

FIELD PROBLEMS
OF
A TYPICAL NORTHWEST
LOGGING AND MILLING
OPERATION



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BY
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THE WOODSMAN'S PRAYER

Give me a garden without a wall,
Where flowers grow centuries old and tall,
Where slanting shafts of sunlight fall
On trunks of a silver grey.

Show me a couch where I may lie,
And hear the fir tree's wind-born sigh,
As they sweep the clouds across the sky,
Or wave to the passing day.

Find me a trail without an end;
Give me only a tree for a friend,
And let my unspoilt range extend
From highway to hill untrod.

But give me, as well, the courage and might
To show my kind the wrong and the right;
To show them the beauties that softly light
The pillar'd gardens of God.

H.B.F.



PLATE
I

FOREWORD

For the aerial photographs contained herein I wish to express my appreciation to the Canadian Department of National Defence. The photographs were taken by the Royal Canadian Air Force, and include an area of approximately one square mile in eighty square inches. The third dimension, or that of depth, is not apparent; it may only be recognized under a stereoscope.

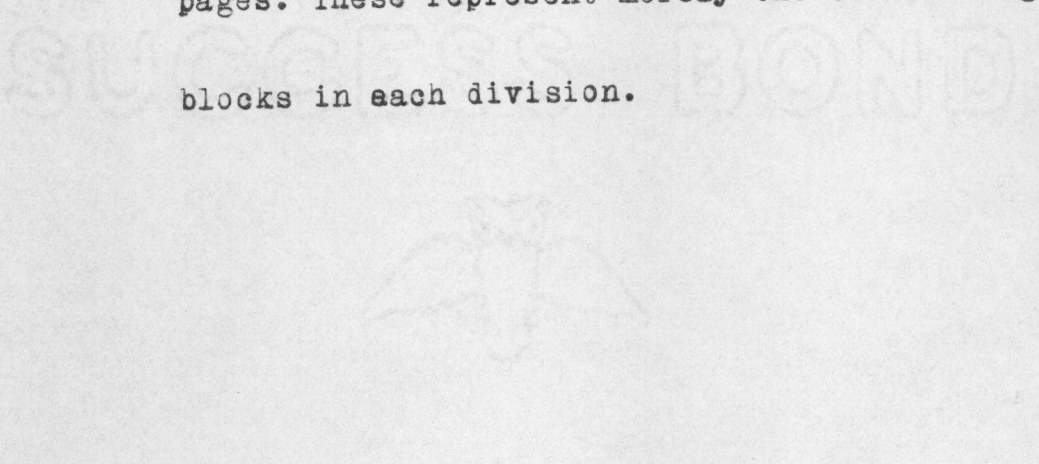
SUCCESS BOND

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PLATE II

This key map shows the relative positions of the tracts of timber mentioned in the following pages. These represent merely the controlling blocks in each division.





PLAN
SHOWING
TIMBER LIMITS
OF
B.S. & W. LTD.

SCALE 1 inch = 4 miles.

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INTRODUCTION:

Of the unexploited, merchantable stands of timber that remain in the Pacific North West there are very few, if any, which present the clear-cut, natural avenues of removal that were so frequently overlooked in the ground logging days of twenty or thirty years ago. There are none of those rolling slopes which rise from a calm, natural booming ground at a maximum slope of 2%, where section after section of tall, clean fir could be removed by the simple process of "grid-ironing" the timber limit. Such ideal claims were only found in our "yesterdays," and they provided the greater portion of the easily liquidated resources which formerly "boomed" the country. But now the present day operator is faced with the problem of keeping the country in the accustomed inflated luxury of those "boom-times." And with timber becoming steadily more and more inaccessible the operator is forced to be satisfied with smaller profits, as well as to devise more ingenious methods of timber removal and manufacture. As an example of a few of the problems which will face the enterpriser of this day, I have selected an actual operation with which I am connected in a capacity which allows me to recommend the material to follow as authentic.

THE OPERATION:

The operation which will be described is located on the south west coast of Vancouver Island. It consists of three separate timber holdings on the Alberni Canal, and several within the watersheds of Sproat Lake. The decentralized condition of these tracts makes it impossible to connect them into a single unit handled from one central control point. From Plate II it may be seen that the tracts of Coleman and Franklin Creeks are separated from those of Coles Creek and Sproat Lake by the width and length of the Alberni Canal.

