

REPORT ON WINTER TRIP
ROUTE "A", ALASKA HIGHWAY

P.M. Monckton, B.C.L.S.

Acting under instructions, I left Victoria on February 21st, 1941, and proceeded via the Canadian National Railway to Vanderhoof, B.C. At this point I had the local foreman drive me to Fort St. James in order to get an idea of the snowfall at this end of the "C" route, over which I had come in 1940.

I found the snow to be 16 inches deep at Vanderhoof, 33 inches at the deepest on the road to Fort St. James, and at Fort St. James 18 inches. This was on the 23rd of February. At this time the snow at Takla Landing was reported as 30 inches.

On the 27th of February the snow at Hazelton was about gone and the streets were covered with about one inch of ice but on the 28th there was a heavy snowstorm which deposited about eight inches of new snow. At this date I moved out to the Love Ranch, Kispiox Valley, and picked up my assistant, J.T. Lee. One Indian, C. Harris, joined us on March 2nd, at Kispiox Village.

Kispiox-Nass Divide Travelling by sleigh, we arrived at McLaren's Ranch, 33 miles from Hazelton on March 2nd and proceeded by dog-team up the Kispiox River to investigate a low pass into the Cranberry, which I had seen from the mountains to the West in 1926. This pass proved to be 59 miles from Hazelton and about 2,000 feet above sea-level, or 550 feet above the Kispiox, the ascent being up a steep rock sidehill. From the Pass to the Cranberry is a more or less level plateau, but broken up with rocky knolls and small lakes. The going along the Kispiox is easy enough and would cost about \$18,000.00 per mile from Mile 33 to Mile 59 or a total of \$468,000.00. The only bridges of any consequence would be the Sweetin (75 ft) and Kispiox (100 ft).

Yukon-Telegraph Trail to 4th Cabin Returning to McLaren's Ranch again, we started relaying our equipment up the Telegraph Trail on March the 9th with 3 dog-teams and toboggans.

The weather was very mild and the snow soft, so we made slow time. The trail is very crooked and uneven: the snow was from 3 to 4 feet deep and had not been broken so that at Mile 55 some reorganization was necessary. The toboggans were given up: one dog-team and driver given the job of relaying all surplus weight back to Hazelton and we had to cut up canvas to make dog-packs. On March 16th we reached 2nd Cabin (Mile 58) under a hot sun and the snow so soft that one went through it a foot deep with snowshoes: the pack-dogs, loaded with 40 lbs. each, struggling behind as best they could and continually breaking through. All of March 17th it rained heavily and on March 18th we continued our trip. The weather continued soft and it took three days to reach Third Cabin (Mile 76) where there was fully 4 feet of wet, heavy snow. March 21st and 22nd were occupied in crossing Poison Mountain, where the trail leaves the Skeena River and crosses a spur of the mountain, climbing about 1,000 feet: this is in order to avoid Poison Mountain Canyon. On March 23rd there was frost and also two trappers helped us with our packs, so that we were able to get along better. At Canyon Creek we took to the ice of the Skeena River, leaving the trail, and that evening were at Fourth Cabin (Mile 94).

Just below 4th Cabin the Skeena makes a right angled turn and the Valley lies East and West instead of North and South: this seems to cut off some of the precipitation and the timber at this point changes from the Coast type (hemlock and Sitka Spruce) to the Interior type (Engelman and Canada Spruce). The snow at 4th Cabin was noticeably less, 36". The ice on the Skeena now being better, we spent two days at 4th Cabin and constructed a sleigh.

4th Cabin to Sustut River on the Skeena The morning of March 26th was clear and cold: so we left at 6 a.m., making very fast time over splendid ice and covered 20 miles before noon. Near this camp, there is a remarkable canyon where the whole Skeena River goes through a gorge, at one point only 27 feet wide. The next day was again ideal and we ran off 20 miles in 5 hours, half of it over clear blue ice. This brought us to the mouth of the Sustut River, Mile 134 from Hazelton, and the point where the best alternative of the "C" route from Fort St. James via Takla Lake would cut in. At Mile 132 is another remarkable canyon, locally called "Chewiaxe": it is 50 feet wide, with walls several hundred feet high and has some very sharp bends. Here the slush ice and snow were piled up and frozen together for a depth of 30 feet or more.

This section of country has been reported on before as follows:-

by J.M. Rolston in 1930 for the Public Works Department, from Hazelton to Mile 103, mouth of Kilankis Creek

and

by J.S. O'Dwyer in 1900 for the Dominion Government, to Mile 134.

Therefore I made no detailed examination of it.

Sustut Crossing to Duti River But for the next 64 miles we travelled through an area which had never before been reported on, nor visited by any white man, other than an occasional trapper. The reason for this might be that it is very difficult to traverse in the Summer: a great deal of it is burnt and the fallen trees are piled up in an almost impassable tangle: also there are several large sidestreams that would be very hard to cross and some canyons might be laborious to get around. However, in the Winter the frozen Skeena River becomes a fair highway for the local trappers, who number about six in all - one white man and the balance Indians, all from Hazelton.

If this route were chosen for the Alaska Highway rather than the one via Lake Thutade, it would cross the Sustut at the same place: viz., at the Canyon, 217 miles from Fort St. James: but instead of making the big climb up Birdflat Creek, would turn down the Sustut and follow its right bank on a series of benches and flats, all easy going: "cutting the corner" at the junction with the Skeena and finally coming out to the bank of the Skeena about 3 miles above the Sustut: or at Mile 231 from Fort St. James; and above this, following benches ranging from beside the Skeena to a mile back from it. At Mile 245 the first large sidestream is crossed, Mosque River: at its mouth it is spread out over gravel bars but quarter of a mile upstream there is a good crossing 120 feet in width.

From Mosque River to the mouth of the Duti River, Mile 272, there are no serious difficulties - a few smaller bridges and at the Duti there is a steep bank of clay. In fact, this section consists mainly of gravel benches, of the very easiest nature.

Owing to my 1941 survey having been undertaken when the ground was deeply covered by snow, and also because of the fact that we travelled on the river, it would be absurd to try to make out any close estimate of the quantities of the various materials. However on this 55 mile section, no solid rock was seen that would have to be moved in connection with road building. The faces of the cut-banks showed the soil to be almost altogether gravel, or dirt. The side streams could be easily seen. The clearing would fall mostly into the "medium" class.

In my report of 1940 on the central route, I put the average cost of construction at \$13,080.00 per mile. This was raised to \$15,800.00 in a letter from Mr. J.M. Wardle of the B.C. - Yukon Alaska Highway Commission dated May 14th, 1941. In line with this, I would put the cost of this section at \$17,000.00 per mile, a total of \$935,000.00. This includes

bridging the creeks, which fall into the Sustut and Skeena en route. These comprise 8 of 40 to 50 feet and one of 120 feet: and about 8 culverts per mile.

The gradient of this section of the route is very gentle, rising only from 2020' at the Sustut to 2600' at the mouth of the Duti, 580 feet in 45 miles.

The next section to be examined is from the Duti River to Currier Creek (M.287), about 15 miles: and is the heaviest piece of construction between Takla Lake and the Stikine.

Duti River to
Currier Creek

The valley becomes narrower, the mountains on the West (the Slangeesh Range) press close against the River, and from the East at various points spurs of the Tatlatui Range reach to the water's edge and confine the Skeena in narrow canyons. On the other hand, more than half of the 15 miles is level bench and the canyons can mostly be passed by climbing on to some terrace. The timber is thicker along here, especially below the Kluatantan, and there are 3 large bridges: viz:- Duti River, 120: Kluatantan, 140 feet: Skeena River, 150 feet.

To avoid the heaviest work the left, or East bank of the Skeena should be retained until half a mile above the Kluatantan; there the Skeena should be crossed and the right bank followed to its source.

The gradients are still easy but a little steeper than in the section below, rising 390 feet in 15 miles to a height of 2,990 feet at Currier Creek.

A rough classification would be: 8 miles level, 5 miles sidehill and 2 miles rocky: and the cost of construction would average \$22,500.00: a total of \$337,500.00 plus \$50,000.00 for bridges, altogether \$387,500.00.

Currier Creek
to Skeena-
Spatsizi Summit

From Currier Creek to the summit, or source of the Skeena, is about 32 miles and the valley rises from 3,000 feet to 4,400 feet. The mountain ranges are

further back but there are many lower spurs which reach the river and form vertical rocky banks 50 to 150 feet high, as far as Biernes Creek (9 miles). From Biernes Creek to the summit, the cross section of the valley is much more flat and may be swampy. The timber becomes scattered as the altitude increases and near the summit the country is quite open for several miles.

From Currier Creek to Biernes Creek, the average cost would be \$20,000.00 and from Biernes Creek to the summit \$12,500.00; or \$467,500.00.

Skeena-Spatsizi
Summit - Indian
Creek Summit

The source of the Skeena is distant from Fort St. James by this route 319 miles, and forms a divide with the Spatsizi, a branch of the Stikine. Crossing this pass the road would follow first the right bank of the Spatsizi, through open grassy country and lightly timbered sidehills; but at Mile 322 it would cross to the left bank for 5 miles, where it would start to ascend Indian Creek Pass, leading to the Little Klappan. It would now climb at about 100 feet to the mile for 6 miles into the pass, which is at Mile 333 and is 4,475 feet in elevation, the highest point on this route.

None of this is heavy construction and would average \$15,000.00 per mile, or \$210,000.00 all told.

