

Surveys and Engineering Branch

Engineering and
Construction Service.

Banff, Alberta,
February 25th, 1941.

REPORT ON THE ALASKA-YUKON HIGHWAY
RECONNAISSANCE
ALASKA BOUNDARY TO DAWSON & CARMACKS, Y.T.

On receipt of instructions sent on behalf of the Commission dated July 30th, 1940, with regard to reconnaissance work to be carried out in the Yukon and British Columbia in connection with the proposed Alaska-Yukon-British Columbia Highway, arrangements were made to leave Jasper, Alberta, on August the 10th, as this was the most suitable time for me to make connections with the river boats leaving Whitehorse for Dawson, Y.T.

On leaving Prince Rupert, British Columbia, on August 12th by the Canadian Pacific boat "Princess Alice" a very interesting trip was made via the inland passage and channel of the Alaska Coast to Skagway, which point was reached on the 14th; thence by train over the White Pass and Yukon route to Whitehorse where I was able to secure transportation on a river boat proceeding down the Yukon River that evening, and after some delay due to weather conditions and an accident to the freight scow, I reached Dawson City on August 17th.

From Dawson as a base, reconnaissance was made of various proposed routes approaching Dawson from the south and extending to the north and west to the Alaska Boundary where connection was to be made with proposed routes previously reconnoitered in 1931 by Mr. D. McDonald, Locating Engineer for the American-Alaska Road Commission. In making these reconnaissances in the vicinity of Dawson, Mr. G.A. Jeckell, Controller for the Yukon Territories, and Mr. McNeil, Road Superintendent for the Territory, gave me considerable information and assistance.

For convenience in following this report, I have prepared a large scale sketch map of the northwest section of the Yukon Territory which extends from the International Boundary of Alaska and the Yukon - latitude 65°, longitude 141° to the Carmacks section, latitude 62°, longitude 136°. Superimposed on the sketch I have

shown in colours, and legendary marking, the various routes reconnoitered between Dawson and the Alaska Boundary and also between Dawson and Carmacks, Y.T. General information of the various rivers shown and contour features have been taken from sectional geographical and topographical sheets issued by the Topographical Surveys Division, Washington, U.S.A. and Ottawa and where sections of the country traversed were missing or not available, these sections were compiled by enlargement from the Yukon Territory sheet and approximate contours and other features filled in.

Proposed Route "A" is shown in a dash-line coloured red and extends westerly from the City of Dawson which is situated on the right bank of the Yukon River below the junction of the Klondike. A crossing of the Yukon River is presently made by ferry at Dawson City, the distance between river banks of the Yukon at this point being approximately 1,000 feet wide, with a rising steep rock sidehill from the waters edge on the west limit and a flat gravel bench 2,000 feet wide on which Dawson City is situated. About 700 feet below the ferry crossing on the west side, the steep sidehill flattens off somewhat. Possible development of a bridge site and high level crossing of the Yukon could be made at this point by the placement of a suspension type of bridge and steel decked truss approach over the townsite. The estimated cost of this bridge would be in the neighbourhood of \$800,000.00. The shore abutment on the west bank would be placed on solid rock. The east abutment and piers would probably be seated on gravel which is generally found to be frozen in this section of the Yukon. Photographic prints Nos. 1 to 5, show the physical features of the ground in the vicinity of Dawson and the terrain along the west bank of the Yukon River at the ferry and the ground immediately west of the river.

After crossing the Yukon River, lower grades would have to be developed than those presently obtained on the Boundary road. This could be done by extending the alignment downstream

and switching back to pass over the high rock bluff opposite the mouth of the Klondike River and about 800 feet upstream from the west ferry terminal, approximately four miles on the traversed line. From Mile 4 to Mile 10 above the mouth of Swede Creek, Route "A" would follow approximately along the old winter trail, which, with the exception of about one mile, traverses flat sloping benches above the Yukon River flats and farms seen in Prints 6, 7 and 8.

From information gathered from various sources I was informed that it would be advisable to cross Swede Creek and traverse the south side of the valley and follow the benches above the winter trail to a branch of Swede Creek which is named the Middle Fork, Mile 25, as the physical feature of the right limits of Swede Creek valley is less precipitous and the country less cut up by small creeks, and deep ravines. These favourable features would lessen the cost of construction and probably eliminate considerable curvature. Print No. 9, taken from a point on the Boundary Road shows the terrain across Swede Creek valley for about five miles above this stream confluence with the Yukon River.

