BRITISH COLUMBIA - YUKON - ALASKA
HIGHWAY COMMISSION
CANADA

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*Report on*

# PROPOSED HIGHWAY THROUGH BRITISH COLUMBIA AND THE YUKON TERRITORY TO ALASKA

August, 1941
Ottawa, Ontario

OTTAWA
EDMOND CLOUTIER
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
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[This table of contents refers to the Preliminary report on proposed... (2 vol set: 625.7 BCYAHC 1940)]

## NOTE

The full Report of the Commission consists of two large mimeographed volumes containing over 50 photographs. These volumes were tabled in the House of Commons and the Senate and copies have been deposited in the Library of Parliament, Ottawa. In order to reduce printing costs only Part I, Vol. 1, which contains the Commission's findings, and Part VI, Vol. 1, on natural resources, have been printed, together with an appendix on estimates of cost and two maps. Reference to the unprinted parts of the Report have not been deleted from the text. The table of contents of the two mimeographed volumes is as follows:

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# APPENDIX

## FOREWORD

Since the Report of the British Columbia-Yukon-Alaska Highway Commission (Canada) was submitted in November, 1941, and since this volume went to Press, the Canada-United States Permanent Joint Board on Defence has recommended to the two Governments that a road to Alaska for military purposes be constructed immediately and that it follow the general line of the present air route. This recommendation has been approved by both Canada and the United States.

A main purpose of this military highway will be to service and connect the existing air ports of Fort St. John, Fort Nelson, Watson Lake, Whitehorse, and Fairbanks. The instructions of the Canadian Commission established in 1938 provided for investigations of a general purpose route west of the Rocky Mountains, and their Report was submitted on this basis.

Fort St. John and Fort Nelson are in north-eastern British Columbia, Fort St. John being near the terminus of the Northern Alberta Railway at Dawson Creek.

# I

## REPORT OF COMMISSION

The idea of building a highway through British Columbia and the Yukon to Alaska had been discussed for some time, but took more definite shape in 1929, when International Highway Associations were organized in Fairbanks, Alaska, and Dawson, Yukon, for the purpose of furthering the project. In the same year the proposal was endorsed by various organizations in Alaska and the State of Washington as well as by several national associations in the United States. The Legislature of Alaska, in April, 1929, adopted a memorial in support of such an international road and requested that steps be taken toward a conference between representatives of the United States and Canada. The Government of British Columbia expressed its interest in the matter and an informal exchange of views took place between officials of British Columbia and Alaska. Conferences were also held between representatives of the United States and Canadian Governments, and the data at that time available were brought together.

*Surveys in British Columbia and Alaska*

Reconnaissance surveys were made in 1930 in northern British Columbia, under instructions of the Government of that Province, for the purpose of locating the most practicable route for a highway. The following year the Alaska Road Commission, after preliminary airplane flights over the general area in Alaska, conducted a survey to determine the best route from the Yukon boundary in the vicinity of Dawson to Fairbanks, Alaska. The reports of these surveys were afterwards published as appendices to the *Report of the Commission to Study the Proposed Highway to Alaska,* issued in 1933, of which something may now be said.

*United States Commission, 1930*

As a result of the interest aroused in both countries, and particularly in the United States, Congress provided in May, 1930,

> "That the President of the United States is hereby authorized to designate three special commissioners to co-operate with representatives of the Dominion of Canada in a study regarding the construction of a highway to connect the northwestern part of the United States with British Columbia, Yukon Territory and Alaska, with a view to ascertaining whether such a highway is feasible and economically practicable. Upon completion of such study the results shall be reported to Congress."

In pursuance of this authority the President appointed as Commissioners to co-operate with representatives of Canada, the following: Herbert H. Rice, of Detroit, Michigan, Chairman; Ernest Walker Sawyer, Assistant to the Secretary of the Interior; Major Malcolm Elliott, Corps of Engineers, U.S. Army, President, Alaska Road Commission.

*Canadian Committee, 1931*

A Canadian Committee, consisting of Hon. George Black, at that time representing the Yukon Territory in the Dominion Parliament, J. M. Wardle, then Chief Engineer of Canadian National Parks and G. P. Napier, Assistant Chief Engineer of the British Columbia Department of Public Works, was

selected to act with the United States Commission as an International Fact Finding Committee and a joint meeting was held in Victoria in October, 1931, for the purpose of considering the practicability and particulars of the proposed highway. In 1933 the American Commission reported to the Government of the United States on the information obtained by itself and the Canadian Committee and submitted the following conclusions and recommendations.

*Report of United States Commission, 1933—Conclusions and Recommendations*

"1. The Highway is a feasible project and can be built at a reasonable cost, which should not exceed $2,000,000 for the Alaska section and $12,000,000 for the Canadian section. Considering the highway to begin at Seattle, Washington, and end at Fairbanks, Alaska, the approximate mileage of completed road and new construction needed for completion is as follows:

| Route | Completed Road Miles | New construction needed Miles | Total Miles |
|---|---|---|---|
| Seattle to Hazelton, British Columbia | 882 | 0 | 882 |
| Vancouver to Hazelton, British Columbia | 830 | 0 | 830 |
| Hazelton to Yukon Boundary | 50 | 520 | 570 |
| Yukon Boundary to Alaska Boundary | 50 | 480 | 530 |
| Alaska Boundary to Fairbanks | 91 | 183 | 274 |
| Seattle to Fairbanks | 1,073 | 1,183 | 2,256 |
| Vancouver to Fairbanks | 1,021 | 1,183 | 2,204 |

"2. If the project is adopted, the stage-construction process is favoured. That is to say, the initial standard should be no higher than is required for the estimated traffic, and improvements to higher standards would be made as demanded by traffic and as funds may become available.

"3. Financing is primarily the responsibility of each of the nations concerned for the section of the road within its own jurisdiction, and any departure from this principle should be covered by international agreement. The Alaska section of the road should be financed in about the same ratio between federal and local funds as obtains under the Federal Highway Act in the sparsely settled States, resulting probably in about 90 per cent of the cost of construction being paid by the Federal Government.

"4. There are two general routes for the northern end of the highway, either of which would serve to open new Alaskan territory of importance and contribute to the general development. The Dawson-Fairbanks route possesses the advantage of a more comprehensive service to Yukon Territory and the Forty-mile and Chicken Creek mining areas in Alaska. The Whitehorse-Kluane Lake-Gulkana-Fairbanks route involves less new road construction in Alaska, saves several hundred miles of new construction, and also serves important mining territory in Alaska. Both routes are acceptable from the American viewpoint.

"5. The benefits to be gained from the project from the American point of view are:

(*a*) Development of Alaska through making the territory accessible by highway, resulting in an increase of population and consequent increase of production and consequent increase in revenue from taxes, tending to decrease the present necessity for Federal appropriations for the support of the territory.

(*b*) The road would be a great contribution to the welfare of American citizens now living in Alaska under adverse conditions, by providing a physical connection with the vast continental road system.

(*c*) Opening of new country that is now practically inaccessible, giving opportunity for settlement, investment of capital and employment.

(*d*) The new road would make accessible to the continental highway system the existing road net in central Alaska comprising about 900 miles, providing a new and valuable area for exploration, for recreation, or for business purposes.

(*e*) The highway would foster air commerce with Alaska by furnishing a guiding landmark and providing service to aviators along the most practicable flying route to the interior of the Territory and to Asia.

(*f*) Promotion of friendly relations between citizens of the United States and Canada.

No attempt is made to evaluate the benefits Canada would derive from this project, but it may be mentioned that in addition to such direct development of new Canadian territory as might be brought about by the road, Canada would gain the business and commerce incident to providing service and supplies to motorists using the road for access to Alaska.

"6. Since the annual cost of operating Federal agencies in Alaska is about $7,000,000 in excess of revenues, the expenditure of an additional $3,000,000—spread over several years—for the purpose of development of the territory to a more nearly self-supporting basis is not unreasonable.

"7. By the construction of about 200 miles of new road—in conjunction with about 1,000 miles of new construction in Canada—the territory would gain a physical connection with the vast continental system comprising hundreds of thousands of miles of road in United States, Canada and Mexico. From the Alaskan or American standpoint, therefore, the advantages are obviously more than commensurate with the cost."

*Recommendations of United States Commissioners*

The United States Commissioners submitted the following recommendations:

" (1) That negotiation be conducted with the Government of Canada, through regular channels, with a view to ascertaining the attitude of Canada with respect to entering into an agreement whereby each Government within its own borders would undertake the survey and locate the best and most practicable route for a highway which would connect the northwestern part of the United States with British Columbia, Yukon Territory, and Alaska, prepare specifications and reliable estimates of cost and resulting benefits of said project, and investigate plans for financing the project. The respective organizations should be authorized to communicate directly with each other for the purpose of co-ordination.

" (2) That if such agreement be reached, suitable allotments or appropriations should be made available to the Alaska Road Commission for carrying out the purposes of the agreement.

" (3) That the respective Governments in formulating their road construction programs conform so far as practicable in their own interests to the general route proposed for this highway so that as many as possible of the local projects will be available for and form a part of the main project.

" (4) That consideration be given by the road-building agencies of Alaska and Yukon Territory to the construction of the Fairbanks-Dawson road without waiting for the adoption of the entire project, in order to develop the intermediate territory and provide an early connection between these two communities, as well as complete a vital link in the proposed through highway."

*Routes Considered by United States Commission*

It will be noted that the American Commission, while recognizing alternative routes through the Yukon, gave consideration to only one general route through British Columbia, though variants of parts of that route were admitted. The British Columbia portion of the highway would run north from Hazelton to the junction of the Stikine and Klappan Rivers. From the Stikine to the Yukon boundary one possible route would run to Dease Lake, Nahlin River, Atlin and the boundary, and the other from the Stikine to Dease Lake, Teslin Lake, Surprise Lake, Atlin and the boundary. Extracts from the reports of reconnaissance surveys by Colonel J. M. Rolston and J. H. Gray, in northern British Columbia, are printed as appendices to the report of the American Commission. Extracts from a report by J. H. McNeil on a route through the Yukon are also printed in the Appendix; as is also a report by Donald MacDonald on routes in Alaska. Mr. McNeil considers only a route through Dawson to the Alaska boundary. The Commission puts forward also alternative routes from Whitehorse to Fairbanks by way of the Tanana River, and via Kluane Lake and Gulkana. Information on these alternative routes is contained in Mr. MacDonald's report.

Broadly speaking, the American Commission appointed in 1930 reported in 1933 that a highway from the State of Washington through British Columbia and the Yukon to Alaska was both feasible and economically practicable.

*Canadian Conclusions*

The Canadian Committee appointed in 1931, which, as already mentioned, consisted of Hon. George Black, J. M. Wardle and G. P. Napier, did not publish a separate report, but Mr. Wardle reported the results of its investigation and deliberations to the Department of the Interior, and the report published by the American Commission contained information collected by the Canadian Committee.

*Type of Highway*

The estimate of the cost of construction, as given in the first paragraph of the American Commission's conclusions and recommendations (page 2) was based on a 14-foot gravel road similar to the type of highway then being constructed by the Government of British Columbia. It was felt that the Alaska Highway might very well be built to such a standard as would accommodate existing traffic, leaving for later consideration its improvement to meet the demands of the future.

There the matter rested officially for several years, though interests in Alaska and elsewhere in the United States continued to press for the building of the international road, and the Premier of British Columbia made no secret of his strong interest in the project.

*Interdepartmental Committee*

In 1938 an Interdepartmental Committee in Ottawa made a report to the Dominion Government, in which the proponents of the project were quoted as saying that the following benefits would follow the building of an international highway through British Columbia and the Yukon to Alaska:

"A. It will provide an outstanding tourist attraction, thus increasing tourist revenue in British Columbia and in Canada as a whole.

B. It will open new territory for settlement.

C. It will make accessible for commercial development great natural resources in new areas.

D. It will open a new and magnificent country for recreation such as hunting, fishing, etc.

E. It will provide an all-Canadian overland route to the Yukon territory.

F. It will be of great assistance to air traffic.

G. If and when construction is commenced, beneficial results will immediately be obtained in the relief of the unemployment problem.

*Order in Council, 1938*

On the 22nd December, 1938, the following Order in Council P.C. 3252 was passed by the Dominion Government:

"The Committee of the Privy Council have had before them a Report, dated December 22nd, 1938, from the Secretary of State for External Affairs, stating, with the concurrence of the Minister of Mines and Resources, as follows:

"That the Premier of British Columbia has repeatedly emphasized the important and beneficial results which, in his opinion, would follow from the decision to construct a highway which would unite the road system of British Columbia and the Yukon Territory with that of Alaska;

"That representations have been received from the United States Government with regard to the desirability of providing for the construction of such a highway;

" That pursuant to the passage of a Bill through Congress instructing and empowering the President of the United States to appoint a Commission of five persons 'to co-operate and communicate directly with any similar agency which may be appointed in the Dominion of Canada in a study for the survey, location, and construction of a highway to connect the Pacific Northwest part of continental United States with British Columbia and the Yukon Territory in the Dominion of Canada and the Territory of Alaska', the President did appoint a Commission consisting of the following persons:

Congressman Warren G. Magnuson, Seattle, Washington,

Dr. Ernest Gruening, Director, Division of Territories and Island Possessions, Department of the Interior, Washington,

Donald MacDonald, Engineer, Alaskan Road Commission, Fairbanks, Alaska,

J. W. Carey, Public Works Administration, Portland, Oregon,

L. W. Riggs, Former Governor of Alaska, New York.

" That the United States Commission was further empowered to discuss ' plans for the financing of the construction and maintenance of the said road ';

" That it is expedient that the Canadian Government should have before it a full report on all aspects of the proposed construction before any decision with regard thereto is taken;

" The Minister, therefore, with the concurrence of the Minister of Mines and Resources, recommends:

1. That a Commission of five persons be appointed to enquire into the engineering, economic, financial, and other aspects of the proposal to construct the said highway to Alaska and to meet for the purpose of discussion and exchange of information with the United States Commission appointed for that purpose, and subsequently to submit to His Excellency the Governor in Council a report setting forth the evidence received and the conclusions drawn therefrom;

2. That the following persons be appointed for this purpose:

Hon. Charles Stewart, Ottawa, (Chairman),

Brig.-General Thomas L. Tremblay, Quebec,

J. M. Wardle, Department of Mines and Resources, Ottawa,

Arthur Dixon, Department of Public Works, Victoria,

J. W. Spencer, Vancouver.

3. That authority be granted for the payment of the necessary and legitimate travelling expenses, during the current fiscal year, of the members of the Canadian Commission from Vote No. 530, S.E., 1938-39, of the Department of Mines and Resources.