Indian Creek
Pass - Ealue
Lake

Leaving Mile 333, the line continues in flat open country for a mile, then descends to the Little Klappan River, following this down all the way on its right bank. There are some glacial hills where cutting will be necessary but in the main it is flat going, bordered by terraces. The line may have to rise and fall to take the best advantage of these benches and avoid rocky banks but it is nearly all very easy work.

The distance to where the line crosses the Klappan is 50 miles: it will then climb the hill leading to Ealue Lake, where it joins the route on which I reported last year. This

will be at Mile 393 by the route now covered, which is equivalent to Mile 460 via Thutade Lake, a saving of 67 miles.

The following rivers call for bridges of some consequence - Tsetia (M.364) 70 feet; Eagle's Nest (M.372) 80 feet; Klappan (M.382) 350 feet.

This section of 60 miles will average \$14,000.00 per mile or \$840,000.00 plus bridges, say \$950,000.00 in all.

To compare this route with that examined in 1940 via Thutade Lake:-

SUSTUT CROSSING TO EALUE LAKE COSTS

	<u>Miles</u>	<u>Cost per Mile</u>	<u>Total</u>
1940 route via Thutade Lake	243	\$15,800.00 #	\$3,839,400
1941 route via Skeena-Klappan	176	16,761.00	2,950,000

Figure as revised by Mr. J.M. Wardle for 66' clearing, 30' grubbing, 24' roadbed and 20' gravelling.

Therefore the 1941 route is 67 miles shorter and nearly a million dollars cheaper: it has only 31 miles above the 4,000 foot contour, compared to 82 via Thutade Lake. The highest summit is slightly lower (4,475' compared to 4,650'): the resources and scenery are about the same, and the climate very similar, though perhaps a little wetter and snowier between Mosque River and Mile 319.

It appears to be on the air-line route of the new Pan American plane service to Alaska as, in fine weather these planes always followed the Skeena and Klappan Rivers.

(Sgd) P.M. Monckton.

June, 1941.

338-A.

Date 1941	Place	Elevation in Feet	Temperature		Depth of Snow in Inches
			Max. in Degrees	Min.	
Feb.23	Vanderhoof	2,100	6	-6	16
Feb.23	$\frac{1}{2}$ Way to Fort St.James	2,750	-	-	33
Feb.23	Fort St.James	2,250	-	-	18
Feb.28	Love Ranch,17 M.N.of Hazelton	850	30	-6	16
Mar. 1	" " " " " "	850	32	14	16
Mar. 2	A.McLarens,33 M.N. " "	1,100	32	10	32
Mar. 3	" " " " " "	1,100	37	-6	32
Mar. 4	By Kispiox R. 44 M.N. " "	1,300	42	15	30
Mar. 5	By Kispiox 55 M.N. " "	1,400	40	18	32
Mar. 6	Cranberry-Kispiox Summit, 59 M.	2,000	40	25	40
Mar. 7	M. 44	1,300	42	32	32
Mar. 8	McLarens, M.33	1,100	40	26	32
Mar. 9	" "	1,100	37	28	32
Mar.10	$\frac{1}{4}$ Way N.of First Cabin, M. 36	1,500	36	8	36
Mar.11	$\frac{1}{2}$ Way N.of First Cabin, M. 44	1,800	35	18	36
Mar.12	N. of First Cabin, M.49	1,800	40	22	42
Mar.13	Near Deep Creek, M.52	1,500	40	24	56
Mar.13	Camp M.54	1,700	40	24	40
Mar.14	" M.56	1,600	40	32	36
Mar.15	" M.56		42	30	36
Mar.16	Second Cabin M,59	1,500	50	25	32
Mar.17	" " M.59		42	34	30
Mar.18	Top of Kuldo Hill, M.62	1,900	40	34	39
Mar.18	Quarter Way Cabin, M.64	1,550	40	34	36
Mar.18	Camp M.66	1,600	40	34	34
Mar.19	Camp M.71	1,600	45	32	36
Mar.20	3rd Cabin M.76	1,650	35	30	48

Date 1941	Place		Elevation in Feet	Temperature		Depth of Snow in Inches
				Max. in Degrees	Min.	
Mar.21	$\frac{1}{2}$ Way Cabin	M.81	2,400	45	30	60
Mar.22	$\frac{1}{2}$ Way Cabin	M.85	2,600	38	27	66
Mar.23	O'Dwyer Cr.	M.87	1,700	38	24	51
	$\frac{3}{4}$ Way Cabin	M.89	1,700			54
	Canyon Creek	M.90	1,700			48
	4th Cabin	M.94	1,780			36
Mar.24	4th Cabin		1,780	43	31	36
Mar.25	" "	M.94	1,780	47	30	35
Mar.26	On Skeena R.	M.114	1,870	44	19	27
Mar.27	Jctn.Skeena & Sustut	M.134	2,020	46	20	24
Mar.28	Beside Skeena R.	M.144	2,100	48	30	32
Mar.29	Mouth of Mosque R.	M.154	2,200	48	10	45
Mar.30	" " " "	M.154	2,200	35	26	45
Mar.31		M.169	3,000	40	16	46
Apl. 1	<u>White Snow Pass</u> (in meadow)		4,320	42	17	58
	" " " (" timber)		4,320			51
	" " " (" Beaver Flats)		4,100			48
	Niven River Pass, Moose Valley		4,250			50
Apl. 2	Mouth of Mosque River		2,200	43	30	40
Apl. 3	" " " "		2,200	50	31	36
Apl. 4	Beside Skeena	M.164	2,250	45	28	38
Apl. 5	Beside Skeena	M.174	2,400	48	29	36
Apl. 6	Jctn.Skeena & Duti	M.184	2,600	44	26	37
Apl. 7	Beside Skeena	M.190	2,690	45	35	35
Apl. 8	Beside Skeena	M.195	2,880	46	32	34
Apl. 9	Carrier Creek	M.198	2,990	44	30	32
Apl.10	Anthracite Creek	M.209	3,400	35	18	36
Apl.11	Caribou Creek	M.221	3,800	34	14	34
	Skeena-Spatsizi Summit	M.234	4,400	34	14	55

Date 1941	Place		Elevation in Feet	Temperature		Depth of Snow in Inches
				Max. in Degrees	Min.	
Apl.12	Mouth of Indian Cr.	M.246	3,700	38	26	26
Apl.13	Indian Cr. Summit	M.252	4,475	36	29	av.38
	Camp on Little Klappan	M.259	4,050	36	29	35
Apl.14	Beside Little Klappan	M.266	3,700	38	20	26
Apl.15	" " "	M.272	3,500	30	7	24
Apl.16	" " "	M.276	3,300	38	7	22
Apl.17	" " "	M.290	3,000	40	18	Patches to 18"
Apl.18	Beside Klappan R.	M.298	2,750	53	20	Odd Patches
Apl.19	" " "	M.310	2,600	51	22	None
Apl.20	Klappan Crossing	M.318	2,555	51	31	None
Apl.21	Ealue Lake	M.323	2,892	63	28	None
Apl.22	" "	M.323	2,892	55	21	None
Apl.23	Klappan Summit	M.327	4,000	48	22	18
Apl.23	Canyon Lake	M.343	2,800	48	22	18
Apl.29	Telegraph Creek	M.402	540			Went off in March

NO MORE SNOW.

REPORT ON ALTERNATIVE ROUTE FROM CLARKE'S STIKINE CROSSING
TO A POINT NORTH OF NAHLIN

P.M. Monckton, B.C.L.S.

Having completed the snow-measurement and reconnaissance trip from Hazelton (through the valleys of the Skeena and Klappan) on the 29th of April, 1941, the next thing to be undertaken was the reconnaissance of an alternative to the route North of the Stikine Crossing.

In 1939 T.E. Clarke had examined the country from Nahlin Telegraph Station via the Upper Nahlin River and the Tuya River: and in 1940 J.H. Mitchell, of Ottawa, had covered about the same route, suggesting some minor changes.

It had been reported to Mr. Clarke that a better route might be via the Tahltan etc., and this fact he noted in his report.

Accordingly, on May 1st I proceeded by truck as far as I could get: that is to say about a mile up the Tahltan Valley to the N.W. of the main road and about two miles from Clarke's Stikine Crossing (altitude - 800 more or less). Our party consisted of myself and assistant and six pack-dogs. The first afternoon we got as far as Hartz Creek: the next day to Beatty Creek: and on the 3rd we reached the Telegraph Trail at Tahltan Flats (see J.H. Gray's report of 1930, p. 2). We had now come 26 miles from the Stikine River: keeping all the way on the north-east or left bank of the Tahltan: elevation had risen to 1900 feet).

The climate along this portion is exceedingly arid. The sidehills are bare and grassy and show no evidence of sliding, although composed mainly of clay, and often rising steeply from the river for several hundred feet. How they would stand up when cut into for twenty feet or so to form a grade is a matter for conjecture. But this condition is probably identical Ward's Hill (Mile 17-18 on the Dease Lake road); and there has been no slide trouble there. At Mile 21, the

Tahltan splits into two forks and our route follows the northern one. Immediately above the Forks the trail climbs 450 feet to avoid a canyon and a road would either have to follow it or take some heavy rock-work. The same thing also occurs 4 miles above Beatty Creek. All in all, this 26 mile section would have some tough work, but the maintenance should be low, there being less snow along here than anywhere else in the North: and it is a favourite range for horses in Winter.

There are four fair sized bridges:-

Hartz Creek.....	20	feet
Middle "	30	"
Beatty "	50	"
Bear "	40	"

and about a dozen smaller ones, plus an average of eight culverts to the mile.

