RECONNAISSANCE AIR SURVEY, PRINCE GEORGE TO DAWSON VIA PARSNIP AND FINLAY, SIFTON PASS, LIARD AND PELLY RIVERS

by

- J. H. Mitchell.-

Complying with your request contained in your wire of the 5th instant re my views and approximate cost of construction of the proposed Alaska Highway along the easterly route from Prince George to Dawson via the Parsnip, Finlay Rivers, Sifton Pass, Liard and Pelly Rivers, I beg to submit herewith a summary of my observations over this route traversed July 9th to 13th, 1939.

On one of the sketch maps being mailed you in connection with the westerly route from Hazelton, I have indicated with a blue dot-dash line the approximate route the alignment would traverse from a point below Finlay Forks to a point north of the British Columbia-Yukon Boundary on the Liard and Frances Rivers.

Not having traversed the section of the Parsnip River between Prince George and Finlay Forks, but from a study of the map, the country would appear to be the same as that section of the valley seen from a point where we crossed from Fort St. James to the Manson River and that part of the Parsnip below Blackwater Creek. If such is the case, I would consider the route from Prince George to Finlay Forks would be good road construction, the summit of the pass being low and the valley bottoms wide flat bench land. The location from Summit Lake would, I think, follow along the eastern side of the Parsnip to a suitable crossing of this river below the mouth of the Nation River. The reason for crossing to the west bank of the Parsnip will be dependent on whether a suitable crossing of the Peace or Finlay Rivers is available below or above Finlay Forks, as I consider that in following the Finlay the road location should follow the east bank of this river to Fort Grahame and Whitewater, to avoid crossing such large streams as the Omineca and the Ingenika, also to be on the east side of the Finlay so as to make suitable connection with any road system from Hudson Hope on the Peace.

The terrain along the east bank of the Finlay is generally fair road construction. Prints 3 to 12 indicate that, although the river flows more along the east side of the valley, there is considerable bench land

along the valley bottom for favourable road construction, swampy sections being easily avoided. On the west side of the valley the bottom is wide and flat to Fort Grahame. Here it narrows down somewhat until Deserters Canyon is passed, opening up again slightly until the Paul River is crossed. From this point to Whitewater, and thence up the Fox River to Sifton Pass, the valley bottom is more confined and of a U shape showing numerous benches along the sides suitable for road construction.

From Sifton Pass, which is crossed at an estimated altitude of 3,000 ft., the route would follow down the east side of the Kechika River to a suitable crossing just above the mouth of the Gataga River, thence along the west bank to a suitable crossing of the Turnagain River a short distance above its junction with the Kechika. After crossing the Turnagain the line would follow across a flat plateau to a point near Lower Post on the Liard River, where it would follow the south bank of the Liard until the Dease River is crossed, a suitable crossing of which may be available two to five miles above its confluence with the Liard. Having crossed the Dease an early crossing should be made of the Liard to the north-east bank. This may be possible at the point called "Canyon" about ten miles above Lower Post. From this point north along the east bank of the Liard and Frances Rivers to a point near the outlet of Frances Lake suitable road material will be met with in following the flat bench land above the river flats. If possible a crossing should be made of the outlet of the east arm of Frances Lake and the north-east shore of the west arm followed to the head of the lake at the mouth of the Finlayson River. The north bank of the Finlayson would then be followed to the head of Finlayson Lake and the Bering Divide crossed at about 3,200 ft.altitude.

The terrain from the point of crossing the Turnagain River to the mouth of the Frances River is flat rolling plateau country, with numerous lakes and large streams all flowing into the Liard River. High mountain ranges are seen thirty miles to the southwest, lower ranges of hills to the northeast. From the confluence of the Frances and the Liard to the Bering Divide, the Frances and Finlayson valleys are more confined with low-lying hills about ten miles distant, and higher mountain ranges to the south.

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After leaving the Bering Divide, the road would follow the side of Campbell Creek Valley, crossing the Big Campbell some distance above its junction with the Pelly River, from which point the road would probably follow the south bank of the Pelly to a point twenty miles below Ross River Settlement.(1) Here it might be feasible to leave the valley of the Pelly and pass over a low divide to the headwaters of the Magundy River, which flows westerly to Little Salmon Lake. From here it may be possible to get through the country south of Glenlyon Mts. via Drury and Tatlmain Lakes to Pelly Crossing, where it would join the present existing Yukon road system to Dawson. This diversion would probably eliminate some heavy construction around the big loops of the Pelly seen in prints 55 and 56 and also the confined area below the mouth of the McMillan River at Granite Canyon.

Generally the country traversed down the Pelly may be considered fairly good road construction material, more confined than along the Liard and Frances Rivers. Good bench land is seen on the south side of the river, but the north slope runs down in many places close to the river bed, leaving less bench land suitable for road construction; further two large streams would be crossed if the north bank of the Pelly were followed, in the Ross and McMillan Rivers. However, a ground reconnaissance would have to determine the most suitable bank to follow.

Summarizing the foregoing, I may say I have no hesitation in stating that the route via the Parsnip, Finlay Rivers, Sifton Pass, Frances Lake and the Pelly River to Dawson would be the most economical of construction and maintenance. As the country traversed is mostly open, flat bush country there would be less precipitation than along the westerly route via the Skeena, Nass and Kluppan Rivers to Atlin, and thence to Whitehorse and Dawson. A considerable distance of the westerly route follows narrow confined valleys between high mountain ranges where considerable sidehill work must be expected, and, from the timber growth in some sections, considerable heavy snowfall is indicated during the winter months, resulting in late spring run-off.

(1) See R. M. Martin's report on Pelly River route.

The total distance of the easterly route between Summit Lake and Dawson is about 1,132 miles. The estimated cost for a 24 ft. gravelled highway through this country, which is less confined and more easy of access to bases of supplies, as many of the rivers followed are navigable for light draft freight boats for many miles, would run about $14,000.00 per mile, including bridges. This would make the estimated cost from Prince George to Dawson at around $16,000,000.00.

In conclusion I would suggest that careful consideration be given to both westerly and easterly routes outlined by the reports I have submitted. In the matter of costs it would be evident to the ordinary layman, who may have the privilege of reviewing the photographs taken over both routes, that the westerly route would be the more costly construction. This, at the same time, is not a matter only of present costs, but rather will the easterly or westerly route be the more suitable for a main trunk road that will be fed by an extension of other road systems from the east, northeast and west, which will eventually result from opening up country which for years has been the home of the prospector and trapper.

Jasper, Alberta,
October 11,1939.

RECONNAISSANCE AIR SURVEY, ATLIN TO FORT ST JAMES VIA WESTERN ROUTE

by

J. H. Mitchell

Complying with your request dated August 21st, 1939, I am returning herewith the 25 - 7 x 9 aerial photographs which were taken during the reconnaissance along the Western route of the proposed Alaska Highway between Atlin and Fort St. James. These prints have been checked over with my records of location, etc., and corrections made where any errors were evident. The information placed by the Canadian Airways was supplied at Fort St. James by me, and conforms very closely with the list mailed you August 8th. The following errors or omissions are given herewith:-

No. 1 - Above Pike and O'Donnell Rivers.
No. 9 - Junction Stikine, Tahlatan and Tuya Rivers.
No. 20 - Junction of Sustut and Skeena Rivers.
No. 21 - Over north end of Bear Lake, looking N.W. to Sustut River Valley, Bear River in foreground.

