is a stiff clay." Captain Arthur Irving says that the bottom is mud and sand. F. H. Gisborn, Esq., the Superintendant of Telegraphs, who has had a great deal of experience in laying down telegraph cable there, says it is "sand all the way across, with some reefs of rock on the New Brunswick side at Jourimain." Judging from this information there can be no difficulty in laying the tube in this clay or sand in such a manner as not to foul ships' anchors or to interfere with such ships as frequent the straits, as the tube will be submerged 28 feet in the water, so that the first objection is satisfactorily answered. We now come to consider the second objection—would the ice currents interfere with the piers, ventilating tower and pumping apparatus? Now, we find that the ventilating towers can be placed on both sides and I need not answer that question. It was an objection raised by several gentlemen and we made up our minds to remove it from the centre of the strait towards the New Brunswick shore. In the report before alluded to of engineer McLeod, who was sent down by the Government and spent the summer there watching the tides and getting all the information he could, he says: "The currents were traced and measured for several days, but at that time they did not exceed a mile per hour. Captain Bayfield and others give a velocity of three miles, and the ice with high winds is said to pass at the rate of four miles per hour. Captain Philip Irving says it is about three knots per hour." There is a curious fact about this tide that Captain Bayfield gives in his book of sailing directions which would nullify to a great extent the whole current. It appears there are two tides; there is a tide coming from Canso eastward, and a tide running from the north part of Prince Edward Island from the westward. They meet somewhere about four miles from Cape Traverse and a vessel coming up from Canso might come with the current and get the flood tide on the other side and have the flood tide all the way through. There is a curious circumstance connected with this matter. I find that for a long period vessels were forbidden to enter the straits at all. I will just read what Captain Bayfield says with regard to the directions of tidal streams:

The direction of the tidal streams corresponds generally, and in fine weather, with the progress of the tide-wave, but is disturbed occasionally by strong winds. The eastern flood stream enters the strait from the northeast, running at the rate of 2½ knots round the east point of Prince Edward Island, but is much weaker in the offing and over towards the southern shore. It runs round Cape Bear, and with an increasing rate along the land to the westward; is strongest in the deep water near the land, and runs at its extreme rate of 3 knots, close past the Indian Rocks and Riflemen Reef.

Losing strength as it proceeds further to

the north-west, it is quite a weak stream when it meets the other flood stream off the Tryon Shoals.

This eastern flood stream is not so strong along the southern or Nova Scotian shore, unless it be in Caribou Channel, for a short space near Caribou Reef; and it is weak, not generally exceeding ¼ a knot in the middle of the strait.

The other or western flood stream comes from the northward, along the west coast of Prince Edward Island, sweeping round the West Point and running strongest in the deep water near the West Reef, where its rate is 2½ knots. Over towards the New Brunswick shore its rate seldom exceeds 1½ knots, and this is its average rate as it pursues its course to the south-east, until we arrive near Cape Tormentine, where the strongest part of the stream runs near the Jouramain Shoals, and thence to the southward, round and over the dangerous Tormentine Reefs with a great ripple, and at the rate of 3 knots.

After passing these reefs part of it curves round to the south west, with decreasing strength, and unites with the other flood stream in the Bay Verte, whilst the remainder is lost in the central part of the strait. The ebb stream, generally speaking, pursues a contrary course to the flood, and at nearly the same rates.

From this account of the tidal streams, it appears that a fast sailing vessel, under favorable circumstances, might enter the straight with the flood, and arriving at Cape Tormentine soon after high water, might there take the ebb, and thus have the stream with her, with but slight interruption from one end of the strait to the other. Or, a vessel beating with the flood, might so time her arrival at the same point as to be able to continue her voyage in the same direction with the ebb.

So I do not think the tide would interfere with it; but on the ice question Capt. Irving said before the Commission of 1883, when asked how long he was connected with Cape Traverse, "I commenced when 16 years of age and have worked for 42 years." When before the commissioners, at page 39 of the report of 1883, he was examined as follows by the Chairman :—

Q. Yesterday you said that the general thickness of the ice was about six inches there?

A. Yes, this winter.

Q. That is not the general thickness?

A. No; I would think from a foot to fifteen inches would be the average thickness of it in an ordinary winter.

That is a reply to the question which the hon. member from Lunenburg put. The ice is from a foot to 15 inches thick in an ordinary winter; and the current runs from a minimum of one mile to a maximum of four miles. Now I do not think any difficulty would be experienced from the currents; I do not think there would be any difficulty with regard to the ice, and therefore on these two points the project is perfectly safe. At the north side of the Island, at Tignish, there is a breakwater situated, as any one can see by looking at the map, in a manner very similar to that which would be built in this case at Cape Tormentine. The breakwater at Tignish is exposed to the whole force of the Gulf, while the other breakwater would be exposed to only nine miles of strait, three and a-half miles of which is shallow water. The breakwater at Tignish has stood for years and has not been damaged by ice, so I think the question of danger from ice is not to be considered. I have said that the cost of this tunnel would be about $2,000,000. I do not think any hon. gentleman has a right to bring a proposition of this kind before any legislative body without being able to show that it can be to a certain extent self-sustaining. I do not expect on this occasion that the Minister of Justice will give any other answer to my inquiry, but the stereotyped one. I am prepared to be laughed at a good deal about this project as I was when I spoke of a railway on the island, but after a good deal of thought I consider it is the only solution of the difficulty of communication at all seasons with Prince Edward Island. All I care to ask from the Government is that they will consider the question, and by that I mean that they will refer the question to some one of the eminent engineers we have in this country. We have in Canada the man who built the Hoosac tunnel, Mr. Walter Shanly, who is an eminent engineer, and we have others whose names I need not now refer to. There is an engineer who occupies a distinguished position in this particular branch of engineering, Sir Fredrick Bramwell, who is now chief engineer of the contemplated tunnel from Kent to Calais. He has had experience in constructing works of this kind. He was in Montreal last summer as chairman of Section G. of the British Association. I say submit all those plans and estimates to him; I think it is the least the Government can do in this matter. It would be to them, at all events, and myself and other gentlemen who think this matter