The character of construction would be about as follows:-

Class A (level cross-section)	8	miles
" (sidehill, 35°)	13	"
Rocky (loose to solid: mostly basalt)...	5	"

The road would have to vary a good deal in its elevation above the Tahltan River to take advantage of the various bench-levels, and perhaps the location of the existing trail would form a guide, although it would have to be modified to some extent. The cost of clearing and grubbing would be very low: and the average cost of the completed construction would be about \$20,000.00 per mile or \$520,000.00 to the Saloon, as the Telegraph Line refuge cabin is called on the Tahltan flats, referred to above.

The next section to be dealt with is from the Saloon to Egnell Creek, 20 miles: and is reported on briefly by J.H. Gray on p.p. 2 & 3 of his report.

It might be said that either side of the Tahltan could be adopted for the first 5 miles: here the line leaves it and crosses an imperceptible summit (2,050 feet) into the Hackett River Valley. Construction here is very easy through an open, wide valley until Kennicott Lake is reached. This name is unknown locally, where it is called New York Lake. There will be some rock work along this lake and also along Hatchan

Lake and along the Hackett River: but mainly it is the easiest of going. The elevation at Egnell Creek (Sheslay Telegraph Cabin) is 1,833 feet.

The classification would run as follows:-

Class A (level cross-section).....	15 miles
(35° sidehill).....	3½ "
Rock (loose to solid, volcanic)...	1½ "
Clearing - light	

The average cost should be around \$15,000.00 per mile - totalling \$300,000.00. Only one bridge - Tahltan River, 100 feet.

At Sheslay Cabin, the line would divert from that of J.H. Gray (and also J.S. O'Dwyer of 1900 in his railroad reconnaissance): instead of climbing the steep sidehill country to the head of Egnell Creek, it seems better to cross Egnell Creek and proceed for some 7 miles down the right bank of the Sheslay River. This river has very little current and falls only about 30 feet in this distance: the bank varying from level river-flats to steep banks, with some short outcrops of rock. At about seven miles from Sheslay, the road would have to start to climb the sidehill to rise on a 6% grade, and intersect the old sleigh-road to Macdonald's Portage perhaps at 800 feet above the Sheslay River. Joining this old sleigh road, which was built in the 1898 gold rush and is still easy to follow, the road would climb to the summit, about 12 miles from Sheslay Station, or 58 from Stikine Crossing. The elevation here is only 3,260 feet, compared to 4,100 feet via Egnell Creek and the construction is much easier. The climate is very dry, the snowfall very light. This twelve miles would be about as follows:-

Class A, level cross-section.....	5
" " sidehill, 35°	6
Rock (limestone).....	1
Clearing, light to medium	
Bridge - Egnell Creek -	25 feet
- McDonald "	- 50 feet (?)
Average cost \$20,000.00: total	\$240,000.00

Thirty-six miles further on is Nahlin Telegraph Cabin at the crossing of the river of that name, and a further six miles connects with J.H. Mitchell's surveys of 1940.

This is all nearly level and open with very little clearing: a good deal of it is swampy but careful location can avoid practically all of this: and it is a country of remarkably low snowfall. At Hatin Lake (elevation 3,100 feet) is a horse ranch, owned by Mr. Fred Collison: where horses winter out in the finest area of bunch grass the writer has seen in northern British Columbia. North of Kaha Creek, the Winter trail is preferable to the Telegraph Trail, giving a better grade into Nahlin and avoiding a canyon of Koshin Creek.

At Teddydeech Lake - elevation - 3,300' (M.84)
 At Nahlin " - 2,400' (M.94)

Nahlin River is swift and calls for a span of one hundred and thirty-five feet. To the north of Nahlin River is a steep bench 350 feet high; the trail ascends this steeply, but the road could climb it on a sidehill grade of say 6%: and on top the ground is level and easy: and at about 6 miles from Nahlin River a connection can be made with either of the routes of J.H. Mitchell or T.E. Clarke from Atlin at an elevation of about 3,000 feet.

The classification for this forty-two miles would be:-

Class A (level cross-section).....38
 " " (sidehill) " 4
 Rock.....none seen.
 Clearing, very light

Bridges:-

Dudidontu R.....35 feet
 Cache Cr.....50 "
 Mosquito Cr.....50 "
 Lost Cr.....50 "
 Kaha Cr.....50 "
 Teddydeech Cr.....30 "
 Nahlin R.....135 "

Allowing \$20,000.00 for the Nahlin bridge and an average of \$12,000.00 for the forty-two miles in this section: the cost of this section would be \$524,000.00.

The total distance from the Stikine Crossing would be one hundred miles and the cost \$1,584,000.00: an average per mile of \$15,840.00.

This would appear to be twenty miles shorter than

343.

either of Mitchell's routes to Atlin and about the same as Clarke's: with a lower summit (3,300 feet). The main disadvantage being the sag in crossing Nahlin Valley. The climate is very dry, probably much more so than via the Tuya.

(Sgd) P.M. Monckton.

June, 1941.

DEPARTMENT OF MINES AND RESOURCESSurveys and Engineering Branch

Engineering and
Construction Service.

P.M. Monckton, B.C.L.S.

OMINECA & ATLIN ELECTORAL DISTRICTSB.C.-Yukon-Alaska Highway ReconnaissanceFort St. James-Stikine River.CENTRAL ROUTE

Acting under instructions to investigate the Central Route, I left Victoria on July 13th by the S.S. "Princess Louise"; arrived at Wrangell, Alaska, on July 16th; leaving the same day on the Barrington Transportation Company's boat "Hazel B. No. 2" and reaching Telegraph Creek on July 18th.

Stores were purchased and the pack-train rounded up. Three men hired to assist on the survey - a packer, a guide and a combination assistant packer and cook. We left Telegraph Creek on July 23rd and camped near the Klastline River, where we commenced our actual investigations.

The mileage looked over during the season was about 635 miles on foot: about 200 by air: and 50 by sketches from mountains etc. Also notes of former trips in 1929, 1930 and 1935 were used for 100 miles: so that a total of almost 1,000 miles will be reported on in later pages. First, some general observations on the area traversed:-

The Central route for this proposed Highway lies about midway between the Western (or "A") and the Eastern (or "B") routes. I have used the letter "C" to designate it.

It would join the Western line near the foot of Eddontenajon Lake, at Mile 470 from Fort St. James, which point would be about 360 miles from Hazelton. From there to Mile 783, (the Yukon boundary) the "A" and "C" routes are identical.

From Fort St. James to Lawyer's Pass, the "C" route could be further separated into two alternatives: and these

again into other sections where one might have the advantage over the other: so that the whole presents a bewildering picture of parallel valleys and various connecting passes criss-crossing the area. The sum-total of these would add up to thousands of miles: only the most promising looking ones were investigated in 1940.

In choosing a route for the highway to Alaska, several objects have to be kept in mind; and the following points are of interest.

Construction Cost.

In this respect the Eastern route has the preference: estimated cost (Rolston & Lamarque) a little less than \$7,000,000.00 for 400 miles from Manson Creek to the Yukon Boundary (on the Liard River). But this distance of only 400 miles on the Eastern route compared to 700 on the others is misleading for the Eastern route is 160 miles longer from the Yukon Boundary to Pelly Crossing, against \$8,500,000.00 from Manson Creek to the Yukon Boundary (on Atlin Lake) on the Central route (Manson Creek-Aiken Lake-Y.T.). The Western route (Hazelton-Bell-Irving River-Eddontenajon Lake) has not been cruised in detail but is about 660 miles and the probable cost is \$10,000,000.00 to the Yukon boundary. The Central route Fort St. James-Takla-Y.T. at Atlin Lake would call for an outlay of \$10,500,000.00.

Maintenance

The main item under this head is snowfall; and this decreases from West to East as more mountains are interposed between the road and the Coast. Very little is known definitely on this score but we can safely rate them from East to West in order of preference. (1) Eastern; (2) Central Aiken Lake; (3) Central (Takla Lake); (4) Western.

Access to Alaskan Coast

For the defence of S.E. Alaska, road access from the U.S. is very desirable: it might be deciding factor. Only the Western route offers this.

Tourist Attractions

So far as scenery, hunting and fishing go, the order would be as follows:-

- (1) Central Route via Takla Lake

- (2) Central Route via Aiken Lake
- (3) Western Route
- (4) Eastern Route.

Natural Resources

North of 550, agriculture and timber hardly count.

Mining possibilities appear to be the main likely source of revenue aside from the tourist trade. Here the order would be:-

- (1) Central Route, via Aiken Lake
- (2) Central Route via Takla Lake
- (3) Eastern Route) both very poor.
- (4) Western Route)

Climate

As might be expected from its latitude and altitude, the climate is severe. There are very few weather stations in Northern B.C. and only Atlin and Fort St. James give in any way complete figures. At Atlin the average precipitation is 11.16 inches, the average snowfall 54.7 inches.

At Fort St. James the precipitation is 15.52 inches; the snowfall 53.6 inches.

At Telegraph Creek a one year record 1927 gave:-
Rain 1 1/2 inches; snow 60.0 inches. At 5th Cabin snow averages 200 inches and at 9th Cabin 150 inches so that an average fall of around 4 1/2 feet, packing to 2 feet on the ground, would be general over a great deal of the area. I think this would apply to Miles 0 to 175 and 285 to 517. From 175 to 285 it would be heavier and this 110 miles might be made up of 50 miles where it would lie 5 to 7 feet deep; and 60 miles of 5 to 4 feet.

This applies to the Takla Lake route.

Via Aiken Lake there is reported to be less but, as there is no definite information, it is better to report nothing on it.

This snow situation is the big question mark on the whole proposal and needs investigation more than any other phase.

