# CONDITIONS OF THE FISHING INDUSTRY

## Interim Report of the British Columbia Commission Is Now Made Public

## IMPORTANT RECOMMENDATIONS

### Commissioner Brown Presents a Minority Report in Which He Dissents From Findings of Colleagues

The interim report of the British Columbia fishery commission, dated Vancouver, Oct. 2, 1906, was made public Saturday. The most important portions follow:

1. We are of opinion that in the Fraser river and the adjacent area outside where sockeye fishing is carried on, no salmon gill-nets should exceed sixty meshes in depth.

This suggested maximum limit in the depth of net, enforced as a universal condition in the waters referred to, would prevent abuses. Very deep nets have been used in recent seasons outside of the mouth of the Fraser as shown by the evidence. Such deep nets (75 to 100 meshes or more in depth, it is stated) might be surreptitiously used in the river, but if no deeper nets than those of sixty meshes are permitted, there is no risk of such abuse. The limitation of the depth of gill-nets will facilitate the ascent of increased numbers of salmon.

**Maximum Length of Net**

2. We favor the limitation of the length of salmon gill-nets to 150 fathoms (300 yards). This was formerly the length of net universally used in the sockeye fishery; but for some years nets double the length, viz., 300 fathoms (600 yards) have been permitted outside of the mouth of the Fraser river. To prevent all risk of abuse arising from the alleged use of long nets inside the Fraser river, a length of 150 fathoms is recommended as a maximum limit.

**Mission Bridge Fishing Limit**

3. The suggested alteration of the salmon fishing limit at Mission bridge on the Fraser river, we cannot recommend. The limit was formerly at Sumas and was brought down to Mission; but the local resident fishermen on the Fraser river between Westminster bridge and Mission bridge protest strongly against a further reduction of the fishing limits in the river. It is claimed that owing to bars, shoals, snags, etc., the fishing area is greatly reduced by natural conditions, and that the extent of the netting done has been exaggerated. We, therefore, recommend that the two following conditions be enforced in that portion of the Fraser river waters between Mission bridge and New Westminster bridge:

(a) Gill-net privileges for sockeye fishing above New Westminster bridge to be rigidly confined to British subjects actually residing on either side of the river between Mission bridge and New Westminster bridge, and the words "license valid between New Westminster bridge and Mission bridge" shall be conspicuously stamped across the face of each such license.

(b) No such special license shall be issued through the inspector of fisheries or his officers, unless the applicant is known to him or them to be a British subject, and a bona fide resident above (that is, east of) New Westminster bridge on the Fraser river for a period of not less than six months prior to the date of the granting of such special license.

**Longer Weekly Close Time in "Off Years"**

4. In view of the fact that each fourth year is recognized as a "big" year, characterized by an abundant run of sockeye salmon, while the three intervening years are recognized as "off" years, when the run of Sockeyes is small, we recommend that a weekly close time be enforced in the Fraser river from its mouths to Mission bridge, from 6 a. m. on Saturday until 6 p. m. on the Monday following, from July 1 to Aug. 25 in each of the three intervening years, known as "off" years, or years characterized by diminished, "poor," runs of Sockeyes. During the period named (July 1 to Aug. 25, both days inclusive) and within the limits named (Fraser river mouths to Mission bridge), this weekly close time shall be substituted for the weekly close time at present in force, but the present weekly close time (6 a. m. Saturday to 6 p. m. Sunday) shall be enforced outside the mouths of the Fraser river, while in fourth years, the so-called "big" years, it shall apply in all the specified waters inside and outside the Fraser river.

**Patrol Service**

5. We recommend that in view of the great expansion of the salmon industry, additional patrol officers should be appointed, and that two or more speedy patrol launches be added to the present fishery patrol boats on the Fraser river.

**Trap Nets in Close Season**

6. We recommend that, by special regulation, a small meshed apron, which can be lowered or raised, shall be provided in each salmon trap, so that such salmon trap can be effectively closed, and the entrance of salmon wholly prevented during the weekly or other closed time. The Washington special fish commission concur in this, and are recommending a concurrent regulation of the same character in the state of Washington.

**Fine for Trap Violations**

7. We recommend that a minimum fine of $250 be specified for violation of the salmon trap regulation in British Columbia, thus making our law uniform with that which it is intended to establish and enforce in the state of Washington.