The Committee concur in the foregoing recommendations and submit same for approval."

*Preliminary Meeting*

The Commissioners held a preliminary meeting in Victoria, British Columbia, on April 27th, 1939, and considered plans for carrying out the task entrusted to them by the Government of Canada. They also conferred with Hon. T. D. Pattullo, Premier of British Columbia, and officers of his Government, and obtained material that would assist them in making their investigation. Mr. Lawrence J. Burpee was appointed Secretary to the Commission, and Mrs. J. L. Montgomery, Secretary to the Chairman.

A summary of what took place at this meeting will be found elsewhere in this Report.

*Public Hearings*

Early in July the Commission began a series of public hearings at Prince George, British Columbia, at which the views were obtained of business men and others, particularly the views of men who had personal knowledge of conditions in northern British Columbia and the Yukon, as to the most practicable route for a highway, taking into account all the factors in the problem, the nature of the country, forest growth, elevation of land, and particularly the height of mountain passes, average snowfall, economic resources, relationship of the route to existing communities, picturesque qualities that would appeal to tourists, fish and game, and so forth.

This was followed by similar hearings at Vanderhoof, Smithers, Burns Lake, Hazelton and Prince Rupert, then at Stewart at the head of the Portland Canal, all in British Columbia, at Whitehorse and Carcross in the Yukon, and at Atlin in the extreme north of British Columbia. Finally a meeting was held in Vancouver, on the return of the party from Skagway. At Vancouver representatives appeared from Kamloops, British Columbia, and filed a brief outlining the interest of that town and neighbourhood in the proposed highway. Telegraph Creek, British Columbia, had asked for a hearing, but as it was not found practicable for the Commission to go there, authority was given for the filing of a brief, or to make representations at one of the public hearings already arranged.

A summary of what took place at these hearings will be found at a later place in this Report.

Requests were also received for meetings at Edmonton and Fort McMurray to enable the representatives of those places to present the views of their people as to the advantages of a route through Alberta to the Yukon and Alaska. The Commission found it impracticable to accede to these requests, the Order-in-Council creating the Commission specifically confining its consideration to routes through British Columbia.

*Natural Resources*

From the reports of federal and provincial officers, and other sources, the Commission has gathered a considerable body of data relating to natural resources in northern British Columbia and the Yukon, the development of which would be facilitated by the building of the proposed highway to Alaska. In some cases these resources would be more readily served by a road following a westerly, and in others by an easterly route.

These resources include precious and base minerals, from gold to coal, timber, grains, fruits and vegetables, game, furs and water powers. Their extent is such as to make their prospective development an argument of some weight in favour of the proposed highway.

Information as to the nature and extent of these resources will be found elsewhere in this Report.

*Air Reconnaissance*

At Hazelton, Mr. Wardle and Mr. Burpee with J. H. Mitchell, Construction Engineer of the Surveys and Engineering Branch, Department of Mines and Resources, left the party and proceeded by airplane to make a reconnaissance of the suggested routes through British Columbia and the Yukon. They flew from Hazelton to Fort St. James, on Stuart Lake, and from there north to Manson Creek and up the Parsnip River to Finlay Forks. From there they descended the Peace River to Hudson Hope to examine the nature of the valley for a road, and returned to Finlay Forks. Flying up the Finlay River they crossed Sifton Pass and followed the Kechika and Turnagain Rivers to the Liard, and ascended the Liard to Lower Fort of the Hudson's Bay Company. From there they flew by way of Tuya Lake and Jennings River to Teslin Lake and Atlin.

Returning to the Liard they went north to Frances Lake, and over the height of land to the upper waters of the Pelly, which they followed to Fort Selkirk, and then down the Yukon to Dawson. From Dawson they flew up the Yukon and the Lewes Rivers to Whitehorse, where they met the remainder of the Commission. Honourable Charles Stewart and Mr. Wardle flew from Whitehorse to Atlin for the hearing to be held there, while the other Commissioners proceeded by railway to Carcross, where another meeting was held. The Atlin party flew to Bennett on the railway, and the Commission proceeded to Skagway and returned by steamer to Vancouver—some eight days having been spent in aerial reconnaissance.

It will be noted that this reconnaissance followed in the main what is indicated as the "B" Route on the accompanying map. From Whitehorse, Mr. Mitchell returned south by air, examining and securing photographs of the "A" Route. His report, together with that of the engineering members of the Commission (both of which are incorporated in the Commission's report) cover the principal features of both these main routes, as well as of certain alternatives that combine portions of both "A" and "B".

*Meeting with The United States Commission*

A meeting was held in Victoria on July 24th, 1939, with the United States Commission, at which the problem of the highway was discussed in some of its broader phases. It developed in the course of the conference that, while recognizing the advantages of the "B" Route from an engineering point of view, the American Commissioners felt that the "A" Route combined with one through the Yukon by way of Kluane Lake to the Alaskan boundary would best serve the interests of communities in southern Alaska. At the same time they recognized that the matter of the route to be selected through Canadian territory was primarily one for decision by Canada. (An account of the conference will be found elsewhere in this Report). Later conferences with the United States Commission were held in Ottawa on January 24th, 1940, and in Washington on March 28th, 1941.

*United States Approaches to Highway*

To round out its knowledge of the problems involved in the Alaska Highway, the Canadian Commission travelled south from Vancouver to Bellingham, in the

State of Washington, over what would be one of the main approaches from the United States to the proposed highway. The portion of this road between Vancouver and the international boundary has been materially improved in character.

This Pacific Coast road is only one of several American approaches to the Alaska Highway, along routes that follow the valleys of the Okanagan, the Columbia and the Kootenay, west of the Rocky Mountains, and the eastern side of Glacier and Waterton Parks in Montana and Alberta, as well as various more easterly routes. It will be noted by a reference to the accompanying map that all these routes of travel from the United States north through Canada converge on Prince George, which may be looked upon as the point from which the "A" and "B" Routes separate—one to follow a line nearer the Pacific, and the other a line nearer the Rocky Mountains.

These converging lines from the south include the highway from Vancouver to Prince George, and its southern extension to the international boundary near Blaine Washington, where the Peace Arch stands as one of several substantial emblems of good-neighbourliness between Canada and the United States. (The Cariboo Road will be more particularly described later in this Report).

Another road from the American side crosses the boundary at Osoyoos, on the Okanagan River, and continues north first on the west, and then on the east, side of Okanagan Lake to Vernon, from which place it forks—one branch running west to Kamloops, and the other northeast to Revelstoke. The Kamloops road taps the Cariboo Road at Ashcroft. At Revelstoke the other branch connects with the Big Bend Highway, now completed. This magnificent scenic thoroughfare, which the Chairman and Mr. Wardle inspected on their way east from Vancouver, sweeps around the Columbia from Revelstoke to Golden, and not only fills one of the two remaining gaps in the Trans-Canada Highway between the Atlantic and the Pacific, but also forms another important link in a north-and-south route from the international boundary through British Columbia.

From Spokane two main routes lead north to the international boundary. The western crosses at Nelway to Nelson, British Columbia, and the eastern crosses at Kingsgate. A third route, still farther to the east, enters Canada near Newgate. These roads are linked together by an east-and-west road north of the international boundary from Lethbridge, east of the Rocky Mountains, by way of Crow's Nest Pass, Fernie, Cranbrook, Nelson, Vernon, Rossland and Kamloops to Vancouver. The route from Spokane that crosses the international boundary at Kingsgate, and the east-and-west road at Yahk, extends north up the valleys of the Kootenay and the Columbia to Golden, where it joins the Trans-Canada Highway.

*Alberta Connections with Highway*

The alternative north-and-south route mentioned above would also provide connections for several east-and-west routes through the Rocky Mountains from points in Alberta to Vancouver, and also to the north country. The southernmost of these has already been mentioned—from Lethbridge through the Crow's Nest Pass to Fernie, Nelson and Vancouver. This road is tapped west of Lethbridge, but still in Alberta by the highway coming up from Glacier Park, in Montana, through Waterton Park, in Alberta. From Calgary the Trans-Canada Highway runs west through the Rockies to Banff and over the Kicking Horse Pass to Golden, where the newly completed Big Bend link is reached. At Castle Mountain, twenty miles west of Banff, the well known Banff-Windermere Highway, completed in 1923, leaves the Trans-Canada Highway and runs southwesterly to the Windermere Valley. Here at Radium Hot Springs it connects with the Columbia Valley road running northerly to Golden and southerly to Cranbrook.

At Lake Louise Station, thirty-eight miles west of Banff, the scenic Banff-Jasper Highway begins running northerly for 150 miles through the heart of the Rockies to Jasper.

Continuing through Golden the Trans-Canada route passes through Revelstoke and Kamloops to Vancouver. The road between Calgary and Vancouver affords connection with the Alaska Highway no matter which route is finally selected. The Commission had an opportunity of satisfying itself as to the admirable character of both the Windermere and Kicking Horse Roads through the Rockies.

*Northern Routes from Alberta*

From Edmonton a road runs west through Jasper Park to within nine miles of its western boundary, and this road is being extended to Tete Jaune and Prince George, affording yet another outlet from Alberta, both to the Pacific and to the Alaska Highway. From Tete Jaune another projected route follows the valley of the North Thompson River to Kamloops. From Kamloops northerly this road is already constructed to beyond Blue River. An alternative route from Edmonton to northern British Columbia, and one that will be of particular benefit to the people of the Peace River Country, follows the existing road to Lesser Slave Lake, Grande Prairie and Hudson Hope, and may some day be available to Finlay Forks. Finlay Forks is on the "B" Route of the Alaska Highway, and, even if that route is not adopted, Finlay Forks will probably be connected before long with the Highway now under construction from Vanderhoof on the Canadian National Railway via Fort St. James to Manson Creek, which might eventually give the Peace River country the long-expected access to the highway system of British Columbia, including the proposed Alaska Highway. Another route will also eventually be available from the Peace River, by way of Grande Prairie and Monkman Pass, which would tap the existing highway east of Prince George.

Referring once more to the map, it will be seen that, apart from the fact that it has the present or prospective assurance of highway routes to Vancouver and the Pacific by a number of alternative roads, Alberta also has the certainty of convenient access to the Alaska Highway, if or when it is built, by whichever route should be finally adopted.

## ENGINEERING INVESTIGATIONS

Under the Order in Council establishing the Commission it was authorized "to enquire into the engineering . . . . and other aspects of the proposal to construct the said highway to Alaska".

To carry out these instructions the securing of engineering information on possible routes, by surveys and other means, was required to an extent that would enable the Commission to report intelligently on the engineering problems that affect the feasibility of the highway, the choice of routes and the cost of construction and maintenance. This involved the comparison of major routes as to cost, period of accessibility, scenic assets and potential natural resources. It further required that in considering various routes the interests of existing towns and settlements in British Columbia, the Yukon Territory, and Alaska be given proper weight. Of major importance was the relationship of possible routes to the existing road systems in British Columbia, Alberta, and the United States, and to the development of air routes across Canada between United States and Alaska. Roads already built that could be incorporated to advantage in any route, were also a factor of some importance. The Commission considered, however, that while existing roads below the standard of construction required had great value as aids to construction, they could not be regarded as conclusive factors in determining routes.

It was the view of the Commission that only facts definitely established through ground and aerial reconnaissance surveys, through various Government sources or through observations confirmed by persons familiar with the districts concerned, should be used as a basis for conclusions reached. It was further their view that evidence on characteristics of various routes obtained by the Commission at its public hearings, while invaluable in directing attention to important factors to be considered, could not in itself be regarded as conclusive.

From a study of the information and data collected by the International Fact Finding Committee established in 1931 by the Dominion Government and the Government of the United States, it was evident to the Commission that there were three general routes through northern British Columbia that merited consideration. These routes would begin in the vicinity of Hazelton, Fort St. James and Prince George, respectively. As each of these points is already connected with existing highways information to be collected fell under two heads:

(*a*) Roads already built on the general route from the international boundary north; and

(*b*) New roads along routes to be determined and running northerly from Hazelton, Fort St. James, or Prince George to the Yukon and Alaska.

The problem of the Commission in regard to (*a*) was to arrive at estimates of cost covering improvement in alignment and surface to bring such existing roads to the international standard desired.

A great deal of time and expense was saved in this respect when the Department of Public Works of British Columbia was able to furnish promptly the information required. Estimates of costs covering necessary re-location and improvement work on the existing roads between Vancouver and Prince George and between Prince George, Fort St. James and Hazelton, were prepared by provincial engineers and are incorporated in the Cost Estimates of this report.

It will be noted from these that improvement or reconstruction work on some 525·5 miles of road between Vancouver and Prince George is estimated at $4,710,000. From Prince George to Fort St. James, a distance of 114 miles, the estimated cost of necessary work is $1,050,000.

Costs have been estimated from the Coastal City of Vancouver, B.C. The Alaska Highway route to the British Columbia coast strikes the Pacific Highway at New Westminster, B.C., some 12 miles east of Vancouver, and there is a choice of several paved roads between these cities. From New Westminster south the Alaska Highway would follow the modern and newly constructed section of the Pacific Highway viz., the King George V. Highway, to the International Boundary at Blaine. This point is 18½ miles from New Westminster and 119 miles from Seattle, Washington.