I also attach the two maps of the northwestern section of British Columbia on which I have indicated by a green dash line the route flown on the 15th, 16th and 17th of July, commencing at the south end of Bennett Lake, from which point I took off on the afternoon of the 15th, arriving at Atlin the same day. Due to weather conditions on the morning of the 16th the flight was postponed until the afternoon, when I continued the journey from Atlin, via the Pike and O'Donnell Rivers, Bell Lake, Nakina River headwaters, Prairie Lake to Dease Lake for the night, resuming the flight on the morning of the 17th from this point to Fort St. James. Aerial photographs were only taken at such points en route between Atlin and Fort St. James. Approximate photographic stations are indicated on the maps by a green triangle and arrow pointing in the direction of the landscape photographed.

I have also indicated on the maps in a blue dash dot line the most feasible route for a western location of the proposed highway from Tagish River outlet from Tagish Lake, the nearest point to present road system to the town of Atlin on Atlin Lake, and from this point to a junction with the Fort St. James - Manson Creek Road near Chuchi Lake and the Nation River.

Also I have indicated by a blue dash 2 dot line, where possible, alternative routes that might be given consideration when ground reconnaissance is contemplated. The first of these is shown to be from a point on the present tote road between Telegraph Creek and Dease Lake, near the Junction of the Tuya and Stikine Rivers, following the Klastline River, Eddontenajon Lake to a point on the Klappan River. The second of these alternative routes is from a point on the Kilankis River, following a route from the Skeena to Hazelton. The country that would be traversed on the Klastline section in the vicinity of its junction with the Stikine is quite rough, the rivers having cut deep canyons in the bottom of the valley, which is shown in prints 8 & 9. If these two prints are placed together where I have marked a cross, and No. 8 is held approximately 4 inches apart, a panorama view of the country northwest of the Stikine River is made taking in the Tahltan, Tuya and Tanzilla Rivers, with the Stikine flowing from right to left in the foreground. It is evident considerable heavy construction would be met with at this point.

Following the route of the Klastline about twelve miles above its junction with the Stikine the valley bottom flattens out and no great heavy construction is evident above the junction of Kakiddi Creek, shown in print 10. Typical country traversed from this point to the Klappan River is shown in prints 11, 12 and 13.

The country crossed by the alternative route between the Kilankis River, via the Skeena River, to Hazelton is clearly defined in print no.18, which indicates that the Skeena Valley is more of a V shape for some distance below the junction of the Kilankis. The timber growth is heavy spruce and pine. The ground slope would indicate that considerable side hill construction would be met with for at least thirty miles. The valley no doubt opens up from its confined traverse through the mountain ranges above the junction of the Babine River and the district north of Hazelton.

Resuming my aerial traverse from Tagish along Little Atlin Lake and the east shore of Atlin Lake to Atlin, no serious engineering difficulties would be met with. Heavy outcrops may be avoided when a ground

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reconnaissance is made. Leaving Atlin and following the O'Donnell River road to Dixie Lake, and thence via BellLake, Ruth Lake to the Nakina River, near the Nakina Cabin, print 2, taken about ten miles below Nakina Cabin, is typical of the terrain one will encounter when leaving headwater courses of streams flowing into the Pacific Ocean. In view of this, in making the aerial reconnaissance of 16th July, I left the proposed route at Nakina Cabin and followed the upper headwaters of the Hayes River, which flows northeasterly to the White Swan River and Teslin Lake. Print No. 3 shows this divide to the left of the view taken. Unfortunately visibility was not too clear at times due to rain squalls and detail is lacking in this print.

From Atlin Lake to Gun or Prairie Lake, and thence to a point on the Dease Lake-Telegraph Creek trail, is practically the same route as covered by Mr. J. C. Brady, District Engineer for the Province of British Columbia. Generally I agree with Mr. Brady that the route as indicated on the sketch maps is favourable for road construction, and swampy sections may be avoided by traversing the bench lands of the wide plateau between the headwaters of the Nakina and the crossing of the Tuya River. A low flat divide would be crossed between the headwaters of the White Swan River and a west branch of the Tuya. This divide is seen on the left of print 4, and may possibly be around 3,500 ft. elevation.

Continuing the traverse after linking up with the trail to Dease Lake the sketch map shows three possible routes to the Klappan River, besides the alternative via the Klastline previously referred to. Field reconnaissance would have to be made here to determine the most feasible. On print No. 5, in the lower right corner, may be seen a section of the Dease Lake telegraph trail, and about three miles above it are the tents of a road construction crew who, I understand, were grading a road to Kluey Lakes, or up the Gnat Creek, for the Public Works Department, who no doubt have location surveys and ground information of the section available.

Prints Nos. 13 to 18 show the valleys of the Klappan, Nass, Kilankis Rivers and that section of the Skeena River below the junction of the Kilankis. They indicate that these rivers flow through flat U valleys with increasing timber growth as the Skeena is reached, evidence that increased precipitation may be met along the Skeena towards Hazelton on the alternative route south. Along this whole section from the Klappan to the Skeena construction would be generally fair, with no engineering difficulties. The summits crossed between the headwaters of the Klappan and Nass Rivers lie in a continuous trough, as do the Damdochax and the Kilankis. The elevation of these summits will probably be around 3,500 ft.

Following the route up the Skeena from the mouth of the Kilankis to the Sustut River and Bear Lake, then down the Driftwood to Takla Lake and via the Nation Lakes to a point on the Manson Creek Road, prints 19 to 23 indicate that the mountains flatten out and the valley bottoms are wide flat U shape to the head of Takla Lake. From this point along the shores of Takla Lake and Nation Lakes to the junction with the Manson Creek Road the terrain is hummocky, with numerous small lakes and rock ridges, with flat, probably swampy basins, between ridges. Generally the well defined water courses to the head of Takla Lake would be easy road location and construction. However, between the head of Takla Lake and the Nation Lakes construction would be more difficult and only a ground reconnaissance could determine the best route to close this link of the suggested location between the junction of the Kilankis and Skeena Rivers and a point on the Fort St. James-Manson Creek Road.

Summarizing the foregoing, I consider a feasible westerly route is possible from a point on the Carcross-Tagish trail to Atlin and thence south along the east shore of Atlin Lake following the O'Donnell-Dixie Lake trail to Bell Lake and the headwaters of the Nakina River, then up the White Swan Valley to the saddle between this river and the west branch of the Tuya to a point on the Dease Lake telegraph trail. Between this point and the Klappan River four possible routes are available, and only a ground reconnaissance could decide the most economical and suitable way to breach the rough country between the Tuya and the valley of the Klappan River. The Big

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Klappan and the Nass should be followed as the proposed route by Eaglenest Creek or the Little Klappan to the headwaters of the Skeena did not look favourable from the air. This is also the reason why I suggest the route via the White Swan River after leaving Nakina Cabin on the Nakina River, where the proposed location was to follow the telegraph line to the Nahlin Cabin and then south to the Tahltan and the mouth of this stream on the Stikine River.

At the junction of the Kilankis and the Skeena two ways are feasible -- one to Hazelton and the other to Manson Creek and on to Fort St. James. The latter would be much longer, but would possibly be the more suitable to link up with an extension of a road system extending west from Hudson Hope on the Peace River, via Findlay Forks and Manson Creek or the Ominoca to Takla Landing. The distance between Tagish and Hazelton is approximately 640 miles, while the distance between Tagish and Manson Creek is about 680 miles. The estimated cost for a 24 ft. gravelled highway through mountainous country as traversed by the westerly route would run around $16,000.00 per mile, including bridges. Therefore, the estimated cost would not be less than ten or ten and one-half millions respectively.

From Tagish to Dawson the distance is approximately 435 miles and, at a cost of $16,000 per mile would make the estimated total figure from Hazelton to Dawson at about $17,000,000.00. A ground reconnaissance and location surveys would be the only means of determining cost factors. However, in view of the great distance of much of the proposed route from bases of supplies, construction costs might be somewhat higher than work we have undertaken in recent years where the section was only 18 ft. and construction workings not more than 70 to 80 miles from railhead.