In addition to the foregoing recommendations, we, as a commission, concurred in certain other recommendations to which the Washington special fish commission gave their adhesion. These recommendations, from an international point of view, are most important, and we regard them as essential to an effective conjoint scheme of sockeye conservation in the contiguous waters of British Columbia and the state of Washington; but, it may be added, they apply only to the waters of the state of Washington, with the exception of the clause numbered "V," which is identical with the recommendation numbered "7" on page seven of this report.

**Re Washington Waters**

(I.) We are of opinion and fully agree with the recommendation of the Washington special fish commission, that the regulation contained in the Washington state fishery laws, prohibiting a trap-owner from holding a salmon trap site unless a trap is erected and operated thereon, be amended so that a trap site granted to a trap-owner may be held by such trap-owner provided that a trap net be built or operated thereon for at least one season in four; provided, also, that an increased fee or rental be required to be paid in those years in which the trap is not operated on the site held.

(II.) We are of opinion that to ensure the effective enforcement of the law, and to safeguard salmon trap-owners against vexatious legal proceedings, the trial of cases of violation of the trap regulations in the state of Washington should be placed in the hands of the superior courts of that state.

(III.) We are of opinion that a close season for sockeye salmon should be enforced in the state of Washington from Aug. 20 to Sept. 10 (both days inclusive). This would afford necessary additional protection to the late schools of sockeyes, and would ensure uniformity in the closing of the sockeye traps along the shores of the state of Washington.

(IV.) We are of opinion, and strongly stated this view at the international conference on Sept. 19, that the state of Washington legislature should be urged to make a distinct and adequate appropriation for the proper enforcement of the laws framed for the protection and preservation of the salmon supply in the waters of the state.

(V.) We are of opinion that the minimum penalty for a violation of the salmon trap laws should be $250, as smaller fines are held not to be deterrent. It may in some cases be profitable to pay a fine if of small amount, and commit the violation. We urge that $250 be the minimum penalty for violations of trap regulations referred to in the state of Washington, and we may point out that recommendations No. 7, on page 7 of this report, is on the same lines, and we have urged its embodiment in the Dominion fishery laws of British Columbia.

Had the majority of the commission omitted from its report the recommendation to make the weekly close time on the river longer than that in outside waters, I should have contented myself with the remark that the limitation to residents of the right to fish above the New Westminster bridge should not apply to "big run" years, and that say, 75 meshes instead of 60 only should have been allowed in sockeye nets. The evidence taken by the commission I think fully supports both these contentions.

But against the recommendation to make the close time on the river twenty-four hours longer than on outside waters, I beg to enter the strongest protest.

The chief objections to it are:

1. It would subordinate the rights of our own fishermen to the profit and advantage of the Puget Sound fishing interests to an extent which the latter neither asked for nor expected, and in return for which we should receive nothing.

2. It would be a most unjust discrimination in favor of the Japanese as against the white fishermen, and would make it unprofitable for most of the latter, who are settled along the riverside, to continue in the business.

3. Its value as a measure of protection (if it were necessary, which it is not) would be doubled by reversing it, making the longer close time outside the river.

4. It was brought before the commission in executive session at almost the last possible moment. There was no opportunity to take evidence with regard to it.

Taking these points in order, I beg to cite:

1. The statement made by Mr. Gorman (chairman) and the other members of the Washington commission (see report proceedings of international conference, page X). Mr. Gorman said "At the expiration of the thirty-six hours you take your traps and nets, and hike up above the New Westminster bridge or as far up as the fish get; there put out your gear, and capture fish that would otherwise have got to the spawning grounds." And, again, (page XVI): "In other words, you have not confined your fishermen between the Mission bridge and the New Westminster bridge to the gear that figures there from day to day. You take the gear which ordinarily is operated near the mouth of the river, and follow the fish up that have been permitted to escape from this gear during the thirty-six hours, in order to intercept them." And both Mr. Gorman and Mr. Deming (page XVII.) make it plain that their complaint referred only to "small run" years. In Mr. Deming's words, "In the big year, I do not care for any close season at all, neither on the Fraser nor here—there would be fish enough." If words have any meaning, the words that I have quoted mean that the American commission asked and expected only that we should limit fishing above New Westminster bridge to resident fishermen. In Mr. Gorman's words, "to the gear that figures there from day to day." They told us that they knew all about our methods and operations. "We have been careful," said Mr. Gorman (page XII.) "to be well informed"; yet they did not suggest any other restriction such as those on depth and length of nets, for example. In return for the limitation of fishing above the New Westminster bridge, they were willing to continue their weekly close time, and to make it effective, and that is all they promise now. This was emphasized by the proceedings of a convention of the Puget Sound fishing interests, held in Seattle a month after our conference (in December, 1905). The proposed "closed year," in 1908, was condemned, and the weekly close time approved by a strong majority.