In regard to (*b*), viz. new roads, the Commission's work involved the major question of the best route north from one of the three points mentioned, together with problems of location, and estimates of cost covering construction and maintenance.

The Commission was consequently largely concerned with the consideration of the three routes requiring investigation through northern British Columbia. These are briefly described as follows:

(1) A route as near to the Pacific coastline as topographical features will permit, and which might afford access to various settlements along the Pacific coast north of the Skeena River through branch roads running westerly. This route will be referred to as the "Coast" route.

(2) A route to the east of the Coast route and which, while still affording possibilities of road connections with coast settlements, would have the advantage of less precipitation and lower construction costs. This route is referred to as the "A" route. It is the route which was subject

to consideration by the International Fact Finding Committee established in 1931, and which the latter reported as feasible. (For information on this route see reports of Colonel J. M. Rolston and Mr. J. H. Gray, engineers of the Department of Public Works in British Columbia, covering their reconnaissance surveys in 1930).

(3) An eastern route following the Rocky Mountain trench, and known for convenience as "B" route. (See accompanying map).

All three routes offer considerable choice in alternative locations, two or three being of major importance. (These are referred to later).

It was evident that fairly extensive field investigatory work would be necessary before the Commission could decide on the relative merits of the general routes mentioned. Consequently, the field program for the 1939 season was decided upon at the first meeting of the Commission in Victoria, B.C., in April 1939, and arrangements made for it to be undertaken. At that time very little authentic information on the eastern or "B" route was available so that a good deal of the 1939 field program was in connection with this route. The work that was undertaken is outlined herewith and was directly under the control of the Commission, using Dominion Government funds except where otherwise stated.

(1) An aerial reconnaissance along the entire "B" route from Port St. James northerly to the Yukon Boundary, and from that point along the Frances Lake and Pelly River valleys to Selkirk, and thence northerly to Dawson. (An aerial flight was also made between Hazelton and Fort St. James and from Finlay Forks to Hudson Hope by the Peace River Valley).

(2) Ground reconnaissance surveys (by the Public Works Department of the Province of British Columbia) in the interests of the Commission, both north and south of Sifton Pass.

(3) Ground reconnaissance surveys (by the Province of British Columbia) in the Dease River area and in the area from Atlin Lake southerly via Nakina and Nahlin districts to the Stikine River and Dease Lake.

(4) Aerial reconnaissance over the little-known territory between Liard Post and Teslin Lake and Atlin Lake, the flight extending as far south as Dease Lake and River.

(5) Aerial reconnaissance from Bennett and Atlin Lakes southerly via the Disella and Dease Lakes and Tanzilla River to the Stikine River, and from there following approximately the "A" route to the Skeena River. From that point the valleys of the Driftwood River and Takla and Trembleur Lakes were followed to Stuart Lake and Fort St. James.

(6) Aerial reconnaissance in the Yukon Territory southerly and easterly from Dawson, as well as a main flight from Dawson along the Yukon and Lewes Rivers and Lake Laberge to Whitehorse.

(7) Aerial reconnaissance from Whitehorse to Atlin, and from Atlin to Lake Bennett.

(8) Ground reconnaissance survey of a route in Yukon Territory from Whitehorse to the Alaska Boundary via Kluane Lake and River, and which crosses the Donjek and White Rivers.

(9) A ground reconnaissance survey down the Pelly River from the vicinity of Ross River to Pelly Farm, Yukon Territory, and which is near the junction of the Pelly and Lewes Rivers.

The primary object of aerial reconnaissance undertaken by the Commission was not so much to locate routes as to eliminate those that were definitely unfavourable, and thus save the cost of ground investigations; also to confirm the feasibility of routes on which favourable reports had already been received. In addition, aerial photographs obtained in flights would give valuable information on the character of the country traversed by any routes. On the "B" route sixty-nine aerial photographs were obtained in 1939. On the "A" route twenty-five aerial photographs were obtained of the northern section, and where information was most lacking. (These photographs are available for consideration in conjunction with this report).

On the "Coast" route a number of aerial photographs that were available of the Bell-Irving River district were also examined.

## COAST ROUTE

The distinguishing feature of this route is its location in regard to Pacific coast settlements in both Canada and in the panhandle of Alaska, and which feature affords greater opportunities of connections with the coastal areas, than offered by any other route.

This route would leave the existing British Columbia road system in the vicinity of Hazelton or Kitwanga. From Hazelton a feasible location is possible up the Kispiox River to the upper reaches, thence westerly to follow a section of Cranberry River and strike the Nass River Valley near the "Rapids" section. The location from Kitwanga would go by way of Kitwanga River and Lake to the upper reaches of the Cranberry River and down the latter to strike the Nass River at the same point as the location from Hazelton. From this junction the coast route would follow, respectively, the Nass River, Hannah Creek, the Bell Irving River, the Ningunsaw River, and the Iskut River to Kinaskin Lake to join the "A" route in the vicinity of Ealue Lake. From the latter locality it would follow the "A" route to the Dease Lake trail in the Tanzilla River Valley.

Information supplied in 1930 to Provincial reconnaissance engineers by residents of the outlying districts on the coast route indicates that its middle section passes through a very heavy snow belt. Snowfall on the Bell Irving and Iskut Rivers is reported as particularly heavy with slides prevalent on the latter.

Mr. P. M. Monckton, in reporting on information obtained by him when in the district during the years 1925 to 1928, states as follows:

> "The Bell-Irving must be crossed again near Mile 184; it is here wide and in several channels, no solid rock for foundations. Perhaps 500 feet in all: and trestling would be out of the question, for the river carries great quantities of drift. Though swift, it can be boated from the Bowser River by good rivermen: and a lot of freight could be handled by boats not over 30 feet long, strongly powered.
>
> "After crossing the Bell-Irving, the road would follow the old Yukon Telegraph Line northwesterly; through a narrow but low pass with imperceptible gradients: the summit being 2,100 feet and so into the Ningunsaw River, a feeder of the Iskut.
>
> "From Mile 184 to Mile 214, was the worst stretch of the whole line, when the Yukon Telegraph Line was operated. It was abandoned and replaced by wireless between Hazelton and Telegraph Creek in 1936. The snowfall is very deep. Being near the Coast it is often very mild and so colossal slides run down the mountains, carrying all before them, and even in July, I have seen snow still piled up 20 or 30 feet deep in the valley bottom.

"However, these slides run in the same place year after year and could be avoided by keeping the road well away from the toe of the mountains, out in the middle of the valley, which is swampy."

.....

"The Iskut Valley is entered at Echo Lake: it is a very broad valley, perhaps 8 or 10 miles in width, bordered by very high mountains. To the West rises the Coast Range, with peaks reaching almost to ten thousand feet, and half buried under a sheet of ice. The Iskut River hugs the west side of the valley in a deep canyon which it has eroded through the soft argillite rocks. The mountains to the East, between the Iskut and Hawkins Pass, are also very high and reach over eight thousand feet in Eva Peak. Large glaciers also cover this range: and large torrents emerge from the range, cutting deep gashes across the valley at right angles to the Iskut River. In addition the flow of the valley is cut up into a maze of rocky knobs, lakes and swamps besides the four main canyons—Devil's Creek, where the old trail fell and rose again 600 feet to cross—Elliott Creek—Slate Creek and Deep Creek. Each creek would call for a span of from 50 to 75 feet and a sidehill rock-cut approach. The snowfall is heavy from just North of Echo Lake to Iskut River Crossing—six to eight feet in an average winter. There would be about 26 miles of difficult location and maybe 10 of hard construction to bring the line to Deep Creek (M.252). At this point the troubles would be over. The heavy snow ceases near here: the valley becomes level and sandy and except for a climb of 500 feet or so to avoid some bluffs on the East side of Kanaskan Lake, it is plain sailing to join the Central Route at M.293 from Hazelton, or 597 from Prince George, compared to 584 by the Central Route".

While complete meteorological records are not yet available, no contrary information has been received as to the heavy precipitation in the river valleys traversed by the Coastal Route. Reports from other sources confirm the view that unfavourable climatic and construction conditions obtain throughout the whole southern section of the route. A study of aerial photographs that are available of the Bell-Irving River Valley shows that heavy construction would be involved and that there are numerous snow-slide areas, some of which could not be entirely avoided.

The information collected in regard to the Bell-Irving-Iskut River valleys is now judged sufficient by the Commission to eliminate the Coastal Route from further consideration.

## ROUTE "A"

The main feature of this general route is that, while still affording reasonable opportunities of connections with coastal settlements at certain points, its situation further east results in lower precipitation, wider valleys and lower construction costs. A longer traffic season would also be enjoyed. This route offers more alternative locations than any other, sections affected ranging from minor changes to those involving considerable mileage. Starting from Hazelton, the "A" route would generally follow the Skeena, Nass, and Klappan River Valleys to the Tanzilla River Valley. Starting from the vicinity of Burns Lake or Topley the "A" route might follow the Babine Lake Valley to Bear Lake and the Skeena River, or the Babine Lake and Babine River Valley to a lower reach of the Skeena, north of Hazelton. From Fort St. James it could follow Stuart Lake, Trembleur and Takla Lakes, and continue northerly until the

Skeena River Valley was reached. All "A" route locations eventually lead to the Dease Lake Trail between Telegraph Creek and Dease Lake and which follows the Stikine and Tanzilla River Valleys.

From the vicinity of Dease Lake, northerly and westerly towards Atlin, minor alternative locations present themselves, the selection of the lowest ground south of Atlin being an important consideration.

Reconnaissance surveys undertaken by the Province of British Columbia in 1930 along various sections of the "A" route provided very useful information. Some of the work was done along what is now designated as the "Coast" route. Ground and aerial surveys made at that time indicated that a route generally following that known as "A" was feasible. It was not possible at that time, nor desirable, to collect enough information to determine which particular valleys or drainage basins afforded the best general location.

Consequently, in the 1939 season the Commission undertook further investigations of the "A" route with a view to selecting a general location that would combine favourable climatic conditions with reasonable construction costs and still afford possibilities of access to the coastal regions to the west. The field investigations comprised both aerial and ground reconnaissance, and are described in items (3) (5) (6) and (7) in the field activities previously listed. This information supplemented or confirmed that previously obtained.

The feasibility of the northern section of the "A" route in British Columbia was dependent upon the finding of a satisfactory location across the large area between Telegraph Creek and Atlin. While considerable information was obtained through field investigations in 1939 on this section, further data were required and a large amount of reconnaissance work was undertaken in the season of 1940 between those points. The results of this additional information showed that a satisfactory route was available and that elevations that would be reached were not prohibitive. The detailed report submitted by Mr. J. H. Mitchell, Construction Engineer, Surveys and Engineering Branch, Department of Mines and Resources, covering his investigations in the Telegraph Creek-Atlin Lake area, is included in the appendix of this report.

First-hand information was also required of a route that from general reports afforded great promise, namely that from Fort St. James along Stuart, Trembleur and Takla Lakes and thence northerly towards the Skeena or Nass Rivers. The investigation of this important route was undertaken by Mr. P. M. Monckton, Engineer on the staff of the Public Works Department, Province of British Columbia, and his report on 1940 reconnaissance work over this section and extending from Fort St. James to a few miles south of the Dease Lake trail, is included in the appendix.

This report covered a route via Bear Lake and River to Thutade Lake and thence by Caribou Hide and the Spatsizi River to the vicinity of Ealue Lake, and which is regarded as a practical one.

In the early spring of 1941 the same engineer while investigating snow conditions travelled a more direct route from Bear Lake, namely, up the Skeena River to the Skeena-Little Klappan Divide, thence down the latter River to Ealue Lake. From previous information obtained it had appeared that this route had serious disadvantages because of heavy snowfall and late accessibility in the Spring. The 1941 reconnaissance, however, showed that snow conditions were not as bad as previously reported and that the Skeena route could be regarded as feasible. As it is also 67 miles shorter for the section of road between Bear Lake and Ealue Lake, then the Thutade Lake route, the Skeena route, subject to confirmation by location surveys, is preferred. Cost estimates have consequently been prepared on the basis of utilizing this route.

With the additional information obtained by the 1940 and 1941 reconnaissance surveys, the Commission are in a position to definitely state that there is a feasible and satisfactory route, from the standpoint of construction and main-

tenance, from Fort St. James along the Stuart, Trembleur and Takla Lake Valleys to the Dease Lake District and Atlin, B.C., and which, for convenience is termed the " Central A " route. This route has greater advantages than any alternatives of the "A" route and the description given herewith, subject to some local revisions, is indicated by reconnaissance surveys as the best location:

Beginning at Fort St. James this route follows the east side of Stuart, Trembleur and Takla Lakes and along the east bank of Driftwood River and Bear Lake to the Sustut River. Crossing the Sustut River it cuts across to the east side of the Skeena River, following it up to the Skeena-Little Klappan Divide—Elevation 4,400 feet. The route then follows down the east side of the Litle Klappan River to the vicinity of Ealue Lake. It then skirts Eddontennajon Lake and proceeds in a northwesterly direction to a bridge site over the Stikine River east of the confluence of the Tahltan River where a junction with the existing Dease Lake route is made.

From this point the route goes to Nakina by either the Tuya River valley and Prairie and Disella Lakes or by the Tahltan, Hackett and Koshin River watersheds passing through Nahlin. Estimates of cost have been based on the first named route, and location surveys will determine which is the better. From Nakina the Bell and Dixie Lakes route is followed to O'Donnell River connecting with the existing road to Atlin. From Atlin the route follows the east side of Atlin Lake and the west side of Little Atlin Lake via Tagish to Carcross and on to Whitehorse. From Whitehorse the route leads through Carmacks crossing the Yukon River at Five Finger Rapids and thence on to Dawson and the Alaska boundary.

Reconnaissance surveys indicate numerous local alternatives on this route, the comparative value of which can only be determined when location surveys are made.