should be met in an intelligent way, a source of satisfaction and gratification because it is well known at the present time the Legislature of Prince Edward Island have forwarded a memorial to the Queen, stating that the terms of union have not been carried out. Without passing an opinion as to whether it is just or unjust, I may say it necessarily leads to trouble and irritation, and it would not be in the interest of the Dominion to have irritation in any part of it. "Only about 120 thousand people," I hear an hon. gentleman say. Yes, but I tell him they are, taken as a whole, the most intelligent and the best educated people, not only in this Dominion, but on this continent. The House will perhaps better understand this when I tell hon. gentlemen that we have on that Island 428 schools and 2 colleges, with 484 teachers. Of the teachers, 264 are men and 220 women; that the whole school population of the Island is estimated at 22,500, whilst those actually enrolled in the Public Schools number 21,488, the difference to which may be added the pupils attending schools not under Government control, which will show that every boy and girl in that Island of fit age is an attendant at school. Mr. Montgomery, the Superintendent of our schools, in a recent report says: "Of the pupils in attendance at the first and second-class schools last year, 441 studied Latin, 15 Greek, 510 French (exclusive of those studying French in third-class and acadian districts), 405 Algebra, 402 Geometry, and 298 Chemistry and Philosophy." It may be as well to remark here that such a population as this do not usually sleep on their rights. Now, with reference to the cost of the work, it would be $2,000,000, the interest on which would be $80,000 a year, capitalized at 4%. How am I going to get $80,000 a year by this work? It is a very pertinent question, and I ask the leader of the Government to pay particular attention to this matter, because I wish to show how the money is to be made up. I have already stated that the expenditures on the Prince Edward Island Railway exceed the revenue by about $100,000 a year. There is not much loss in the summer. It is only in the winter season. There is the same expense in running the road in winter, and there is less traffic. I contend that this improved means of communication with the mainland, with trains passing between the Island and the mainland four times a day throughout the year—you would cross in 25 minutes—would soon have the effect of wiping out that deficit of $100,000 a year. At all events, half of it would disappear. I do not see any reason why the whole of it should not be wiped out. We have 200 miles of railway on the Island, and there are as many people to the square mile in that Province as in Nova Scotia or New Brunswick. There is no reason why the carriage of freight and passengers over that line should not make it self-sustaining. It would relieve the Government in that way, and if they bought the 35 miles from Sackville to Cape Tormentine they would have control of the whole of the railway traffic in that part of the Dominion. It is a statement that cannot be controverted that by this means the deficiency in the operation of the Prince Edward Island Railway would be reduced 50 per cent.

| | |
|---|---|
| For mail service at the present time we pay to the Prince Edward Island Steam Navigation Company per year..... | $10,000 00 |
| Maintenance of 'Northern Light.' | 15,000 00 |
| Interest on her cost, @ 4%..... | 2,400 00 |
| Depreciation per year, snpposing her to last but three years longer, as per Pilot Finlayson's report..... ..... ..... | 4,000 00 |
| Amount paid at present is..... | $31,400 00 |
| And it is proposed to put on another ship at Georgetown to assist the "Northern Light" which will cost no less than her, say..... ..... ..... | 21,400 00 |
| Allow one-half for two tug boats to be used at the Capes..... | 10,700 00 |
| The present cost of the mail service between the Capes in winter as paid by the P. O. Dept. here is about..... ..... | 3,000 00 |
| And you have in round numbers | $66,500 00 |
| If you add to this, say a saving of fifty per cent. in earnings of the Prince Edward Railway, which I do not consider to be an unfair estimate, about..... | 50,000 00 |
| We have a sum of ..... ..... | $116,500 00 |
| Deduct the interest on $2,000,000.00 @ 4%, the cost of my subway ..... ..... ..... .. | 80,000 00 |
| And you leave a margin of..... For profit and loss account. | $36,500 00 |

To my mind this undertaking would be the first step towards consolidating the Maritime provinces and in my judgment, after an experience of ten or twelve years in this Chamber, I believe it would confer lasting advantages on them. Looking from another standpoint Mr. Ketchum, in his pamphlet on the construction of the Baie Verte Ship Railway and Canal—

HON. MR. POWER—Hear, hear!