2. Practically all the Japanese fish at or outside the mouth of the river, while a large majority of the white fishermen (whose aggregate capital invested in boats and nets, is estimated at some $250,000) fish in the river. They would, of course, have the legal right to go outside, but as that would involve a boat journey, out and back, of from 20 to 30 miles, few of them could profitably do so. The sockeye season lasts for six weeks of five and a half days each; the proposed regulation would cut the week on the river to four and a half days, and would therefore, on its face, give the Japanese thirty-three days' fishing, as against twenty-seven for the white fisherman. I say "on its face" because its real effect would be much more far-reaching. Examined on the question of extending the close time above New Westminster bridge only, 12 hours, J. J. Wilson, fishery guardian, said (report of evidence, page 55, answer Mr. Hall): "Well, we'll say that the close time above New Westminster bridge was extended until 6 o'clock Sunday night—there would be no fish here on Monday morning—the gates would be closed." The same witness said (page 50, answering Mr. Taylor), "The mouth of the river is completely barred throughout the week." Similar evidence was given by a number of witnesses, fishermen, fish dealers and canners. Of the points as to which the commission took evidence, none was more clearly established than that of the effective barring of the river mouth by nets. If then these barriers be in operation at the mouth of the river for twenty-four hours before fishing in the river begins, it follows that the latter would be of little value. The practical effect of the regulation would be to close the river against fishing, the fish being caught outside, by seines and traps, and by those fishermen who come to the river for the sockeye season only, the great majority of whom are Japanese. Our resident fishermen, who are permanent settlers, would be driven out of the business.

3. Side channels, shoals, and snags make it impossible to bar any part of the river by nets. Of the fish which get fairly into the river, a good percentage will go through to the spawning grounds. This was repeated by witness after witness, and is proved by the experience of the present season. On the other hand, it is possible to establish a pretty effective barrier of nets on the sandheads, just outside the river. Plainly, therefore, if the close time is to be lengthened in any one part of the Fraser river, as a measure of protection, the longer close time should be outside the river. But the proposed regulation is not necessary. The run of this season (1906) was a small one; fishing above New Westminster bridge was in full swing; deep and long nets were in use, and yet there were in the hatchery pens at the beginning of September, almost enough sockeye to stock all the Dominion hatcheries to their full capacity, and the sockeye have been running in considerable numbers during the whole of the month.

4. On this point I do not care, in an official report, to do more than cite the fact that a recommendation (previously assented to) to keep the ship channel at the mouth of the river free from nets (a regulation of considerable value as a protective measure, and which would have been of some advantage to our resident fishermen) was struck out, and this drastic recommendation, the effect of which would be to drive hundreds of the best class of our fishermen out of the business, was substituted and brought before the commission, as I have said, at the last moment.

In conclusion, I beg to point out that every restriction proposed operates, or would operate, to the disadvantage of our resident white fishermen, and to their disadvantage only, except, perhaps, the abolition of the double length net.

(Signed) JOHN C. BROWN,
Commissioner.

# REPORTS ON SOILS OF QUEEN CHARLOTTE ISLANDS

## Prof. Shutt Gives Information of Interest to All Having Swamp Lands

The following report by Prof. Frank T. Shutt, chemist, Central Experimental Farm, Ottawa, on soils from Queen Charlotte Island, collected by the Rev. C. Harrison and sent by J. R. Anderson, Deputy Minister of Agriculture, for analysis, is published by request, as the information contained therein should be of general interest to all those who have any area of swamp land to reclaim.

No. 1. A deep black, well decomposed muck, showing little or no fibrous structure, but containing a few small pieces of semi-rotten wood. A very little sand throughout the sample (evidently derived from underlying layer) and a few fragments of shells. Practically neutral to test paper.

This is the most promising soil of the series.

No. 2. A brownish muck of a somewhat pasty consistency and full of fine, undecomposed root fibre. Shows no sand or shells. Acid re-action.

No. 3. A fine, powdery, brown muck with a very little sand scattered through it, and some root fibre. Strong acid reaction.

No. 4. A brownish-grey muck, containing more sand than any others of the series, with a few pebbles.

These would be commonly known as muck soils as they consist essentially of semi-decomposed vegetable matter. Strictly speaking, they could scarcely be considered soils, since the torn soil implies the presence of disintegrated rock matter, sand and clay, which is practically wanting in this series of samples, save, perhaps, in No. 4.