Continuing the traverse of Route "A" up the Middle Fork from Mile 25 it will be found that the V shaped valleys confine a location to what benches and talus slopes may be found above the water course on developing a higher line along the edge of the break in ground slope about 500 feet above the stream bed. This could very easily be developed by commencing a rising grade about Mile 20 and following the benches above Swede Creek and the Middle Fork along the 2,500 foot contour to the forks of a branch entering the Middle Fork about Mile 28. Here the stream can be crossed by a small bridge and the left bank of Middle Fork followed to the divide on the watershed of Fish and California Creeks, Mile 30. Prints Nos. 10 and 11 show the valley of the Middle Fork of Swede Creek from this stream's confluence with the main water of Swede Creek to the divide on the watershed. Prints Nos. 15 to 20 show sections of the winter trail and the confined nature of the ground along the

watercourse of the Middle Fork. Prints 12 to 14 show views of the second main branch of Swede Creek which had been used some years ago as a winter trail between the Boundary road and 60-Mile River. The information gathered here with respect to a favourable route between Dawson and the Sixty Mile River did not appear favourable and no reconnaissance was made beyond the points seen in the photographs.

After crossing the divide Mile 30 on the watershed of the Middle Fork and Fish Creek very good country would be traversed across the divide and low-lying ridge between Fish Creek and a branch of California Creek, from which point an easy descending grade can be obtained by following the main water course of California Creek to near its confluence with Sixty Mile River, Mile 42. From this point Route "A" would follow a westerly course along the benches and lower slopes of the left bank of Sixty Mile River to the International Boundary between Alaska and the Yukon at Mile 66. Prints 21 and 22 show a panorama view of the divide between Fish Creek and the east branch of California Creek. Prints 23 to 25 show the physical features of the terrain that would be traversed along the benches and slopes of the flat U-shaped valley of Sixty Mile River, from Mile 42 to Mile 66 at the International Boundary which is approximately eight (8) miles west of Photographic Station.

At Mile 10 on Route "A" above the mouth of Swede Creek I have suggested a possible alternative route "A-1", which would be a diversion of Route "A" eliminating the necessity of following Swede Creek, the Middle Fork and California Creek to the Sixty-Mile River. I am not aware if this suggestion of a possible route via the headquarters of Bell or Garner Creeks to the Sixty-Mile valley has been given any consideration in the projection of a line between Dawson and the International Boundary.

It is unfortunate that at the time of my visit to Dawson no topographical maps of the country between Swede Creek and the Sixty Mile Valley were at my disposal, had they been, it is probable that an extensive ground reconnaissance would have

been made over this country to confirm subsequent conclusions I have made by an extensive study of such topographical maps which I have been able to procure since my return.

From a study of the sketch map it might be seen that at the head of Bell Creek the contours indicate a low divide on the watershed between the Yukon and Sixty-Mile River. If this exists it would appear to me that a more feasible and less costly route could be obtained by following the alternative Route "A-1". The distance scaled would be approximately the same as Route "A", to the mouth of California Creek for at least six miles; more favourable ground would be traversed along the wider valley of the Sixty-Mile River. A study of Print No. 9 which was taken from a point on the Boundary Road, shows the physical features of the terrain across the hogback between the lower section of Swede Creek and the valley of Bell Creek. Further investigation of this diversion of the "A" route should be given consideration before final decision of a feasible route between Dawson and the Alaska Boundary is accepted.

Reconnaissance of an alternative route "A-2" following the general alignment of the present high line of the Boundary Road was investigated and is given here as a supplementary to proposed routes "A" and "A-1". This route would follow the general elevated ground along the watershed between the Yukon and Swede Creek, also the watershed of the Sixty-Mile and Forty-Mile Rivers. Diversions from the present route of the Boundary Road would have to be made to cut out the abrupt grades which are evident along many sections of the Boundary Road. Also, it would be necessary to revise many sections to eliminate and avoid heavy snow drifting conditions that prevail during the winter, which would shut off traffic in November and December and require heavy maintenance cost to keep open during winter months.

Projection of Route "A-2" from the Ferry Crossing would require the development of an easier grade than the presently used section of the Boundary Road for about five miles, until an elevation of 2,700 feet is attained, from which point the present

road may be used for about two miles along the hogsback to Mile 7 at an elevation of about 3,000 feet. Here I would suggest traversing the southern slope overlooking the Swede Creek Valley, and an elevation of not more than 3,600 feet be maintained to Mile 44 - the divide on the watershed of Swede Creek and California Creek on the southern slope of Swede Dome Mountain. Along this section between Mile 7 and Mile 45 there are very few sections, if any, of the present road that could be used. Barometer readings taken at various points indicate that the present alignment follows the rim of the watershed at an elevation of 3,500 to 3,900 feet. Prints one to three show the terrain west of Dawson that would be traversed the first three miles after crossing the Yukon River. Prints 26, 27, 28 and 29 show the south slope of Swede Creek, the divide on the watershed and the terrain west of Swede Dome Mountain.

Continuing the traverse of the high line Route "A-2" after crossing the divide below Swede Dome Mountain the traverse would pick up with that part of the abandoned section of the Boundary Road and follow more or less the present alignment at an elevation of approximately 3,300 feet to Mile 54 and the junction of the trail going to the boundary and Walkers Fork Creek. Here the alignment would take a south-westerly direction and follow the valley of Little Gold and Glacier Creeks to the Sixty-Mile River valley, Mile 61, and connect with proposed Route "A" at Mile 55. Photograph No. 30 shows a revised section of the Boundary Road down Bruin Creek, which was constructed a few years ago to avoid sections of heavy snow-drifting conditions in the vicinity of the northwest slopes of Swede Dome Mountain.