In conclusion, I would suggest that further careful ground and aerial reconnaissance be made over the routes outlined on the sketch map before any location or construction work is projected, as these would provide more detail of ground conditions than one can observe from only one flight over unfamiliar territory.

Jasper, Alberta,
October 10, 1939.

REPORT ON SURVEY - WHITEHORSE TO WHITE RIVER.

By R.M.Martin

I beg to submit the following report on the reconnaissance survey I made between Whitehorse and the White River for the proposed British Columbia-Yukon-Alaska Highway.

I drove from Whitehorse to Kluane Lake by truck on August 11 and 12, following the surveyed trail marked on the map of the Yukon Territory 1936, and passing through Chambers' Ranch at Champagne and the F. Sketch Trading Post at Kloo Lake. The Jacquot Bros. Motor boat met me at Kluane Lake and took me to their ranch at Burwash Landing. The inspection of the west side of the lake was done on my return trip. I left Burwash Landing with a pack outfit and Tom Dickson as guide and followed the trail marked on the above mentioned map to a point four miles up Wolverine Creek on the west side of the Donjek River. Becoming discouraged with the country traversed since crossing Duke River, I returned to the Donjek and followed the river bars down to "Donjek Canyon" ten miles below the mouth of the Wolverine. This point is the most suitable crossing on the Donjek River and is on the north side of a valley which runs from Kluane Lake to the Lower Canyon on the White River. I could see through to the White River so I returned by following the edge of the valley in an easterly direction to "Kluane Canyon" on the Kluane River in order to avoid swamps, then going south 50 degrees East, to a point on the Duke River a mile below the trail. From there I followed the trail to Burwash Landing and arrived back at Whitehorse on August 23rd.

From the information I gathered on this reconnaissance trip, and from two previous years' experience in the Yukon, I have found that the following conditions should be considered in locating and constructing a highway:-

(1) Altitudes. Timber line in the Yukon is approximately 4,000 feet above sea level. High altitudes should be avoided. Snow comes a month earlier in the Fall and stays a month later in the Spring 1,000 feet above the valley. The

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snowfall is also heavier and is more inclined to drift.

(2) Perpetual Frost. Avoid heavy hillside work on frozen ground as they continually slide after the surface is stripped. Make fills over low frozen ground without disturbing the present insulation. The poplar tree grows only on thawed ground and is usually found on the lower slopes of the valley. The region of perpetual frost lies west of Kloo Lake.

(3) Seasons. Snow melts in the valleys between April 1st and 15th and road work could commence the 1st and 10th of May. The freeze-up comes between October 5th and 20th.

(4) Snowfall. The snowfall between Whitehorse and the White River does not exceed 2½ feet and is usually 1 to 1½ feet west of Kluane Lake. The Jacquot Bros'. have 75 horses wintering on the range all winter. On the present trail above Bear Creek at an elevation of 3,200 the snow becomes 4 feet deep. The road would be open from December 1st to April 1st.

The route traversed from Duke River over to the head of Wade Creek and over the Donjek River to Tepee Lake by the pack trail is not suitable for a highway for the following reasons:-

(a) The trail climbs 1,100 feet in the first two miles, and the side hill is frozen gravel covered with moss and 6" spruce;

(b) in going over to the head of Wade Creek it is necessary to climb to an elevation of 4,400 feet above sea level;

(c) the country between Duke River and Wade Creek is frozen glacier gravel covered with grass and 'niggerheads';

(d) their is a drop of 1,200 feet in two miles to get to the mouth of Wade Creek;

(e) the Donjek River bed spreads out over a width of two miles from Wolf Creek (8 miles above the Wade) down to Wolverine Creek. The channels are changing every year. At the island just above Arch Creek at the present time the water is in small streams spread over 1,600 feet on each side of the island;

(f) the elevation between Wolverine Creek and Tepee Lake is approximately 3,600 feet above sea level.

I have made a projection on the accompanying map, which is herein described.

Commencing at Whitehorse with an elevation of 2,080 feet above sea level follow within a few hundred feet of the present trail to Canyon on the Aishihik River a distance of 84 miles. Thence N 80° W to the present bridge over Jarvis River. Thence follow within a few hundred feet of the present trail to Silver Bay on Kluane Lake. Thence follow edge of Kluane Lake on west side to Burwash Landing and on to Duke River to a point a mile below the trail crossing. Thence N 80 degrees west a distance of approximately 17 miles to Kluane Canyon. Then N 80 degrees W. to Donjok Canyon a distance of approximately 14 miles. Thence follow the same general direction to the Lower Canyon on the White River a distance of approximately 33 miles. The total distance being approximately 240 miles.

MILE 0 - MILE 20 Follows terraces on the Yukon and Takhini Rivers, maximum elevation is 2,300 feet above sea level. Elevation of Takhini crossing is 2,100 feet. Rock bluffs are avoided, soil is glacier sandy clay and gravel ridges; clearing would be light, with the exception of a few bluffs of 4" spruce it consists of scrub poplar; there is no swampy ground; maximum haul on gravel for the first 15 miles would be 2 miles; there is no gravel between mile 15 and mile 20; the Takhini River carries silty sand with no gravel; the work can be done with bulldozer and grader; there is a ferry at the present time on the Takhini River; the width of the river is 300 feet, and runs about 2 miles per hour; the water is 6 feet deep at the present time, and flood level would be 5 feet above the present level.

MILE 20 - MILE 33 Clearing consists of scattered scrub poplar with many open places. The soil is sandy clay with gravel showing on creeks; maximum haul on gravel would be 3 miles; the grading can be done with bulldozer and grader; there is no rock work, swampy ground or frost conditions; excavation would be about 4,000 c.y. per mile.

MILE 33 - MILE 45 Clearing consists of 4" to 6" spruce and poplar; the present trail has been cut out fairly straight, and can be taken advantage of. The ground is level, and most of grade work would be done with a grader and bulldozer to level up small sags. The soil is chiefly clay. Gravel can be found at Mile 35, Mile 37, Miles 40 and 42.

The excavation would be approximately 3,000 c.y.per mile.

MILE 45 - MILE 60 Clearing consists of scrub poplar and bluffs of 3" spruce. The ground is level, most of the work can be done with a grader. The soil is sandy clay, and gravel can be obtained at Miles 50 and 54, also along the foot of hills lying two miles to the north. Excavation would be approximately 3,000 c.y. per mile.

MILE 60 - MILE 64 Chambers' Ranch at Champagne is at Mile 62. This is fairly open country with a few bluffs of scrub poplar. The soil is very sandy, and is covered with 2" of loam and turf. The country is rolling, and is on the divide between the Takhini and Dezadeash Rivers. The elevation is 2,300 feet above sea level. The work can be done with a grader and bulldozer. Gravel can be found along the foot of the hills two miles to the north; maximum haul on gravel is three miles; excavation work is about 3,000 c.y. per mile.

MILE 64 - MILE 90 The road follows the plateau above the Dezadeash River. The clearing consists of scattered bluffs of 3" poplar and spruce; the soil is sandy silt with gravel showing on small streams crossing the trail; maximum haul on gravel would be three miles. The work can be done with a bulldozer and grader; excavation work about 3,000 c.y. per mile.

MILE 90 - MILE 114 The present trail on this section follows a lower route to Bear Creek, which is level, has gravel near the surface most of the way, and is covered with scattered bluffs of scrub poplar. It then climbs over the side of Mt. Decoell to an elevation of 3,200 feet above sea level. This section has glacier gravel all the way, and is covered with 4" to 10" spruce. The total distance is 30 miles.

I have made the projection on a plateau which runs through from Mile 80 to the Jarvis River.

The clearing would be 3" poplar and spruce. The soil is glacier gravel and sands. The work can be done with bulldozer and grader. Excavation work is 3,000 c.y. per mile on this section. The elevation at Jarvis River is 2,720.