Towards the reclamation of areas covered with this vegetable deposit, drainage is of first importance. This is necessary to remove superfluous water and lower the level at which it stands in the soil, to allow the air to enter the soil and to encourage a "firming" or settling of the land. Mucks are naturally acid or sour—a property more or less injurious to farm crops—and drainage will be found of considerable value in sweeting them. Ditches will naturally precede the drains, but alone are seldom sufficient to satisfactorily drain the land.

To render such soils more suitable to the majority of crops it is desirable to make additions of sand and clay, in which, as already stated, mucks are naturally deficient. This can be brought about where the depth of the deposit is not too great, by deep ploughing or trenching. If the subsoil is not too great a depth to make such impracticable, clay or sand, or both may be hauled on to the muck, spread and worked into the land with the disc harrow. On account of the expense of hauling, this latter method is seldom feasible save for small crops.

It is in the mineral elements of plant food—phosphoric acid potash and lime—that mucks are more particularly poor. One method to cheaply supply this mineral need is to burn the upper few inches of the muck or peat, the ash thus formed being sufficient for the crops of several seasons. This burning must be done when the fire will not go too deep, i.e., when the surface only is dry, otherwise the whole deposit may be destroyed and more harm than good result.

**Fertilizers**

The character of the fertilizers most useful for such land will already have been inferred from what has been said regarding the character and natural deficiencies of mucks and peats. They must be those that correct sourness, and thus favor decay of the muck, and also furnish potash, phosphoric acid and lime. The best of all fertilizers is wood ashes, since they answer both requirements. A heavy dressing may be given to the shallow-ploughed land and harrowed in. Lime, marl and "gas lime" can all be used to advantage, but are not so valuable as wood ashes. A substitute for wood ashes may be made as follows: Basic slag (phosphate powder) 500 lbs., muriate of potash, 200 lbs. per acre. Spread on the ploughed land and incorporate with the soil by harrowing.

Ask for Amherst solid leather footwear.

# COST OF BRIDGING SEYMOUR NARROWS

## An Exhaustive Report Is Prepared for Government by H. P. Bell, C. E.

## VALUABLE DATA IS PRESENTED

### An Estimate Made That Sum of $25,000,000 Would Be Required to Span Big Waterway

At Friday morning's meeting of the council of the Board of Trade, the following report, made by H. P. Bell, C. E., at the request of the department of railways and canals, upon the question of bridging Seymour Narrows, was received. It will be considered at the next general meeting.

Ottawa, Ont., Sept. 11, 1906.

Honorable H. R. Emmerson, Minister of Railways and Canals, Ottawa, Ont:

Sir,—Upon the 14th day of May, 1906, I received instructions from your department to make a report concerning an rail communication between Victoria, Vancouver Island, and the mainland of British Columbia.

A clear introduction to this subject will be found in a report of Sanford Fleming, then chief engineer of the Canadian Pacific railway, made to the Dominion government, and dated January 26, 1874, part of which is as follows:

"In order to ascertain how far it may be practicable to reach Victoria, Esquimalt, and other ports on Vancouver Island by a continuous line of railway from the mainland, a survey was made from Waddington harbor at the head of Bute inlet. The survey extended along the northwesterly shore of Bute inlet to Valdes island and passed over to Vancouver island at Seymour narrows; from this an exploration was made along the easterly shore to Esquimalt and to the harbor at the head of the Alberni canal or inlet.

"For a distance of about 50 miles from Waddington harbor, the only course for the line is to follow the base of the high rocky mountains that extend along Bute inlet. On this section a great number of tunnels varying from 100 to 3,000 feet in length, through bluff rocky points would be indispensable, and the work generally, even with unusually sharp curvature, would be very heavy.

**Clear Span Bridges**

"Careful examination has established the fact that to reach Vancouver island from the mainland, the following clear span bridges would be required:

| | Feet. |
|---|---|
| At Arran Rapids, clear span | 1,100 |
| At Cardero Channel, 1st opening | 1,350 |
| At Cardero Channel, 2nd opening | 1,140 |
| At Cardero Channel, 3rd opening | 640 |
| At Middle Channel | 1,100 |
| At Seymour Narrows, 1st opening | 1,200 |
| At Seymour Narrows, 2nd opening | 1,350 |

"The length of the section across the group of islands lying at the Valdes islands, lying between the mainland and Vancouver island is about thirty miles. The channels to be bridged are of great depth, with the tide flowing from four to nine miles per hour.