From information gathered from various sources, and from a study of the terrain traversed by the existing road, the worst snow-drifting sections are between Mile 20 and Mile 40. The wind is generally from the southeast and as the watershed lies mostly above timberline, no windbreak of timber prevents the snow in the winter months from drifting and accumulating into great

drifts along the northwest slopes. It is practically impossible to eliminate this condition, but by following an alignment with a southern slope the condition would be reduced considerably. Photographs 30 to 35 show the physical features of the terrain traversed along the present existing road between Mile 40 and Mile 54. Prints 36 to 39 show general ground features on the trail to the International Boundary and Walkers Fork.

Investigation of Dr. Bostock's proposed route between Dawson and Forty-Mile River by following the right limits of the Yukon River to the International Boundary did not appear to be favourable or have any advantages over the "A" and "A-2" routes reconnoitered. No extensive reconnaissance was made. Photographs 40 to 44 give a panoramic view of the terrain along the east slope of the Yukon River between Dawson and Fifteen-Mile River. Photographs 45 to 47 show both slopes of the Yukon valley and watercourse between Dawson and the mouth of the Chandindu River.

Reconnaissance of various routes approaching the City of Dawson from the south and east was made by traversing such known sections which were most favourable and direct to make connection between Carmacks, situated on the Lewes River, latitude 62° and longitude 136°. The limited time at my disposal prevented me from covering the whole of this section on foot or saddle. However, sufficient information was collected to indicate that a feasible route could be developed between these two points. To illustrate the general projections of the various sections of the country reconnoitered I have indicated on the sketch map the proposed route "B" by a dash line coloured blue and any alternatives or diversions as "B-1", "B-2" and "B-3", with distinguishing markings coloured blue.

Proposed Route "B", after leaving Dawson would traverse the valley of the Klondike River easterly and would follow the existing mine road for about twenty-seven miles. Considerable regrading and revision of the alignment would be necessary to bring the present trail to the standard required. Generally the

the surface material is black soil underlain with frozen gravel, but this condition is gradually improving due to scarcity of the standing timber growth which during the last fifty years has been used extensively for building and domestic purposes. Solid rock will be met with in the widening of three or four rock bluffs which confines the trail between the base of these and the River for short distances between Mile 15 and Mile 25.

From Mile 27 a fairly good trail crosses the Klondike River here by a private ferry to the Yukon Consolidated Mine Company's power house and intake works, on the north fork of the Klondike River. Projection of the winter overhead trail to Carmacks and Whitehorse continues from Mile 27 along the south limit of the main branch of the Klondike River to Flat Creek crossing Allgold and Flat Creeks about Mile 30, and then follows some low-lying marshy flats before climbing to a wide flat plateau which practically extends right through to Slough Creek and the Stewart River. I have shown the contour elevation of this plateau at 2,500 feet but it may be lower. Barometer reading taken on high points on that section of the trail traversed did not exceed 2,400 feet. Photographs 56 and 57 show the physical features of the Klondike River valley looking towards the valley of Flat Creek, taken from a point above the intake of the Yukon Consolidated Mining Company's power plant. Photographs 58, 59 and 60 show the country traversed by the trail between Mile 50 and 60. At Mile 48 and 58 I have indicated possible diversion that might lessen the distance or give better alignment between the Klondike and Stewart Rivers.

At Mile 65 Route "B" would leave the valley of Slough Creek and traverse the benches and lower slopes of the right limit of the Stewart River to a bridge site at Icebox Rapids eight miles below the mouth of Slough Creek, Mile 75. At this point below the rapids is a much better site than that suggested by Dr. Bostock at Sterling Bend, 25 miles upstream, the distance from shore to shore being about equal at both sites and is approximately 400

feet. The Icebox site has a 60 - 70 foot rock bench on the left bank and a high gravel flat on the right which is not subject to overflow to any appreciable extent during highwater. As the stream is confined to one channel a suitable ferry crossing could be made immediately below the site pending bridge construction. Crossing of the Stewart River at this point will eliminate an expensive structure across the McQuesten River. The Stewart River is navigable between its confluence with the Yukon River and Mayo. Any bridging of this watercourse between these points will have to provide for river steamer passage-way either by placing the structures with sufficient clearance above high water mark or providing a lift or swing structure. Photograph 61 shows the physical feature of the bridge site at Icebox Rapids looking upstream from a point immediately below the site.

Two alternative routes namely "B-2" and "B-3" which leave route "B" at Mile 2 and 9 respectively, following the present existing mine roads by the Bonanza and Hunker Creeks would intercept the "B" route at Mile 75. The only advantage that would be obtained in following either of these alternatives would be the amount of improved construction compared to the unimproved section of Route "B" between Mile 9 and Mile 27 and the difference in cost of new grading. The alternative would, if favoured, provide better transportation facilities for the mining district of Quartz Creek and Granville.