MILE 114 - MILE 133 This section lies between Jarvis River and Kluane Lake at Silver Bay, and crosses the divide between the Alsek River and the White River Basin at an elevation of 2,800 feet above sea level. The trail follows a ridge between Silver Creek and Christmas Creek covered with scrub poplar with scattered 4" spruce. There is gravel the entire distance covered by 4" of Volcanic ash and turf. There is no rock work, no swampy ground and no frost to be encountered. The grade work can be done with a bulldozer and grader and would be approximately 3,000 c.y. per mile.

MILE 133 - MILE 143 The road should follow the edge of the lake on the gravel bench 10 feet above the water level as far as Slims Creek at Mile 138. A delta has been built up at the mouth of the creek. Some work would have to be done here building road above water level. Between Mile 141 and Mile 143 the mountain comes down to the lake, and there is a solid rock bluff with a small bench on it 40 feet above the lake. The excavation work would be 6,000 c.y. per mile with 2,000 c.y. of solid rock and the balance slide rock on these two miles. This is the only section of the road that is not "prairie work". The clearing would be negligible and the work can be done with a bulldozer and grader with powder work on the rock.

MILE 143 - MILE 177 From Mile 143 there is a level bench 40 feet above the lake to Burwash Landing. The soil is sandy clay and gravel covered with scrub poplar and bluffs 5" spruce. There is also some deadfall. The section between Burwash Landing and Duke River is level gravel bars covered with scattered scrub poplar. The grading can be done with a bulldozer and grader. The excavation work would be 3,000 c. y. per mile.

MILE 177 - MILE 194 The road would cross Duke River at an elevation of 2,650. The creek jumps out of its channel near the point where the trail crosses and spreads out over a half mile, making new channels. Approximately ten days' work with the bulldozer would be required to overcome this. At the present time Duke River is 100 feet wide and 3 feet deep in the old channel at the Canyon. From Duke River to Burwash Creek the road follows gravel bars covered with bluffs of poplar and spruce. From Burwash Creek to Kluane Canyon the road would cross gravel ridges with low wet stretches in between.

The wet ground is frozen. The clearing would be 4" poplar and spruce in scattered bluffs. The work would be done with bulldozer, dump wagons with tractor and grader. The excavation would be 4,000 c.y. per mile.

MILE 194 - MILE 208 At Mile 194 the road would climb 100 feet on to a bench and follow the hillside for 4 miles where it would cross a wet and frozen flat for a distance of a mile. It would then climb 100 feet to another bench and follow the hillside at an elevation of approximately 2,700 feet above sea level, and gradually drop down to Donjek Canyon to an elevation of 2,155. The country has been burnt over in recent years. There are bluffs of 3" spruce and poplar with deadfall. The soil is sandy silt and gravel. The excavation work would be 3,000 c.y. a mile.

MILE 208 - MILE 240 I have reason to believe this section is similar to the section Mile 194 to Mile 208. There is very little difference in the physical features of the country between Whitehorse and the White River by the route outlined, and can be summed up as follows:-

(1) Clearing and Grubbing. Scrub poplar 3" to 4" poplar and spruce and a few bluffs of 6" to 8" spruce. The number of stumps to be blasted is negligible.

(2) Grading. Except for two miles at Kluane Lake the balance is "prairie work". A grader can do the most of the work with a bulldozer to grub and level off. Frost conditions would not interfere with the work, as no cuts would be made below thawed ground. There is no swampy ground between Whitehorse and Burwash Creek. There is approximately two miles of wet ground to be filled between Burwash Creek and the Donjek River. One foot of gravel is all that is necessary on these wet places.

(3) SURFACING. The maximum haul on gravel on the first 90 miles would be about three miles. From Mile 90 to the Donjek River at Mile 208 there is gravel on every mile.

(4) Culverts. There is not sufficient timber along the route for native wood culverts. This fact, together with the high cost of labour, would justify the use of corrugated iron pipe. For bridge culverts and for bridges over creeks where there is no run of ice, pile-bent trestles could be used. The The piling could be obtained locally. Thawing for piling west of Kloo Lake can be done with steam points, and is cheaper than hand labour for crib excavations.

(5) Bridges.There are 2 major bridges required, one at Takhini River with two 150 ft.spans,and one on Donjek which requires a 1,000 ft. opening but pile trestle could be used on half of this distance. Also 60 ft.spans are required for Little, Aishihik, Jarvis and Duke Rivers. The remaining creeks can be crossed with trestles with pile-bents spaced 18 ft. centres.All bridges are enumerated with cost in the cost estimate. A detailed

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list of bridges required on this route is given herewith, the type of bridge being shown. Estimates of cost are also given for each bridge based on a width between wheel guards of 24 feet. Estimated costs of the two larger bridges where steel spans are required are not included in the list but are given separately.

COST OF BRIDGES WHITEHORSE TO WHITE RIVER

PLACE	TYPE	LENGTH IN FEET	24' WIDE COST
Mile 9.2	2 Bent Trestle	18	$ 1,000.00
" 10.4	2 " "	"	1,000.00
" 13.7	2 " "	"	1,000.00
" 15.5	2 " "	"	1,000.00
" 20 Takhini	(See page)		
" 27.7	2 Bent Trestle	18	1,000.00
" 31.2	2 " "	"	1,000.00
" 33 Little R.	60 ft. truss wood	60	7,500.00
" 37	2 Bent Trestle	18	1,000.00
" 49	2 " "	"	1,000.00
" 52	4 " "	55	2,250.00
" 59	4 " "	"	2,250.00
" 67	2 " "	18	1,000.00
" 70	2 " "	"	1,000.00
" 78	3 " "	36	1,625.00
" 82	2 " "	18	1,000.00
" 84 Canyon	Truss on concrete, wood	60	7,500.00
" 95 Marshal	4 Bent Trestle	55	2,250.00
" 105 Pine	3 " "	36	1,625.00
" 110 Bear	3 " "	"	1,625.00
" 114 Jarvis	Truss, wood	60	7,500.00
" 129	2 Bent Trestle	18	1,000.00
" 130	2 " "	18	1,000.00
" 132	3 " "	36	1,625.00
" 140 Slims	4 " "	55	2,250.00
" 146	2 " "	18	1,000.00
" 148	2 " "	"	1,000.00
" 152	2 " "	"	1,000.00
" 154	2 " "	"	1,000.00
" 157	2 " "	"	1,000.00
" 159	2 " "	"	1,000.00
" 162	2 " "	"	1,000.00
" 166	2 " "	"	1,000.00
" 169	2 " "	"	1,000.00
" 177 Duke	Wooden Truss	60	7,500.00
" 183 Burwash	4 Bent Trestle	55	2,250.00
" 190 Quill	3 " "	36	1,625.00
" 207	3 " "	36	1,625.00
" 208 Donjek	(See Page)		
" 208 to 240	Estimate 5 - 2 Bent Trestles		5,000.00
	Estimated cost of 60 foot wooden trusses and trestles		$78,000.00

Approximate estimate for twenty-four foot road exclusive of side ditches.

Takhini River Bridge (width between wheel guards 24 feet).

2 - 150 ft. steel spans on concrete abutments - 1 centre pier.

Concrete pier and abutments	$20,000.00
Excavation	1,700.00
Steel trusses	60,000.00
Total	$81,700.00

Donjek River Bridge (width between wheel guards 24 feet).

Cost of piers	$ 17,000.00
Excavation	1,700.00
3 steel trusses	95,000.00
Wood trestle - 550 feet	27,500.00
Total	$141,200.00

Estimated cost of other bridges, including trestles, etc., for a twenty-four foot road is shown on Page .