HON. MR. HOWLAN—My hon. friend says "hear, hear." The statistics are not mine. They are furnished by gentlemen for whom he has the highest respect, gentlemen who, he believes, as I believe would not furnish information that he they did not believe to be correct. The figures are furnished by Mr. J. C. Hall, who did a large business at Charlottetown, Hon. J. C. Pope, C. Burpee, M.P., U. Elder, M. P. P., and Hon. J. S. Carvell. Here are the facts and figures as given by this pamphlet. I find that he estimates the amount of freight passing from Prince Edward Island to the mainland at 50,000 tons of agricultural products alone. If that quantity passes from Prince Edward Island at present, its volume would not be lessened but would be increased if we had this outlet. In my judgment it would increase 50 per cent. There is one portion of the industry of Prince Edward Island which has never been tapped and cannot be tapped on account of want of this communication—that is fresh fish. After due consideration, and after an experience of thirty years in the business myself, and having the experience of others and talking this question over very fully, I believe that 50,000 tons of fresh fish and oysters would come out of that country every year. I do not think therefore that 100,000 tons of freight would be too much to expect, and it would make it self-supporting.

HON. MR. KAULBACH—What kind?

HON. MR. HOWLAN—Smelt, herrings, eels, shad, bass mackerel and oysters. You would have all these. They are now building a bridge across the St. John river. And with this improved communication we would then be within twenty hours of the Boston and twenty-four hours of the New York markets. By this arrangement the fresh fish that are used in this city of Ottawa in winter could be brought from Prince Edward Island. They are now brought from Portland and Boston, much further off. Then there would be no difficulty in establishing manufactories in Prince Edward Island. We might as well have a sugar refinery in Prince Edward Island as in Halifax.

HON. MR. POWER—Hear, hear; we will give you one.

HON. MR. HOWLAN—We would have the facilities to establish boot and shoe and other factories in Prince Edward Island. Then it would be of incalculable benefit to the farmers of Prince Edward Island. We raise large quantities of agricultural products, but we cannot get them to the markets of Boston and New York before June, and when we reach there we find that the market is gone, whereas, if we had this subway built we would have every day communication with the outside world. So far as the question of payment is concerned, I think there would be no difficulty on that point. It would be an outlay that the Government would have a return for in that way. They would be simply taking the money out of one pocket and putting it into the other. That Prince Edward Island railway will always be in debt more or less from the facts which I have mentioned. We use largely on the island coal and limestone, which must be procured from the mainland. I the farmers could procure these supplies in winter they would use more lime upon their land. Looking at it any way you please it would confer great benefit upon the Province of Prince Edward Island. She entered the Union on condition that continuous communication would be established, and has behaved loyally ever since. Even in the unfortunate troubles which have occurred in the North-West, she has shown a loyal spirit, and is willing to-day to send 1,000 men to the west for the protection of Canada. She is bearing her portion of the burden, and I do think, all things considered, that if the Government were to submit all those facts to eminent engineers and order a survey to ascertain that the statements

made here are correct then we would be in a position to see what should be done, and whether this subway could be built for the sum mentioned or not. Something should be done. I state this with a full knowledge of the facts, and of the value of the words I am making use of, that if the Government can for $80,000 a year give Prince Edward Island that continuous communication with the mainland which was provided for in the terms of Union, this subway should be built.

Let me say to the Government one word in conclusion. They should approach this question from a national standpoint, may I say from a lofty standpoint of national honor, where that honor has been undoubtedly pledged to the people of that Island, a people who, whilst they value highly their constitutional rights, have borne in dignified patience what they have every right to consider as a great wrong having been done them.

I know there is great irritation amongst our people, and it is a matter of public notoriety which cannot have escaped the eyes of the Government that there is a strong feeling existent in the Maritime Provinces that they, their rights and their peculiarities have not received that consideration at the hands of this Parliament to which, in their opinion, they were entitled.

I need not say to the hon. gentlemen who compose this House that, using the words of a great statesman, "irration weakens the nation." To meet, to destroy and to set at rest all such carping as this then, let the Government build this work, and leave it in the East as a monument to their wisdom, which will long bear testimony by its connecting link with this continent, their anxiety that all members of this young nation shall believe they are, one and all, the wards of a paternal Government.

I have to thank the House for the patient and kindly hearing they have given my remarks on a subject which, to many, must be a dry one, and I hope some of my hon. friends from the Maritime Provinces will give me the assistance of their voices, at any rate, in furtherance of the project I have advocated.

HON. MR. HAYTHORNE—In my judgment the hon. gentleman who has just resumed his seat has used excellent discretion in handling this question. In the first place, the motion itself has been carefully framed. It is not calculated to pledge the Government to the adoption of any particular course, further than in the first instance, after due consideration, to cause inquiries to be made into this important matter. I think also that my hon. friend is entitled to the greatest credit for the diligence, talent, and research with which he has investigated this subject, and I am the more inclined to give him credit on that score, because I know that the kindred question of approaching the Island by means of a tunnel has generally been treated with a good deal of ridicule. I notice that in the opening part of his address my hon. friend alluded to certain tunneling schemes, and showed, I think, pretty clearly the great additional expense which would be caused by tunneling under the Straits of Northumberland as compared with this project of a subway. He mentions several large undertakings of that kind. One I remember was the box tunnel. That was a work which was undertaken by the younger Brunel. It was part of the Great Western Railway of England—a broad gauge railway—broad gauge in the English sense, and not the American—and it certainly was a prodigious work of its kind—I think about three miles long, and bored for the most part through a stone pretty generally known as Oolite, or Bath stone, not a very hard stone, and very suitable for tunneling purposes. Then he alluded to some of the Alpine tunnels, but in my opinion no land tunnel affords any analogy to a marine tunnel. It is just as well that this subject of tunneling should be set at rest. We have very few instances of tunnels of any considerable length under the sea. The most important one which has been undertaken is that between England and France, and that possesses peculiar advantages, advantages which could perhaps scarcely be found in any other part of the world. Its great feature is that the chalk formation is unbroken underneath that channel, and consequently the tunnel between England and France is through chalk the whole way. Chalk is not only an easy substance to bore through, but it has this advantage that it is a dry sub-