The disadvantage would be the introduction of considerably more curvature on account of the narrow confined nature of the Bonanza and Calder Creeks and the Hunker and Dominion Creek valleys. Two summits would be crossed at an elevation ranging between 2,600 and 3,200 feet and both routes would be longer by eight and fourteen miles respectively. Photographs 48 to 50 show the confined physical features of the Bonanza and Eldorado Creeks - Photographs 51 to 54 show the valleys of the Hunker and Dominion Creeks traversed by Route "B-3". Photograph 55 shows the mine road and Sulphur

Creek valley which could be developed into an alternative to that section of Route "B-3" which traverses Dominion Creek and would probably be two to three miles shorter than that route, but would still have the same disadvantages.

Continuing the traverse of Route "B" from the Icebox Rapids at Mile 75 the line could either follow up the Stewart River along the benches of the left limit to near Crooked Creek; preferably I would suggest that the line follow down the Stewart River for three miles and then traverse the wide valley of Lake Creek via Reid Lakes to about Mile 95. Here a choice of two routes could be taken, namely: Route "B" or Route "B-1" as indicated. The former would traverse the valley of Lake Creek to Grayling Lakes on the watershed of the Stewart and the Pelly Rivers. The alternative Route "B-1" would traverse a low divide between the headwaters of Upper Reid Lake and the valley of the Stewart River and thence following the benches above the Stewart River to near Crooked Creek and thence by this watercourse to the divide at the headwaters of Willow Creek and a junction with proposed Route "B" at Mile 146. The distance traversed by this alternative would be approximately seven miles longer but would have its advantages in traversing a wider valley and with an improved road projected northeasterly from about Mile 120 a branch road to Mayo Mining district would be accessible. Photographs 65 to 67 show a panoramic view of the terrain lying between the mouth of Lake Creek and the basin in which the Reid Lakes are situated. Photographs 68 to 71 show the many unfavourable features of Sterling Bend proposed bridge site, and Photographs 72 to 75 show the physical features of the Stewart valley between the Sterling Bend and the valley of Crooked Creek.

Reconnaissance work on the Pelly River consisted mainly of reconnoitering the various proposed bridge sites available between this stream's confluence with the Yukon River and Granite Canyon. The shore to shore width at the Granite Canyon bridge site is approximately 340 feet and has greater possibilities than any considered, as may be seen from Photographs 86 to

91, and would, to my mind, be the most logical bridge site for the proposed easterly route, via Francis Lake and the upper reaches of the Pelly River. However, due to the Canyon's location it would be on an indirect route in the projection of a line between the Stewart River and the crossing of the Lewes River at Five Fingers Rapids. The suggestion of the probable terrain this route would traverse is indicated on the sketch map by a long dash dot line, from the divide at the headwaters of Willow Creek to Granite Canyon and thence along the lower slopes and benches of Ptarmigan Mountain to Mica Creek, thence following this watercourse to Tatlimain Lake and the divide on the watershed of Tatlimain Creek and Tatchun Creek, following down this stream to a junction with the proposed route "B" at Mile 204. Grading costs show that this alternative would be higher due to greater mileage, the distance being twenty-two (22) miles longer in the projection of Route "B-1" from the divide on Willow Creek at Mile 145. Approximately seven miles of this additional mileage is attributed to that part of Route "B-1" between Reid Lakes and Mile 145. A suitable temporary ferry crossing can be obtained immediately below bridge site, pending construction of bridge.

Continuing the traverse of proposed Route "B" from Mile 146, the projection would be continued down the valley of Grayling Creek to a crossing of the Pelly River at Gull Rocks, Mile 153. This bridge site was chosen in preference to a crossing of Braden's Canyon at Moosehide Rock, notwithstanding that the width of the Pelly River at the latter bridge site is approximately 450 feet wide, whereas at Gull Rocks the shore to shore width is approximately 860 feet. However, it is considered that less development on the approaches of the latter would be required and as about ten miles of extra grading would be eliminated, general construction costs at the Gull Rock site would be generally lower. Photographs 76 to 78 show the bridge site crossing at Gull Rocks. Prints 79 to 82 show various views of Moosehide Rock, Braden's Canyon bridge site. Photographs 83 to

85 show the physical features of the terrain along the valley of the Pelly River between Braden's Canyon and the Granite Canyon. A suitable temporary ferry crossing can be obtained immediately above the bridge site, pending construction of bridge.

Projection of the proposed route "B" after crossing the Pelly River at Gull Rocks would travel easterly along the benches of the Pelly for a few miles and thence south across the flat watershed to Minto and the valley of the Lewes River, following more or less along the general route taken by the Dawson-Whitehorse winter trail to a crossing of the Lewes River at Five Fingers Rapids at Mile 206. From the crossing of the Lewes River - the traverse would follow the left limit of the Lewes River to Carmacks at Mile 222. The section between the Pelly River and Carmacks is generally considered to be the most open and dry section that would be met with along the whole route. Photographs 92 to 94 show the possibilities of developing the Five Fingers as a bridge site.