Total estimated cost from Whitehorse to White River crossing via Kluane Lake for a twenty-four foot road is as follows:-

Grading and surfacing -	
238 miles @ $9,500 per mile	$2,261,000.00
2 " @ $14,000 " "	28,000.00
Small bridges (Page)	78,000.00
Takhini River bridge	81,700.00
Donjek River bridge	141,200.00
Total	$2,589,900.00
Engineering and Contingencies 10% approx.	259,000.00
Grand Total	$2,848,900.00

Attached herewith are photographs taken on the route of the reconnaissance survey between Whitehorse and the Donjek River. The point at which each photograph is taken is shown on the attached map which also shows the reconnaissance lines.

Barometric readings between Whitehorse and Donjek River as determined on the survey are listed herewith:-

Whitehorse	2080	
Takhini	2105	
Champagne	2300	
Cracker Creek	2225	
Canyon Creek	2100	
Marshall Creek	1990	
Pine Creek	1900	
Bear Creek	1970	
Bear Hill	3200	
Jarvis Creek	2720	
Summit Lake	2800	
Kluane Lake	2500	
Duke Canyon	2750	
Duke-Bur Divide	3870	
Duke-Bur Bench	4300	
Burwash Crossing	4400	
Wade Crossing	4000	
Wade Bench	4100	
Top of bank Donjek	4000	(above mouth of Wade Creek)
Bottom of Wade Bench	3770	(on the Donjek)
Donjek at mouth of Wolverine	2550	
Cabin on Wolverine	2570	
C.P. on Wolverine	3120	
Summit at 40/angle	3500	Max (between Wolverine and Tepee Lake)
Donjek Canyon	2155	

Summit North	2400	(between Donjek and White River)
Hill Side South	2400	
Lake at Saddle	2720	(6 miles east of Donjek Crossing)
Side Hill	2600	(10 " " " " ")
Camp	2350	
Kluane River	2300	(at Kluane Canyon)

The Donjek River has a grade of 30 feet per mile.

From the tourist point of view the proposed route through the Yukon to Alaska via Kluane Lake has the following to offer:-

There are mountains along the south side of the Takhini River and the Dezadeash River. There is also a range of mountains along the west side of Kluane Lake which run through to the White River. The Donjek Glacier could be reached by the construction of a side road along the east side of the Donjek River flats from the Donjek Canyon at a small cost.

There are trout and grayling in Pine Lake, Kloo Lake and Kluane Lake. The upper Donjek River abounds with mountain sheep and caribou.

The Kluane Lake region is mineralized.

I have shown on the accompanying map an alternative route from Canyon to the mouth of Slims River at Kluane Lake. This is a longer route but goes near the Kaskawuish Glacier.

South winds from the Alsek River Valley blow over Kluane Lake making seas too heavy for a motorboat much of the time.

This section of road could be built in two to three years' time.

The road would be open without the use of snow-ploughs between December 1st and April 1st, but might be kept open all winter with very few trips with the snow-plough.

I would be glad to give you any further information on this route.

Yours very truly,

(Sgd) R.M. Martin.

REPORT ON RECONNAISSANCE SURVEY
ALONG THE PELLY RIVER VALLEY.

by R.M.Martin.

I beg to submit the following report on a reconnaissance survey for the proposed British Columbia-Yukon-Alaska Highway along the Pelly River Valley.

I covered the route by going to Ross River by plane, and drifting down stream in a row-boat. While at Ross River I walked six miles up stream and could see the valley for another six miles. In going down stream I made camp every second day and examined the soil and investigated the creek crossings. I also made three side trips; one to investigate a valley twenty miles above the mouth of McMillan River going over to that river, the second in the region of Diamain Lake to connect with the present trail to Mayo, and the third along the old Dawson trail going northwest from Pelly Farm which is three miles above the mouth of the Pelly River.

Attached to this report is a map of the Yukon Territory 1936 on which I have sketched a proposed route following the north side of the river. The road would be on a river terrace 100 to 300 feet above the river from Ross River to Bradens Canyon with exception of dropping down to river flats at a few valleys coming into the Pelly River. From Bradens Canyon the road would be about thirty feet above the river. There would be no sharp curves in the alignment and the road would be within a few hundred feet of the river at all large bends which swing to the north; the valley being comparatively straight.

For the purpose of describing the physical features of this route, I have numbered the miles from Ross River to Pelly Farm; also the snapshots accompanying this report.

From information I got from Mr. Etzel, who is in charge of thetrading post at Ross River for Taylor and Drury, I deduce that there would be no difficulty in making a road from Ross River to Pelly Banks at the mouth of the Campbell River.

A river crossing on Ross River was chosen 1000 feet up stream from the mouth and is shown in snapshot F1. The width of the river is 300 feet. The

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water was running two feet deep; the bed of the river is gravel. Ice conditions in the Spring would require a bridge to be 20 feet above the present water level. The elevation of the Pelly River at the mouth of Ross River is 2390 feet above sea level.

Going south-east from the River crossing the road would follow a creek valley for two miles and come out on the Pelly River on a bench 300 feet above the river 3 miles up stream from the mouth of the Ross River. (See snapshot F2).

MILE 0 - MILE 10:

Commencing at the Ross River Crossing the road would go in a general direction of North 65 degrees West, climbing on to a terrace 150 feet above the river in order to avoid bluffs which run into the river at miles 3, 8 and 9 (see snapshots F3,F4). The terrace on this section is covered with scrub poplar with bluffs of 4" spruce and poplar. The soil is 2" loam 4" Volcanic ash, 18" gravel on shale. Gulches at miles 3,5,6 and 9 would cause road to be diverted into them with trestles of 2 and 3 bents for culverts. Earthworks would average 5,000 c.y. per mile, with maximum haul on gravel of one mile.

MILE 10 - MILE 25:

At mile 10 the road would drop to the edge of the flats at the foot of the terrace, making easy side hill work and shortening the distance at mile 18 where there is a large gulch. After crossing this gulch the road would climb 200 feet and ride over a rock bluff where there would be a possible 1000 c.y. of rock work. The road would then follow side hill into the Orchay Creek valley without losing elevation in order to ride through a saddle 300 feet above the river at a high bluff at mile 25. The clearing is thin 2" to 4" spruce and poplar. The soil is shale and gravel. Earthworks 6000 c.y. per mile, maximum haul on gravel one mile.

MILE 25 - MILE 35.

Dropping down on to a terrace 150 feet above the river the road goes to mile 30, where it crosses a creek valley by dropping down a 100 feet and climbing again to the terrace. The clearing is thin 2" and 4" poplar

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and spruce. The soil is gravel and clay. Earthworks is 5000 c.y. per mile, mostly level with side hill crossing the creek valley. Maximum haul on gravel two miles.

MILE 35 - MILE 40:

At Mile 35 a creek is crossed by diverting road into the gulch a quarter of a mile. (See photos G2 and G3). The road follows the terrace as in G3 for three miles when it drops on to the river flats of Blind River. The Blind River at Mile 40 is crossed with a 60 foot wooden truss. Clearing is 3" poplar and spruce with some 6" spruce on flats. Soil sandy clay, sand and gravel. Earthworks 4,000 c.y. per mile. Maximum haul on gravel one mile.

MILE 40 - MILE 50:

From mile 40 to 45 the road would follow a level terrace when it drops on to gradual sloping ground in a valley two miles wide. A terrace 150 ft. above the river is again followed to a creek at mile 50, which can be crossed with a 20 foot opening. Clearing is 3" to 4" poplar and spruce with bluffs of dense 3" spruce. The soil is sandy clay and silt. There is gravel in the creeks. Earthworks 5000 c.y. per mile. Maximum haul on gravel two miles.