Timber

Mainly Jackpine and White Spruce. The latter is useful for short bridges, being tough and fairly durable. It can always be obtained within 1/4 mile, and nearly always within 100 feet of where needed.

Method of Survey I was provided with good contour maps covering the whole area; therefore the aneroids could be checked almost daily against some definitely known level; the distances were paced and checked against scaling on the maps.

Game Moose are fairly plentiful in the valleys; caribou on the mountains, north of Thutade Lake. A few deer from Takla south. Fish can be had in any lake, with a net.

Transportation as Related to Construction. From Fort St. James to the head of Takla Lake there is excellent water transportation: David Hoy of Fort St. James has two scows and two gas boats; he has taken heavy machinery up to Takla Landing. That is to say for the first 151 miles, heavy machinery can be taken at a cost of $1\frac{1}{2}$ ¢ a lb.

From the head of Takla Lake up the Driftwood River, canoes and flat-bottomed boats can go when the water is high in the Spring; and even up a small creek almost to Bear Lake. There is a 300 yard portage into Bear Lake. So anything up to say 500 lbs. in one piece could be taken to the foot of Bear Lake, 203 miles. From here on, the only ways in would be by packhorse, airplane or by using the end of the road, as it was pushed forward.

From Telegraph Creek (4¢ a lb. from Vancouver by boat) work could be done both North and South.

Good lakes for planes are plentiful: Stuart, Trembleur, Takla, Bear, Thutade, Tatlatui, Coldfish, Ealue and Eddontenajon, and via Aiken Lake; Aiken, Johanson and Thorne Lakes.

A fair packtrail runs the whole length of the route.

Estimates. Estimates of cost are based on figures submitted by W. Miers, District Engineer at Prince George, in August, 1939, (file 470) for work on the Manson Creek road; which comes closest to conditions on the Alaska Highway of any that could be found.

Comparing the per cost mile (using Mr. Mier's figures) it is interesting to note:-

Lamarque's estimate	(B.C.-Yukon Boundary-Sifton Pass)	\$13,056.
Clarke's	" (Atlin-Stikine Crossing)	14,380.
Rolston's	" (Manson River-Sifton Pass)	20,500.
Monckton's	" (Fort St. James-Mile 517)	13,080.
Monckton's	" (Aiken Lake-Mile 517)	12,740.

The above are computed for a 24 foot roadbed; clearing 66 feet wide, grubbing 30 feet.

Timber bridges, using local spruce where feasible: rates on these vary with local conditions, handiness of timber, etc.

ROUTE C (1) FORT ST. JAMES TO METSANTAN LAKE, VIA TAKLA LAKE

Elevation above sea-level
 Mile 0.0
 2,240'

Fort St. James, situated on the east shore of Stuart Lake is the oldest white settlement in B.C. having been started as a fur-trading post in 1806 by the Northwest Fur Company. It is connected with the C.N.R. at Vanderhoof by a good road (43 miles) which can be covered in an hour, when conditions are favourable. Population (1940) about 200 whites and 350 Indians.

The opening up of the quicksilver mine at Pinchi Lake, 30 miles to the north, has added greatly to the prosperity of the town. There are two hotels, several stores and restaurants and other conveniences.

As a tourist centre, Fort St. James is second to none in B.C. Hundreds of miles of waterways can be treated from here; there is excellent fishing and hunting and the scenery is very attractive. It is also a base for Canadian Airways & Yukon Southern Air Transport.

Photo 20-6

Mile 2.0
 2,400'

Owing to the fact that the shores of Stuart Lake are too rough to follow (Photo 20-3 & 17-6) use the new McKenzie Highway for two miles: here

the road to Pinchi comes in from the north. This road is only an 8 foot wagon-trail. It undulates over rolling country consisting of benches of clay, sand and gravel. No solid rock, few boulders. It is poorly located but a good location would not deviate by more than a few hundred feet from the existing route.

- Mile 5.5
2,600' Two small creeks calling for culverts at M. 5.5 and 6.0.
- Mile 8.0
2,450' Enter Prince's ranch (Photo 20-4) (open hay meadow) and follow this for one mile. Clay meadow, can easily be drained.
- Mile 9.0
2,450' Prince's ranch buildings: (a wagon trail to Pinchi Lake turns off, to the right).
Road passes through small poplar for one mile, then descends to Prince Creek. (Photo 20-3)
- Mile 10.0
2,410' Prince Creek, sluggish, flows from Prince's meadows into Pinchi Lake. Culvert 6' wide will handle its flow at any stage.
Road now enters burnt area, sand, gravel soil (Photo 20-3)
- Mile 10.2 Culvert, 4'
2,430'
- Mile 11.5
2,500' Leave burnt and enter green timber. Road rises and falls between 2,500' and 2,600'; no solid rock that cannot be avoided.
- Mile 15.0
2,600' Pass between two small lakes and commence descent to Pinchi. This is very gradual, except for a half mile stretch (16.5 to 17.0) where it is 10% in spots. Here is one mile of boulders.
- Mile 18.5
2,240' Cross Pinchi Creek, just above Pinchi Village: The creek is practically still water, 40' wide, 6' deep. Low banks of gravel and sand. (Photo 20-2)
- Mile 19.0
2,235' Pinchi Village: consisting of half a dozen Indian houses on the shore of Stuart Lake at the mouth of Pinchi Creek.

Elevation
above sea-
level

SUMMARY OF M. 0.0 - M. 19.0 (Fort St. James -
Pinchi Village, 19 miles).

<u>Clearing</u>	Medium	100	acres	@	\$265.00	\$26,500.00
<u>and</u>	Open	8	"	@	0.00	0.00
<u>Grubbing</u>	Burnt	12	"	@	175.00	2,100.00
	Light	16	"	@	175.00	2,800.00

\$31,400.00

Grading - Class A Sand and gravel
(with a few small boulders)

17 miles @ 40¢ per yd. - 102,000 yds. 40,800.00

Bridge

1, 40' span or trestle across Pinchi
Creek @ \$3,500.00 3,500.00

Culverts

6 culverts, 6' each @ \$100.00 600.00

TOTAL

\$76,300.00

Mile 19.0
2,235'

Leave Pinchi Village and ascend gradually:
travelling north-west through light poplar woods,
some open meadows (Photo 20-1); soil is clay or sand,
no sidehill.

Mile 30.0
2,400'

Some place here (to be better determined from air)
photographs, 20-9, 20-10 and 20-11, leave the exist-
ing road and travel northwestwards through almost
level country, keeping as directly as possible on a
line to a point a mile East of Trembleur Lake.
There are some ridges and muskegs to be avoided;
these will be seen on aerial photos.

Mile 42.0
2,325'

Kuskwa River to be crossed: it is 40' - 75' in
width, slack water.

Also about 10 culverts, 6'.

SUMMARY - PINCHI-TREMBLEUR LAKE (32 MILES)

<u>Clearing</u>	Open				0.00	
<u>and</u>	Light	85	acres	@	\$175.00	\$14,875.00
<u>Grubbing</u>	Medium	171	"	@	265.00	45,315.00
<u>Grading</u>	Class A,	32	miles	-		76,800.00
				192,000	yds. @ 40¢	
<u>Bridges</u>	Kuskwa R.	60'	@	\$5,100.00		5,100.00
<u>Culverts</u>	10 - 6'		@	\$1,000.00		1,000.00

TOTAL

\$143,090.00

Elevation above sea-level Trembleur Lake (Photo 19-15) is reached at its N.E. corner after crossing a creek 15' wide. The line would now follow the North shore in a westerly direction for 9 miles to the mouth of Middle River. Along the lake there are bluffs, altogether 2 miles in length, and are spurs of Mt. Copley. These can be mostly avoided by climbing 100 ft. above the Lake.

Mile 51.0
2,255'

Mile 60.0
2,255'

At the mouth of Middle River, on its left bank, is an Indian village, of about ten houses.

SUMMARY, ALONG TREMBLEUR LAKE (9 MILES)

<u>Clearing and Grubbing</u>	Light, 72 acres @ \$175.00	\$12,600.00
<u>Grading</u>	Rock 1 mile (limestone) 28,000 yds. 30° @ \$1.50	42,000.00
	Class A (sidehill) 4 miles - 281,600 yds. @ 40¢	112,640.00
	Class A (level) 4 miles - 24,000 yds. @ 40¢	9,600.00
<u>Bridges</u>	1 (15 ft), N.E. cor. of Lake	500.00
<u>Culverts</u>	5 - 6' each @ \$100.00	500.00
	Total	<u>\$177,840.00</u>

Mile 60.0
2,255'

Leaving Trembleur Lake, follow up the left bank of Middle River; the location cannot go far back from the river, owing to rocky ridges, but some corners can be cut off. The road will be on gravelly benches from 15' to 40' above the river.

Mile 62.0
2,256'

Kazchek Creek, still water, 40' wide, 3' deep. Same character of travelling; varying from cottonwood flats to benches 50' above river:

Mile 77.0
2,259'

to Natazutlo Creek, 40' wide at H.W.

Mile 84
2,260'

Follow flats and benches along the river to Snoski's cabin, which is at the outlet of Takla Lake (Photo 17-7). Thence along the east shore of Takla Lake; low country, level sandy, to Leo Creek, 40' wide.

Mile 88
2,260'

Elevation above sea-level Continuing level and sandy, except one mile of bench (gravel sidehill), to Sand Point: cut back of this, and continue on, on low sandy going to Takla Narrows, where again the road can cut off the point. Creek 25' wide at Narrows.