"In crossing the islands, heavy rock excavation, and probably a few short tunnels would be required.

"Taking everything into consideration, the work of construction on these eighty miles, lying between Waddington harbor and Vancouver island, would be of a most formidable character.

"In Mr. Smith's report for 1872, (page 134) will be found an account of the examinations he made from Seymour narrows along the west coast of Vancouver island to Esquimalt.

**General Reconnaissance**

"I have myself, made a general reconnaissance of portions of the country, and am satisfied from what I have seen and learned, that this line would be generally favorable with works of a moderate character.

"The whole distance between Seymour narrows and Esquimalt would be about 160 miles; of this distance, 25 miles between the latter place and Cowichan would have heavy rock excavations. From Cowichan to Nanaimo 35 miles, the work would be somewhat lighter. The remaining 100 miles would be very favorable.

"An exploration was made from the coast line to the harbor at the head of the Alberni canal with satisfactory results. This examination showed that it would be quite practicable to carry the railway to the seaboard on the west coast of Vancouver island by this route.

"Whatever point on the mainland be selected for the terminus of the Transcontinental railway, there can be no doubt that a line along the eastern coast of Vancouver island will, at no distant day, form part of the railway system of British Columbia.

"Vancouver and adjacent islands of the Straits of Georgia possess sources of wealth in coal and iron lying side by side capable of immense development. The eastern coast is believed to be rich in these and other natural resources for nearly its entire length. From Cowichan to Seymour narrows, a distance of more than 130 miles, the geological survey has already obtained positive information, which leaves no doubt upon that head. The eastern coast of Vancouver island in addition to its mineral wealth is known to possess considerable tracts of excellent agricultural land, the climate is salubrious, and with these elements of prosperity it cannot fail to become the centre of a large industrial population.

**Trunk Line Required**

"It is quite evident that a trunk line of railway will soon be required from Victoria and Esquimalt via Cowichan, Nanaimo and Comox to Seymour narrows, eventually perhaps, as far north as Fort Rupert, near the northerly end of the island, with branches to Alberni on Barclay sound, Nootka sound and other good harbors on the western coast.

"To connect this insular portion of the British Columbia railway system, with the mainland, by a direct unbroken line, such as that projected across the Valdes group of islands, will be a difficult and enormously expensive undertaking. Until the traffic be to some extent developed and the prospect justify the outlay, a steam ferry suitable for railway traffic can be easily established between Vancouver island and the terminus on the main shore, such as would probably for some time answer every purpose."

The profile and plans of the work to which this report of Sir Sanford Fleming's refers, were burned in the fire that destroyed the government, Canadian Pacific railway survey offices in Ottawa during the winter of 1873 to 1874.

These profiles were well known to some engineers, who examined them as a curiosity of engineering; there being no other profiles in the office for singularity of physical features and weight of work to compare with them. The profile was not only precipitous and vertical in many places, but in other instances overhung.

**The British Pacific Scheme**

For the charter known some years ago as "the British Pacific railway" (being identical with the route referred to by Sir Sanford Fleming's report of 1874) some location survey work was done upon the Vancouver island portion of the route. The result of this location work was to confirm the report of Sir Sanford Fleming with regard to its favorable features. In the year 1895, a survey was made by the British Columbia legislature, which covered within its terminal points the 80 miles of line above referred to and caused their re-examination.

With reference to the grading of these 80 miles between Seymour narrows and the head of Bute inlet, the report of Sir Sanford Fleming, before referred to states that:

"For a distance of about 50 miles from Waddington harbor, the only course for the line is to follow the base of the high Rocky mountains that extend along Bute inlet. On this section a great number of tunnels varying from 100 to 3,000 feet in length, through bluff rocky points would be indispensable, and the work generally, even with unusually sharp curvature, would be very heavy."

A prominent physical feature is the fact that the water is too deep and the natural slope of rock shores too precipitous for the making of embankments.

Under the circumstances, the only recourse is to cut the whole roadbed continuously out of the solid, which means that there is not sufficient room for good curvature without tunnelling, and bad alignment becomes a necessity if very heavy works are to be avoided.

**Tunneling Is Necessary**

It did not appear that these tunnels would be as numerous as the first line run suggested, provided that very sharp curvature was used to avoid them, but the fact remains that tunneling is necessary for any alignment upon which a fairly good speed could be maintained.