In the very approximate estimates of cost given for the "Central A" route in the 1940 preliminary report the distance from Fort St. James to the Yukon boundary, on approximately the same route as described, was estimated by scale at 690 miles with a rough estimated cost of $13,200,000.

Based on information later obtained in the field, the mileage from Fort St. James to the Yukon Boundary is placed at 736 and the estimated cost at $12,170,000.

It will be noted that while the distance determined from the reconnaissance surveys is greater than the original rough estimate, the estimated cost is substantially less.

An important feature of the "Central A" route, above described, is the depth of snow on the higher passes that must be traversed on the section between Fort St. James and the Dease Lake trail. The highest elevation that will be reached is apparently 4,475 feet and which is in the vicinity of Indian Creek, a tributary of Spatsizi River. Between the Dease Lake trail and the Yukon boundary the highest elevation that will be reached is apparently 3,500 feet.

As the depth of snowfall at these elevations in the Spring will be the main feature in determining the length of season that will be afforded on the "Central A" route, actual snow measurements were made in the months of March and April, 1941, at all governing elevation points. The information has been obtained and is included in the appendix.

The "Central A" route is naturally divided into three sections:

(1) From Fort St. James to the Dease Lake trail;

(2) From the Dease Lake trail to the Yukon boundary;

(3) From the Yukon boundary through the Yukon territory to Dawson and the Alaska boundary.

On each of these sections location surveys are essential before the best of alternative locations available can be determined.

As compared with the "B" route, dealt with later on, construction costs per mile are estimated to be greater but are by no means excessive. Maintenance costs per mile, while estimated to be greater than similar costs on the "B" route, are also within reason.

## "B" ROUTE

From the Prince George district north this general route follows an extension of what is known as "The Rocky Mountain Trench." This physical feature lies immediately to the west of the Rocky Mountain Range, and in Canada extends from the International Boundary northwesterly to at least the vicinity of Prince George. From this point an extension of the trench with similar physical features extends well above latitude 59° north, and in fact into the Yukon Territory. From the highway or railway location standpoint it is a feature with great advantages, and deserves the most careful consideration.

Little authentic information was originally available to the Commission on the "B" route, and as a result main field investigations of the 1939 season consisted of reconnaissance work along it. (See Field Work Items Nos. 1, 2, 4, 6 and 9.) Sufficient information was obtained to give an approximate estimated cost from Prince George, or from Fort St. James, via Finlay Forks and Sifton Pass to the Yukon Boundary, and from that point to Pelly Farm in the Yukon Territory.

Information obtained showed that this route was feasible in every respect. Climatic conditions were favourable as compared with other routes. Precipitation is low, both in summer and winter; construction is comparatively easy, and a remarkably straight location is possible practically throughout the whole route north from the Finlay Forks area to Pelly Farm, Y.T. A main item of cost on this route is of course its remoteness from railhead, or from any point where supplies could be conveniently obtained. Transportation of supplies, equipment and construction personnel would add to actual construction costs. However, in this respect some of the rivers followed by the route are navigable for river boats, and information that would be obtained during location surveys would undoubtedly reveal those waterway sections where water transportation could be utilized to advantage.*

*Aiken Lake Route*

Reference will be made here to an alternative location, referred to as the Aiken Lake route, that would go northerly from the Manson Creek district, and would lie between "B" and "A" routes. Beginning west of the "B" route at the end of the mining road from Fort St. James this location would follow the western slopes of the Finlay River Drainage Basin to Aiken Lake. From this point it would follow near the height of land to Thutade Lake. From there it would proceed northerly to the Stikine River by either Caribou Hide or the headwaters of the Spatsizi River or the Little Klappan River.

While this location follows fairly high ground with a maximum elevation of perhaps 4,850 feet, it merited careful consideration because of the possibilities offered for mineral development. The southern part traverses the Cassiar-Omineca Batholith, while the northern section follows it very closely. This mineral zone is regarded as most promising.

*It might be mentioned in connection with "B" route that whether the highway is projected northerly from Prince George or from Fort St. James, direct and easy connection is afforded to points west, including Hazelton, by means of existing highways.

At the present time there is a first-class mining road from Fort St. James via Gaffney Creek to Manson Creek and from the latter point a passable road 12 feet wide via Germansen Landing to Aiken Lake. The distance from Fort St. James to Aiken Lake via this road is estimated at 258 miles. Bridges are needed over the Omineca River and Big Creek and over Mesilinka River. The existing road would afford very useful construction facilities.

The Aiken Lake route could connect beyond Aiken Lake with either the " Central A " route or the "B" route, although the connection in each case would involve fairly high curvature and thus increased mileage.

It is the opinion of the Commission, after considering all factors, that this route does not possess the location advantages required by an international highway from the standpoint of grade and alignment and that it is properly a local highway serving mining areas, and which can be connected to the main international route either at Fort St. James, or by lateral connection running to the "B" route to the east, or to the "A" route to the west.

Referring again to the "B" route proper, its lower section offers two alternatives—one starting from the vicinity of Prince George and reaching Finlay Forks via Summit Lake and the Parsnip River, and the other starting from Fort St. James and following the route of the newly-constructed mining road to Gaffney Creek and leaving the existing road at that point to follow Manson Creek to the vicinity of Finlay Forks. From the latter point the main route would follow the Finlay River, the Fox River, the Kechika River and the Liard River to Liard Post or vicinity. The Liard and Frances River valleys would then be followed to Frances and Finlayson Lakes, and the Pelly River valley to Pelly Farm in the Yukon. One or two local alternatives merited further consideration, one of these being a traverse in a generally direct line from the confluence of the Kechika and Turnagain Rivers to the vicinity of Lower Post. Reconnaissance showed this to be quite feasible.

## MANSON CREEK ROUTE

As previously mentioned this route is an alternative of the lower section of route "B" and would involve leaving the existing highway system at Fort St. James and following the new mining road to a point near the junction of Manson and Gaffney Creeks and then proceeding northeasterly to Finlay Forks. Its main advantage is the fact that a good secondary road is available for some three-quarters of the distance between Fort St. James and Finlay Forks and which would afford first-class construction facilities for bringing the existing road up to the international standard and for building the Gaffney Creek-Finlay Forks section.

On the other hand it is not as direct a location for the "B" route as that from Prince George to Finlay Forks via McLeod Lake and the Parsnip River. The latter is obviously the proper route for an international highway. The Manson Creek route is a road of a secondary type for servicing mining areas and has been well located and built with this end in view. Its maximum elevation is approximately 3,600 feet, as compared with 2,315 feet on the Parsnip River route.

The Commission consequently prefer the McLeod Lake and Parsnip River route between Prince George and Finlay Forks.

Since, if the "B" route were followed directly into Yukon Territory and down the Pelly River to Pelly Crossing or Pelly Farm in the Yukon Territory, the towns of Atlin and Whitehorse, with their adjacent mining districts, would have no direct connection with the main highway, investigations were made as to the possibility of a route running westerly from the vicinity of the Kechika or Turnagain Rivers to Atlin and thence northerly to Whitehorse.

A good deal of reconnaissance work was consequently undertaken in endeavouring to find a practical location on this route. Aerial and ground reconnaissance surveys were both made but the search for a satisfactory route was unsuccessful. Much of the country to be traversed would have an average maximum elevation of 4,500 feet; the character of the ground was unsuitable for construction, and heavy snowfall and a restricted season could be expected.

While a route up the Turnagain River, or up the Dease River to Dease Lake, was feasible, both these were circuitous and increased the mileage to a far greater extent than justified by the advantages offered.

The Commission consequently finds that the "B" route, if adopted, must follow the natural valleys extending from Lower Post along the Liard and Frances Rivers and that no diversion of this route to Atlin is feasible. The Dease Lake District can, however, be connected with it either by a highway down the Dease River or by a highway down the Turnagain River from the south end of Dease Lake. At the present time there is a tractor road from Dease Lake to Boulder Creek on this route.

In so far as Atlin is concerned the adoption of the "B" route would not improve its present situation in regard to connection with the outside world. It could be linked with "B" route, however, by the construction of a local highway from Atlin via Dease Lake. A local highway north from Atlin to Carcross would afford connection with the White Pass and Yukon Railway, and eventually there would be the possibility of a highway from Carcross to Whitehorse and on to the "B" route. If the "Central A" route were adopted, the Atlin and Dease Lake areas would be directly served by it.

Since the "B" route will thus follow the location already described the responsibility of the Commission resolves itself into a comparison of the advantages and disadvantages of the "Central A" route and the "B" route.

A factor in the consideration of the former route is the preference expressed by the United States Alaska Highway Commission for a route through the Yukon via the Kluane Lake and River districts, since this affords a very favourable connection, from the Alaska standpoint, for the road between Fairbanks and the Yukon boundary.

The Kluane Lake route through Yukon Territory starts from Whitehorse and after traversing the Kluane River basin crosses the Donjek and White Rivers and reaches the Alaska boundary in the vicinity of Mirror Lake. From this point the United States Commission state that a very favourable road connection is possible via the Tanana River to the Richardson Highway and thence to Fairbanks.

The summary of mileages and estimates of cost of the "Central A" and "B" routes given herewith thus includes two estimates for the former route, one on the basis of the highway going through Dawson to the Alaska boundary, and the other on the basis of the route via Kluane Lake which does not touch Dawson.

The estimates of cost are based on the standards decided upon by the Commission, namely, a road grade 24 feet wide with a gravel surface 20 feet wide. (See Appendix.)

## ESTIMATED COSTS

24' Grade with Gravelling 20' Wide.

Based on Wages, Material, and Equipment Costs as prevailing in April, 1940.

| *"B" Route* | *Miles* | *Cost* |
|---|---|---|
| Section 1—Vancouver to Prince George, B.C. via existing highways (Improvement and Revision) | 525·5 | $ 4,710,000 |
| Section 2—Prince George to Yukon Boundary via Summit Lake (New Construction) | 526 | 7,900,000 |
| Sections 3, 4 & 5 Yukon Boundary to Dawson | 586 | 8,310,000 |
| Section 6—Dawson to Alaska Boundary via routes "A" and "A-1" | 68 | 1,880,000 |
| Total | | $22,800,000 |
| Engineering and Contingencies (10 per cent approx.) | | 2,200,000 |
| Total—Vancouver to Alaska | 1,705·5 | $25,000,000 |

| *"Central A" Route via Dawson* | | |
|---|---|---|
| Section 1—Vancouver to Fort St. James via existing highways (Improvement and Revision) | 639·5 | $ 5,760,000 |
| Section 2—Fort St. James to Yukon Boundary (New Construction) | 736 | 12,170,000 |
| Sections 3, 4 & 5 Yukon Boundary to Dawson | 458 | 6,790,000 |
| Section 6—Dawson to Alaska Boundary via routes "A" and "A-1" | 68 | 1,880,000 |
| Total | | $26,600,000 |
| Engineering and Contingencies (10 per cent approx.) | | 2,600,000 |
| Total—Vancouver to Alaska | 1,901·5 | $29,200,000 |

| *"Central A" Route via Whitehorse and Kluane Lake to Mirror Creek* | | |
|---|---|---|
| Section 1—Vancouver to Fort St. James via existing highways (Improvement and Revision) | 639·5 | $ 5,760,000 |
| Section 2—Fort St. James to Yukon Boundary (New Construction) | 736 | 12,170,000 |
| Section 3—Yukon Boundary to Whitehorse | 76 | 1,170,000 |
| Section 4—Whitehorse to Alaska Boundary at Mirror Creek via Kluane Lake | 307 | 4,000,000 |
| Total | | $23,100,000 |
| Engineering and Contingencies (10 per cent approx.) | | 2,300,000 |
| Total—Vancouver to Alaska | 1,758·5 | $25,400,000 |

With the approximate cost data now available it is possible to weigh the merits of the different routes.

The main advantages of "B" route can be summarized as follows:

(*a*) It is the shortest and most direct route through British Columbia and the Yukon to the Alaska Boundary.[1]

(*b*) It is the least costly of any of the routes under consideration.[2]

(*c*) No major construction difficulties are involved and the topography of the country traversed affords every opportunity for securing satisfactory grades and alignment.

(*d*) It is conveniently located in regard to the air route from Edmonton to Fairbanks via Fort St. John, Fort Nelson, Watson Lake and Whitehorse and is crossed by the air route at Watson Lake. It is also crossed by the air route between Prince George and Fort St. John.

[1] 196 miles shorter than "A" route through Dawson and 53 miles shorter than "A" route via Whitehorse and Kluane Lake.

[2] $4,200,000 cheaper than "A" route via Dawson, and $400,000 cheaper than "A" route via Whitehorse and Kluane Lake.

(*e*) Climatic and ground conditions are quite favourable from the standpoint of air transportation along the entire route. Landing fields could be constructed without difficulty and numerous lakes and rivers are available for the landing of planes equipped with pontoons. A highway on "B" route would thus serve a safe and alternate air route from Edmonton or Prince George to the Yukon and Alaska.

(*f*) It gives the opportunity for convenient highway connections with the Province of Alberta either by way of the Peace River through Hudson Hope or by way of the Monkman Pass route from the vicinity of Grand Prairie, Alberta. It also affords a possibility of a very practical and important connection from Edmonton, Alberta, to Prince George, B.C., via the existing Edmonton-Jasper Park Highway and by the proposed Jasper-McBride-Prince George Highway.

(*g*) There are no high passes to be crossed. The highest elevations[1] that will be reached north of Prince George are as follows:

2,315 feet on the direct route between Prince George and Finlay Forks;
3,273 feet at Sifton Pass;
3,150 feet on the Arctic Behring Divide just north of Finlayson Lake.

(*h*) Precipitation is moderate, the maximum snowfall on the ground at any one time being 3 feet in the vicinity of Sifton Pass, and from 3 to 4 feet on other sections.

(*i*) Construction will not be difficult, and average costs[2] per mile would be well within reasonable limits. Maintenance costs would also be reasonable.