Mile 93 2,260'

Mile 97 2,260'

SUMMARY, TREMBLEUR LAKE - TAKLA NARROWS (37 MILES)

<u>Clearing</u>	Light, 240 acres @ \$175.00	\$42,000.00
<u>and</u>	Medium 56 " @ 265.00	14,840.00
<u>Grubbing</u>		<hr/>
		\$56,840.00
<u>Grading</u>	Class A (level) 35 miles - 210,000 yds. @ 40¢	84,000.00
	Class A (sidehill) 2 miles - 140,000 yds. @ 40¢	56,000.00
		<hr/>
		\$140,000.00
<u>Bridges</u>	3 - 40' spans @ \$3,500.00	10,500.00
	3 - 25' " @ 2,000.00	6,000.00
<u>Culverts</u>	20 - 6' \$100.00	2,000.00
		<hr/>
	TOTAL	<u>\$215,340.00</u>

Mile 97.0
2,260'

TAKLA NARROWS - TAKLA LANDING

Leaving Takla Narrows (Photo 19-14) keep near the Lake (Photos 19-3 and 19-10) until the first creek at M. 101 (10' wide at H.W.); then (Photos 19-11, 19-12) ascend 80' to pass above first bluff at

Mile 101.5 M.101.5 keep on climbing to pass back of 104 M. point
2,260'

at 150' above the Lake. Two further small creeks, 10' wide at H.W. Creeks at M.105 and 106 (each 30') will call for some descent to shorten length of bridges, as they soon emerge from canyons.

To Mile 117 (the next 13 miles) is the roughest portion of lake (Photos 19-5, 19-6, 19-7). There is an old bench level about 150' above the lake most of the way but some stretches of it have been eroded away (Photos 19-3 and 19-4). From M. 106 to M. 110, the best height would appear to be 100' above the lake, and at M. 111 another creek 30' wide must be covered not over 60' above the lake,

Elevation
above sea-
level

Mile 123.5
2,260'

Mile 127
2,260'

and another at M. 114, and at M. 117. From M. 114 to M. 117 the road had best keep near the lake but north of M. 117 should ascend to the 150' bench and remain there to M. 123½, which is the end of the rocky shore (Photos 19-1 and 19-2).

From the above it will be seen there is 22 miles of rough shore line. If the road is kept at lake level, 50% is rock bluffs, sloping up at 45°; 15% is rock slide; and 35% sand or gravel, where creeks have formed fans.

By ascending and descending and making use of the various benches, especially what is left of the old 150' bench, this can be improved.

The last portion to Takla Landing (Photo 13-1) is sand, gravel, clay benches (Photo 13-2).

SUMMARY, TAKLA NARROWS - TAKLA LANDING (30 MILES)

<u>Clearing</u>	Heavy	10 acres @	345	\$	3,450.00
<u>and</u>	Medium	86 "	@ 265		22,710.00
<u>Grubbing</u>	Light	80 "	@ 175		14,000.00
	Burnt	64 "	@ 175		11,200.00
					<u>51,440.00</u>
<u>Bridges</u>	6 - 30'	each @	\$2,500.00		15,000.00
	3 - 15'	" @	500.00		1,500.00
	3 - 10'	" @	550.00		1,650.00
<u>Culverts</u>	10 @	\$100.00			1,000.00
					<u>\$ 69,990.00</u>
<u>Grading</u>	(if at lake level)				
	Solid rock (bluffs 45° - 60°)				
	11 m - 308,000 yds. @	\$1.50			462,000.00
	Loose rock (35° slope) 5½ miles				
	385,000 yds. @	60¢			231,000.00
	Class A (sidehill) 3 miles -				
	420,000 yds. @	40¢			168,000.00
	Class A (Flats) 5½ miles -				
	45,000 yds. @	40¢			18,000.00
					<u>\$879,000.00</u>
<u>Grading</u>	(if best advantage taken of benches at various elevations)				
	Solid rock - 3¼ miles - 91,000 yds.				
	@	\$1.50			\$136,500.00
	Loose rock (35° slope) 5½ miles				
	385,000 yds. @	60¢			231,000.00

<u>Elevation above sea- level</u>	Class A (sidehill) 9 miles - 630,000 yds. @ 40¢	\$252,000.00
	Class A (flat) 12 $\frac{1}{4}$ miles - 73,500 yds. @ 40¢	29,400.00
		<u>\$648,900.00</u>

The above section will require very careful detailed reconnaissance before a location is finally decided upon.

Total for this section (1) lake level \$948,900.00
(2) using benches 718,800.00

TAKLA LANDING TO BULKLEY HOUSE

Mile 128
2,260'

Leaving Takla Landing, the going is nearly level bench and sandy shore, past the Hudson's Bay Company Post (Photo 17-16) and on to Mile 131, where a low pass, elevation 2,275, cuts behind the Red Bluff (Photo 17-15). Then follow the shore of the bay; ascend the shoulder which forms the White Bluff, rising to 2,500 feet, and falling again to 2,270' at M.134. Thence level going (Photos 17-10, 17-11, 17-12, 17-14) or almost so and keeping close to the shore all the way to M. 147 $\frac{1}{2}$, where the road will cut behind a point to emerge on the lakeshore again at Bulkley House.

Mile 151
2,260'

SUMMARY TAKLA LAND TO BULKLEY HOUSE (24 MILES)

Light	16 acres @ \$175.00	\$ 2,800.00
Medium	160 " @ 265.00	42,400.00
Heavy	16 " @ 345.00	5,520.00
		<u>\$50,720.00</u>

<u>Grading</u>	Class A (flat)	
	21 M. - 126,000 yds. @ 40¢	50,400.00
	Class A (sidehill 35°)	
	3 M. - 210,000 yds. @ 40¢	84,000.00

<u>Bridges</u>	Hudson's Bay Cr. 30' @	2,500.00
	Wudsti Creek 30' @	2,500.00
	2 - 20' @	1,000.00
	4 - 10' @	1,200.00

<u>Culverts</u>	6 - 6' @	600.00
		<u>\$192,920.00</u>

Elevation
above sea-
level

BULKLEY HOUSE TO BEAR LAKE VILLAGE

- Leave Bulkley House, level, sandy soil;
- Mile 151
2,260' Bates Creek, 15' across water, 50' channel
across gravel bar; 40' span needed; low gravel
banks. Thence through easy going, flat or gentle
slopes of sand and gravel to Lion Creek.
- Mile 159
2,300' Lion Creek: now very low, water is 50' wide
x 6 inches deep, channel 175' across bars, gravel
banks 6' high (Photo 11-11). The next 15 miles
are mainly level jackpine flats of sand and gravel;
with one mile of wet clay going, which can be easily
drained. (Photos 11-7, 11-8, 11-9 and 11-10).
- Mile 174
2,360' Enter meadows and travel 2 M. through them, grassy
and low; at the foot of bluffs. Could easily have
a fill made with loose rock from the talus-slopes.
- Mile 176
2,400' Kastberg Creek, now very low, 40' across water
(low gravel banks). Bed is 300 feet wide and
full of drift logs so it must be very violent at
times. It is of this character from the Driftwood
for $1\frac{1}{2}$ M. upstream. The next 5 miles are undulating,
jackpine benches, with a little sidehill.
- Mile 181
2,460' Hudson Bay Creek and meadow (Photo 11-6). The
road would now turn up the valley of Hudson's Bay
Creek and go 11 miles through a flat valley over
a low, almost imperceptible divide to the head
of Tsaytut Bay on Bear Lake (Photo 10-12). (This
piece was not walked over by the writer but was
flown; information checked by K. Hanoyal, store-
keeper at Bear Lake. The winter sleigh trail goes
this way).
- For the next 2 miles the line follows the toe of
Box Car Mountain; between it and the lake.
- Mile 194
2,640' The road would now leave the shore-line and cut

Elevation
above sea-
level

across low flat spruce land to M.197; from here it would either follow the shore of Bear Lake on a level grade for 6 miles to Bear Lake village (rocky going) (Photo 10-11) or ascend a small creek to the east, behind the first ridge; climbing to 3,150' where it reaches the Omineca trail; then descending a 35° bench to elevation 2,700'; the latter route being longer but with little rock. Bear Lake Village (Photo 10-10) about 10 houses of Indians; and a store kept by K. Hanoval.

Mile 201
2,680'

SUMMARY BULKLEY HOUSE (151) - M.196 (45 M)

<u>Clearing and Grubbing</u>	Medium	320 acres @ \$265.00	\$ 84,800.00
	Light	40 " @ 175.00	7,000.00
<u>Grading</u>	Class A (level)	36 M - 216,000 yds. @ 40¢	86,400.00
	Class A (35° sidehill)	3 M - 210,000 yds.	84,000.00
	Loose rock (slide 35°)	6 M - 420,000 yds. @ 50¢	210,000.00
<u>Bridges</u>	Bates Cr.	40' @ \$3,500.00	3,500.00
	Lion Cr.	60' @ 5,100.00	5,100.00
	Kastberg Cr.	80' @ 7,500.00	7,500.00
	6 others of 20' each	@ \$500.00	3,000.00
			19,100.00
<u>Culverts</u>	50 of 6'	@ \$100.00	5,000.00
			<u>\$496,300.00</u>

Summary Mile 196 to Bear Lake Village via lake-shore route (5 M)

<u>Clearing and Grubbing</u>	Heavy	16 acres @ \$345.00	\$ 5,520.00
	Medium	24 " @ 265.00	6,360.00
			<u>\$ 11,880.00</u>
<u>Grading</u>	Loose rock, 4 miles	- 280,000 yds. @ 50¢	140,000.00
	Class A, 1 mile	- 6,000 yds. @ 40¢	2,400.00
<u>Bridges</u>	2	20' each @ \$500.00	1,000.00
<u>Culverts</u>	6	- 6' each @ \$100.00	600.00
			<u>\$155,880.00</u>

Elevation
above sea-
level

Summary Mile 196 to Bear Lake Village
via Boxcar Creek route (7M)

<u>Clearing and Grubbing</u>	Heavy	16 acres @ \$345.00	\$ 5,520.00
	Medium	40 " @ 265.00	10,600.00
			<u>16,120.00</u>
<u>Grading</u>	Loose rock, 2 miles, 140,000 yds. @ 50¢		70,000.00
	Class A, 3 miles - 18,000 yds. @ 40¢		7,200.00
	Class A, 2 miles (sidehill) - 140,000 yds. @ 40¢		56,000.00
			<u>\$133,200.00</u>
<u>Bridges</u>	2 - 20' each @ \$500.00		1,000.00
<u>Culverts</u>	6 - 6' each @ \$100.00		600.00
			<u>150,200.00</u>

(The former route is recommended, although a little more costly).