stance, and no water is met with in it as long as the chalk is present. I am aware of certain other attempts that have been made to construct submarine tunnels, one particularly under the Severn estuary, which bears a more exact analogy to the case of the Northumberland Strait in this way; the distance although somewhat less is under a strait which is liable to the same objections as the Straits of Northumberland are. I refer to the difficulty of flowing springs. I have here an extract that I made some years ago at the time the tunnel question was under consideration, describing difficulties which had been encountered in the attempt of the Great Western Railway Co. of England to connect its English and Welsh lines by means of a tunnel under the estuary of the Severn —I think about four miles from land to land, and about two and three-quarter miles under the sea; but without troubling the House to read the details of those operations, I may say that the workmen were driven out of that tunnel by tapping one single spring. They were driven out so completely that the men had some difficulty in escaping with their lives, and the horses were actually drowned. The tapping of that spring retarded the work for several years. It was again undertaken and this spring was mastered; but more recently some advance had been made, when another such spring was encountered with similar results. I mention these things to show what we should probably meet with if we attempted a tunnel under the Strait of Northumberland. That strait, as we Islanders know perfectly well, is on the old red sandstone formation, and we know from experience that we can always find abundance of water by sinking to a depth of forty or fifty feet or even less. Hon. gentlemen know how extremely difficult it would be under these circumstances to drive a tunnel under the straits, and for these reasons I am rather glad that this project of my hon. friend even if it should result in no other benefit, has by its comparative cheapness and facility of construction put an end to any project for tunneling the Straits of Northumberland. I may say in my judgment there is nothing impracticable in the scheme proposed by the hon. gentleman from Alberton. It seems to me that it is as applicable to our strait as it has proved in many other instances. I might mention that there are difficulties incidental to it which must be met, but we have already in different parts of Canada, and round the shores of the Maritime provinces encountered very great and formidable difficulties in the way of building wharves, and building breakwaters which will stand the power of the wind and waves, and perhaps the still greater pressure of the ice; and therefore I am not one to despair that the adits of this subway can be constructed in such a way that the tube itself shall have a fair starting point into the deep water as described by my hon. friend. Of course I am not a professional man, and do not profess to have studied the question as the hon. gentleman has done, and I am not prepared to offer any general opinions on this question; but I think quite enough has been stated to warrant the Government in making close and complete inquiry into this important subject. It certainly would have the effect if it could not be carried into operation of putting a satisfactory end to the trouble which has risen as to the fulfilment of the terms of union between Prince Edward Island and the Dominion. It would have a further effect, to which my hon. friend alluded in the latter part of his address—that it would completely revolutionize the industries of Prince Edward Island. Every description of industry there would be still further stimulated. The great objection which has beset our industries hitherto is that they have been suddenly shut down at one particular part of the year, and we might almost say of them that they hybernate for five months until the warmth of May has let loose our bonds; but we should never, should this plan prove to be practicable and carried into effect, be imprisoned in the future as we have been in the past, and not only would the old industries of the province be stimulated and put on a level with the industries of the other provinces, but I can conceive that quite a large number of new industries—new to us at all events—would be inaugurated. Many industries cannot be even attempted in Prince Edward Island at the present time—industries for which its shores and soils are admirably adapted, and which might become thriving enterprises, not only bringing wealth into the country, but assisting the Government in