LOG DISPOSAL:

The first major problem to be considered is that of the disposal of the timber. There is, at present,

one mill situated at the head of the Alberni Canal. It has a cutting capacity of 200 M a day, but, unfortunately, its own logging operations are sufficiently extensive to readily supply its wants. If the logs were to be sold in the open market it would necessitate towing them from the Alberni Canal to the Fraser River, a distance of 210 miles. If this item involved merely the making up of ordinary swift-er booms the disposal of logs in this manner might be well considered. But the fact that the booms would have to be towed across 80 miles of open water makes the construction of Daris Rafts necessary. The lowest cost of building these rafts is \$0.50 per M, and almost half of that to dismantle them. There remains then, only the alternative of building a mill which will be accessible to all the timber limits--providing, of course, that the cut lumber may be disposed of.

MARKETING THE CUT LUMBER:

Rail shipment of the mill product is almost out of the question. In the first place it would mean the installation of a dry kiln, and secondly the rail haul would have to be 100 miles over an 1800 foot summit, thence 65 miles by barge to the main land before it could even begin to compete with the main land sawmills. Although the Esquimalt & Nanaimo Railway has already established the train and barge service, yet the freight rate for this distance would be a prohibitive factor in competition with the main land mills who may buy logs for very little more than their cost on the Alberni mill's log-deck.

Local consumption can be almost entirely eliminated, for a circle having the mill as its center and a radius of fifty miles would not include a population of over 10,000 people.

This leaves only the deep sea shipments as an outlet for the lumber. At present Australia is demanding all the hemlock that British Columbia can cut, and Great Britain has shown a remarkable bit of generosity, tact, and patriotism by allowing one of her humble possessions to supply her with fir lumber and structural timbers at the rate of 750,000 M a year. China and Japan are also buying large quantities of cut lumber as well as many small logs.

The foreign market is not dormant as yet, in fact it has shown a lively awakening during the past year.

The Alberni Canal is fortunately situated for deep sea shipments. Vessels have no trouble navigating this twenty-five mile fjord. From Port Alberni it is almost a day shorter in sailing time for ships bound for the Orient or the Panama Canal than from the British Columbia main land ports, and it is also more convenient than the ports of Bellingham or Seattle. Thus the prospects are all in favor of a foreign trade outlet for the finished product. At the present time the Alberni Pacific Mill (the mill which is operating on the Alberni Canal at present) is working double shift, cutting 200 ~~M~~ each shift, and it is still unable to cope with all the orders it receives. It actually turns over orders to a competing mill fourteen miles distant, has it cut them, and hauls them by rail to be loaded aboard the ships as Alberni Pacific lumber.

CONSIDERATIONS IN REGARD TO MILL LOCATION:

Next in order the problem of the actual location of the mill presents itself. There are two possible sites on the Canal. One is situated along the waterfront of the town of Port Alberni. Here there are sixty acres of level land which included part of the foreshore of the town site and a portion of the Lupsi Aupsi Indian reserve. The area required for the mill would only be about a third of this or twenty acres. It, together with the foreshore rights may be purchased for \$12,000. The greatest drawback to the selection of this property as a mill site is the condition of the ground, for it is all a silt delta formed by the Somass River, and test piles show in many places that a firm bottom cannot be reached even with 100 feet of driving. Not only the wharves and the mill, but the lumber yards as well would have to be on piling, for the acreage given above is only the low tide figure; at high tide this land is all covered. The number of piles needed for this structure has been estimated at 3,000 of an average length of 65'. One-third of these will be creosoted piles costing \$0.42 a foot; the remaining 2000 untreated piles may be obtained for \$0.10 a lineal foot.

PLATE III

This aerial photograph shows a portion of the town at Port Alberni as well as the proposed mill site of Bloedel Stewart & Welch, Ltd.

The scale is approximately 1200 feet to the inch -- the photograph being taken from a height of 15,000 feet.