BEAR LAKE VILLAGE TO SUSTUT CROSSING

Mile 201 2,680'	Leave Bear Lake village and cross a creek in 3
Mile 202 2,675'	forks, each 10' wide. (Could be concentrated into one channel). Thence over jackpine flats ($\frac{1}{2}$ m. boulders) to Mile 205 $\frac{1}{2}$. thence one mile ridges, thence alternate pine flats and sandy sidehill
Mile 208 $\frac{1}{2}$ 2,550'	to cross <u>Bear River</u> at M. 208 $\frac{1}{2}$. River is in fixed channel, gravel banks, 100 ft. wide and two feet deep; current 4 m.p.h. Now follow pine benches and meadows to Mile 212, crossing a pine ridge at 2,750'; after this the trail continues over level
Mile 212 2,750'	benches, with some small ravines to M.214. Thence a descent starts to the Sustut, down sidehill of gravel or clay to the <u>bridge site</u> (Photo 10-7)
Mile 214 2,750'	
Mile 217 2,200'	

SUMMARY BEAR LAKE TO SUSTUT CROSSING

<u>Clearing and Grubbing</u>	Light	20 acres @ \$175.00	\$ 3,500.00
	Medium	100 " @ 265.00	26,500.00
	Heavy	8 " @ 345.00	2,760.00

.....

<u>Elevation above sea- level</u>	<u>Grading</u>	
	Class A, $12\frac{1}{2}$ miles - 750,000 yds. @ 40¢	\$ 30,000.00
	Class A, (sidehill) 3 miles - 210,000 yds. @ 40¢	84,000.00
	Loose rock, $1/2$ mile - 35,000 yds. @ 50¢	17,500.00
	<u>Bridges</u>	
	Bear R. 100' span (Howe truss)	12,000.00
	4 creeks - 10' each @ \$250.00	1,000.00
	<u>Culverts</u>	
	16 6' @ \$100.00	1,600.00
		<hr/>
		\$178,860.00

SUSTUT CROSSING TO THUTADE (pronounced
"Too-day-dy") LAKE

Mile 217
2,200'

Sustut River is the main tributary of the Skeena River, coming from the East. Its upper waters originate in an area that drains chiefly to the Finlay; so that it carries a large volume of water in the early Summer. Many years ago there was an Indian bridge at the crossing; built on the cantilever principle. But it was destroyed by the Mounted Police in 1906, as being too dangerous. There is solid rock on each side; a span of 90' would clear all danger of driftwood. The approach from the south is down a bench of gravel and clay; that on the north solid rock, ascending 60 feet to a gravel bench.

To take advantage of the southern exposure and to avoid the steep clay sidehills on Birdflat Creek, the trail ascends 1,600 feet in the next 6 miles; and it would be best for the road to follow the same general course, but on easier grades. Some outcrops of sandstone and conglomerate will be encountered. If an average of 4% were aimed at, a distance of 8 miles would reach the 3,800' contour. Having reached this the road would flatten out and run for the next 8 miles at about this elevation. There

Mile 225
3,800'

Elevation
above sea-
level

Mile 233
3,800'

Mile 243
4,320'

Mile 246
3,980'
Mile 248
4,230'

Mile 249
4,050'
Mile 256
4,260'

Mile 259
4,200'

Mile 261
3,650'

are 4 side valleys to cross, 50' to 80' deep with banks of gravel or clay. The timber is heavy (balsam and spruce), the ground clay at present very wet, but easy to drain. At Mile 233 (elevation 3,800') the timber ceases and Birdflat Creek, at the head of its canyon has risen to 3,700' and from here up has a much lower gradient. I am told by the Indians that a much heavier snowfall is entered at M.225 and continues to Tabletop Pass M.278. From Mile 233 to 243, a gradual ascent is made following Birdflat Creek (Photo 10-3) to its source at White Snow Pass (Photo 10-2) said to be where there is the greatest snowfall on the route. By the blazes on the trees, it would appear to lie about 6 feet deep at the time the trappers would be passing around the 1st of April. The pass continues northward, open meadow all the way to Mile 258 (Photo 10-1) crossing low summits at Ms. 248, 256. This open stretch from Mile 233 to Mile 258 is wet meadow or swamp; but is never over 2 feet deep to a hard bottom of clay and rocks; it is by no means bottomless muskeg, as might be thought at first glance from its appearance of wet moss. It is hard enough to carry loaded horses; in fact we never had a horse down on the whole trip. There are numerous "islands" of gravel and dry ground projecting from the meadow and these might be joined up in many cases (Photo 9-12).

At Mile 259 the road would start to fall more rapidly towards Thutade Lake; passing through heavy balsam timber, soil being clay and loose shale (Photo 9-11).

The Thutade valley is reached in 2 miles and it is about 2 miles to the corner of the lake on the far

Elevation
above sea-
level

side. The valley is partly low and swampy, but there are some sandy benches that could be utilized and on the north side are beds of shale from whence material for a fill could be drawn. A fill of 1/2 M. would be the shortest that could be expected.

Mile 262
3,635'

Thutade Creek is 100' across water and 250' across its channel. Banks 3' high. Being glacial, it is subject to sudden rise and fall.

Mile 263
3,625'

The line would then follow the north shore along foothills of loose shale to Thutade Lake.
(Photo 9-10).

SUMMARY, SUSTUT CROSSING TO THUTADE LAKE (46M)

<u>Clearing</u>	Heavy	16 acres	@ \$345.00	\$ 5,520.00
<u>and</u>	Medium	160 "	@ 265.00	42,400.00
<u>Grubbing</u>	Open	192 "	@ 0.00	00.00
				<hr/>
				47,920.00

Grading

Rock (35° slope)	2 miles -	84,000.00
56,000 yds.	@ \$1.50	
Class A (35° sidehill)	4 M.	
280,000 yds.	@ 40¢	112,000.00
Blue Clay (35° sidehill)	4 M.	
280,000 yds.	@ 45¢	126,000.00
Swamp	35½ miles @ \$5,000 per mile	177,500.00
Fill 10' high (Thutade Cr. Valley) 1/2 m.,	38,000 yds. @ 50¢	19,000.00

Ditching

40 miles (both sides)	8,800 yds. per mile -	352,000 yds.
@ 40¢		140,800.00
		<hr/>
		\$659,300.00

Bridges

Sustut River, 90' (steel)	@ \$20,000.00	20,000.00
Thutade Creek, 125'		40,000.00
Birdflat Creek (3 crossings)		
10' @		350.00
30' @		2,500.00
60' @		5,100.00
Fern Creek 70' @		7,000.00
Noon Creek 25' @		2,000.00
Ravine Creek 60' @		6,000.00
Cross Creek 25' @		2,000.00
		<hr/>
		\$ 84,950.00

Elevation
above sea-
level

Culverts

At least 200 culverts @ \$100.00
to take care of drainage in the
swamp areas.

\$ 20,000.00

\$812,170.00

THUTADE LAKE TO FIRESTEEL RIVER

Mile 263
3,625'

The road has now entered a zone of sedimentary rocks (shale, conglomerate, sandstones) which form the eastern edge of the Groundhog coalfields; and for the next three miles would keep close to the edge of Thutade Lake in a shale formation. At Mile 265 a snow slide comes down the mountains and in years of deep snowfall would reach the lake, so the road would need protection here. The slide is 400' in width.

Mile 278
4,650'

An ascent to Tabletop Pass now starts; and an easy gradient up a sidehill, (5° to 30°), rising 1,000 feet in 11 miles, brings the line to the highest summit on this route. (Photo 9-9)

This 11 miles is wet in places from lack of drainage, especially from M.266 to 272, where it is more level. Partly it has been burnt off, and where this has taken place, the ground is dry. There are many boulders (of sandstone) from M.271 to 275.

Tabletop Pass is a large meadow, almost level 1/2 a mile wide and 3 miles long. It is bordered by very gentle slopes of alpine timber, through which the road might go rather than in the meadow, to avoid drifting of snow.

After crossing Tabletop Pass a change is seen in the vegetation, indicating a drier climate. Bunchgrass makes its appearance, the country is more open and the ground drier.

Mile 285
4,050'

The pass falls gradually to Firesteel River, outlet of Tatlatui Lake. This can be crossed on a natural

Elevation above sea-level bridge site, 2 miles below Tatlatui Lake. (Photo 9-4).