MILE 50 - MILE 60:

A range of mountains parallel the river on both sides. The road would follow a bench a 100 feet above the river to mile 53, where it goes on to flats 30 feet above the river to mile 55. At mile 55 a narrow bench 200 ft. above the river is followed to mile 60. Small creeks are crossed at miles 53, 54, 55 and 56. There are four small gulches on mile 58. Two bent trestle culverts could be used on all these water courses. The clearing is scrub poplar with bluffs of 4" poplar and spruce, and small windfall. The soil is sandy clay and gravel. Earthworks would be 5000 c.y. per mile. Maximum haul on gravel would be two miles.

MILE 60 - MILE 70:

At mile 61 a small creek is crossed and the road would follow a bench to mile 64. The bench at this point is narrow and is cut with small gulches, but no serious obstruction. At mile 64 the river swings to the opposite

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side of the valley and comes back just above mile 70. The river flats are high and dry covered with spruce. All river flats above this point are flooded from year to year. The sharp bends in the river at mile 70 are known as "The Fish Hooks". The Iron River comes in at mile 65. From mile 65 to Mile 70 the road would be on gradual sloping ground covered with 4" poplar and spruce. The soil is sandy silt and gravel. Earthworks 4000 c.y. per mile with maximum haul on gravel two miles.

MILE 70 - MILE 80:

The mountains recede from the north side of the river. The road would follow a terrace 150 feet above the river to the Tay River at mile 75 which had a flow of 50 cu. feet per second. The terrace is wide to mile 80 where another valley is crossed. The clearing is scrub poplar and scattered 3" spruce. Earthworks 5000 c.y. per mile. Maximum haul on gravel one mile.

MILE 80 - MILE 90:

From mile 40 to mile 87 the general course was N.55 degrees W. From mile 80 to mile 87 the road would follow a wide terrace 200 feet above the river. (See photos K3 and K4). The clearing is scattered 3" poplar with bluffs of 4" poplar and spruce. Earthworks 4000 c.y. per mile. Maximum haul on gravel two miles. At mile 87 the road would follow at the foot of a rock butte and meet the bend in the river at mile 90. (See Photos L1, L2 and L5). Rock between mile 87 and 90 can be avoided.

MILE 90 - MILE 100:

The road follows a plateau 150 feet above the river. At mile 97 the road would be a half mile from the river to avoid a slough on the river flats and a bluff running into the river just below it. The Earn River is crossed at mile 98. This can be done with a low crossing with a 60 foot truss a hundred feet below the plateau or with a level crossing using an arch bridge 200 feet long over a canyon 60 foot deep. (See sketch Photo M1).

MILE 100 - MILE 110:

From the Earn River the road would go N. 85 degrees W. following a level bench covered with scrub poplar to mile 104, where it would go S 80 W and follow the south side of a ridge to mile 110. At mile 108 there is a rock

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bluff with a narrow bench, with a possible 500 c.y. of rockwork. The clearing is scattered 3" poplar and spruce. Earthworks 4000 c.y. per mile. Maximum haul on gravel is one mile.

MILE 110-MILE 120:

At mile 110 the road would drop on to river flats 25 feet above the river and follow foot of bench at mile 112 and climb up on a 100 foot bench on crossing a small creek at mile 115. At mile 120 the road would drop off the bench and cross a small creek. The clearing is 3" poplar with bluffs of 4" spruce. Earthworks 4000 c.y. per mile, soil silt and gravel. Maximum haul on gravel one mile.

MILE 120 - MILE 130:

A wide valley runs toward the McMillan River at mile 125. At mile 120 the road would follow the edge of the wet river flats along the foot of the slope of the side hill. A small creek is crossed at mile 126. At mile 128 a rock ridge comes close to the river and the road would climb on to a narrow bench. (See photo M5). At mile 130 the bench widens out. Earthworks 4000 c.y. per mile, soil mostly gravel. Maximum haul on gravel one mile.

MILE 130 - MILE 140:

The road would follow a wide level bench covered with scrub poplar. Five small gulches are crossed between miles 132 and 136. The soil is silty sand and gravel. Earthworks 4000 c.y. per mile. Maximum haul on gravel one mile.

MILE 140 - MILE 150:

Between miles 140 and 142 a rock ridge is very close to the river. Small benches are in evidence, but a few rock points would make 2000 c.y. of solid rock. From mile 142 to mile 144 the road would follow a gravel terrace and drop off it to the river crossing on the McMillan River. (See photos M6 and N1). The clearing between miles 142 and 150 is 4" poplar and spruce. Soil is silt, gravel and some rock. Earthworks 6000 c.y.per mile. Maximum haul on gravel two miles. (See sketch of McMillan River Crossing).

MILE 150 - MILE 160:

The road follows benches 300 feet above the river to foot of high ridge at mile 155 and then goes on to bend in river at mile 157. (See

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photos N2 and N4). From this point the road would go S 45W following top of gravel terrace. The clearing is then 4" poplar and spruce. The soil is mostly gravel. Earthworks 5000 c.y.per mile. Maximum haul on gravel one mile.

If it is desirable to follow the present trail to Dawson by the Mayo route, the road should leave the Pelly River at mile 158 and go along the north side of Diamain Lake. (See photos N2 and N5). The geological map attached shows the projection from mile 158 north of Diamain Lake and also to Pelly Farm near Selkirk.

Diamain Lake is 400 feet above the Pelly River, and is 2100 feet above sea level. The summit between the Pelly and the Stewart is approximately 2300.

MILE 160 - MILE 170:

From Mile 160 the road would continue S 45 W to mile 165, where it would go west to Pelly Crossing. Diamain Creek is crossed at mile 161 at the top of a canyon at an old cache a half mile from the mouth of the Creek. A 36 ft. trestle is all that is necessary. The clearing is 3" poplar and the soil is mostly gravel. Photos 02, 03 and 04 show type of country between mile 156 and Pelly Crossing at Mile 172. The grading would be mostly level work. Earthworks 4000 c.y. per mile. Gravel on every mile. The granite at Diamain Creek is crossed on a narrow bench of gravel.

MILE 170 - MILE 180:

The road would run N. 80 W., dropping off the terrace at Willow Creek and following river flats 25 feet above the river. Photos P1, P2 and P3 show the gravel terrace. Photo P5 shows a rock bluff which is crossed on a narrow bench. At Grayling Creek the road would cross over a bench to the bend at mile 180. The clearing is scrub poplar and scattered 4" spruce. Earthworks would be mostly level work 4000 c.y.per mile. Maximum haul on gravel one mile. There is a possible 500 c.y. of rock work at mile 175.

MILE 180 - MILE 190:

At mile 180 the road would swing in and out of a gulch gaining altitude to get on a plateau. The plateau 200 feet above the river is followed to mile 185, where the road would drop on to the river flats 25 feet above the

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river. The road would go through a saddle in a rock bluff at mile 186 and cross Crossby Creek at mile 187 on the river flats. On crossing the Creek the road would go on to a low bench on a rock bluff. (See photos Q1, Q3 and Q4). The clearing is scrub poplar except for a bluff of 4" poplar and spruce on mile 187. There is a 1000 c.y. of rock work on mile 188. The soil is silt, gravel and some rock. Earthworks 6000 c.y.per mile. Maximum haul on gravel one mile.

MILE 190 - MILE 198 (Pelly Farm):

From mile 190 the road would follow river flats to mile 192, where a rock bluff comes down to the river, leaving a narrow bench. (See photo Q5). There is a possible 1000 c.y. of solid rock at this place. The road would follow the river flats to Pelly Farm. There is a V shaped gravel bench 80 ft. high protruding into the valley and running in to the river at mile 194. This would make the heaviest piece of work on the entire road there being approximately 6000 c.y. in this cut. The clearing is very light being scattered poplar and spruce. Soil is sandy silt and gravel. Earthworks 6000 c.y. per mile. Maximum haul on gravel is two miles.