SUCCESS REPORT

The other mill site in question is known as the Macktush Creek site. It is situated eleven miles farther down the Canal. The greatest disadvantage of this site is its isolated position, for it is impractical to build a road connection between it and Port Alberni, and the only method of transporting supplies, etc., is by boat. Here the company would have to establish its own town, build residences for its workers, provide a store, illumination, plumbing, etc. It is true that this cost would be defrayed in a period of years by rent charges, but in this day a large initial capital expenditure is not welcomed where it is unnecessary. But this site has the distinct advantage of being much more accessible to shipping than that at Port Alberni. When the fall and winter fogs roll down and obscure both sides of the Canal from a ship in its center, it is then that eleven miles cut from a ship's voyage will sometimes make the difference of a day. Probably the most convincing argument that would serve to establish the mill at Macktush Creek, is the condition of the ground. It is an alluvial fan (143 acres) of hard packed, almost cemented gravel. The only piling needed would be for the assembly wharf, and for the machinery substructures; this could be obtained for \$15,000, a difference in cost of \$15,300 from the piling item at the Port Alberni site.

It is interesting to note that the difference in the cost of piling for the two mills is \$15,300 and that the estimated cost of establishing residences at the Macktush Creek mill would be \$17,000. In the first case the initial expenditure for piling at the Port Alberni site is a total loss as far as capital value is concerned. The piles, once driven, have absolutely no value other than utility value; they cannot be liquidated; there is no resale value when their period of usefulness is completed, and the majority of the uncreosoted piling will have to be replaced within twelve years. But the expenditure in residences at Macktush Creek could be carried on the books as an interest-bearing investment, or as operating capital. If each of twenty-five residents paid only \$10.00 a month rent the capital plus the interest would be returned in six years. The remaining time of operation would see the company being presented each year with a little gift of \$3000 by its own employees.

PLATE IV

This aerial photograph shows the mouth of Macktush Creek and the location of the proposed mill site at that point. The arrow at the extreme top of the picture indicates a deep-sea vessel, loaded with lumber from the Alberni Pacific mill.



The only other disadvantage in locating the mill at Macktush Creek is that of towing the logs. Logs from Sproat Lake and Coxs Creek would have to be towed down the Canal against the prevailing winds, for there are very few days out of the year that a steady twenty mile an hour wind does not blow up the Canal toward Port Alberni. But this difficulty may be easily overcome by towing at night when the wind has died down.

When the cost of towing the logs to the respective mill sites is considered we find that with the mill at Port Alberni the logs from Franklin and Coleman Creeks, totaling approximately 1,300,000 M, would have to be towed a distance of eleven miles, while 450,000 M would have to be towed four miles from Coxs Creek. Weighing these figures so that they represent a common distance we find that a total of 1,464,000 M would have to be towed 11 miles. But with the mill at Macktush Creek the 450,000 M at Coxs Creek and the 500,000 M at Sproat lake represents a towing distance of 11 miles for 1,050,000 M. From this it may be seen that the mill at Macktush Creek would facilitate a saving in towing costs for 414,000 M over 11 miles, which, at \$0.04 per M, would amount to \$16,560.

There is no need to discuss the various item in which differences occur. All the major costs show a balance favorable to the Macktush Creek site. Tabulated below these cost differences appear as:

Mill site and foreshore rights	\$ 5,000
Piling (exclusive of driving)	15,300
Driving of piles	6,000
Towing	16,560
Total	\$ 42,860

There are many minor items of difference, but none would enhance the significance of this figure either one way or the other. \$42,860 represents the monetary advantage of the Macktush Creek mill site, and yet at the time of writing (March, 1934) Port Alberni has been definitely selected as the site on which the mill is to be built. The reasons for this selection I have not been able to discover. But after tracing the curious quirks of the minds of those heavy-browed gentlemen who blink painfully through affected

clouds of cigar smoke, conceal their thumbs in their arm pits, and grunt decisively that it shall be done thusly and thusly, there appear to be two possible solutions to the apparently unbusiness-like decision. The first and most tangible reason presents itself in the possibility that the mill might be overdeveloped as far as power was concerned, and this surplus electric power could be sold to the outlying districts. The second and slightly more far-fetched reason is that of desiring to be adjacent to a rail-connection should the occasion arise when world difficulties would cause a boycott to be placed on their foreign markets. A rail outlet, in this case, would furnish them with an excuse to look for a market in America.

LOG TRANSPORTATION PROBLEMS.

I have already discussed, in connection with the mill, the towing of logs in the Canal. To this I need only to add that where the tow is for more than a mile the logs should all be arranged into "swifter booms". The towing will be much easier, faster, and the boom will be much less liable to break up than the more haphazard "^{bag}log booms".