(*j*) It will have a comparatively long traffic season, approximately from the latter part of May to the end of October. It appears that the limitations of this route, in so far as the length of season is concerned, will not be any greater than connecting routes to the South.

(*k*) It will serve Dawson and adjacent areas.

(*l*) It will afford access—through the construction of lateral roads to the West—to areas of considerable promise from the standpoint of mineral development.
(See information on Natural Resources.)

While construction on "B" route would make accessible large hunting and fishing districts, as well as areas with considerable scenic value, these advantages are common to all routes under consideration and are not a particular feature of "B" route.

Certain disadvantages of the "B" route such as remoteness, inaccessibility for construction purposes, and lack of populated areas, are shared to a greater or less degree by all routes and are not confined to "B" route only.

From a casual study of the accompanying maps it might be thought that the "Central A" route would be more accessible from a construction standpoint since camps on the lakes sections can be serviced by water transport and the Dease Lake section serviced by supplies brought up the Stikine River to Telegraph Creek. On the other hand the southern section of the "B" route can be serviced over the Manson Creek mining road and the character of the terrain followed by this route permits the cheap and rapid construction of a tote or tractor road for the transportation of supplies. Very little side hill construc-

[1] The highest point between Vancouver and Dawson, if the "B" route were adopted, would be on the Cariboo Highway at 83 Mile House, where the elevation is 3,830 feet.

[2] It is considered costs per mile would be lower than those on the Golden-Revelstoke Highway recently completed, on the basis of the same width of road.

tion for tote road purposes will be necessary on the entire route and clearing is compartively light. On the "Central A" route tote road construction will be slower and more costly. Climatic conditions are also more favourable for winter hauling of supplies than on the "A" route. Consequently if there is any advantage in so far as accessibility of construction is concerned it would seem to rest with the "B" route.

In so far as agricultural development is concerned the natural restriction north of latitude 56 is common to all routes.

Disadvantages that apply particularly to "B" route might be summarized as follows:

(*a*) It is too far to the east to offer any opportunity of road connections with existing coastal settlements in British Columbia or in the Alaskan panhandle.

(*b*) There is a serious local disadvantage in that it will not directly serve the Atlin and Whitehorse districts, both of which show considerable mining promise.

(*c*) With the exception of trading posts at Finlay Forks, Fort Graham and Fort Ware, there is practically no white population on the route north of Prince George until the headwaters of the Pelly River are reached in Yukon Territory.

(*d*) There is little or no commercial timber along the route.

The advantages of " Central A " route are listed as follows:

(*a*) It is nearer to the geographical centre of the Province and will give more convenient access to central areas than the "B" route.

(*b*) It will serve a promising mineral area and open to the public an excellent tourist route from the scenic and recreational standpoint.

(*c*) Its forest resources from the commercial standpoint are superior to those on the "B" route.

(*d*) Revenues accruing to the Province as a result of its construction are potentially greater than from the Eastern or "B" route.

(*e*) It will pass through Atlin and Whitehorse and directly serve the Dease Lake area.

(*f*) It has the advantage of construction facilities afforded through the possibility of water transportation.

(*g*) It will benefit more existing settlements in British Columbia than the "B" route.

(*h*) It is nearer to the Pacific Coast areas than the "B" route. (See ahead).

Chief disadvantages of the " Central A " route appear to be as follows:

(*a*) It is longer and more costly than the "B" route on either location that might be selected through the Yukon Territory and a longer construction period would likely be required.

(*b*) Climatic conditions are not as favourable as on the "B" route either from the construction or maintenance standpoint, there being higher precipitation.[1]

(*c*) Elevations in British Columbia are higher than on the "B" route, the highest elevation being approximately 4,650 feet as compared with 3,273 feet on the "B" route.

(*d*) Elevation and climatic factors tend to result in a shorter season.

(*e*) It is not as favourable from a standpoint of air transportation as the "B" route and is further removed from the air route between Edmonton and Alaska.

[1] See P. M. Monckton's 1941 report on depths of snow on this route.

(*f*) The character of the country traversed will not permit grades or alignment of the same standard as the "B" route.

(*g*) The alternative route in the Yukon Territory via Kluane Lake sidetracks Dawson.

The comparative proximity to the Pacific Coast of the " Central A " route as compared with the "B" route, has been listed as an advantage in the consideration of coastal connections, and in view of the interest of the United States Commission in lateral road connections between the route chosen and the panhandle of Alaska, and in view of the similar interest of Canadian coastal settlements, the Commission has given some consideration to this matter.

Connections to the west coast from the " Central A " route are only possible through river valleys. Apart from a highway down the Nass River Valley and which would yield precedence to a connection from Prince Rupert to Hazelton via the Skeena River, the only river valleys that merit any consideration are those of Bear River leading to Stewart, B.C., the Unuk River, the Iskut River, the Stikine River and the Taku River. A summary of the best information available to date on the possible routes leading from the " Central A " route along these rivers is given as follows:

*Route via Upper Reaches Nass River, Meziadin Lake and Bear River to Stewart, B.C., on Portland Canal*

From Cabin 6 the north side of the Nass offers the best possibility by staying some distance back from the River and crossing the Taylor River well up. The Nass Valley is narrow with steep sides for some distance above the mouth of the Bell Irving. Also a steep rise from the Nass to the Meziadin Lake level. The trail from Meziadin Lake to Stewart skirts the hillside above a glacier for about two miles at the head of Bear River. This part of the trail is practically all blasted out of solid rock on a very steep hillside and it is understood slides make it difficult to keep open. This seems the only North Pacific Coast connection that has any promise of being feasible.

*Unuk River Route*

Local sources report that the Unuk River, from the standpoint of roads or trails, is as bad or worse than the other North Coast rivers. There is a trail from the Coast in Alaskan territory to the boundary. An officer of the Department of Mines and Resources, who has been along the headwaters of the Unuk River, states that even if the road could be carried past the boundary, it would lead nowhere, as the passes are all ice-filled, and can be travelled only on foot.

The high ranges which lie to the west of Bowser and Meziadin Lake are all to the east of the Unuk River.

*Iskut River to International Boundary*

This is an extremely difficult country. The upper part of the Iskut River has numerous canyons and is inaccessible to horses. Dominion officers who have been in the district state it is not a favourable route for a road.

*Stikine River from Telegraph Creek to the International Boundary*

The river is navigable from salt water to Telegraph Creek from about the middle of May to the 1st of October each year.

Along the lower 60 miles of the river all the valleys on the West side and even some of the larger ones on the East side are occupied by glaciers that extend down nearly to the level of the River. The valley of the river at Telegraph Creek has been cut down to an elevation of 500 feet above sea level. In the wet belt below Little Canyon the river flats are a veritable jungle. The lower

slopes wherever conditions are favourable are heavily clothed with a mature forest of spruce, balsam, and hemlock. In many places where the slopes are steep, the rock is entirely bare. Timber line in the wet belt averages 3,500 feet.

Above Little Canyon vegetation somewhat resembles that of the dry belt. The valley flats are slightly more open in the lower part of the river. Timber line in general is about 4,500 feet.

The slopes on either side of the river rise very rapidly to the mountain peaks, which are in many cases higher than 5,000 feet.

From Telegraph Creek south to Shakes Creek it is possible to use horses to some extent since there are few trails on the lower wooded slopes, and above timber line the surface over large areas is too rugged to permit of travel by this means.

*Taku Route*

The upper portion of the Taku River, called the Nakina, is inside the coast range and it would probably be possible to build a road even as far down the Taku as King Salmon Creek. From there on it would be practically impossible. Any flats along the river are flooded when the Taku goes on the rampage as it does at times of high water. The walls of the valley are very precipitous in some places rising directly from the water to heights of over a thousand feet. Survey parties in this area were strongly advised by the people in the country not to attempt any work in the lower valley until late in the season due to the danger from avalanches and snowslides. They report these were very frequent.

In the lower reaches of the Taku River and up to the mouth to the Tulsequah River the river-bed is featured by a very gradual gradient, there being a rise of only 70 feet from sea-level in this distance of 26 miles. At normal water the river in this stretch is consequently not excessively swift and can be easily navigated by small river-boats equipped with 6-horsepower outboard motors.

Above the Tulsequah River the course of the stream rises more steeply and the flow is consequently swifter. It is said to be navigable by small 16-foot outboard-motor powered boats, with the aid of poling and lining in the more rapid stretches, as far as the confluence of the Nakina and Sloko Rivers, 31 miles above the mouth of the Tulsequah River.

From the above information it is apparent that lateral connections from the "Central A" route to the Pacific Coast are not favourable from the standpoint of reasonable construction or maintenance costs. Even if expensive surveys revealed locations on which a road might be built, the cost of construction and maintenance, combined with a short season, would in no way be justified by the advantages that might be gained.

Settlements on the Pacific Coast, both in Canada and Alaska, now have the benefit of first-class water transportation over the entire year, and there seems no good reason for the construction of costly connection to the Alaska Highway route that would not improve present transportation facilities.

The advantage of the "Central A" route through being nearer the Pacific Coast than the "B" route is not established when the facts are known.

## YUKON TERRITORY

In the preliminary report of the Commission submitted in April, 1940, brief reference was made to routes of the highway through the Yukon Territory. As mentioned at that time a large amount of information on possible routes through

this area was already available from Federal sources. This was supplemented by reconnaissance work undertaken in the 1939 season from Whitehorse to the Alaska boundary via Kluane Lake and River and by extensive reconnaissance survey work undertaken in the Yukon Territory in the 1940 season by Engineer J. H. Mitchell. (See Appendix for Mr. Mitchell's report on reconnaissance surveys from the Alaska boundary to Dawson and Carmacks, Y.T., and on routes from Carmacks to the Yukon boundary on Atlin Lake.)

The information now available indicates clearly the routes that will likely be followed.

On the eastern or "B" route the location through the Yukon would, as previously mentioned, traverse the valley of the Frances River and Frances Lake to the Behring Divide north of Finlayson Lake and thence down the Pelly River to the vicinity of Pelly Crossing. From that point, while several alternative routes offer themselves, the general course of the highway would be northerly via Reid Lakes to McQuesten and then to Dawson via either Flat Creek and the Klondike River, or by promising routes via Radford and Bonanza or via Caribou and Hunker.

Mr. Mitchell's reconnaissance report favours a route designated as "B" and "B-1" between the Pelly River and Dawson. This route approximates the location of the existing trail from Pelly Crossing to the vicinity of Stewart River and then turns westerly to Reid Lakes. Lake Creek valley is then followed to McQuesten and from that point the route follows successively the valleys of Slough Creek, Flat Creek, and the Klondike River to Dawson.

From Dawson northwesterly to the Alaska boundary a good deal of reconnaissance work was undertaken. Several routes were investigated including those via Fortymile Creek valley, via the existing Glacier Creek road, via Swede Creek valley and via Bell and Sixtymile Creeks. The most satisfactory route appears to be that from Dawson via Bell Creek and over the divide to the Sixtymile valley and following the latter to the Alaska boundary. The estimated distance on this route is 68 miles. This route, and other routes, is described in detail in the reconnaissance report.

On the "Central A" route the entrance into the Yukon Territory would be made on the east bank of Atlin Lake. From that point a route following the east side of Little Atlin Lake and of Marsh Lake and down the Lewes River to Whitehorse, is the shortest and most direct. While it by-passes Carcross it is less costly because of lower mileage. A location via Carcross would shorten road connection between Atlin and the Yukon-Whitepass railway by 22 miles, but this local advantage does not justify abandoning the shorter and cheaper Marsh Lake route.

From Whitehorse the main highway towards Dawson would follow generally that of the existing winter road or trail to Carmacks. No difficulties in construction are indicated. North of Carmacks at Five Finger Rapids, the highway would cross the Lewes River continuing along the east bank to Minto. From this point the favoured route would swing northeasterly to the Pelly River.

A suitable bridge site is available down river from Pelly Crossing just above the confluence of Grayling Creek and Pelly River and from here the route to Dawson and the Alaska boundary would follow that already described as part of the "B" route.

An alternative location is possible from Five Finger Rapids via Tatchun Lake, Tatlmain Lake, and Mica Creek to Granite Canyon on the Pelly River, some 16 miles above Pelly Crossing, and which is a first-class bridge site. However, this route is 22 miles longer than the route from Five Finger Rapids bridge site via the Lewes River and Minto, and the latter is consequently considered the better location.

*Whitehorse-Kluane Lake Route*

The "Central A" route through the Yukon Territory offers an important alternative from Whitehorse via Kluane Lake and River to the Alaska boundary and which has already been referred to. (See also appendix report of R. M. Martin, 1939.)

Reconnaissance surveys show that this is the shortest route through the Yukon Territory itself to the Alaska boundary. It cuts across the southwest corner of the Yukon Territory and the mileage is much less than that of the route through Dawson, the estimated cost being proportionately lower. It does not, however, compensate for the much greater mileage of the "A" route in British Columbia as compared with that of the "B" route. As previously mentioned the Kluane Lake route required careful consideration because it is favoured by the United States Alaska Highway Commission. On this route the Alaska boundary is reached in the vicinity of Mirror Creek and which, members of the latter Commission state, is a very favourable point for connection with the Alaska section of the road coming up the Tanana River Valley from the Richardson Highway. From Whitehorse to the Alaska boundary via Kluane Lake the estimated distance is 307 miles. From Whitehorse to the Alaska boundary via Dawson the estimated mileage is 450. On the Kluane Lake route, elevations are moderate and from the information obtained by reconnaisance surveys are slightly below a maximum of 3,000 feet.

On the route via Dawson, elevations are also comparatively low, the only section where they might be a factor being between Dawson and the Alaska boundary. However, the maximum elevation on the route favoured is on the divide between the headwaters of Bell Creek and the headwaters of a tributary creek of the Sixtymile River, and Mr. J. H. Mitchell in his reconnaissance report considers this elevation is below 3,000 feet. Consequently there seems no advantage to either route in so far as elevations are concerned.