paying the interest on the large outlay in this proposed undertaking. I allude to the smelt trade, and hon. gentlemen from other parts of the Lower Provinces know what a profitable industry that has become; I allude also to the possibilities of the oyster trade. It is well known that oysters are becoming scarcer and scarcer every year. The oyster beds, for which the coast of Prince Edward Island is perhaps better adapted than any other part of the world, could be made to produce a large supply. It is not a bold assertion to make, because we have it in our daily experience at home that a large proportion of our population are engaged two or three months of every year while we are here attending to our legislative duties, taking out the deposits of decayed oysters which have been deposited there for centuries. What is there to prevent the renewal of those oyster beds? And that alone would become such an important item in the trade of the Island, that I firmly believe the oysters of Prince Edward Island would become as celebrated as any others on the continent. After the long address that has been made by my hon. friend, I am quite aware that the House must be somewhat weary of this subject, but I think I should be acting an unpatriotic part if I did not give my hon. friend full credit for the great ability and industry he has shown in handling this subject. For my own part I can only say that in debating the question of winter navigation across the straits, in this House of anywhere else, I never took the ground that the Government of Canada should be held to the performance of impossibilities. It seems to me that such language involves an absurdity, and of that absurdity I certainly should not be guilty. I have claimed for my province, and I claim it still, that the best that circumstances will permit to be done should be done to render communication with the mainland easy and safe at all seasons of the year; but my contention, in speaking from my place in this House, and in the memorial which I put in before the committee of the other House has been that although I would not attempt to bind the Dominion Government to the immediate carrying out of those terms of Confederation, which up to the present time have been virtually impossible, yet at the same time if they perform their duty as a Government to the best of their present ability, I still maintain that the improvements in science and navigation might at some future, and perhaps not very remote date, be such that by means of new inventions, or the discovery of greater powers, it might be within their means to literally carry those provisions of the confederation into effect, and it seems to me that this project of my hon. friend's is the dawn of the possibility that I anticipated. I hope it will meet the favorable consideration of the Government, and that it will not be thrown aside as a forgotten and useless thing. I shall await with the greatest interest the reply which I am sure the leader of the Government is prepared to give us, and which I hope will be in all respects favorable.

HON. MR. KAULBACH—When I saw this notice of motion on the order paper I considered it quixotic—a midsummer night's dream. I did not think that a man of my hon. friend's practical ability and common sense would have advanced such a project; but when I heard his arguments and found that they were supported by such a practical and eminent engineer as Mr. Vernon Smith, I thought it worth while to give the subject some attention. I have listened to my hon. friend this afternoon with great interest, and I think he has gone far to take the matter beyond the realms of fancy. I believe that the work can be done, but whether it could be brought within the estimates of my hon. friend, I would not like to admit. It is true that there have been, as he says, in the Clyde and in the Thames and Severn, short tunnels of some half a mile in length; but when we come to cross such a mighty water stretch as the Northumberland Straits, it is a project of quite a different character, and though I believe the Government should by all reasonable means do their utmost to carry out the terms on which Prince Edward Island entered the Union, and establish regular communication with the mainland at all seasons of the year, I hope that while considering this matter, and employing competent engineers to look into it, they will not have their minds diverted from what is due to that province, and neglect the improvements already at their

command. No doubt this project would cost a large sum of money, and the interest on it would be $100,000. The railway on the Island is run at a loss of about $100,000 a year, and the mail service costs about $25,000 a year, which is a large subsidy given to Prince Edward Island. That those deficiencies would be in any way reduced by the construction of this tunnel is not quite as clear to my mind as it is to that of my hon. friend. I am not sure that larger crops would be raised in the Island because of the construction of this subway; neither would there be much more fish caught and cured. It would, however, enable the Islanders to keep their produce till the winter when they could get a larger price for it.

HON. MR. HOWLAN—How are you going to ship your fish without it in the winter?

HON. MR. KAULBACH—It might have the effect of over-doing business. We find the lobster business in Nova Scotia is going down in consequence of over-fishing, Though I looked upon this project at first as absurd, the arguments of my hon. friend have caused me to change my opinion, and I think it is worthy of the favorable consideration of the Government. A survey should be made and estimates prepared by some engineer in whom the Government has confidence, to report to this House.

HON. MR BOTSFORD—I certainly shall not resist the appeal from the hon. member from Prince Edward Island, as he has made a very able statement of a question which at first sight appeared to be a very absurd one; but the more he discussed the subject, and the more information he gave the Senate, the more feasible the project seemed to be. He certainly has given it very great consideration. He has shown great ability in the manner in which he has collected and made use of the information which he has derived from various sources, and if this project is feasible, and the subway can be constructed for the amount of money which has been estimated by the engineer, it would be difficult to estimate the great advantages which not only Prince Edward Island, but the Dominion at large, would derive from such a work. I may say, without expressing an opinion upon it, that the hon. gentleman has shown that it is the duty of the Government to make inquiries with respect to this great work. I offer no opinion about it, but I say I congratulate the hon. gentleman on the very able manner in which he has presented this question for the consideration of the House.

HON. MR. BELLEROSE—Coming from one of the large provinces of the Dominion, I believe that it is expected that the representatives of that province shall say a word on this important question. I believe that the representatives of the people of Quebec have already shown since Confederation that they are always happy to assist the other provinces in anything which they ask for that would be to the benefit of the Dominion at large. In every instance that province, which has generally supported the Conservative Government, has favored all measures which were in the interests of the other provinces, and it is not, I believe, the intention of any of the representatives of the Province of Quebec to depart from that policy now. The Dominion has done much to unite the smaller provinces of the west. The Government has gone to great expense to attain that object. The building of the Pacific Railway was certainly a work which at the beginning many of us in both Houses thought was of such magnitude that it was too much for a population of some four millions, but we have carried that into effect, and without imposing a new burden on the people of this country, we will very soon have a road from ocean to ocean, and that will be in the interest of every province of the Dominion. The only province that will not benefit by it is Prince Edward Island, and I believe that the Dominion ought to do something for that province. Since Prince Edward Island entered the Confederation, I might fairly say that the Government have done their best to carry out the arrangements for winter communication which were entered into at the time that province came into the Union, but there are many difficulties in the way—difficulties which I believe cannot be met except by some great project such as the hon. member from Prince Edward Island alluded to