But in respect to the transportation of the logs from the woods to the salt water the problems are varied and by no means subject to an immediate solution. The Sproat Lake operation probably offers the greatest variety of transportation difficulties. In the first place the lake is so shaped that it is impractical to connect the timber to the Alberni Canal by means of an unbroken railroad haul. The most logical and cheapest way to overcome the difficulty is to boom them in the lake, at the logging operation and tow them to that point which is most convenient for their final handling before reaching the mill. It is this last stage of transportation that possesses the variety of solutions.

Primarily there is the possibility of driving the logs down the Sproat River (the outlet to Sproat Lake.) During the freshets there is sufficient water in this river to float the largest seven or eight foot log, but during the summer, and the winter cold spells the river's volume is diminished to such an extent that it is certainly doubtful whether even poles or piling could be floated. This means, of course, that a dam or sluiceway would have to be constructed at the lake's outlet, and the level of the lake raised at least four feet to insure an ample volume of water which would float a constant supply

of timber to the mill. But this method encounters a difficulty of no small proportions.

Sproat Lake has been one of the most famous, one of the most widely advertised summer resorts in British Columbia. Cornelius Vanderbilt Jr. owns a palatial summer home on one of the islands of the lake, and he, as well as the numerous other private and public resorts, bases the recreational value of his property upon the attractive beaches of the lake. Of course, if Sproat Lake were raised four feet above its average height the beaches would be obliterated, and lawsuits to recover damages would be the inevitable result. It is impossible to even estimate the damages that would be incurred in this case; it is sufficient to say that they would prohibit the removal of logs in this manner.

The second possibility of transporting the logs from the lake to the mill is by means of a railroad from the outlet of the lake. At present (March 1934) there is a projected line, six miles in length, which connects Sproat Lake to a point on the Alberni Canal directly adjacent to the mill site. The project involves a construction cost, including bridges, a dump, and loading works, of \$54,000. Steel, ties, etc, would cost another \$30,000, bringing the total cost to \$84,000. This total cost expressed as a charge against the timber being hauled over the railroad would be \$0.17 per M. In addition to this there would be a crew of five men loading the logs, the train crew, and the upkeep on the railroad; this would represent an item of \$0.18 per M, making a total charge against the timber of \$0.35.

A third alternative in this connection is that of a flume from the outlet of Sproat Lake to the junction of the Sproat and Stamp Rivers; from this point to the mill there should be no trouble driving the river. The general alignment of the Sproat River does not lend itself readily to fluming; the banks are steep and the sharp turns of the river necessitate spanning it twice with the flume if the ruling curvature of 10° is to be adhered to. The flume would need a dam or sluiceway, but merely a diversion channel about eight feet wide, whose base would be low enough to maintain four feet of water at the lowest level of the lake. Preliminary surveys have been run, and topography has been taken to determine the exact location of such a flume. Without going into unnecessary detail it has

been found that 1.73 miles of flume are necessary, and that the cost will be six dollars a foot or \$54,804 which includes both material and labor. It has been estimated that a complete renewal will be necessary at the end of eight years; this, with an operating cost of \$60,000 for the life of the operation, brings the total cost to \$169,604, or \$0.34 per M as a charge against the timber which it transports.

The fourth and last consideration is that of a tunnel from the head of Sterling Arm (Sproat Lake) to Shoemaker Bay, in the Alberni Canal. The distance between these two points is relatively short, actually being only 1.4 miles in a straight line. Although no detailed survey has been made, there is every reason to believe that good driving should be encountered over the entire length of the tunnel. The ridge between the two bodies of water is entirely rock at the surface, and the Geological Survey's report for this particular section shows a medium hard granite formation. The diameter of the tunnel would be nine feet, probably a little larger than one might expect, but, nevertheless, necessary to accomodate crooked, long logs.

From reliable information supplied by the British Columbia Electric Railway Company in their recent power developments it is evident that such a tunnel could be driven and lined with cement at a cost of twenty dollars a foot; a total cost of \$147,840. There would be no upkeep on such a development, and the operating cost would be only \$15,000 over the ten year period. Again representing these items as a charge against the Sproat Lake timber we find that the tunnel development would cost \$0.32 per M.