In regard to mileages in territorial Alaska the estimated length from the Alaska-Yukon boundary at Mirror Creek on the Kluane Lake route to Fairbanks is given by the United States Commission as 330 miles, of which 100 miles (along the Richardson Highway) is already built. On the Sixtymile Creek route west of Dawson a rough estimate of the Alaska mileage (by scale) is 320 miles, of which 100 miles (along the Richardson Highway) is already built. A member of the United States Alaska Highway Commission has supplied an estimated cost for the 230 miles of new road required in Alaska from Fairbanks to the Yukon-Alaska boundary at Mirror Creek of $2,760,000. The United States Commission has not yet supplied any estimated cost for the route from the Alaska boundary at Sixtymile Creek to the Richardson Highway.

The Whitehorse-Kluane Lake-White River route crosses the southwestern corner of the Yukon and if adopted, the latter territory, which is under Dominion control, would have comparatively little benefit from the Alaska Highway except through the construction of secondary roads. Construction on this route would mean that Dawson and all the productive mining areas in the Dawson, Mayo, and other districts, would have no convenient connection with the International Highway. These areas would still have to depend on summer navigation on the Yukon River or on the eventful construction of secondary roads to connect with the main highway.

Dawson, Bear Creek, Hunker Creek, and the Klondike River are all names that represent world famous placer-mining areas. Dawson particularly is intensely interesting from the tourist standpoint and for this reason alone has a strong claim for the international route. At the same time if the Dawson route is selected the main highway can pass through the more settled sections of the Yukon Territory without any increased mileage or loss of alignment advantages. The route through Dawson is further a natural location if the "B" route, and which follows the Pelly River, is adopted.

Regardless of what arrangements may be arrived at for the financing of the Alaska Highway some 85 per cent of the distance will be in Canadian territory and the responsibility of its maintenance will largely rest with Canada. At the same time Canadian interests require that where the highway can be routed to better advantage for the development of natural resources, this should be done provided the route as a whole will not suffer through inferior grades and alignment or by increased mileage and cost.

In so far as the Yukon Territory is concerned there seems no doubt that the Kluane Lake alternative, which is available on the "Central A" route, would benefit the Yukon as a whole to only a small degree unless extensive secondary roads were built. The cost of these to Canada would be far greater than the expected saving to the United States through the adoption of the Kluane Lake location.

In view of the short length of the highway in Alaska there can be no serious disadvantage to that territory if Canada selects a route that will make connection with the Alaska section of the road at a point west of Dawson.

These points were discussed at the joint meeting of the two Commissions in Washington in March, 1941, and the members of the United States Commission expressed full appreciation of the Canadian viewpoint. At the same time they asked that, in making its 1941 report, the Commission set down the facts in regard to the Kluane Lake route and mention the preference of the United States Commissioners for it. This has been done. However, under all the circumstances, the Canadian Commission has decided that Canadian interests would be much better served by routing the Highway through Dawson if the "Central A" route should be adopted.

A general statement on highway construction in northern areas is appropriate at this point. While the information collected shows that there is no difficulty in construction through the Yukon Territory and that ample construction facilities are afforded by existing waggon roads or trails, construction in the northern section of the Yukon will follow a somewhat different procedure than in southern areas because of frost conditions. It is considered in the Yukon Territory that from the construction standpoint the perpetual frost line runs east and west through Yukon crossing and that north of this line construction methods must be modified to suit frost conditions. These circumstances have been given due consideration in estimates of costs through the territory, which are comparatively high in view of the moderate amount of grading that will be required per mile of road.

## GENERAL

In reviewing available routes of the British Columbia-Yukon-Alaska Highway the Canadian Commissioners have given consideration to the general problem of servicing an area or a country by highways. The Alaska Highway opens the broadest fields in so far as this feature is concerned. A route through the approximate geographical centre of Canadian territory is possible and, by some diversions and meanderings, a large amount of territory can be directly tapped in which the natural resources show considerable promise. On the other hand a direct route is possible which will afford low mileage and result in low cost. Areas not served by this route can be connected with it by secondary lateral roads.

The type of route first mentioned involves some sacrifice of the road standard, as regards grades and alignment. It also requires the investment of a large sum of money per mile to service areas where potential resources have not yet been proven. On the other hand a direct route involves no assumption of profitable development of any area, and areas that prove themselves later on can always be connected to the main route by secondary roads.

These factors indicate that from the engineering viewpoint and from the standpoint of an International Highway, the best route is that which is the shortest and most direct, and which at the same time affords reasonable access to adjacent territory. This view is strengthened when the direct route is also the least costly. On this basis the Eastern or "B" route has the most advantages.

As shown on the table of estimates this route involves 1,180 miles of new construction at an estimated cost of $18,090,000, and a total cost, including necessary improvements to existing roads, of $22,800,000 from Vancouver to the Alaska boundary, with a total distance of some 1,705·5 miles.

The addition of ten per cent for engineering and contingencies brings the total estimated cost to $25,000,000.

## ECONOMIC ASPECT

The Order in Council of December 22, 1938, appointing the Canadian both the standpoint of military defence and from the standpoint of economic financial, and other aspects of the proposal to construct the said highway to Alaska".

Supporters of the project have stated that the highway is justified from both the standpoint of military defence and from the standpoint of economic development. The Commission does not intend nor is it authorized to dwell on the matter of the Highway from the military standpoint. This question is one that will no doubt be dealt with from time to time, as necessary, by the Joint Defence Board of Canada and the United States.

In regard to the economic aspects this is a wide question that possibly could not be definitely answered until the Highway was built and in use.

Information given in the Appendix of this report indicates the natural resources of the areas in northern British Columbia and the Yukon that will be traversed by the Highway. The extent to which the development of these natural resources will be encouraged by the construction of the Highway depends upon their own potential value. Certainly the building of the road will stimulate to a great degree investigation of forest, mineral, and water-power wealth in the Pacific northwest. At the same time since the Highway will connect territorial Alaska with the main area of the United States it will prove a tremendous factor in encouraging and developing tourist traffic from the Pacific States, not only through British Columbia and the Yukon but throughout all the western provinces. The new highway will make available unlimited recreational areas that will attract tourists of all classes and ages. New hunting and fishing areas will be made easily accessible and new scenic areas will come within range of all motorists in North America.

In its excellent report of 1938 the Interdepartmental Committee at Ottawa came to the conclusion that the construction of the Highway at that time was not justified from the economic standpoint. This considered opinion has been carefully weighed by the Canadian Commission. The latter agree with the findings of the Government departmental committee to the extent that it may not be possible to prove now in so many figures that the construction of the Highway is justified from the economic standpoint. The Canadian Commission points out, however, that experience in the past has shown how difficult it is to estimate in dollars and cents the economic advantages that may accrue from the construction of a new highway. The Queen Elizabeth Highway in Ontario, the Banff-Jasper Highway in Alberta, and the Kingsgate-Kootenay Park Highway in British Columbia are striking examples of

recent investments that are far exceeding in benefits the results anticipated. Such transportation channels, by their very availability, attract new business and create their own advantages.

The estimates show that the cost of the highway completed to the standard decided upon, but exclusive of paving, will range from $25,000,000 to $30,000,000. It might assist in getting a true perspective of the cost of this project by giving some figures of highway expenditure in Canada. For example the Province of Ontario in the past four years has made the following expenditures on provincial roads. The figures given include provincial subsidies to county and township roads:

| | |
|---|---|
| 1937-38 | $43,703,000 |
| 1938-39 | 42,000,000 |
| 1939-40 | 31,900,000 |
| 1940-41 | 26,300,000 |

In addition there have been substantial expenditures each year by the counties and townships.

The Province of British Columbia which has a large road mileage, much of which is in fairly mountainous country, has made the following expenditures on main roads only:

| | |
|---|---|
| 1936-37 | $2,200,000 |
| 1937-38 | 3,900,000 |
| 1938-39 | 3,900,000 |
| 1939-40 | 5,220,000 |

Proponents of the project consider that it is on a sound economic basis and that it would be more favourably situated in this respect than other more costly projects that have been developed in Canada. They point out that main highways once built are never abandoned, although they may be relocated or improved.

### Period of Construction

Under normal conditions the economic time to be allotted for construction purposes is usually arrived at by setting an approximate balance between cost of equipment necessary for quick construction and the extra overhead costs involved over a long construction period, all being subject to any urgent need of the project. In the case of the Alaska Highway, five or six years would be reasonable from the construction standpoint and would also ensure fairly prompt completion of the road. If an emergency condition arose the construction period could be greatly shortened. In the latter case the "B" route has considerable advantage over the " Central A " route since it is not only shorter but its topographical features lend themselves more readily to quick construction of a preliminary nature.

## CONCLUSIONS

After careful consideration of the information obtained on the ground by members of the Commission and its engineers, as well as of the facts and opinions brought out in public hearings and in briefs filed on behalf of various interests, all of which are embodied, in whole or in summary, in this Report, the Commission has agreed upon the following conclusions:

From the towns of Prince George, Fort St. James and Hazelton, B.C., all at present connected with Vancouver and the international boundary through the provincial highway system, three main routes suggest themselves for the extension of that system north through British Columbia and the Yukon Territory

to Alaska. The characteristics, advantages and disadvantages of these three main routes, known as the "Coast" Route, the "A" Route and "B" Route, as well as of various alternatives of parts of these routes, have been investigated by the Commission as carefully as circumstances would permit. They have been described in some detail in the earlier parts of this report.

Briefly stated, the Coast Route would run from Hazelton or Kitwanga by way of the Nass and Bell-Irving Rivers to the Upper Iskut River, and via Kinaskan and Eddontenajon Lakes to the Stikine Valley. Thence by either the Tahltan and Sheslay Rivers or by the Tuya River to Nahlin, Nakina and Atlin. From the Telegraph Creek-Dease Lake area to Atlin and the Yukon Boundary and beyond, the Coast Route and "A" Route would be the same. It is the conclusion of the Canadian Commission—and we are informed that the United States Commission has reached the same conclusion—that the Coast Route would, because of topographical and climatic difficulties, be impracticable for the purposes of the Alaska Highway.

The "A" Route, if starting at Hazelton, would follow the Skeena, Klappan and Stikine Rivers to the Tanzilla River Valley. An alternative would start from the vicinity of Burns Lake and follow the Babine River Valley to the Skeena. Another alternative would start from Stuart Lake, at Fort St. James, and following Trembleur and Takla Lakes continue north to the Skeena River Valley. All these alternative routes meet west of Dease Lake, and from there again alternative routes would be available to Atlin. Similarly from Atlin to Whitehorse and beyond, while the general route as far as Whitehorse presents no particular problem, beyond there alternative routes must be considered to Dawson, or an entirely different route is practicable from Whitehorse to Alaska via Kluane Lake.

The "B" route starts from Prince George, and by way of McLeod Lake, Finlay Forks, Sifton Pass, the Liard River and Frances Lake, runs north to the height of land and then down the Pelly River to the vicinity of Pelly Crossing, from which point it runs northerly and then westerly to Dawson. Continuing westerly from Dawson it strikes the Alaska Boundary some 220 miles from the Richardson Highway. Several alternatives of this route have been described in the earlier part of this Report.

Generally speaking it appears from the information before the Commission that the "B" Route would present few engineering difficulties, would not be expensive either to build or to maintain, would give convenient access to feeder highways from Alberta through the various mountain passes, would tap valuable natural resources, and would lead directly to Dawson and by an easy engineering route to the Alaskan boundary. It would have the additional advantage of offering practicable connections with the Air Routes now under construction from middle-western airfields through Edmonton to Fort St. John on the Peace River, and from the Pacific Coast through Prince George and Fort McLeod to Fort St. John, and thence to Fort Nelson, Whitehorse, Dawson, and Fairbanks in Alaska.

The "A" Route, in any of its alternatives, would be interesting and attractive to tourists from a scenic point of view. It would offer unusual possibilities for big game hunters and fishermen, would give even more convenient access to valuable natural resources than the "B" Route, and would serve in varying degrees the interests of existing communities such as Hazelton, Telegraph Creek, Atlin, Carcross and Whitehorse and, through the medium of the White Pass and Yukon Railway, similar communities in southern Alaska.

It should be particularly noted that both the "A" Route and the "B" Route would be entirely practicable from an engineering point of view.

The Commission finds that the cost of a highway completed to the required standard, but exclusive of paving, would range from $25,000,000 to $30,000,000.

The Commission thinks it important to emphasize the fact that all estimates of costs given in this Report are based on reconnaissance surveys, and are therefore necessarily only approximate. Before construction could begin location surveys would be necessary to decide on the final location of the road where certain alternative routes are available and to confirm and enlarge information already obtained.

As proposed in the Commission's Preliminary Report, field work was carried out in the season of 1940 by both Dominion and British Columbia engineers, whose Reports will be found in the Appendix. These Reports substantially confirm the Commission's expectations as to the characteristics of the various "A" Routes in British Columbia, and of practicable routes in the Yukon.

While, as stated above, the Commission finds that, with the exception of the Coast Route, all routes mentioned in this Report are entirely practicable from an engineering point of view, and each has important advantages as a highway through British Columbia and the Yukon to Alaska, a careful balancing of advantages and disadvantages leads the Commission to the conclusion that the "B" Route would best fulfil the purposes of such a highway.

The Commission desires to record its appreciation of the willing cooperation of all interested parties in bringing together the available material bearing upon practicable routes for the proposed highway. Particularly the Commission wishes to express its gratitude to the Government of British Columbia for placing the maps and engineering data in its possession at the disposal of the Commission and for authorizing, at considerable expense, additional field surveys by its engineers. The Commission also wishes to express its thanks to the Department of Mines and Resources, Surveys and Engineering Branch, for the reconnaissance survey work of its construction engineers, and for undertaking the great task of checking reports, estimates of cost and mileage, and preparing the maps that accompany this report. All this work has been of the greatest assistance in the preparation of the Commission's own report to the Canadian Government.