From various sources I was informed that the average winter snowfall along the sections traversed by both the proposed "A" and "B" lines and the adjacent districts thereto is from three (3) to five (5) feet. Evidences of heavy ice flows and possibly jams are seen along the banks of most of the large rivers, and careful consideration will have to be given to clearance on all bridge structures placed. Small settlements or mining operations are scattered along the whole route from the Alaska boundary to Carmacks, the greatest congestion of these being in the vicinity of Dawson.

Most of the elevations shown on the sketch map were taken from geologic and topographic survey maps and were established from precise levels made by Douglas H. Nelles, D.L.S., during the year 1908 - 10 and were published by the Dominion Observatory, Ottawa, Vol. 1 No. 2 of Precise Levels from White Pass, B.C., to the 141st Meridian.

The following summary of costs of construction are based on a 20 foot gravelled surface and a standard 24 foot road section, 2½ feet at least above ground surface in level country. A cleared 66 foot right-of-way stumped and brushed; sufficient native timber is available for culverts, cribs, and small bridges. All other structures would be imported.

ESTIMATED COST
PROPOSED ROUTE "A"
DAWSON CITY TO ALASKAN BOUNDARY
ESTIMATED DISTANCE - 66 MILES

Mile to Mile	Distance	Cost per Mile	Bridges	Estimated Cost	Total Estimated Cost
1			Bridge & Approaches 2000 ft.	\$800,000	\$800,000
1	4	\$14,000			56,000
4	5	16,000			16,000
5	10	12,500			62,500
10			50' Truss	5,000	5,000
10	25	14,000			210,000
25	30	16,000			80,000
30	42	14,000			168,000
42	55	12,500			162,500
55			40' Truss	4,000	4,000
55	66	12,500			137,500
Total Estimated Cost					<u>\$1,701,500</u>

Average cost per mile, not including large bridges - \$13,659.09.

ESTIMATED COST
ALTERNATIVE ROUTE "A-1"
DAWSON CITY TO ALASKA BOUNDARY
ESTIMATED DISTANCE - 68 MILES

Mile to Mile	Distance	Cost per Mile	Bridges	Estimated Cost	Total Estimated Cost
1			Bridge & Approaches 2000 feet	\$800,000	\$800,000
1	10	Some as Route "A"			139,500
10	20	\$15,000			150,000
20	35	13,500			202,500
35	44-42	9			112,500
44-42	66	24	Same as Route "A"		304,000
Total Estimated Cost					<u>\$1,708,500</u>

Average cost per mile, not including large bridges - \$13,360.30.

ESTIMATED COST
ALTERNATIVE ROUTE "A-2"
DAWSON CITY TO ALASKA BOUNDARY
DISTANCE - 72 MILES

Mile to Mile	Distance	Cost per Mile	Bridges	Estimated Cost	Total Estimated Cost
1			Bridge & Approaches 2000 feet	\$800,000	\$800,000
1	3	3		\$14,000	42,000
3	10	7		13,500	94,500
10	35	25		12,000	300,000
35	40	5		13,000	65,000
40	54	14		12,000	168,000
54	61-55A	7		14,000	98,000
61-55A	66	11		12,500	137,500
Total Estimated Cost					<u>\$1,705,000</u>

Average cost per mile, not including
large bridges - \$12,569.44

ESTIMATED COST
PROPOSED ROUTE "B"
DAWSON CITY TO CARMACKS
ESTIMATED DISTANCE - 222 MILES

Mile to Mile	Distance	Cost per Mile	Bridges	Estimated Cost	Total Estimated Cost
1	10	10		\$ 8,000	\$ 80,000
10	27	17		10,000	170,000
27	34	7		14,000	98,000
34	60	26		13,000	338,000
60	75	15		14,000	210,000
75			Stewart River Bridge 400'	\$120,000	120,000
75	78	3		14,000	42,000
78	95	17		12,500	212,500
95	134	39		13,000	507,000
134	146	12		12,500	150,000
146	152	6		14,000	84,000
152			Pelly River Bridge 800'	240,000	240,000
152	156	4		14,000	56,000
156	163	7		12,500	87,500
163	175	12		13,000	156,000
203			Bridge 50'	5,000	5,000
175	206	31		10,000	310,000
206			Lewes River Bridge 600'	180,000	180,000
206	222	16		12,000	192,000
Total Estimated Cost					<u>\$3,238,000</u>

Average cost per mile, not including
large bridges - \$12,153.15.