The lining of the tunnel with cement serves to eliminate friction as well as cover up rock projections which might stop the progress of the logs. Only the lower half of the tunnel need be lined as that portion of it will be the only area carrying water. The lowest level of the lake is 102 feet above the datum plane of low tidewater and the intake of the tunnel should be $4\frac{1}{2}$ feet below this elevation. The outlet of the tunnel should be at least fifteen feet above low tide, which will allow a drop of $82\frac{1}{2}$ feet in 1.4 miles, or a steady grade of 1.12%. Under such conditions, with due allowance for friction, the flow

at the outlet would be eleven miles an hour which would allow 300 M to be floated through during a day of six hours.

Four considerations for one phase in the transportation of the Sproat Lake timber have been outlined. The first one (that of driving the Sproat River) may be eliminated as impossible. The remaining three are represented below according to their respective initial investments, renewal and operating charges, and total cost per M.

METHOD OF TRANSPORTATION	INITIAL INVESTMENT	RENEWAL AND OPERATING CHARGES	TOTAL COST PER THOUSAND
Railroad	\$ 84,000	\$ 90,000	\$ 0.35
Flume	54,804	114,804	0.34
Tunnel	147,840	15,000	0.32

It is evident that the tunnel presents the cheapest method of transporting the logs from Sproat Lake to the Alberni Canal. But it also represents the larger initial investment, and to submit a report of projected development which would involve even a moderate capital expenditure would, at this time, have about the same effect on the "executive powers that be" that would inevitably be instilled, upon painting, to the gullible two-year old, the fantastic atrocities of the "boogey mans". They (the promoters, etc.) would rather pay, through a period of years, for upkeep and replacement on a cheap development, an amount equal to twice the cost of establishing a permanent development which would serve their needs for the length of the operation. Their confidential reason for such action is that "it looks so much better on the books". At present the necessity for a decision has not arrived, but when that time comes the above figures represent what the choice should be.

The operation at Cons Creek presents no problem out of the ordinary. The railroad construction cost will be high in proportion to the amount of timber taken out, due jointly to the ⁴/₅ miles of "dead" line that will have to be constructed before the timber is reached, and to the relatively small amount of timber which will be hauled over the road. The topography is steep and irregular, resulting in heavy construction costs. The main line has already been located with a ruling grade of 4% and a maximum curvature of 16°. The grade and bridges on this "dead" portion of the Cons Creek main line has been estimated at \$46,500, which in itself is quite an item of expense when we consider that it is necessary

PLATE V

This aerial photograph shows the mouth of
Cous Creek and the proposed developments connected
with the logging of the timber to the west. About
400 ~~M~~ feet of timber will be dumped into the Alberni
Canal at this point.



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before we can even begin to log the timber. But it serves as an appropriate example of an axiom that is becoming increasingly prevalent to the operators in the lumber industry: "Continued exploitation of the timber resources without an attempt at replacement will result in an inevitable increase in operating costs."

The Franklin Creek main line, like that of Coñs Creek, was located during the summer of 1930. At that time it was requested that the ruling grade for each operation be held to a 4%, compensated grade. In the Coñs Creek development no difficulty was encountered because of this restriction, but at Franklin Creek the 4% grade threw the main line into an almost perpendicular rock wall, 1800 feet in length, and representing a rock removal of slightly more than 27,000 cubic yards at a cost of \$0.90 a yard. When the report for this line was submitted it was recommended that the ruling grade be increased to 5%. In so doing a single switch back could be used, increasing the length of the line $1\frac{1}{4}$ miles, and eliminating the rock work by running above it. The 5% grade would be used only in the first three-quarters of a mile, and on this stretch a "booster" locomotive could be employed to assist the main line engine. And while not occupied in this manner the "booster" could fill in the rest of the time ballasting track, shunting steel cars, etc.

Just before the last war, during the years of 1912 and 1913, the Canadian National Railway started to open up the westerly portion of Vancouver Island by building a railroad through the district. The outbreak of the war caused them to abandon the project (a boon to the taxpayers) when they had built the grade to a point two miles north of the mouth of Franklin Creek. South of Franklin Creek this grade follows the shore of the Alberni Canal for three miles before turning south and following Coleman Creek to its source. The construction for this section of the line was extremely heavy; the contractors, working on a cost-plus basis, submitted a cost statement of \$103,000 a mile, and the accompanying photographs may serve to show that such a cost would not be excessive. It is proposed that a portion of this grade at Franklin Creek be used for siding and tail-track. The grade is much too high to provide an efficient dump for the logs, for at the only suitable place for a dump, the grade is 39 feet above low tide. Dumping from this height would break the cedar logs beyond all hope of salvage.