At the head of Bute inlet (like the majority in British Columbia) the water shoals suddenly, and there is not sufficiently wide area for anchorage. When the wind blows up the inlet for even a few hours, it produces a ground swell, in the shoal water at the head, that must be seen to be conceivable.

Being there on one occasion in a small schooner with an auxiliary propeller, it became necessary to anchor in the mouth of the Southgate river to prevent the masts going by the board. It is doubtful even whether the head of Bute inlet is a fit landing for a ferry boat in all weathers, and it is not to be wondered at, that the late Mr. Marcus Smith, M. I. C. E., wished to have a ferry with one terminus at the head of Frederick Arm. The entrance to Estero basin, Frederick arm, however, is closed up by rockslide at low water, and would require heavy works to make it accessible even for a ferry boat. Works that might properly be considered as justifiable only for some place that might become a considerable centre of population.

But this also is unlikely because Frederick arm and Estero basin are nothing more than a salt water lake with precipitous shores and probably no anchorage inside; unfit for harbor purposes unless the building of a dock on a steep side hill with no natural piling ground, can be considered as sufficient natural advantages for a harbor. A better point however, can be found at no great distance.

**Bridge Would Be High**

As regards the grading upon the thirty miles east of and terminating at Seymour narrows, it is to be observed that the bridge crossings would probably have to be kept as at Quebec—150 feet above high water level.

With seven large bridges in a distance of thirty miles, it would not be possible to rise and fall between these bridges to any great extent, nor does it seem likely that a direct high level line could be found in so rough a country, or as Sir Sanford Fleming has it, "In crossing the islands, heavy rock excavations and probably a few short tunnels would be required."

The suspension bridges before referred to would require piers for the navigable channels of variable heights, ranging from 260 to 300 feet above water level. There would be 12 anchorages required for the cables of these bridges.

It was found in the case of the Quebec bridge that the quantity of masonry required for the suspension bridge designs was not greatly different from that required for the cantilever bridge. Whatever the style of construction adopted, so long as the requirements remained the same, the cost of the machinery would likely vary but little.

The superstructure of the bridges enumerated by Sir Sanford Fleming, and taken from actual measurements upon the ground after careful examination of the crossings, have been approximately estimated as regards costs. All of those enumerated except one of 640 feet span have been estimated as single track, stiffened suspension bridges capable of carrying the train load known as "especial heavy," see p. 52 of the Dominion government general specifications for steel bridges and viaducts, bearing date 1905.

**Capacity of Bridge**

This load consists of two engines and their tenders, which occupy a total length of 109 feet and impose an average load of about 6,954 pounds per foot run, supposed to be followed by an average train load of 5,000 pounds per foot. Each one of these bridges is supposed to have one main span, and two side (or approach) spans, the side span equal to one half the length of the main span.

The general dimensions of these stiffened suspension bridges from 1,100 to 1,350 feet, both inclusive, are as follows: Average width of the floors, 40 feet. Versed sine or sag of the cable at the centre of the span one-tenth of the span length.

The strength estimated as given these bridges is governed by the Dominion government railway specifications before referred to where applicable, and where not applicable, as in the case of steel wire cables, the unit stress was taken at 40,000 pounds per square inch in reference to the fact that such steel wire can be procured with an ultimate strength of 100 tons of 2,000 pounds per square inch.

The type of truss chosen for the suspension bridges estimate, is similar to that designed by Mr. Gustave Lindanthal, Mem. Am. Society of Civil Engineers for the Quebec bridge competition; used also in his design for the Manhattan bridge, New York, and to be found described in a paper read by him before the American Society Civil Engineers, New York, on September 21, 1904.

**Designs in Vogue**

This design has been approved by eminent engineers in modern practice, both European and American. It has one notable economical feature, namely, that the cables in addition to carrying the weight of the whole structure, form the top chords of the stiffening trusses, and admit of the greatest depth of truss at the quarter points of the span where depth of truss is required most.

It is a matter of public notoriety that the cantilever type of bridge was chosen for the St. Lawrence crossing at Quebec, and it has been stated by well known authorities that for spans of 1,200 to 1,500 feet and over, that the cantilever is more economical than the suspension bridge, not because it weighs less, but because the lower price per pound more than makes up for the difference of the greater quantity of material required. There is, however, an important factor to be reckoned with in making such comparisons, that is, the width of the floor required. A cantilever bridge 1,200 feet in length, properly requires by the Dominion government specifications a floor 60 feet wide; but a suspension bridge could be built with as much lateral stability with half the width of floor, due to the fact that its points of support are so much above its centre of gravity as to give it natural stability, that is to say, it is in stable equilibrium, and the cantilever bridge is not. When the load to be carried is perfectly symmetrical about the centre as in a single track railway bridge, the circumstances are favorable to the stiffened suspension bridge.