PELLY FARM TO STEWART RIVER (via Scroggie Creek):

The old Dawson trail went north-west from Pelly Farm following a creek for three miles with maximum grade of six per cent. The west banks of the creek are covered with moss and is frozen ground but a road could be built on the east bank on thawed ground. The work would be side hill in slide rock and gravel which is easily moved. From the third mile the ground rises gradually there being meadows with glacial gravel ridges. The old trail followed the level ground to avoid work in levelling. Photos R1, R2 and R3 show the nature of the country fairly well. The clearing would be scrub poplar with bluffs of 4" poplar and spruce. The first three miles would have about 10,000 c.y. per mile of earthworks and going over the plateau to the Stewart would run 5,000 c.y. per mile. Gravel would be plentiful for surfacing. The cost per mile would run the same as the average on the Pelly River. The elevation going to the Stewart River would not exceed 2,200 feet above sea level. The elevation of Pelly Farm is 1,600 feet above sea level.

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From previous experience in the Dawson and Indian River areas I know a road could be built from the Stewart River up Blackhills Creek, up the Indian and up either Dominion or Sulphur Creeks. There is a road on these two creeks at the present time. A road could be made from Blackhills down Rosebute to Ogilvie, crossing the Yukon at this point and go up Sixtymile River.

Perpetual frost conditions exist north of Selkirk. Following hillsides on the sunny side especially where the poplar tree grows there is no frost within 20 feet of the surface. The wet 'pups' at intervals along the valleys are usually covered with moss and spruce trees with 'niggerheads' on the lower slopes. It is necessary to keep the frost in the ground on these places. This can be done by making embankment without breaking the insulation of moss. This can be done on a wide road by hauling material with trucks or wagons and bulldozing it ahead. The present practice of using brush is because the natural insulation becomes cut up doing construction.

The cost of construction of roads north of the Stewart River would be only slightly higher than along the Pelly River due to the haul on material, over about 15% of the road, usually in short stretches. The best locations are along the sunny slopes of valleys 50 feet above the bottom.

From the foregoing description it will be seen that the Pelly River route is ideal from a construction point of view. In general the road would follow a terrace 100 to 300 feet above the river. The terrace above the McMillan River is mostly shale with gravel and sandy clay on the surface, and below the McMillan River is mostly gravel. The clearing is light, being scrub poplar, 3" to 4" poplar and spruce with light windfall. There are a few scattered bluffs of timber suitable for piling on the river flats, but there is not sufficient timber on the route for native timber culverts. The alignment would be fairly straight as the bends in the river are on low river flats and the terrace continue through in the general direction of the Valley. The most of the road would be on level ground with side hill work at creeks coming into the Pelly River and in climbing over bluffs which run into the river in a few places. Six rock bluffs would make a possible 6,000 c.y. of rock

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work. Gravel for surfacing is plentiful.

From the trips I made to Diamain Lake, and along the old trail going north-west from Pelly Farm, and from the information I got from parties familiar with the country, I gathered that it is feasible to use either of these routes in going to the Stewart River. The road work would be a different type to that of the Pelly River in both cases. The sides of glacial gravel ridges would be followed where possible and embankments made over low-lying meadows and swamps, which are frozen. The trail from Pelly Crossing to Minto follows a similar country with a maximum elevation of 2000 ft. above sea level. The present trail from Whitehorse to Carmacks and Yukon Crossing is being used by cars and trucks and offers no difficulties to road construction. The snowfall along the Pelly River during the winter amounts to 1½ to 2 feet. This is practically the same as that in the Dawson area, which I have seen myself three winters. The road would be open from April 1st to December 1st without the use of snow-ploughs. If the road were ploughed off two or three times during the winter it would be kept open. The freeze-up comes between October 5th and October 15th, and roadwork could commence between May 1st and May 10th. Mr. Etzel at Ross River claims he plants his garden between April 18th and April 24th. It is a well-known fact that it is the water from the Pelly River that takes the ice out of the upper Yukon. There was a foot and a half of snow on the coast range of mountains above Skagway when I came out on October 14th this year. (I am sending with this report photos showing the scenic value of the route.)

A potential mining field would be opened up by the proposed road. Placer gold having been found in the Campbell, Ketza and Lapie Rivers, and rock formations between the Blind and Earn Rivers show mineralization. The Pelly not being a navigable river for steamers has discouraged prospecting in this area. The game in the country consists of mountain sheep, cariboo and moose. There are salmon and whitefish in the Pelly River and grayling and trout in the creeks. Transportation problems during construction could be best met by construction of toto trail on the right of way. A plane with pontoons could be used hauling supplies out of Selkirk. Machinery and fuel oil supplies could be hauled up the Pelly River on the ice by tractor trains.

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C O S T E S T I M A T E S.

Assuming the distance from Ross River to Pelly Farm near Selkirk to be 198 miles, that the right-of-way be cleared to a width of 66 feet, and that the road be graded to a width of 24 feet shoulder to shoulder with a surface of gravel 6" deep.

Engineering .....$600.00 per mile

Transportation and Camp Establishment ..... 300.00 per mile

Clearing and Grubbing ..... 800.00 per mile.

GRADING:

Bulldozer, operators, fuel, oil, repairs 9 days @ $120 a day.....	$1,080	
Tractor, grader, operators, fuel, oil and repairs 9 days @ $100 a day..	900	
1 Foreman 9 days @ $10 per day	90	
1 Mechanic 9 days @ $9 per day	81	
1 Blacksmith 9 days @ $9 per day.....	81	
12 Labourers @ $7 per day each..(9 days)	756	
Total.....	$2988	Say.....$3000.00per mile

SURFACING:

1 3/8 yard gas shovel, operator, gas, oil, cable and repairs 10 days @ $60 per day.....	600	
5 dump trucks, drivers, gas.oil and repairs, 10 days @ $30 per day each..	1,500	
8 labourers 10 days @ $7 " "	560	
Total.....	$2,660	Say.....$2700.00 per mile

CULVERTS:

Allowing 2--18" C.G.I.P.per mile
2--24" C.G.I.P.per mile
2--30" C.G.I.P.per mile
In place.....$1000.00 per mile

Maintenance for three years at $200 per year.....	600.00 per mile
Total.....	9000.00 per mile
Saall tools and exigencies 10%.....	900.00 per mile
Grand total per mile exclusive of bridges.....	9900.00 per mile
Average cost of 190 miles say.....	10000.00 per mile
Average cost of 8 miles say.....	11000.00 per mile

Total Cost - Ross River to Pelly Farm:

190 miles at $10,000 per mile	$1,900,000.00	
8 miles at $11,000 per mile	88,000.00	
Cost of small bridges & bridge culverts.....	108,600.00	(page 11)
Cost of Ross River bridge (p.12)	87,000.00	
Cost of McMillan River bridge (p.12).....	130,000.00	
Grand Total.....	$2,313,600.00	

COST OF SMALL TRESTLES AND BRIDGES - ROSS RIVER TO SELKIRK.

Assuming trestles are used to cross small streams and spring freshettes. Pile bents being placed 14 feet centres and deck designed to carry a uniform load of 5,000 lbs. per lineal foot. Dressed fir timber and native red spruce piling to be used and painted with coal tar.

A single panel requires 5,000 F.B.M. costing.....$ 150.00 per M in place
with 12 piles costing..... 20.00 each in place
making a total cost for the structure of say.....$1,000.00
2 panels would cost.....$1,800.00
3 panels would cost.....$2,600.00
A 60 ft. wooden truss on piling would cost in place. 100.00 per lineal ft.
The freight rate on lumber to Selkirk is..... 70.00 per M.