There is no reason why this old grade should not be

PLATE VI

This aerial photograph shows the mouth of Frank
Franklin River and some of the proposed develop-
ments connected with the logging of the timber
in the Franklin Valley. At the extreme top of
the picture may be seen the delta at the mouth
of Macktush Creek.

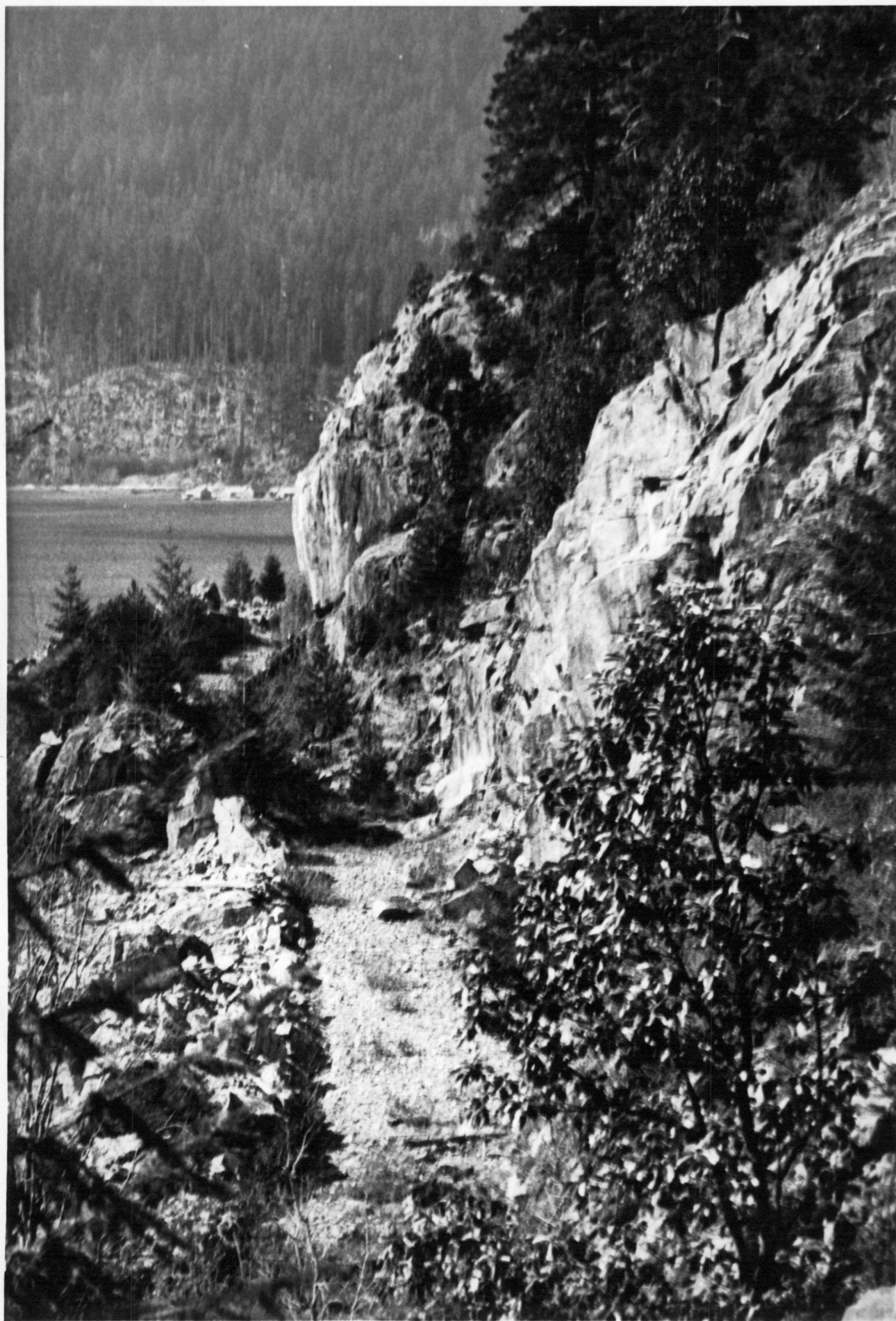


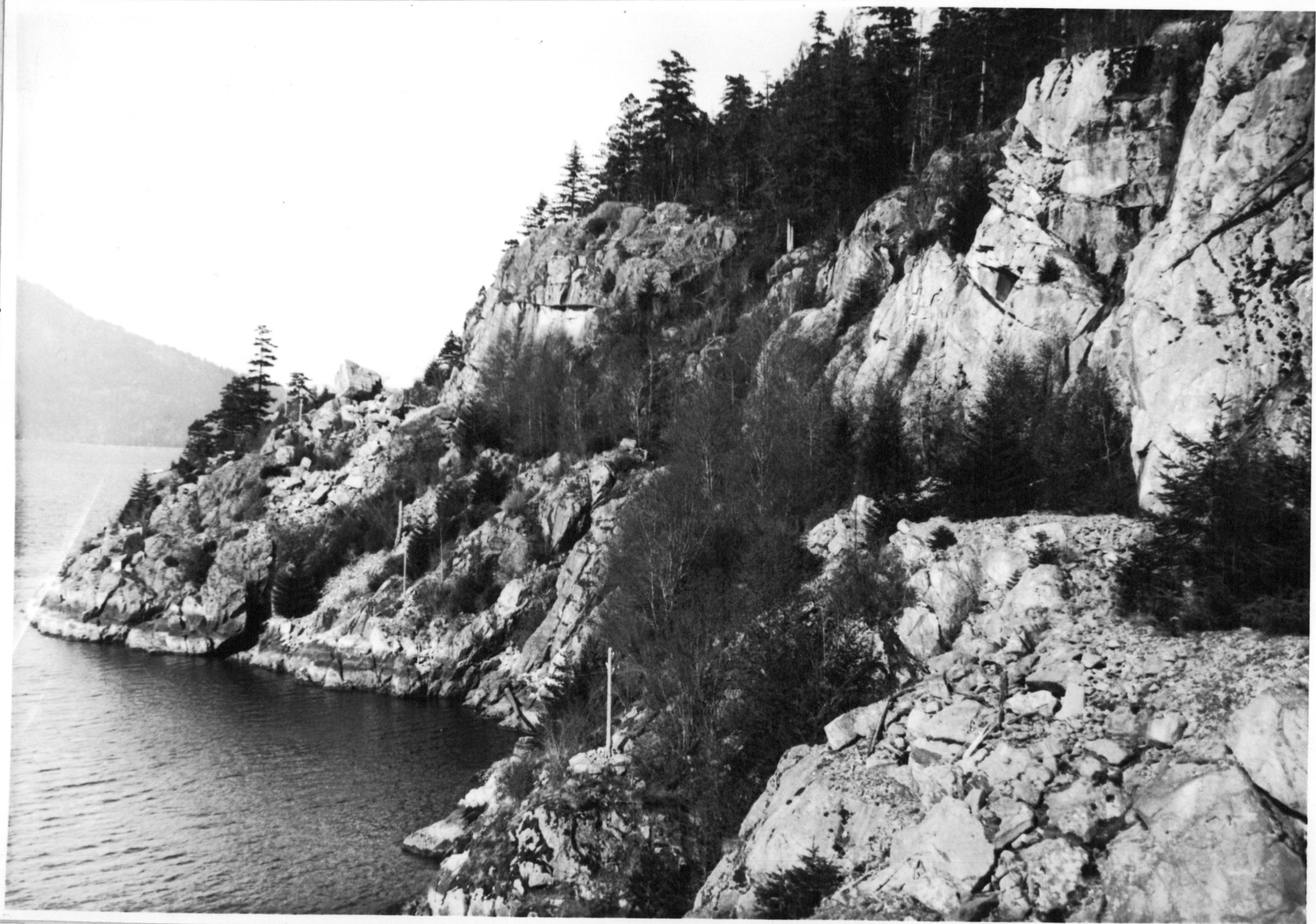
used to transport the logs from Coleman Creek. The maximum grade would be $2\frac{1}{2}\%$ favorable to the loads, and the curvature of the line does not exceed 10° . Of course, it would be necessary to construct the bridges of which there are eight totaling 3270 lineal feet. The cost per foot would be relatively high owing to the difficulty of getting footings on the steep rock slopes of the creeks, but with the cost averaging \$11.00 per lineal foot, and allowing \$3.00 a station over the twelve miles of line for brushing out saplings removing windfalls, repairing a few small rock slides, etc., the total cost involved in conditioning this part of the line for steel would be \$37,906 or \$.05 $\frac{1}{2}$ per M as charge against the timber hauled over it. This in itself is ridiculously low for a main line construction cost, but when we consider the fact that this method of transportation allows one central camp, one booming ground, and a single group of repair shops to serve two operations, then the prospect of handling the logs in this manner is made to look particularly attractive.