It may, however, be considered as sufficient for all present or practical purposes to obtain the cost of any well devised class of structure, as being approximately the same as that of any other of equal capacity.

**Expert Engineer's Data**

With reference to the elasticity that belongs to a suspension bridge, a commission of officers of United States engineers have reported as follows:

"The army board devoted considerable attention to this question. It remarked that, the great distinction between the stable equilibrium of a suspension bridge, which cannot break down from the failure of any stiffening member, and the unstable equilibrium of a truss, arch or cantilever bridge, in which the failure of a member may involve the collapse of the entire bridge, ought to receive full recognition in the adoption of unit stresses and safety factors. Again, the board remarked that rigidity is in this case of much less importance than it is in most other kinds of bridges; indeed, it may be shown that a certain small flexibility is a positive advantage in suspension bridges; and still again, the board does not doubt that within narrow limits a certain degree of flexibility is an advantage to the bridge. Deflections in a system of stable equilibrium do not impair the safety of the structure, as they do in an unstable system like the upright arch, and they may exert a very beneficial influence in modifying the dynamic effects of a rapidly varying live load."

The late George S. Morrison, an eminent bridge engineer, past president American Society Civil Engineers, wrote as follows:

"A long span suspension bridge necessarily changes its shape with every change of load, and changes, too, in such manner as to relieve local strains, every unstiffened suspension bridge having some shape of perfect equilibrium for every possible loading.

**An Important Part**

These changes of shape play an important part in proportioning a suspension bridge, and so long as they are kept within limits which do not disturb convenience of operation, they are a source of strength instead of weakness. A suspension bridge must be permitted to change its shape within proper elastic limits, and this change of shape must be made the basis of calculations in proportioning the structure.

Mr. R. S. Buck, member American Society Civil Engineers, a well known authority on suspension bridges, says:

"The foregoing conclusions have long remained unquestioned, and are sound principles of design established by practice as well as by theory."

The proportion that the weight of metal in the bridge cables (not including connections) bears to the weight of metal in stiffening trusses is almost equal.

The span of 640 feet previously referred to was estimated as a braced steel arch with steel approaches.

Instead of steel wire cables, there are those who prefer link and pin construction. The structural steel required for a link and pin instead of a steel wire cable will weigh about two and one half times as much for equal strength, the total cost is therefore not materially different.

The use of wire links as proposed in some recent designs permits of a variable strength and size of cable as required and saves material.

In favor of the link and pin construction, the heavier the dead weight of the structure in proportion to the moving load, the less the distortion, and the lighter in proportion the weight of the stiffening truss to that of the cable.

**G. T. P. Standard**

It would be possible to build a suspension bridge so heavy that it would not require a stiffening truss, but it might entail such a waste of material as to make it more economical to use the stiffening truss.

In making the attached estimate, the work is supposed to be of the same standard as that set forth in the last Grand Trunk Pacific general, and Dominion government bridge specifications, in fact, such a road as the government would build as a state enterprise, or such as the Canadian Pacific railway and Grand Trunk Pacific are building with a good standard of traffic capacity in all respects.

It may be pointed out that previous survey prove that the same amount of money that would be required to make continuous rail communication between Vancouver island and the mainland would suffice to build a railway with a first class car ferry, from Comox on Vancouver island, and from the mainland to the summit of the Rocky mountains at the Yellowhead pass, a distance of about 477 miles, by the shortest yet explored route.

It should not be considered that the traffic capacity of the ferry would be inferior to that of the all rail connection, nor the time of transmission longer.

The time is near at hand when the traffic by way of Seymour narrows will be much greater than at present. The rock in mid-channel at the narrows, which has often been spoken of as the site of a bridge pier, is an obstruction to navigation.

Would it not be much better in the interests of this navigation, to mine that rock with drill holes, driven from a crib, for 35 feet in depth, and blow it up at one blast?

**Improving Navigation**

It would still be possible to cross there with a suspension bridge of 2,800 feet in length, which is within the limit of strength of bridge material at the present time.

It would seem to be of more importance that this navigation be improved, than that a saving should be made in the cost of building a bridge.