a moment ago. If such a work could be carried out at the expense mentioned by the hon. gentleman, I do not believe that the Dominion ought to hesitate to undertake it. Indeed the hon. gentleman from Prince Edward Island has pretty well shown that even in expending $2,000,000, or even $3,000,000 the Government would not impose a great burden on the Dominion, so that under the circumstances there should be no objection to carry on that work. I know there is a great deal of difficulty in the way. The hon. gentleman himself does not ask that such a project be undertaken; he merely asks that the question be taken into consideration, so that the Government can see whether such a project can be carried out effectively. I only hope that the Government will see their way to assist that province which now stands in a very bad position towards the rest of the Dominion. They helped us in carrying on all the other public works of the country, and it is only right that we should help them in having easy communication with the mainland. Two millions of dollars is a large sum of money, but we know that if peace is not restored we will expend more than $2,000,000 in the North-West. I hope we will not be put to that expense, but if peace is not restored we will not only expend millions of dollars but will have blood shed there, and not only for months, but possibly for years.

HON. SIR ALEX. CAMPBELL—I hope not.

HON. MR. BELLEROSE—I hope not, but I say if peace is not restored we will have both loss of blood and money. It is well known that this rebellion in the West has not sprung up without some reason. I am one of those who, in 1870, stood up in my place and said that I did not consider that the rebellion at Red River was such a crime as many people thought, and to-day I say the same. I say that according to my principles it is a crime, but there are other crimes also, and the first crime is sometimes worse than the second, because it has been the cause of the second. Well, hon. gentlemen there have been causes—

HON. MR. POWER—I rise to a question of order. I do not say but what the hon. gentleman's remarks may be perfectly proper at another time, but they are not germane to the subject before the House.

HON. MR. BELLEROSE—I will speak to the question of order. I want to show why the population of Prince Edward Island may, some day, think they are not well treated, and as an example of the consequence of ill-treatment I am referring to the troubles in the North-West.

THE SPEAKER—I think the remarks of the hon. gentleman in the sense in which he has made them, may be germane to the discussion; but I am inclined to believe that my hon. friend was going a little too far when he was called to order.

HON. MR. BELLEROSE—In the North-West there are difficulties, and there are reasons for it, and in Prince Edward Island there may be dissatisfaction in the future that may cause trouble—no doubt not such trouble as we are now facing in the North-West, but there may be other trouble and dissatisfaction. I believe that since Confederation we have been endeavoring to unite the whole Dominion as a contented people, and I say that some millions expended to secure that unity of spirit and heart and feeling is something worthy of consideration. In answer to the hon. member from Halifax that hon. gentleman may perhaps remember that Nova Scotia cost us $10,000,000 for peace. He may remember that, so that even if I were to refer to that question now and say that Nova Scotia is entitled to more money, he might not consider it quite out of order, so I say that to have peace with the people of Prince Edward Island, it is worth expending a few hundred thousand dollars. I hope that the Government may see their way to take the proposition of the hon. member from Alberton into favourable consideration, and see whether it can be carried into effect.

HON. MR. WARK—I think the hon. gentleman from Prince Edward Island is to be congratulated on the manner in which he has brought this matter before the attention of the House. I have for some forty years lived within sight of

Prince Edward Island, and I have always sympathized with the people of that province in the inconvenience, hardship, and danger that they have to encounter in crossing the Straits in winter. I think it was one of the great drawbacks to the confederation of the Maritime provinces, the difficulty of having communication between the Island and the mainland in winter. If the hon gentleman is correct in the estimates he has made of the expense of this project—even if it were a million dollars more, I think it is well worth the consideration of the Government to give satisfaction to the people of that Island.

HON. MR. OGILVIE—I am delighted to hear from my hon. friend, the hon. member for DeLanaudière, the generous sentiments he has expressed towards Prince Edward Island for this—I cannot tell you what it is—this hybrid article that one cannot find a name for. If there is one thing with which I am perfectly acquainted it is the power of water, for I have made a special study of it for some thirty years. The idea of a structure such as the hon. gentleman proposes, to contend against the tide and ice of the Straits of Northumberland is so thorougly absurd and ridiculous that I would not like to have it go out of this Chamber without opposition. I have been put to a great deal of trouble to retain a column of nine feet of water. I have been put to an immense deal of trouble to keep back twenty feet of water in a situation of that kind. That is what I intended to speak of first, but I was more than delighted with the quixoticism of my hon. friend from DeLanaudière who thinks that so much should be done for Prince Edward Island. It is the first time I ever saw him pose as a philanthropist, anxious to please everybody, and aid everything to satisfy the rest of the Dominion. Never mind ourselves hon. gentlemen; let us try to please those other people. He speaks about the millions to be spent in the North-West in this rebellion. I am neither a philosopher nor the son of a philosopher; nor am I a prophet or the son of a prophet, but I will venture one prophecy: I believe there will not be one fight in the North-West. To-day we had reports about the principal trouble being at Crow Foot Crossing, because the Indians did not meet Capt. Cotton there. I was at Crow Foot Crossing last year, and met old Chief Crowfoot there myself. He is a very intelligent, wide-awake, able man, and he and his band know what they are doing just as well as anybody, and I say that the Government were dealing with those Indians as fairly as it was possible to do. I have seen it myself with my own eyes. I have seen the old chief pick up good bacon that any of us would be glad to have on our own table, and pitch it away contemptuously and say "No want that! Want fresh beef!" That is the way the Indians acted. I say that they are well treated, and when I heard my hon. friend from DeLanaudiere express his deep anxiety to please the people of Prince Edward Island I thought a new feeling of benevolence had struck him that I never knew him to be influenced by before, but that is apart from the question. The project submitted to us, when laid before competent hydraulic engineers, will prove to be utterly fallacious. I do not trouble the House very often, but I would object very much to have anything go out from the Senate with our approval that is so utterly ridiculous and absurd as this subway across the Straits of Northumberland. I have had experience with all kinds of water works, and I have seen a six inch hole in a bank carry away a four story building inside of six hours. The thing is perfectly ridiculous, and if it is undertaken $2,000,000 will hardly make a good beginning. No douht $2,000,000 would begin it, and about $10,000,000 might finish it but certainly nothing less, and I speak advisedly.