Of course we have not considered the difficulty of obtaining permission to use the old right-of-way. Being government owned there would necessarily be a lot of "red Tape" connected with the process of securing it. But, because it never has produced a revenue since its construction over twenty years ago, I have reasons to believe that the logging operator would be granted a long-term lease merely for his efforts in rendering the line fit for operation, and that no other charge would be imposed. However, during these times when budget balancing comes to resemble the antics of a one-armed man with the itch, our staunch and public spirited members of parliament are very liable to snatch hungrily at the logging operator's petition to utilize one of British Columbia's "white elephants" and say, "By Jove! a source of revenue! we'll soak the blighters for the running rights". And quite "sans souci" they might approve the petition with the recommendation that for the privilege granted Bloedel Stewart and Welch Ltd. the operators should pay the nominal sum of one dollar for each thousand board feet hauled over the line. A more profitable and reasonable stipulation which the government could offer would be that the operator purchase and log all government timber sales and licenses within a reasonable distance of the railroad. This latter plan would ensure a much larger income for the government, and at the same time prove a small source of income to the operator.

PLATE VII & VIII

This and the succeeding photograph shows the extremely heavy construction encountered by the Canadian National Railway along the shores of the Alberni Canal. A portion of this line is to be reconditioned and used for the purpose of transporting logs.





By virtue of this logical way to remove the timber from Coleman Creek, no other alternative has been considered by exacting surveys. A rough reconnaissance has served to show that to construct a booming ground at the mouth of Coleman Creek, and a main line to the back of the timber limit would far exceed the cost of conditioning the old Canadian National line.

LOGGING:

The very rough topography of each of the divisions of timber eliminates all but a combination of the skidder and cold-deck method of removal. It is planned, for Coleman Creek, Franklin Creek, Co²ns Creek, and a portion of the Sproat Lake holdings, to operate track machines with an average yarding radius of 1200 feet, and in conjunction with these to use high lead cold-deck machines whose average yarding radius would be about 800 feet. But because a large amount of the Sproat Lake timber is directly adjacent to the lake shore which rises almost abruptly from the water at slopes of from twenty to forty degrees, it has been recommended that a special slack-line skidder be purchased and mounted on a raft so that it may be used as an "A" frame machine. This arrangement is, at present, being used on Great Central Lake, and logs are being delivered at the Great Central Mill at a cost of a little under \$4.00 a thousand.

CONCLUSION:

Although the above discourse touches only the very salient points of question concerning operating conditions of the modern western enterprise in "Green Gold", yet enough, I believe, has been outlined to leave a little more than a vague impression that the lumber industry is no longer finding its raw material growing practically at the foot of the "jack-ladder."

The company, whose holdings I have described, will, when operating to full capacity, have a capital value asset of \$1,700,000 exclusive of stumpage. At the end of seventeen years the mill will have cut over a billion and a half feet of lumber--all the timber that it now holds, and at the end of thirty years it will have denuded the entire Alberni Canal district. When that time comes there will be no such thing as a capital value asset. Such machinery that is not worn out will be antiquated beyond all hope of further economical use. None of the assets will be capable of liquidation, except in the form of junk. Yet the only provision this company is making to perpetuate its oper-

ations is to consider another block of timber three hundred miles farther north; one which would require fifty-three miles of main line to give it a salt water outlet, and an expenditure of \$1,300,000 for development alone. Considering a project like this is similar to trading in last year's car for an ox-cart, merely because the ox and its appendage is capable of hauling you over more bumps and through newer country than could a modern car. Why not perpetuate the operation by practising a little constructive forestry? An amalgamation of the private operators, with the aid of the government, could easily reforest the land that was conveniently logged twenty or thirty years ago, and there is certainly more than enough of this comparatively level country to produce each year, from only a sixty year old stand, the volume that is now being cut in British Columbia. But that is much too intangible an asset for the consideration of the businessman of today. Just because the asset does not represent an immediate figure of 50¢ to the acre, or ever, he is not interested. But, I suppose, good business men are not dreamers nor poets; they are not capable of realizing an inner sense of beauty and utility through the manipulation of visional forms.