Taking all things into consideration, it appears that the recommendation in favor of a ferry, made by Sir Sanford Fleming in 1874, will still hold good.

The waterway built by nature, with no cost to the country, may reasonably be considered a more perfect aid to transportation, than any road that ingenuity, aided by capital, can build, and to fail to utilize this advantage would not seem to accord with sound economical principles.

On the other hand, the building of a railroad from a well chosen point on the west coast of the mainland into the mountains, via the Yellowhead pass, would open up to mining that country which is pre-eminently well suited for alluvial work.

There are three things necessary to successful alluvial mining, namely, plenty of water, plenty of fall, and plenty of gold bearing material. All those are known to exist under conditions of a favorable character in the territory referred to, and to require only the means of access to produce an area of mining that would be simply the sequence of that which took place in former days, when the wagon road was extended into Barkerville by the enterprising pioneers of that time. A very high opinion of the mineral wealth of the country referred to was held by the late Dr. Dawson, C. M. G., than whom perhaps no better authority could be given.

In British Columbia there is a large farming and ranching community between the coast and the Fraser river at Quesnelle mouth.

The establishment of a large mining community in the upper country would give this population a good market next door, and make the whole province as prosperous as it is conceivable that it could be made. When the miner and the farmer are prosperous the merchant who supplies them is the same.

I have the honor to be, sir,
Your obedient servant,
H. P. BELL.

Ottawa, Sept. 10, 1906.

**Approximate Estimate**

Approximate estimate of the cost of works required to make all rail connection etween Vancouver Island and the mainland of British Columbia:

| | |
|---|---|
| 54 miles of single line of railway 4 ft. 8½ in. gauge, from Comox to Seymour Narrows, complete at $16,000 per mile | $ 864,000 |
| 80 miles of single line, same gauge, to the Mainland from Seymour Narrows, eastward, at $70,000 per mile | 5,600,000 |
| Cost of tunnelling on these 80 miles of line, say | 1,400,000 |
| BRIDGES. | |
| 15,900 tons of steel wire cable, in place, at $301 per tons | $ 4,785,900 |
| 5,190 tons of steel wire rope, in place, at $349 per ton | 1,811,310 |
| 460,000 tons of structural steel, in place, at $104 per ton | 4,222,400 |
| 2,000 tons of steel castings, in place, at $200 per ton | 400,000 |
| MASONRY, CONCRETE AND TIMBER. | |
| 152,000 cubic yards masonry, face work, at $18 | $ 2,736,000 |
| 132,000 cubic yards concrete backing, at $8 | 1,216,000 |
| 5,000,000 feet B. M. timber, at $27 | 135,000 |
| Add for omissions and contingencies, 10 per cent | 2,317,061 |
| | $25,487,671 |

(The ton is 2,000 lbs.)

H. P. BELL.

## HENRY WEHRUN DEAD.

Scranton, Pa., Nov. 23.—Henry Wehrun, one of the best known men in the iron and steel industry of the United States, died in Buffalo today from a stroke of apoplexy with which he was prostrated last Wednesday.


SAANICH MUNICIPALITY INCORPORATED A.D. 1906

MUNICIPALITY OF SAANICH.

Municipal Elections, 1907.

Notice is hereby given that in order to qualify as voters in the forthcoming municipal elections as householders, such persons are required during the month of November to make and subscribe before a Supreme of County Court Judge, Justice of the Peace, Stipendiary or Police Magistrate or Notary Public, the statutary declaration provided by the Municipal Elections Act.

This declaration may be made before the Clerk of the Municipality at the municipal office on Glanford avenue.

Note.—Assessed real estate owners and those who have bought real estate in the municipality during 1906, are requested to call at the municipal office and see that their names are duly entered and declaration made before the Municipal Assessor (H. O. Case) according to statute.

The municipal office is open to the public between the hours of 9 a .m. and 5 p. m. Saturdays, 9 a. m. to 1 p. m. Sundays and legal holidays excepted.

HENRY O. CASE, C. M. C.

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For Firemen and Brakemen. Experience unnecessary. Over 500 positions open at the present time. High wages. Rapid promotion to Engineers and Conductors, $75 to $200 per month. Instructions by mail at your home without interruption with present occupation. We assist each student in securing a position. Don't delay. Write today for free catalogue, instructions and application blank.

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at hand. It is the most powerful liniment manufactured and gives instant relief in cases of Wrenches, Bruises and Sprains. It also cures Strains, Rheumatism, Neuralgia and all kindred troubles. 25c. at all dealers.

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