ESTIMATED COST
ALTERNATIVE ROUTE VIA "B-1"
Granite Canyon Bridge Site
DAWSON CITY TO CARMACKS
DISTANCE - 244 MILES

Mile to Mile	Distance	Cost per Mile	Bridges	Estimated Cost	Total Estimated Cost
1	95	95	Same as Route "B"		\$1,270,500
95	120	25		\$12,500	312,500
120	145	25		12,000	300,000
145	165	20		10,000	200,000
165			Granite Canyon Bridge 340'	\$100,000	100,000
165	170	5		14,000	70,000
170	178	8		10,000	80,000
178			Bridge 60'	6,000	6,000
178	195	17		10,000	170,000
195	215	20		12,000	240,000
215			Bridge 50'	5,000	5,000
215	226-204B	11		13,500	148,500
226-204B	222	18	Same as Route "B"		392,000
Total Estimated Cost					<u>\$3,294,500</u>

Average cost per mile, not including
large bridges - \$11,862.70

ESTIMATED COST
ALTERNATIVE ROUTE "B-1"
Granite Canyon & Minto
DAWSON CITY TO CARMACKS
DISTANCE - 242 MILES

Mile to Mile	Distance	Cost per Mile	Total Estimated Cost
1	173	173	Same as Routes "B" and "B-1" \$2,283,000
173	183-163B	10	\$10,000 100,000
183-163B	222	59	Same as Route "B" 843,000
Total Estimated Cost			<u>\$3,226,000</u>

Average cost per mile, not including
large bridges - \$11,677.69

ESTIMATED COST
ALTERNATIVE ROUTE "B-1"
Via Gull Rocks Bridge Site
DAWSON CITY TO CARMACKS
DISTANCE - 229 MILES

Mile to Mile	Distance	Cost per Mile	Total Estimated Cost
1 145	145	Same as Route "B- and "B-1"	\$1,883,000
145 153-146B	8	\$13,000	104,000
153-146 222	76	Same as Route "B"	1,310,500
Total Estimated Cost			<u>\$3,297,500</u>

Average cost per mile, not including
large bridges - \$12,041.49.

ESTIMATED COST
ALTERNATIVE ROUTE "B-2"
DAWSON CITY TO CARMACKS
DISTANCE - 230 MILES

Mile to Mile	Distance	Cost per Mile	Bridges	Estimated Cost	Total Estimated Cost
1 2	2	\$8,000			\$ 16,000
2 25	23	10,000			230,000
25 27	2	12,500			25,000
27			60 ft.	\$6,000	6,000
27 45	18	12,500			225,000
45 59	14	14,000			196,000
59 70	11	12,500			137,500
70 83-75B	13	14,000			182,000
33-75B 222	147				2,342,000
Total Estimated Cost					<u>\$ 3,359,500</u>

Average cost per mile, not including
large bridges - \$12,258.70.

ESTIMATED COST
ALTERNATIVE ROUTE "B-3"
DAWSON CITY TO CARMACKS
DISTANCE - 236 MILES

Mile to Mile	Distance	Cost per Mile	Bridges	Estimated Cost	Total Estimated Cost
1	48	\$8,000			\$384,000
48	51-45B-2	3			36,000
48			50 ft.	\$5,000	5,000
51-45B-2	222	185			2,857,500
Total Estimated Cost					<u>\$ 3,282,500</u>

Average cost per mile, not including
large bridges - \$11,620.76.

Summarizing the foregoing information and considering the physical ground features and relative costs between the proposed Routes "A" and alternative "A-1" and "A-2, between Dawson City and the Alaska Boundary, I would suggest that possibly a line projected along the Routes "A" and "A-1" would probably give a better alignment, notwithstanding that the estimated cost is \$7,000.00 higher than the total estimated cost of proposed Route "A". The estimated distance would probably be two miles longer. The highest point on the divide appears to be well below the 3,000 ft. elevation and should be an advantage.

Summarizing the information covering the reconnaissance of the "B" route between Dawson City and Carmacks I would suggest that a line projected along the Routes "B" and "B-1" via the Granite Canyon, Minto or Tattlimain Lake Routes would give a better alignment. The bridge site at Granite Canyon is undoubtedly the best inspected on that section of the Pelly River and notwithstanding a longer road mileage the Route "B-1" via Minto indicates the least construction cost, namely \$3,226,000.00. The section of Route "B-1" which traverses the Crooked Creek would permit of a connecting road to the Mayo Mining District and should be given consideration in projecting a line between Dawson City and Carmacks.

I am enclosing 106 photographs which were taken during the reconnaissance survey between the Alaska Boundary and Carcross, Y.T. Photographic Stations are indicated on the sketch map which is being forwarded under separate cover. A study of these photographs is more descriptive of the physical ground features than can be described in a report. I also enclose a photograph of the inland passage between Prince Rupert and Skagway.

(Sgd) J.H. Mitchell,
Senior Assistant Engineer.

DEPARTMENT OF MINES AND RESOURCESSurveys and Engineering Branch

Engineering and
Construction Service

Jasper, Alberta,
May 20th, 1941.

Re - Alaska-Yukon British Columbia Highway
Observations & approximate cost
of section between
Atlin, B.C., Whitehorse & Carmacks, Y.T.