Dated at Ottawa this 15th day of October, 1941.

CHAS. STEWART

T. L. TREMBLAY

J. M. WARDLE

ARTHUR DIXON

J. W. SPENCER

## II

## NATURAL RESOURCES (Part VI, Vol. 1)

It will have been seen, in the earlier part of this Report, that a number of witnesses at the various hearings offered evidence as to the resources of the country through which the highway would be built, whichever route should be finally selected. This evidence was for the most part very general in character, and it seems to the Commission desirable to supplement it with more specific and detailed information drawn from governmental and other authoritative sources.

*Minerals, Forrest A. Kerr*

Forrest A. Kerr, of the Geological Survey of Canada, in a summary report dated April, 1932, said of the proposed Alaska Highway and its relation to mineral development in British Columbia:

"Northern British Columbia is known to contain two favourable zones for mineralization:

"The western zone lies in the eastern part of the Coast Range, stretching as a narrow belt from a point between Atlin and Stewart the zone is accessible at present by the Stikine and Taku rivers, Portland Canal, Atlin, and to a lesser extent, by the Unuk river.

"These routes provide the necessary means, by improved water transportation of railway construction material, of developing any major mineral deposits which may require the moving of very large tonnages of ore and equipment.

"Some sections of the zone, however, remain inaccessible by these routes and although a road on the eastern flank of the range would provide a means of prospecting these areas and to some extent a means of developing any important discoveries, any long road haul would be prohibitive, except in the case of unusually rich deposits.

"There is little evidence to show that the area immediately north and east of the above-mentioned western zone is favourable for mineralization, although there may be some small areas deserving further study; hundreds of square miles are covered with lava and are likely to be entirely barren. Large coal deposits are known to exist in the Groundhog section. These may be of considerable value at some future date.

"There is an eastern belt favourable for mineralization, lying roughly to the west of the Parsnip river and the Finlay river and considerably to the east of Dease Lake, and is separated from the proposed route of the road by the Cassiar and Omineca Mountains, a formidable system extending from central British Columbia to central Yukon. Long feeders from the main highway would be necessary near the Cassiar-Omineca Mountains, but it is doubtful whether the main highway would be an important direct aid in the development of this zone.

"In the western part of the Cassiar-Omineca Mountains the zone known as the Cassiar-Omineca batholith, which is parallel to the above-mentioned eastern zone, is geologically favourable for mineralization and is probably the source of some of the Yukon placer deposits. The Dease Lake area is the only deposit which has been examined geologically or extensively prospected, and is somewhat discouraging. Otherwise, practically nothing is known about this geologically favourable zone.

"It is thought that a third zone immediately west of the Cassiar-Omineca batholith may exist, though it appears doubtful that it has the potentialities of the other two. However, a route near the Cassiar-Omineca Mountains might be the means of opening up valuable mineral resources."

*Minerals, J. D. Moodie*

Inspector Moodie of the Northwest Mounted Police in his Report of 1899 on the overland expedition from Edmonton to the Yukon, included some notes on the mineral resources of the region traversed.

" At Manson Creek," he said " between Stuart Lake and Grahame, mines are being worked and a considerable amount of capital invested. A large number of bench and river claims were staked out during April, 1898, on the Finlay and Parsnip rivers. From one bar, about eight miles up the Finlay, a large amount of gold has already been washed. Horn Creek is also said to yield good prospects; it flows into the Peace River a short distance below the Parsnip. The Ingenica, Ospica and Omenica rivers give good colours in many places. In fact, as I have said, almost every creek and river will give ' colours ' in more or less paying quantities."

Inspector Moodie added: " Copper was found near Deadwood Lake about forty miles east of McDame's Creek, and a good seam of coal near camp 50, north of the divide between the Finlay and Turnagain rivers."

*Minerals, John D. Galloway*

In 1931 John D. Galloway, Provincial Mineralogist of British Columbia, made a report to what was known as the Fact Finding Committee, set up in connection with the former Alaska Highway Commission. In this report Mr. Galloway said:

" Geologically, this area is known to be mineralized in many places, but a large part of it is difficult of access. It has been penetrated by prospectors in many places, from Hazelton to the north, Atlin to the south, and from suitable points on the coast.

" The Eastern Contact zone of the Coast Range is known to be a well-mineralized zone. In this zone are contained the important productive mines of Stewart, B.C., notably the Premier. Other mineralized areas in this zone are Alice Arm, Anyox, Taku river and the Atlin placer area somewhat to the east. This Eastern Contact zone has only been intensively prospected where it could be reached from the coast, but long stretches are not accessible.

" The probable route of the road (as then proposed) will lie somewhat to the east of the Eastern Contact zone of the Coast Range, but would give much better access to parts of this area than is now possible from the coast.

" Further east from the Contact Zone metallic mineralization also occurs, as for instance in the Rocher deBoule Range at Hazelton, at Meziadin Lake and at Telegraph Creek.

" The proposed road would also pass somewhere near the Groundhog coal-field. This field was slightly developed in 1910 and 1911 but since has laid dormant. Good transportation might result in the best parts of the field being further tested. Ultimately, of course, no appreciable production of coal would be made without railway connection.

" The further development of the placer district around Atlin would not be advanced to any extent by this road, as the present transportation suffices. In connection with mineral resources, the following statement has been made by Dr. J. T. Mandy, Resident Engineer for the District:

> ' Despite the exceptional mineral resources of this area, the region has remained comparatively inactive. The fact must be acknowledged that the development of the country is retarded by an inconvenient and expensive transportation system, and it will not be fully developed unless this condition is alleviated. The remedy, apparent and logical, lies in the construction of a direct transportation system down the Taku river valley to seaboard, approximately 143 miles in length. With the develop-

ments that are now taking place in this latter area and the mooted Pacific-Yukon Highway, the hope for the materialization of this remedy to the struggles of the interior Atlin region may perhaps be fulfilled in the not distant future.'

" It is the policy of the Department of Mines to open up known mineralized areas for prospecting by good trunk trails. As a rule, roads are not considered, first of all on account of expense, and, secondly, because the exploration of a mineralized area is speculative and the possibilities cannot be appraised in advance as in the case of land and timber. The expense of roads for prospecting cannot therefore be justified. Following the finding of certain mineral showings, roads, as a rule, become necessary before adequate development can be carried out to determine the value of the properties. The Nation river-Manson Creek area is a case in point, which has been served by trails for years and now the Department is endeavouring to get a main sleigh-road through the area.

" The acceleration of prospecting in the mineralized area from Hazelton to Atlin would in no way justify the proposed road but if built much additional mineral exploration will undoubtedly result with the incentive of possibly finding another Premier mine."

Mr. Galloway's Report deals, as will be seen, particularly with the route from Hazelton to Atlin, and does not give consideration to the more easterly routes. It is also to be noted that transportation facilities in the Atlin district are much less adequate to-day than they were in 1931.

*Forest Resources*

The following Report, prepared for the information of the Fact-Finding Committee of 1931, also deals entirely with the region that would be traversed by the highway from Hazelton to Atlin:

" For descriptive purposes the region of the Province noted in the attached summary has been divided into five drainages. Two drainages, namely, the upper Skeena and upper Nass river valleys are situated within the organized forest district of Prince Rupert. The three remaining drainages are in unorganized territory. While forest resources in all drainages described are principally suitable for manufacture into pulp, timber suitable for construction will be found in varying quantities when needed. Up to the present, due to lack of demand and distances from present-day markets, there has been practically no exploitation of these resources. The only forest products that have been utilized are cedar poles from the vicinity of Hazelton and Kitwanga, mine timbers and a small amount of saw timber for local use in the vicinity of Atlin.

*Upper Skeena River*

" This region comprises an area drained by that section of the Skeena river east of the axis of the Coast Mountains. The headwaters of the Skeena rise in a pass that divides it from the Stikine river at an elevation of approximately 4,000 feet. From this point it bears a southerly course to its junction with the Bulkley near Hazelton, elevation 725 feet. The principal tributary streams are the Alankis, Kispiox, Shegunua, Sustut and Kitwanga rivers. Topographic features are very uniform and consist of a series of plateaux broken by high barren ranges rising to a maximum elevation of 7,000 feet and forming main divides. Forest growth is very uniform and is chiefly the hemlock-spruce type. Lodgepole pine found on the drier sites occurs both in pure stands and in mixtures with spruce and balsam. Cedar occurs along the upper benches of the Skeena, its northern limit being found 40 miles north of Hazelton. Burned areas are relatively small north of Kisgegas, an Indian village on the Babine river. These areas are restocking fairly satisfactorily. The only exploitation of timber in this drainage to date has been in cedar poles for eastern markets via Hazelton and the Canadian National Railway.

*Upper Nass River*

" This drainage adjoins the Skeena Valley to which it is similar as regards physical features and forest cover. The headwaters of the Nass rise in Lat. 56° 50'-Long. 130° opposite the headwaters of the Iskut river and flowing in a southerly, thence westerly direction through the Coast Mountains, emptying into Observatory Inlet at Lat. 55°-Long. 130°. Important tributaries of the Nass are the east fork, the Bell-Irving, Cranberry, Kuiskuch and Tseax rivers. Recent examination of the forests of this region show extensive areas of Crown timber, chiefly suitable for manufacture into pulp. Hemlock, balsam and spruce predominate, with extensively burned areas reproducing the lodgepole pine. Cedar is found only in the southwestern extremity of this drainage, namely in the Tseax valley.

*Stikine and Iskut Rivers*

" The drainage basins of these two rivers comprise the area that is situated between the axis of the Coast Mountains on the west and the Cassiar mountains on the east. As the axis of the Coast Mountains forms the boundary between British Columbia and Alaska, only the eastern slopes are within the Province. The altitude of the bottom of the Stikine Valley varies from about 4,000 feet at its source to tidewater at its mouth. Topographic features vary and while main divides attain higher elevation than the Nass to the south, the formation of the valleys is similar. Whitford and Craig (1917) reported the climate differences at this latitude greatly influence forest growth; timber is smaller and is only found in commercial quantities on protected sites. Around Telegraph Creek the climate is arid and there are areas along the Stikine and its tributary the Klappan where conditions are too dry to support forest growth. The volume of timber suited to commercial purposes is small. The hemlock-spruce type prevails; balsam of an inferior grade is found throughout the region. Lodgepole pine stands occur in commercial quantities on the upper Spatsizi river. Excellent summer grazing is to be found on the plateau land of this region.

*Taku River Drainage*

" The drainage basin of the Taku river lies between the Stikine on the south and the Atlin region on the north. It contains portions of two physiographic units, namely, the slopes of the Coast Mountains and the Yukon Plateau. Two important tributaries are the Sloko and Inklin rivers. The plateau portion of this region has a general altitude of 4,000 feet. The Coast Mountains are high and rugged and covered with glaciers, some of which fill the small side valleys and reach nearly to the waters of the Taku. The portion of this valley in British Columbia supports a heavy growth of hemlock, spruce and balsam. Timber line occurs at an altitude between 1,500 and 2,000 feet. Of the 846 square miles below the merchantable timber line, 409 square miles is considered incapable of supporting timber. This area is composed of swamps, lakes and badly burned patches, which, not restocking, are covered with grass or willow growth, or are barren. The merchantable timber lies mostly along the lower reaches of the Taku, where the moist warm climate of the Alaska coast exerts a favourable influence.

*Atlin Region*

" This region comprises that portion of northwestern British Columbia situated between the axis of the Coast Mountains on the west and the Dease Lake River divide on the east. There are two contrasting types of topography in the district: the Coast Mountains and the Yukon Plateau. The Coast Mountains consist of a rugged range partly covered with snow and ice throughout the year. The Yukon Plateau to the east consists of uplands and valleys. The uplands have a general elevation of between 4,000 feet and 5,000 feet, while

valleys range from 2,200 feet to 2,400 feet. The valleys are steep-walled typically U-shaped depressions and are partially covered by lakes. Of these Atlin Lake is the largest in the Province. Although precipitation is similar to Kamloops in the southern part of the dry belt, conditions of temperature are unusually severe and to a great extent influence the forest growth in this region. The amount of merchantable timber is very small. The principal forest type of the region is spruce-alpine fir. Lodgepole pine occurs on the poor soils. Poplar groves and willow thickets occupy the richer soils where the original forest has been completely destroyed by fire.

"From the viewpoint of the coast or interior lumbermen of southern British Columbia, the forests in the vicinity of Atlin would not be considered as containing merchantable timber. The character of the timber growth is comparable to that found at an altitude of 5,500 feet in the southern part of the Province. It is of interest to note to what degree utilization of our forests can be practised when records show that in former years seven small mills around Atlin Lake had an annual output of 750 M.B.M. of this grade of timber."

In addition to the foregoing Report on timber resources, the Commission has received from the Dominion Forest Service a Memorandum prepared by Mr. W. E. D. Halliday; and four sheets of tabulations of forest land classification and merchantable timber on the "A" and "B" routes, supplied by the Government of British Columbia. These will be found in the Appendix as 6 and 7.

*Water Powers*

The following statement on water powers, in the same area between Hazelton and Atlin, was prepared for the Fact-Finding Committee of 1931 by officers of the British Columbia Government:

"There are numerous water powers of many sizes within transmission distance by electrical energy of the projected highway but of which at present very little detailed information and data have been collected. However, of the larger rivers, such as the upper waters of the Skeena, the Nass and the Stikine, the information available indicated that the potential water powers are large and would repay further investigation. For instance, on the upper waters of the Skeena above Hazelton, there are four known power sites, i.e., the canyon at 4-mile bridge, the Old Kuldo Canyon, the Big Slide Canyon and the 4th Canyon 9 miles above the 4th Telegraph Cabin.

"On the Nass river the following sites are known to exist, i.e., Grease Harbour, 1¼ mile, 14 mile, 15½ mile, at mouth of Tchitin river, just below mouth of the Kinskuch river, Flat Rock Point, just below mouth of Meziadin river, and at Big Bend (28 miles), Smoke House (30 miles), and Micks Isle (43 miles), besides the possibilities on the tributaries such as the Kinskuch river, Meziadin river, etc.