SUMMARY, THUTADE LAKE TO FIRESTEEL RIVER (22 M)

<u>Clearing</u>	Light	48 acres	@ \$175.00	\$ 8,400.00
<u>and</u>	Open Meadow	56 "	@ 00.00	00.00
<u>Grubbing</u>	Burnt	40 "	@ 175.00	7,000.00
	Heavy	32 "	@ 345.00	11,040.00
				<hr/>
				\$ 26,440.00
 <u>Grading</u>				
	Rock	1/2 M - 14,000 yds.		
		@ \$1.50		21,000.00
	Loose rock	5 miles - 30,000 yds.		
		@ 50¢		15,000.00
	Class A (level)	11 1/2 miles -		
		69,000 yds. @ 40¢		27,600.00
	Class A (sidehill)	5 miles -		
		200,000 yds. @ 40¢		80,000.00
				<hr/>
				143,600.00
 <u>Bridges</u>				
	M.272	50 ft.	@	5,000.00
	2 of	20 ft. each	@ \$750.00	1,500.00
 <u>Firesteel River</u>				
	3 spans,	30 each	@ \$3,000.00	
	(separated 100 ft. or so from each other). Solid rock on both sides			9,000.00
 <u>Culverts</u>				
	88 - 6'	@		8,800.00
				<hr/>
				\$194,340.00

FIRESTEEL RIVER - METSANTAN LAKE (NEW CARIBOU HIDE)

Mile 285
4,050'

After crossing Firesteel River, almost flat valley country is encountered all the way to Metsantan Lake, a distance of 38 miles. No solid rock is met with, and 80% is meadow land. Sometimes wet for a depth of 2 feet, but with solid bottom. (Photos 9-8, 9-2 and 7-12).

Mile 291
4,350'

Rognaas Creek, outlet of Kitchener Lake, is crossed by a 60 foot span and four miles further on a flat summit is crossed into the valley of Sturdee Creek.

Mile 305
4,050'

This Valley is followed along the western edge of a long meadow for 14 miles (Photos 9-1, 7-10) to cross

Mile 308
4,450'

Jellicoe Creek on a 70' bridge and 2 miles further is the summit of Lawyer's Pass (Photo 7-11)

elevation 4,450

.....

Elevation
above sea-
level

Lawyer's Creek, falling into Toodoggone (or Two Brothers) River, is followed keeping a short distance from its left bank and when one mile from its mouth, bearing off to the west to cut the corner into Toodoggone River Valley (Photo 7-7). From this point, the road which has so far trended mainly to the North turns to the West, and in over 200 miles only goes 35 miles to the North.

Mile 316
4,000'

At the mouth of Lawyer's Creek the elevation is 4,000'; a gradual ascent is made through meadows to Metsantan Summit, the continental divide, at 4,150', and a fall of 50 feet in one mile brings the

Mile 323
4,100'

road to Metsantan Lake (Photos 7-6 and 7-2) on the north shore of which now stands the Indian Village of Caribou Hide, moved in 1930 from its original site 7 miles further West. (Photo 7-4)

SUMMARY, FIRESTEEL RIVER TO METSANTAN LAKE (38 M)

<u>Clearing and Grubbing</u>	Jackpine (light) 64 acres @ \$2.65	\$ 16,960.00
	Open Meadow 240 "	0,000.00
	@ 0.00	<u>16,960.00</u>
<u>Grading</u>	Rock 1/4 Mile, 7,000 yds. @ \$1.50	10,500.00
	Class A (sidehill) 3 m - 210,000 yds. @ 40¢	84,000.00
	Class A (level) 54 3/4 - 208,500 yds. @ 40¢	83,400.00
		<u>177,900.00</u>
<u>Bridges</u>	Rognaas Creek 60' @	7,000.00
	Sturdee Creek 60' @	7,000.00
	South Stag Cr. 40' @	4,000.00
	North Stag Cr. 40' @	4,000.00
	Jellicoe Cr. 70' @	8,000.00
	Toodoggone Cr. 20' @	750.00
		<u>30,750.00</u>
<u>Culverts</u>	30 - 6' each @	3,000.00
		<u>\$228,610.00</u>

Totals Fort St. James - Metsantan
Lake via White Snow Pass

(a) Following lake level of Takla
and Bear Lakes \$3,821,550.00

(b) Using benches, etc., to econo-
mize along Takla Lake and
Bear Lake 3,586,490.00

Elevation
above sea-
level

ROUTE C (2)

FORT ST. JAMES-GERMANSSEN LANDING- AIKEN LAKE-
CARIBOU HIDE

At present a good road is in operation to Germansen Landing and a mining road is partly completed to Aiken Lake. Since all the information on these is already available in the office of the Public Work's Department, no more need be said here; so this report will start at a point on the Mesilinka River, east of Canyon Creek, and at Mile 82 from New Hogen, or 233 from Fort St. James. That is to say, by using this C (2) Route, the road can be started approximately opposite White Snow Pass on the C (1) Route. Elevations are based on Johanson Lake - 4,730', from Geological Survey.

Mile 233
5,130'

MOUTH OF CANYON CREEK TO JOHANSON PASS (28 M)

The area around Aiken Lake (Photo 13-3) was examined in 1939 by Douglas Lay of the Department of Mines; and an excellent report and sketch map made by him are available. (Bulletin No. 1, 1940). The road should turn off the existing road at about Mile 82 (east of Canyon Creek) and climb to the summit of the bench up a gravel and boulder sidehill. Once this climb is made, the going is nearly level; care must be taken to keep the road far enough back from Canyon Creek to miss Goat Creek Canyon, about one mile. The valley continues wide and nearly level to M.250, seventeen miles (Photos 13-7 and 13-8). After this the grade is still gradual but the floor of the valley becomes rougher; ridges of boulders (up to 1 yard, mostly about 12" diameter (Photo 13-9)). This continues to the trapper's cabin, shown on D. Lay's plan. Here we met the trapper, Thomas Abraham,

Mile 254
4,490'

Elevation
above sea-
level

of Bear Lake. He speaks very little English but we made out from him that the snow gets about 4 feet deep at this cabin and 7' to 8' deep in the pass at its deepest; also that the West Fork of Canyon Creek is the best pass.

Here the North Fork is to be crossed; it is 30' wide, 1 foot deep, in a low canyon 15 feet deep, rock both sides, an ideal bridge site.

Mile 254
4,490'

From the North Fork crossing to the Pass is 7 miles; and the rise is 330 feet; there is an indefinite Indian trail all the way but it is not well located. By travelling this trail, the impression would be gained that there was a very bad piece of country. It is not as bad as it at first appears. The rise is an average of 1%; and for a considerable part of the way the road could follow the edge of a bench facing south over gravelly soil, with a few boulders. The area has been burnt and a lot of it grown up with brush, so it is hard to see in detail. The swamps are of small area (an acre or less) with ridges around them.

Mile 261
4,820'

The last mile approaching the summit is very narrow, not over 600 feet wide between the foot of the mountains, which rise very steeply (35°) to a height of 7,500'. (Photos 13-12 and 13-14). 3 snowslides were noted, only one of which (400' across) might reach the road.

SUMMARY, CANYON CREEK TO JOHANSON PASS (28 M)

<u>Clearing</u>	Burnt, with second growth	
<u>and</u>	84 acres @ \$175.00	\$14,700.00
<u>Grubbing</u>	Medium 112 acres @ \$265.00	29,680.00
	Open meadow 28 acres @ 0.00	0.00

<u>Elevation above sea- level</u>	<u>Grading</u>		
	Rock 1/2 mile - 14,000 yds. @ \$1.50		\$ 21,000.00
	Class A (level) 15 1/2 m. - 93,000 yds.		
	@ 40¢		37,200.00
	" " (sidehill) 4 m. - 280,000 yds.		
	@ 40¢		112,000.00
	Loose rock 8 m. - 48,000 yds. @ 50¢		24,000.00
	<u>Bridges</u>		
	Goat Creek 50 ft. @ \$4,500.00		4,500.00
	N. Fork 30 ft. @ 2,500.00		2,500.00
	6 others of 20 ft. @ 1,000.00		6,000.00
	<u>Culverts</u>		
	30 - 6' @		3,000.00
		TOTAL	\$254,580.00

Mile 261
4,820'

ROUTE C (2)

JOHANSON PASS - MOUTH OF THORNE CREEK, VIA McCONNELL
CREEK

Emerging from the summit on the north (Photo 13-15) the pass immediately opens out into a beautiful valley, of open bunch grass and dry soil and so continues past Johanson Lake (Photos 14-2, 14-3, 14-5 and 14-6) to the Forks of Johanson Creek, (Photo 14-9) and down the creek (Photo 14-10). The line should keep on the bench to the East of the lake and creek; cross to the north side of the Forks and keep on the benches, continuing down Johanson Creek to a point about four miles down stream from where the McConnell Creek trail crosses. Here a choice can be taken of a route via McConnell Creek or via Moose Valley. To take former first:-

Mile 275
4,200'

Mile 280
4,600'

An ascent is made up a small side creek through open, but wet, meadows to the divide leading into the Ingenika (Photos 15-1 and 15-2). Thence follow the left bank of the Ingenika not far from the existing trail to reach McConnell Creek at the mouth of Jensen Creek. This stretch alternates about half and half between dry and wet ground. From Jensen Creek, cross McConnell Creek and keep to the East bank, along the East side of McConnell Lakes

Mile 293
3,800'

Elevation (Photos 16-14 and 16-5) (which drain to Attichika
above sea- level Creek). The going is rough close to the Lakes and
Mile 298 as ascent should be made of about 150 feet. Jack-
4,120' pine benches or flats can now be followed down the
Mile 309 Attichika to its junction with Thorne Creek, easy
3,800' going. Snowfall at McConnell Creek is stated to
reach 5 feet in an average Winter.