PLACE	TYPE	LENGTH IN FEET	COST.
Ross River (see page 12)			
Mile 3	2 bent trestle	15	$1,000.00
Mile 3.5	2 " "	15	1,000.00
Mile 5	2 " "	15	1,000.00
Mile 6	2 " "	15	1,000.00
Mile 8	2 " "	15	1,000.00
Mile 8.2	2 " "	15	1,000.00
Mile 19	3 " "	29	1,800.00
Mile 25 Orchay R.	4 " "	43	2,600.00
Mile 30	3 " "	29	1,800.00
Mile 35 Water	2 " "	15	1,000.00
Mile 36	2 " "	15	1,000.00
Mile 37	2 " "	15	1,000.00
Mile 39 Blind R.	60 foot truss	60	6,000.00
Mile 46 Water	3 bent trestle	29	1,800.00
Mile 51 "	4 " "	43	2,600.00
Mile 53	2 " "	15	1,000.00
Mile 54	2 " "	15	1,000.00
Mile 55	2 " "	15	1,000.00
Mile 56	2 " "	15	1,000.00
Mile 57	2 " "	15	1,000.00
Mile 58	2 " "	15	1,000.00
Mile 61 Water	3 " "	29	1,800.00
Mile 64	2 " "	15	1,000.00
Mile 65	2 " "	15	1,000.00
Mile 69 Iron R.	60 foot truss	60	6,000.00
Mile 70 Little H.R.	2 bent trestle	15	1,000.00
Mile 71 Water	2 " "	15	1,000.00
Mile 75 Tay R.	60 foot truss	60	6,000.00
Mile 77	2 bent trestle	15	1,000.00
Mile 79	4 " "	43	2,600.00
Mile 82	2 " "	15	1,000.00
Mile 91	2 " "	15	1,000.00
Mile 98 Earn R.	60 foot truss concrete piers	60	10,000.00
Mile 100	2 bent trestle	15	1,000.00
Mile 115 Water	3 " "	29	1,800.00
Mile 119	2 " "	15	1,000.00
Mile 120	2 " "	15	1,000.00
Mile 125 Water	3 " "	29	1,800.00
Mile 127 Water	3 " "	29	1,800.00
Mile 132	2 " "	15	1,000.00
Mile 133	2 " "	15	1,000.00
Mile 134	3 " "	29	1,800.00
Mile 135	4 " "	43	2,600.00
Mile 136	4 " "	43	2,600.00
Mile 142	4 " "	43	2,600.00
Mile 144 McMillan R. (see page 13)			
Mile 146	3 bent trestle	29	1,800.00
Mile 147 Water	4 " "	43	2,600.00
Mile 156	3 " "	29	1,800.00
			91,200.00 .....

Continued

TRESTLES AND SMALL BRIDGES (Continued):

Place.	Type.	Length in ft.	Cost.
	Brought forward....		$91,200.00
Mile 161 Diamain Creek	3 bent trestle	29	$1,800.00
Mile 165	3 " "	29	1,800.00
Mile 167	2 " "	15	1,000.00
Mile 168	2 " "	15	1,000.00
Mile 173 Willow Creek	4 " "	43	2,600.00
Mile 179 Grayling Creek	3 " "	29	1,800.00
Mile 181	2 " "	15	1,000.00
Mile 186	2 " "	15	1,000.00
Mile 187 Crossby Creek	3 " "	29	1,800.00
Mile 192	2 " "	15	1,000.00
Mile 198	4 " "	43	2,600.00
Total cost of trestles and trusses			$108,600.00

ROSS RIVER BRIDGE:

Length of bridge -- 300 feet
Width of water -- 300 feet
Depth Aug. 26, 1939 2 feet, velocity 4 miles per hour
Flood level -- 6 feet above this level
Elevation above sea-level 2,400 feet.

Required - two abutments 48'X6'X30'- 8640 cu. ft. - 320 cu. yds. each	
one centre pier 24'X8'X30'-5760 cu ft. 213 cu. yds. each	
total concrete 853 cu. yds @ $28	$23,880.00
#excavation - 800 cu. yds @ $4.....	3,200.00
Total (say).....	$27,000.00
two steel 150 foot trusses @ $200 per lineal foot....	60,000.00
Total cost of Ross River Bridge.	$87,000.00

McMILLAN RIVER BRIDGE:

Length of bridge -- 500 feet
Width of water -- 500 feet
(Max. depth water
(Sept 21,1939 -- 8 feet, velocity 3 miles per hour
Flood level -- 5 feet above this level.

Required - two abutments 48'X6'X30'- 8640 cu. ft. - 320 cu. yds. each	
2 river piers 24'X8'X30'- 5730 cu. ft. - 213 cu. yds. each	
total concrete - 1066 cu.yds @ $25.	$26,650.00
#excavation - 100 cu.yds. @ $4	4,000.00
Total (say)....	30,400.00
three steel 166 ft. Howe trusses @ $200 per lineal ft.	99,600.00
Total cost McMillan River bridge	$130,000.00

Depth of excavation for piers taken as 15 feet.

LOCATION SURVEYS:

A location party of ten men could complete a mile of road location per day including preliminary lines. A motor-boat is obtainable at Pelly Farm or from Mr. Edwards at Pelly Crossing. Mr. Dan Van Bibber, (a mile above Pelly Crossing) knows the country well, and can give useful information. The High Bank Indians (three miles above Pelly Crossing) also have a motor-boat. An Indian trapper (65 miles below Ross River) is the only other one on the Pelly River below Ross River. Taylor and Drury have trading posts at Selkirk, Ross River and Pelly Banks at the mouth of the Campbell River. There is a portage at Houle Canyon 16 miles above Ross River.

A survey of the country south of Pelly Banks could be best made by going to Finlayson Lake by plane, taking collapsible boats. The short distance from there to Pelly Banks could be done on foot. A reconnaissance survey of this country could be made in the winter by going out from Pelly Banks with a dog team.

TRANSPORTATION DURING CONSTRUCTION:

If it were decided to construct a road on the Pelly River route, Selkirk would be the nearest transportation centre; steamboats are operated by the White Pass and Yukon route. While Taylor and Drury have taken a small steamboat up to Ross River they experienced a great deal of trouble. I understand that rocks are to be blasted out of Granite Canyon, and if this is done, boats could run to the mouth of the McMillan River without difficulty. In any case, boats can be run to Pelly Farm or Pelly Crossing using either of these points for supply bases. A regular service is run by the White Pass and Yukon route on the Stewart River. This service would be a great help in constructing a road from the Pelly River to Dawson.

The following freight rates are in force between Vancouver and Whitehorse on material:-

Lumber.....	$61. per M
Structural Steel.....	55. per ton
Culvert Pipe.....	55. per ton (nested)
Cement	36. per ton

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CONSTRUCTION:

Construction units consisting of one bulldozer, one Letourneau scraper, one tractor and grader, one 3/8 yard shovel and five dump trucks would build 15 miles of road in one season. The cost of above equipment would be approximately $50,000.00 delivered, and, if written off in three years, would amount to $1100.00 per mile for equipment. Allowing $4,000 per mile for labour, $500. per mile for gas, oil and repairs and $100. per mile for small tools, etc., the total cost of grading and surfacing would be approximately $5,700.00 per mile.

A clearing gang of 8 men working with above unit would keep ahead of the grading.

A culvert gang of 4 men would also work with above unit.

One bridge gang of 8 men and pile driver would form a unit to do all trestle bridges and be nucleus of gang for larger structures.

The McMillan River would require a ferry and Earn River would require a bridge to facilitate movement of equipment and supplies during construction. All other streams below Ross River are easily crossed with native pole bridges for trucks or by driving through the streams.

If I can supply you with any further information, I would be glad to do so.

Vancouver, B. C.,
November 18, 1939.