"Should the demand exist, developments totalling over 200,000 horse-power could be made from the waters of the Nass. Of the power possibilities of the Stikine river and its tributaries, little is known, but as the river flows through several rocky canyons whose walls exceed 200 feet in height, it is more than likely that sites exist at which developments could be made."

*United States Highway Report*

In the Report of the Commission to study the proposed highway to Alaska, published at Washington in 1933, considerable attention is given to the question of natural resources in northern British Columbia, the Yukon and Alaska, as one of the justifications for the highway. It is to be noted that in this Report, as in the reports to the Fact-Finding Committee already quoted, it is assumed that the highway would follow the westerly route north from Hazelton, and the resources described are those that would be available along that route.

These natural resources, says the report, consist of gold, silver, copper, lead, zinc, gypsum, coal, timber, furs, wild game and farm lands, and the principal attention is given to minerals. The report states that the most important gold deposits in British Columbia are in the northern half of the Province and can be reached now only with great difficulty. Development in the Telegraph Creek, Taku and Atlin areas had been greatly retarded by transportation difficulties which would be largely overcome by the new road.

*Conditions in Yukon*

It is observed that transportation facilities in the Yukon are pretty well confined to the Yukon river and its upper tributaries. These waterways offered adequate provision for through transportation of freight, but the development of the country could not be completed until a road system supplementary to the river was provided. A road from Whitehorse to Dawson, with branches tapping intermediate areas, would make it possible to move freight by truck more expeditiously and cheaply than by river steamers.

*Gold in Alaska*

The Report draws attention to the fact that the area in Alaska between Dawson and Fairbanks is known to contain gold in paying quantities. "In the Chicken Creek area particularly there are extensive low-grade deposits, which could be worked profitably if transportation difficulties could be overcome, as they would be by this new road. Investigations made by the United States Geological Survey show that conditions in the general area between the Tanana and Yukon rivers are favourable to the occurrence of valuable metalliferous deposits. Their development is practically impossible under present transportation difficulties, but if there were an autotruck road across this area, development of the resources would be feasible."

*Changed Conditions*

In the 1933 Report, it is emphasized that it is important to keep in mind the changed conditions in mining gold in the north country. "In the early days," it says, "rich concentrations of gold were found in British Columbia, the Klondike, Tanana Valley, Nome and elsewhere. These deposits were so rich that even individual miners with no more equipment than they could carry on their backs or on dog sleds, could wash out gold in paying quantities. But these rich deposits have largely been exhausted and the remaining metal is so diffused that mechanical processes are necessary for its extraction. Where pans or crude rockers and sluices once yielded paying quantities, now dredges or powerful hydraulicking outfits are required. The machinery, the fuel, the supplies, the labour required for these operations cannot be brought to the site of the work economically without modern transportation. Even the prospecting and development work which precedes the production phase, demands economical transportation, which generally must involve the use of autotrucks. It is no longer generally possible for a couple of prospectors to go out and with pick and shovel uncover rich deposits of gold or other metals. The modern system of prospecting comprises a general observation of ground forms, geological investigations for the purpose of locating favourable conditions, extensive excavation, and sometimes tunnelling so as to locate the deposits. All of this work must be done before a prospect is brought to a production basis, and cannot be done without the use of modern overland transportation. Unless roads are provided, work of this kind must be confined to the areas immediately adjacent to the navigable waterways, leaving untouched large areas not so favourably situated.

"In Alaska, and probably also in Yukon Territory, short roads have been built inland from various points on the navigable rivers for the development of nearby areas, and while these have answered the most urgent requirements,

the lack of a comprehensive trunk system has greatly retarded development. Under present conditions, the transportation of a shipment of freight from a Canadian or American supply point to the interior of British Columbia, Yukon Territory or Alaska frequently demands the use of an ocean vessel, a railroad, a river steamer, an autotruck or wagon road and a pack trail in turn. If the gaps between the existing isolated road systems were filled in, some of these expensive rehandlings of cargo could be avoided, thus reducing the total freight charge, which, under present conditions, is often prohibitive.

"In Canada the area between Kitwanga and Bowser Lake has been prospected and many claims staked. In 1930 it drew the attention of several large companies who sent their engineers in, and it is understood that the region is very promising. Lack of transportation has retarded development. In the Topley and Smithers districts mines are under development, and the mineral area extends northward into the Babine Mountains, where extensive claims exist. During 1930 several large mining companies have investigated extensively along the Driftwood, Bear and Omineca rivers and westward of Takla Lake. On the lower Klappan, claims showing high values have already been staked, and the upper Stikine offers a good field for further promising investigation. These areas are now beyond the field of the ordinary prospector, because of the expense and difficulty of entering the region. Large companies are exploring by plane. From the Stikine river northward, in the Dease Lake district and along Liard river, placer mines have been worked; but transportation costs of $160 per ton from Wrangell make profits doubtful."

*Coal*

North of the Bear river, in the region between the upper waters of the Skeena and the Stikine, it is pointed out that the mineralized formation yields to the coal measures. In this district are found the Groundhog coal fields, valuable anthracite deposits, in which so far little development has been attempted because of the lack of transportation facilities. These coal fields lie on the Hazelton-Atlin route.

*Timber*

It is reported that the lower Nass valley, in the region of the Cranberry and Bell-Irving rivers, carries a good stand of pulp wood, Engelman spruce, estimated by the Canadian forestry authorities at some two billion feet. A fair stand of pulp wood of the same species exists along the Skeena and in the valley of the Lower Babine river. These areas at present are without adequate transport outlet facilities. At Hazelton is centred a small cedar post and pole industry, which is floated down to tidewater on the Skeena. Ties from jack-pine have also developed into an industry. Tie timber is obtained along the Babine route to Bear Lake. A tabular statement of forest resources, based on a report of the Commission of Conservation of Canada in 1917, shows four billion feet on the Upper Skeena, four billion on the Upper Nass, two billion on the Stikine-Iskut rivers, a quarter of a billion on the Taku river, and about two hundred million in the Atlin region.

*Furs*

The 1933 Report points out that fur is an important resource in all the northern parts of the continent, and that a new highway would provide increased facilities for trapping and the production of furs. It might also be worth while to consider the possibilities of fur farming, in the region tapped by the highway.

*Hunting*

Attention is drawn to the attractions offered to big game hunters and fishermen throughout the region, where moose, caribou, mountain sheep and mountain goat are plentiful, and the many streams and lakes full of fish. At the present

time owing to the excessive cost of transportation, the expense of a thirty-day hunting trip amounts to about $3,000. This cost would be very much reduced if it were possible to travel most of the way on a highway.

*Agriculture*

The 1933 Report states that the popular idea that this northern country is a forbidden land of snow and glaciers, where agricultural development would be impossible, is without foundation. "The rich soil, the ample moisture, and long hours of summer daylight, produce surprising crops of many different kinds. In Alaska, adjacent to or even north of the Arctic Circle, grains, hay, vegetables, small fruits and flowers are grown successfully."

In support of the opportunities for farming in Alaska, the experience of the United States Department of Agriculture in conducting Agricultural Experiment Stations in 1929 at Fairbanks and elsewhere in Alaska, is cited. Spring wheat of good quality required from 98 to 109 days to ripen, and yielded 21 to 28 bushels per acre. Oats of good quality needed 96 to 111 days to ripen, yielding from 35 to 77 bushels per acre. Barley of good quality required 89 days to ripen, and yielded 28 to 49 bushels per acre. Flax was raised during a one-year test and believed to be well adapted to local conditions. Alfalfa survived the winter practically one hundred per cent and yielded at the rate of 6·2 tons per acre. Clovers survived about 30 per cent, as did also vetch, which yielded about 6 tons per acre. Field peas yielded hay of high quality, at 1·3 tons per acre. Potatoes were planted May 24th and matured about September 20th. They were of fine quality and yielded from 193 to 214 bushels per acre. Other vegetables grown were spinach, kale, cabbage, celery, onions, parsnips, salsify, beets, carrots, turnips, radishes, cauliflower, brussels sprouts, tomatoes, sweet corn, leeks, Swiss chard, peas, head lettuce and rutabagas All did well except tomatoes and sweet corn. The tomatoes made a large yield of green fruit, none of which ripened. Sweet corn grew slowly, tasselled and silked but produced no ears. Cranberries and blueberries grow wild in great profusion over a large part of the territory. Raspberries have been raised successfully and strawberries do well except in the Fairbanks region.

*Dairying and Stockraising*

It is noted that in the vicinity of Fairbanks, in 1933, eighty-seven dairy cattle were producing milk and cream for the local market. There were very considerable areas of good grazing land along the route from Hazelton to Alaska. The increase of the reindeer herds had been amazing. The herds had grown from a few thousand head when introduced from Siberia a few years ago to nearly a million. Experiments in raising domestic sheep had indicated that the industry was a promising one. Similar experiments with mountain sheep in captivity had been made near Fairbanks with considerable success. The hair was not suitable for wool but the meat was much superior to ordinary domestic mutton. Wild goat culture for the production of milk for cheese was also a possibility. Some areas in British Columbia, like the Klappan Valley, with its large meadows and bunch grass hillsides, afforded good winter feeding grounds. Caribou Mountain in this region was the wintering ground for thousands of caribou. The snowfall was light and bunch grass flourished in early spring. Stock raising could be made as productive and successful an industry as in the Chilcotin Valley. Good land had been reported in the valley of the Lower Nass, as well as in the Bell-Irving Valley, the Babine and Takla Lake region. Conditions were also favourable for agriculture in the vicinity of Dawson, Whitehorse and other parts of the Yukon. The principal obstacles to further expansion of agriculture in northern British Columbia, the Yukon and Alaska were lack of roads and lack of markets. Both obstacles would be overcome by the building of the proposed highway.

*Water Power*

It is also pointed out that major and minor water power sites abound throughout the region between Hazelton and the Yukon boundary. All the rivers were capable of development to some extent, at any rate for local purposes. No surveys had been made but the rivers usually had plenty of fall and the numerous lakes furnished natural reservoir sites. The Stikine river and Tuya Lake in particular offered great possibilities for power development.

*Geological Survey of Canada*

Since 1887 a number of reports have been made by officers of the Geological Survey of Canada on explorations in northern British Columbia and the Yukon Territory by G. M. Dawson, R. G. McConnell, W. W. Leach, G. S. Malloch, G. A. Young, George Hanson and others. A list of these reports, which contain a great deal of information on the mineral resources of this region, will be found in Appendix 8.

# APPENDIX

## III

### Estimates of Cost

Before estimates of cost could be prepared, it was necessary for the Commission to decide on the standard of road it would recommend for the Alaska Highway.

Estimates of the 1931 International Fact Finding Committee were based on a road width of from fourteen to sixteen feet, and which conformed to the type of road then existing in interior and northern British Columbia. Since that time roads have been greatly improved in the Province, and are well adapted to the type and volume of traffic which they bear.

It was the opinion of the Commission, however, that a considerably higher standard of road should be adopted for the Alaska Highway. Not only would it be an International route of great importance, but its southern extremity would connect with modern roads in the United States of very high standard. It would consequently not be advisable to construct a highway that would, when opened to traffic, suffer in comparison with connecting roads as regards width, alignment, and other engineering features.

As a result estimates are based on a roadway twenty-four feet wide with necessary ditching and with gravel surfacing twenty feet wide. The twenty-four foot grade will permit the laying of paving later on to a width of twenty feet. No cost figures have been included for the eventual paving of the highway, as these did not seem necessary at the present time.

While the cost estimates which were prepared by reconnaissance engineers and which are included in the appendix, form the basis of the final estimate figures, it was necessary for the Commission to carefully review these and modify them where necessary so that they would be "on all fours" in regard to location and construction standards and also fairly reflect the character of the country traversed.

In the case of larger bridges, cost figures cover structures of a permanent or semi-permanent type. Simple bridges and culverts will also be of similar type, except in cases where local conditions might render it advisable to install temporary structures utilizing local native timber, where available.

The Commission calls attention to the fact that the estimates of cost are based on wages for various classes of work and costs of material and construction machinery that prevailed in April, 1940 Since that time there have been moderate increases in production costs of materials and machinery and which at the present time (May, 1941) are approximately, as follows:

Construction Machinery—increase from 8 per cent to 10 per cent in production costs.

Steel—increase from 2 per cent to 5 per cent in fabrication costs.

Lumber—increase of about $1 per M. in production costs.

If materials and machinery to be used in the construction of the highway were subject to war taxation costs, cement, steel, and lumber would be subject to an 8 per cent sales tax in the present year (1941) and road machinery would be subject to sales tax of from 8 per cent to 10 per cent depending on the type.

As it would be impossible for the Commission to include taxation figures and keep their estimates up to date, all construction estimates given are exclusive of sales tax or other war taxation that may be imposed in future.

CANADA

BRITISH COLUMBIA-YUKON-ALASKA
HIGHWAY COMMISSION

MAP SHOWING

# HIGHWAY ROUTES

CONSIDERED IN CONNECTION WITH

# PROPOSED HIGHWAY TO ALASKA

SCALE 35 MILES TO 1 INCH

50 0 50 100

August, 1941

## LEGEND

Existing Main Highways.....

Roads in Northern Areas..... Trails

Routes Considered.....

Accompanying 1941 Report

PREPARED AT THE HYDROGRAPHIC AND MAP SERVICE, OTTAWA, 1941
SURVEYS AND ENGINEERING BRANCH

CANADA

BRITISH COLUMBIA-YUKON-ALASKA
HIGHWAY COMMISSION

MAP SHOWING

ALTERNATIVE HIGHWAY ROUTES

SELECTED FOR

# PROPOSED HIGHWAY TO ALASKA

SCALE 35 MILES TO 1 INCH

50 0 50 100

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