With reference to supplying the Commission with a summary of my observations and approximate cost of the section of the proposed Alaska-Yukon British Columbia Highway, between Atlin and Carmacks, I beg to submit a sketch map of the country, part of which was traversed by plane during the aerial reconnaissance made in July, 1939, also aerial trips and ground reconnaissance made in September and October, 1940.

The following observations and comments over the proposed route outlined would of necessity have to be confirmed by a ground reconnaissance. However, sufficient information was obtained from the aerial trips to indicate that a route is quite feasible between Atlin, Whitehorse and Carmacks by either of the suggested routes indicated on the sketch map enclosed. Approximate costs given are such that might generally be met with through the country traversed.

For guidance in following this report, I attach hereto a sketch map showing the northern part of British Columbia in the vicinity of Atlin, and also showing the southern part of the Yukon territory, which includes the district between the northern boundary of British Columbia and Carmacks, Y.T. Superimposed and indicated by a dash line I have shown the proposed route "A" between Atlin, Whitehorse and Carmacks; also I have indicated by a dash dot line a diversion from the proposed route "A" which would touch at Carcross enroute to Whitehorse and Carmacks.

The route "A" between Atlin and the Provincial Yukon territory boundary would follow the benchland in a northerly direction along the east shore of Atlin Lake. The present route

of the trail to the 4th of July Creek might be followed or a route approximately along the Telegraph Line trail might be followed to its junction with the 4th of July Creek trail about seven miles north of the town of Atlin. From this point the route would continue along the benches to Indian Creek, Mile (24). North of this point for about five miles the benchland is cut off and the terrain is considerably rougher with considerable rock exposures where the mountain ranges appear to carry their slopes down to the east shore of Atlin Lake.

North of the boundary, the country opens up somewhat, and considerable benchland timbered with small pine extends to the east and north along the east shore of Little Atlin Lake. At Mile (60) near the north end of Little Atlin Lake, a diversion is shown which would traverse westerly to a crossing of Six Mile River at Tagish, Mile (68) and thence through a low pass via Crag Lake to Carcross, Mile (86). The country traversed on the diversion between Mile (60) and Mile (86) is generally jackpine benches, with sand dunes for about one mile as one approaches the vicinity of Carcross.

North of Carcross, the diversion would follow generally along the present location of the Carcross Whitehorse trail. Difficulty will be met with in avoiding the sand dunes for about three miles north of the Village of Carcross, after which the country generally consists of benchland of poplar and jackpine ridges. The only structure of any consequence would be the crossing of Six Mile River in the vicinity of Tagish.

Mr. J.H. McNeil in his report to the Commission to study the proposed Highway to Alaska, 1933 Appendix D. states there is a choice of two bridge sites across Six Mile River. The lower site where the Telegraph Line crosses, here the stream is about 900 feet wide, with a solid rock island about 300 feet distant from the east bank, which is composed of a sandy clay gravel to a height of about 20 feet above water level. The West bank consists of the same gravel material, but is about

30 feet above water level. The other site is situated opposite Tagish Settlement and is about 750 feet wide with 15 feet clay banks on the east side and 10 feet clay sand and gravel banks on the west side.

The river has a depth of 15 to 20 feet in the channel, and a maximum current flow of about three miles per hour. It rarely freezes at this point to permit of safe crossing in the Winter months. Piles can be easily driven for bridge foundations. Navigation requirements are nominal and can be confined to a short span draw bridge. Moderate precautions would have to be taken to safeguard the bridge structure from damage from floods or ice jams in the Spring.

Continuing the traverse of proposed route "A" from Mile (60) near the north end of Little Atlin Lake, the route would traverse a low saddle and follow the benchland above the east shore of Marsh Lake, to a crossing of the McClintock River above this stream estuary where it empties into Marsh Lake. The terrain along the east bank of the Lewes River appeared from the air to be more difficult, as it seemed to be more cut up with numerous small water courses. However, a ground survey would determine the most suitable country to traverse from the outlet of Marsh Lake to Miles Canyon, Mile (102). The crossing of the Lewes River at this point could be made by a 100 foot truss bridge without any difficulty, as the Canyon has solid rock walls with flat jackpine benches extending back about 200 feet on the west side and 400 to 500 feet on the east side.

On the west side an automobile trail connects with the town of Whitehorse, a distance of about five miles. The diversion via Carcross would join the proposed route "A" about Mile (103), but would be 22 miles longer to this point. The route traversed after leaving Miles Canyon would traverse the sidehill of the Lewes Valley for a short distance to rolling benchland about 300 to 500 feet above the Lewes River. From here the approach to the town of Whitehorse might be made by a low

route via the Whitehorse Rapids, or a high route via the Airport. The latter might be the better approach as the terrain is fairly flat. The lower route is confined to a steep clay cut bank; the prior location of the White Pass and Yukon Railway, and the Lewes River which parallels the railway tracks for about half a mile immediately south of the town of Whitehorse.