HON. MR. FERRIER—I was very much pleased with the manner in which my hon. friend submitted his project to the House, and I am one of those who think that there is no danger of his incurring any of the ridicule which my hon. friend (Mr. Ogilvie) has spoken of in reference to recommending that the Government look into this matter and give it their best attention. I am disposed now, and have been for some years past to get rid of the word "impossible." I cannot understand how we should hesitate to believe a project is feasible when we have seen so many great works accomplished in various parts of the world. My hon. friend from Prince Edward Island has not

brought this matter before the House in an inconsiderate manner. I have followed him closely, and I think on the whole he has placed details before the House which are worthy of careful consideration on the part of the Government; because if that tunnel can be constructed for $2,000,000, it will be the best spent money that Parliament has ever voted. I am delighted at having had an opportunity to hear my hon. friend submit his project to the House in a detailed manner. When we were considering the question of Confederation there was the greatest imaginable difference of opinion about the construction of the Intercolonial Railway. On that occasion, as the official report of the Confederation debates will show, I was of the opinion that there was no risk whatever in constructing that road, and I supported my view with the details of of what I knew the railways of the world were doing, and had done. From the manner in which my hon. friend has gone into this question he deserves that every consideration should be extended to him. And we should not reject a scheme of this kind if it is feasible. To my mind it is quite possible that the project may be worked out in a most satisfactory manner.

I think it would be well if the Government would look into it. We have in our country one of the most eminent engineers on the continent, Mr. Walter Shanly, who so successfully carried to completion the famous Hoosac tunnel, after the American engineers had failed, and if the matter were referred to him he could look into the details of the project, and report as to its feasibility. From my personal knowledge of his ability as an engineer, and his thorough integrity of character, I am confident that the Government could rely on any statement he would make on the subject.

HON. MR. POWER—I did not propose to say anything on this subject until the hon. gentleman from DeLanaudière seemed to express on behalf of the Province of Quebec the opinion that we should be quite prepared to spend two or three millions of dollars for this object. And I am somewhat surprised to find that the Nestor of the House to whom we might look for counsels of prudence seems to endorse the view of the hon. gentleman from DeLanaudière. I quite agree with the hon. gentlemen who have spoken who say that the hon. gentleman from Alberton deserves a great deal of credit for the very satisfactory way in which he has put his scheme before the Senate. When that hon. gentleman undertakes to do a thing he does it thoroughly, as he has done in this instance. I think that what the hon. gentleman asked, that the Government should make a survey, is not altogether an unreasonable request. Perhaps before making the survey the Government would do well to have the opinion of some other engineers as to the feasibility of my hon. friend's scheme. Probably an engineer of as good standing as Mr. Vernon Smith would not have endorsed the scheme if it were not practicable; but there are engineers, like Mr. Page for instance, whose opinions would be of great value. The doctrine laid down by the hon. gentleman from DeLanaudière is to my mind a most extraordinary one. He says that because we have been guilty of extravagance in the North-West therefore we should immediately be extravagant in the south-east. Now, I think too much money has been spent in the North-West and in a great many other quarters of the Dominion; but, if we expect this Confederation to hold together, the time has come when we should be a little cautious about rushing into these expenditures. Our debt is increasing with tremendous rapidity. Taxation is increasing; and our financial future is anything but cheerful, so that this would be an unfortunate time to undertake heavy expenditures. Already the feeling has grown in some of the Provinces, and is beginning to grow even in Ontario that Confederation costs rather more than it is worth; and, if we are to do a great deal more for the Province of Prince Edward Island and go into expenditures of this kind, the feeling will grow as to that Island at any rate. When Prince Edward Island came into the Union she came in on most advantageous terms, one of which was that this communication with the mainland was to be maintained. The Government made an effort to maintain the communication; that effort has not been altogether successful. Two years ago a Committee of the House of Commons was appointed to deal with this matter. They sat for a number

of days, took a great deal of evidence and made certain recommendations. That committee did not recommend a subway or tunnel; and I think that until the recommendation of that committee has been tried and found not to be satisfactory it is too soon to initiate another scheme; still it is to be hoped that the Government will get information on this subject, and if they are satisfied that the scheme is a feasible one that they will cause surveys to be made. But I hope that they will hasten slowly in this matter. There has been in Canada altogether too much fighting against nature. We are fighting against nature out in the Rocky Mountains. There are schemes for navigating Hudson's Bay and all sorts of undertakings of that kind which much wealthier and more prosperous countries would not venture to undertake. We are not responsible for the fact that Prince Edward is an island. Providence separated her from the mainland, and she has to take the consequences. If we get over the inconvenience for a reasonable figure it is all very well, but we are not bound to do it *coute qui coute.*

HON. MR. HOWLAN—You are by the terms of Union.

HON. MR. POWER—There is another reason why I feel that it is rather soon just yet to undertake to make much further expenditures on account of Prince Edward Island. The hon. gentleman from Alberton referred to the fact that the Island Railway cost about $100,000 a year more than it brought in. It is only a little while ago that we undertook to give them more railway on the Island. The communication with the mainland costs a great deal now. The population of the Island is about 110,000 or 115,000 people.

HON. MR. HOWLAN—But look what a class of people we have got.

HON. MR. POWER—They are a very superior class of people, but it might perhaps pay as well to bring them all over to the mainland, if we are going to spend so much for communication with the Island. While so much money has been spent for this Island with its 110,000 or 115,000 people and while so much has been done for Vancouver Island, with its 12,000 people, there is an island which I think is of quite as much value as either of these—Cape Breton—for which almost nothing has been done. I really think that the 85,900 or 90,000 people of the Island of Cape Breton deserve a little consideration from the Government before a large expenditure is gone into in Prince Edward Island.

HON. MR. HOWLAN—Do not be a dog in the manger.

HON. MR. POWER—There is no railway in Cape Breton, whereas there are 200 miles of railway in Prince Edward Island.

HON. MR. HOWLAN—We paid for that ourselves.

HON. MR. POWER—The hon. gentleman is right in one way; the Island Government built the railway, but the debt is assumed by the Dominion. It is generally understood that the administration of the day built the railway, because they felt that the Island would be obliged to come into the Union as she could not bear the debt; and when the railway was under way the Island entered the Confederation.

HON. MR. HOWLAN—The hon. gentleman's information is not correct.

HON. MR. POWER—The hon. gentleman from DeLanaudiere spoke of Nova Scotia having cost $10,000,000. Nova Scotia came in ultimately with a debt of $10,000,000 just as Prince Edward Island came in with her debt, and Canada with hers. Canada came in with a debt of $70,000,000, and I am quite sure that Nova Scotia brought in as much value in proportion to the amount of her debt as either Canada or Prince Edward Island. The island of Cape Breton has not a single mile of public railway. This Government has spent no money on Cape Breton, except upon the enlarging of the St Peter's Canal and some harbor improvements. The strait separating the island from the mainland is not 9 miles across—it is not one mile, and if there are to be subways that is a much better place for them than Northumberland Strait. After a subway

is made across the Strait of Canso, and the railway is extended to Sydney, then it will be time to ask for $2,000,000 to build a subway from Cape Tormentine to Cape Traverse.

HON. MR. BELLEROSE—I wish to make a brief explanation in reply to the remarks of the hon. gentleman from Halifax. I never mentioned the $10,000,000 as an argument for granting this to Prince Edward Island. The hon. gentleman from Halifax interrupted me, and I said if I had been discussing the $10,000,000 for Nova Scotia he might have allowed me to proceed with my argument without interruption.

HON. SIR ALEX. CAMPBELL—I am sure the hon. gentleman who introduced this subject to the House must be gratified by the very marked impression his speech has made. The information he has laid before the House, I think, is admirably calculated to bring the minds of hon. gentlemen to the conclusion at which his own has arrived. He has brought details of a most interesting character, and I think has given us all information which we did not possess until he rose to make his remarks, and evidently by the discussion which has taken place he has produced a very decided impression upon the minds of hon. gentlemen who have listened to his speech and who, perhaps—some of them at all events—were rather disposed to be prejudiced against the project which he has laid before us. I am not able to give my hon. friend the exact promise which he seeks for in his inquiry. I will say frankly to him, and to the House, that the promise to undertake the survey of this work is one which I am not prepared to make. That the Government will give attention to the subject I can promise with great pleasure and in perfect faith, but not that it may lead to any survey. The question as put by the hon. gentleman is whether the Government, after due consideration, will be prepared to recommend the survey. I am not able to say whether the Government will at any stage of their inquiry recommend a survey or not, but I will take care that the remarks which my hon. friend has made, and an account of the effect which has been produced by those remarks on the House, are conveyed to the Government, and more particularly to the Minister who is charged with this class of Government business. I will take care that full information is given, and I think it is very likely that the impression made on this House may, to some extent, be communicated to the members of the Government when they have the benefit of the report, which no doubt will appear, of the speech which my hon. friend has made. I will take care that due consideration is given by the Government to the proposition which my hon. friend has put forward and the arguments by which he has supported it. Beyond that, and with reference to a survey, or the result of it, I am not able to give my hon. friend the promise which he desires, but I hope he will be satisfied that he has made a very considerable impression upon the House and that the Government will give consideration to the subject to which he has called attention.

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