Between Whitehorse and Carmacks there appears to be no other choice than to follow approximately along the routes of the old Overland Whitehorse to Dawson winter trail.

Mr. J.H. McNeil in his report to the Commission to study the proposed highway to Alaska, 1933 Appendix D. describes this section of the route as being quite passable for tractors, trucks and cars for most of the year over a distance of 31 miles out of Whitehorse to Kluane Junction.

From Kluane Junction the route "A" traverses the valley of the Little River, to a pass on the watershed of Klusha Creek, the main branch of the Nordenskiold River, which flows into the Lewes River in the vicinity of Carmacks. This section of the Overland Trail has not been improved to the standard of the section between Whitehorse and Kluane Junction, but is passable for trucks, cars and tractors during most of the year.

The two main streams that will be crossed are the Tahini River and the Nordenskiold. The former is presently crossed by ferry and at the crossing has a width of 500 feet, with a depth of 10 to 12 feet during midsummer. The current is very sluggish with mud and small gravel bottom, banks apparently being low and probably subject to overflow from jammed ice during the Spring breakup. It is probable that a more suitable crossing could be got above the junction of Little River. The Nordenskiold is presently crossed by three wooden spans having an overall length of 218 feet. A more suitable location is available a little further upstream, where a structure of two spans would suffice.

The terrain that would be traversed is apparently lightly timbered in places, but good timber for small bridges is available along the Nordenskiold River. The ground is fairly good with gumbo in many sections. After crossing the watershed of the Klusha Creek, the country is comparatively flat, and requires drainage. Generally, the balance of the route which traverses along the hillside slopes of the valley of the Nordenskiold is fairly dry. Good gravel exists along the present trail in many places.

The distances traversed by the proposed route "A" from Atlin to Carmacks is probably 241 miles. Whitehorse situated on the banks of the Lewes River at an elevation of 2,080 feet, is nearly midway between these points, if the diversion via Carcross were followed, and 108 miles north of Atlin via the proposed route "A". Maximum elevation is approximately 2,800 feet above sea-level, which is reached on the watershed between the Little River and the Nordenskiold on the section between Whitehorse and Carmacks.

The following summary of costs of construction are based on a 20 foot gravelled surface, and a standard 24 foot road section $2\frac{1}{2}$ feet at least above ground surface in level country. A cleared 66 foot right-of-way stumped and brushed; sufficient native timber is available in many sections for culverts, cribs and small common bridges. All other structures would be imported.

ESTIMATED COST
PROPOSED ROUTE "A"
ATLIN, B.C. to CARMACKS, Y.T.
ESTIMATED DISTANCE - 241 MILES

Mile to Mile	Distance	Cost per Mile	Bridges	Estimated Cost	Total Estimated Cost
0	8	8			\$ 96,000
8	24	13			208,000
24	30	6			96,000
30	60	30			360,000
60	84	24			336,000
84			60' Truss	\$6,000	6,000
84	102	18			292,000
102			90' Truss	8,000	8,000

Mile to Mile	Distance	Cost per Mile	Bridges	Estimated Cost	Total Estimated Cost
102	103	1		\$14,000	\$ 14,000
103	108	5		12,000	60,000
108	138	30		14,000	420,000
138			3-90' Truss	\$24,000	24,000
138	155	17		12,000	204,000
155	188	33	1-80' Truss	7,000	7,000
188	228	40		13,000	520,000
228			2-90' Truss	16,000	16,000
228	241	13		12,000	156,000
Total Estimated Cost					<u>\$2,823,000</u>

Average cost per mile, including bridges - \$11,713.69.

ESTIMATED COST
VIA DIVERSION ROUTE
ATLIN, CARCROSS, WHITEHORSE TO CARMACKS, Y.T.
ESTIMATED DISTANCE - 263 MILES

Mile to Mile	Distance	Cost per Mile	Bridges	Estimated Cost	Total Estimated Cost
0	60	60	Same as proposed Route "A"		\$760,000
60	68	8		\$13,000	104,000
68			700 Pile Bents & 2-100' Truss	\$40,000 \$20,000	60,000
68	76	8		12,000	96,000
76	79	3		14,000	42,000
79	86	7		12,000	84,000
86	92	6		12,000	72,000
92	100	8		14,000	112,000
100	125	25		12,000	300,000
103	241	138	Same as proposed Route "A"		\$1,407,000
Total Estimated Cost					<u>\$3,037,000</u>

Average cost per mile, including bridges - \$11,547.53.

Summarizing the foregoing information and giving consideration to the relative costs, etc., between the proposed Route "A", and the diversion route via Carcross, it would appear that Route "A" would be less costly and more direct between the towns of Atlin, Whitehorse and Carmacks. Construction of the diversion route via Carcross would place railway communication

331.

for freight, tourist traffic, etc., about 22 miles nearer to the town of Atlin, which appears to be the only advantage if this route were taken.

(Sgd) J.H. Mitchell,
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23

24

25