SUMMARY JOHANSON PASS-MOUTH OF THORNE CREEK,
VIA McCONNELL CREEK (48M)

<u>Clearing</u>	Medium	288 acres @	\$265.00	\$76,320.00
<u>and</u>	Open	96 " @	0.00	0.00
<u>Grubbing</u>				
<u>Grading</u>				
	Rock	2 miles -	56,000 yds.	
	@	\$1.50		84,000.00
	Loose rock	- 6 miles -		
		60,000 yds. @	50¢	30,000.00
	Class A (level)	36 miles -		
		216,000 yds. @	40¢	86,400.00
	Class A (sidehill)	4 miles -		
		280,000 yds. @	40¢	112,000.00
<u>Drainage</u>				
		10 miles to be ditches on		
		both sides - 88,000 yds. @	40¢	35,200.00
<u>Bridges</u>				
		8 of 40 ft. @	\$4,000.00	32,000.00
<u>Culverts</u>				
		150 6' @	\$100.00	15,000.00
				\$470,920.00
			TOTAL	

Route C (2) Johanson Pass to mouth of Thorne Creek
via Moose Valley (44M)

Mile 275 This route was flown, only, and not gone over on
4,200' foot. It is reported to be much better than via
McConnell Creek, having no rockwork, but to be
rather swampy. Seen from the air it appears to be
timbered with spruce, with about 15% of meadowland.
It crosses a low summit 6 miles south of Thorne
Lake, altitude 4,100, more or less. It enters the
Attichika at the mouth of Thorne Creek, in an open
valley of bunch-grass meadows. This route is
slightly shorter and cheaper than via McConnell Creek.

Elevation
above sea-
level

SUMMARY JOHANSON PASS TO MOUTH OF THORNE CREEK
VIA MOOSE VALLEY (30M) (See Photo of 1935)

<u>Clearing</u>	Spruce & Pine - 288 acres	
<u>and</u>	@ \$265.00	\$ 76,320.00
<u>Grubbing</u>	Open meadow - 64 acres	
	@ 0.00	0.00
<u>Grading</u>	Class A (level) 40m.-	
	240,000 yds. @ 40¢	96,000.00
	Class A (sidehill) 4 m.	
	280,000 yds. @ 40¢	112,000.00
<u>Ditching</u>	10 miles, both sides -	
	88,000 yds. @ 40¢	35,200.00
<u>Bridges</u>	8 @ 40' each @ \$4,000.	32,000.00
<u>Culverts</u>	150 6' each @	15,000.00
		<u>\$366,520.00</u>

MOOUTH OF THORNE CREEK TO LAWYER'S PASS
ROUTE C (2)

Mile 305
3,800'

(Via Moose Valley) Easiest imaginable going down the right bank of the Attichika (Photos 16-8, 16-9, 16-10, 16-11 and 16-12) sand and gravel benches.

Mile 310
3,700'

Kemess Creek (Photo 15-8) at M.310 is 30' across water, but 80' across bed; gravel banks. Leaving Attichika Creek and bearing off to the N.W.,

Mile 314
3,624'

Camp Creek is crossed (10' wide) at M.313 and at M.314 the shore of Thutade Lake is reached, at a small island (Photo 16-6).

From this point the shore of Thutade Lake should be followed, more or less closely. For 3 miles it is low and would need some draining, although it has a natural slope of 5° or so. Of the northern 3 miles, 2 miles are rock and the shore is very irregular, bays and points, but a lot of straightening out could be done by filling across bays etc. (Photos 16-1, 16-4 and 16-5). The last mile is again clear of rock but needs draining

Mile 320
3,624'

(Photo 15-15). The outlet of the lake, which is the head of the Finlay, is at Mile 320 (Photo 15-14)

Elevation
above sea-
level

Mile 325
3,475'

The Finlay now commences to fall away very fast. It descends 60 feet into a gorge in the first 2 miles, while the banks rise in elevation. It then plunges 50 feet vertically over one of the most spectacular falls in B.C. (Photos 15-10 and 15-11) and continues to drop rapidly (Photo 15-9) to the junction with Firesteel River, with which it has run parallel for a mile. Both the Finlay and the Firesteel are about 150' each across their beds, 100' of water on September 27th (low then). The combined rivers below the junction are 350 acres, shallow, 6 m.p.h. (Photos 15-12 and 15-13). From outlet of Thutade Lake, follow down the gravel benches on the right bank but keep well back from the edge (Photos 15-15 and 15-16). See Minister of Mines Report, 1908; p. 74-75. Then develop a grade to near the mouth of Firesteel River, cross below the junction and then follow the north bank of Firesteel and Sturdee Creeks, to get exposure to the sun. Here there is a gap in the reconnaissance; to Lawyer's Pass. I ordered the plane three times in order to fly this; each time it was foggy weather. However, in 1935 I had flown over this and, as near as I remember it, there was about 8 miles of canyon, with rock sloping about 45°, but less steep above. The last 10 miles to Lawyer's Pass are open meadow, fine going and level. (Photo 7-10).

Mile 345
4,450'

Here is the junction with the other route, via Bear Lake. It will be seen that the Aiken Lake route is 37 miles longer than by Bear Lake but calls for 196 miles less of new construction. So far as snowfall goes, nothing definite can be said until some measurements are taken by a reliable person.

Elevation
above sea-
level

The Aiken Lake route is drier and offers more chance for prospecting; the Bear Lake route has the finer scenery, bordering so many big lakes but probably worse snow difficulties from Mile 225 to Mile 278 - 53 miles of reputed heavy snow; but how heavy we do not know.

SUMMARY - THORNE CREEK-LAWYER'S PASS (40M)

<u>Clearing</u>	Open	40 acres @ 0.00	\$ 000.00
<u>and</u>	Medium	280 " @ \$265.00	74,200.00
<u>Grubbing</u>			<u>\$74,200.00</u>

Grading

Solid rock 6 miles -		
168,000 yds. @ \$1.50		252,000.00
Loose rock (sidehill) 2 miles-		
140,000 yds. @ 50¢		70,000.00
Class A (level) 26 miles -		
156,000 yds. @ 40¢		62,400.00
Class A (sidehill) 6 miles -		
420,000 yds. @ 40¢		168,000.00
		<u>\$552,400.00</u>

Bridges

Attichika Creek	30'	2,500.00
Kemess Creek	40'	4,000.00
Camp Creek	10'	200.00
		<u>6,700.00</u>
Finlay River	350' @	125,000.00
Possibly 6 other creeks,		
30' each @ \$2,500.		15,000.00

Culverts

100 - 6' each @		10,000.00
		<u>156,700.00</u>

Ditching

10 miles (both sides) -		
88,000 yds. @ 40¢		35,200.00
		<u>\$818,500.00</u>

PLUS LAWYER'S PASS - NETSANTAN (15 M)

<u>Clearing</u>	Medium	32 acres @ \$265.00	\$ 8,480.00
<u>and</u>	Open	88 " @ 0.00	0.00
<u>Grubbing</u>			
<u>Grading</u>	Class A (sidehill)	1½ M. -	
		105,000 yds. @ 40¢	42,000.00
	Class A -	1¾ M. -	
		81,000 Yds. @ 40¢	32,400.00
<u>Bridges</u>	Toodoggone Creek	20 ft. @	750.00

Elevation above sea- level	<u>Culverts</u> 60 @ \$100.00	\$ 6,000.00
	TOTAL	\$ 89,630.00
	Aiken Lake - Metsantan (via Moose Valley)	\$1,529,230.00
	" McConnell Cr.)	1,633,630.00

METSANTAN LAKE (NEW CARIBOU HIDE) TO
HYLANDS POST (52M)

Mile 323 (via Takla) 4,100'
Mile 360 (via Aiken Lake) 3,850'

Mile 329½ 3,850'

Mile 330 3,800'
Mile 337 3,750'

Mile 346 3,600'

Mile 346½ 3,770'
Mile 352 4,000'

Mile 357 3,420'

Mile 358 3,390'

Follow around the north side of Metsantan Lake; after one mile cross a large fork of Metsantan Creek, 30 feet wide; follow down the right bank, keeping about 300 feet back from the creek on the edge of the timber; 6½ miles to junction with Moyes Creek (30'). (Photos 6-11 and 7-1) and a further half-mile, swing to the right into the big meadow called by the Indians "the Battlefield" (Photos 6-10 and 6-12). This stretches for 7 miles; the Stikine should be crossed just below the mouth of Chili Creek (150' wide here) (Photos 6-8 and 6-9) and a cut-off made across the next bend of the River, for 1¼ miles. Then follow the banks of the River or contiguous benches to Mile 346. A long cut-off is now to be made to avoid a big elbow of the Stikine River; and at M.346 a bench is climbed, rising 170 feet; the country then climbs slowly to the summit of the cut-off at Mile 352, (Photo 6-4) following Blue Spruce Creek nearly all the way, and crossing it four times. A gradual descent to Sanabar Creek is next, through a swampy country with dry ridges. Sanabar Creek is 80 feet wide, shallow and swift (Photos 6-3) one mile further the Stikine is again reached. (Photo 6-2).

From Mile 347 to Mile 357, the trail is very wet. However, the swamp is never over 2½ feet deep with clay and rock bottom. Air photographs would help

Elevation
above sea-
level

greatly in projecting this part of the line.

The next six miles will more or less follow the left bank of the Stikine, but at varying elevation. A bench parallels the river but it is dissected by some very deep ravines; also where the Stikine is cutting its toe, it is subject to slide into the river, being a mixture of clay and sand. So it will have to be ascended and descended twice in 6 miles.

Otherwise this is good going.

From M.346 to M.364 a very detailed examination should be made before a location is started.

Mile 364
3,250'
Mile 366
3,375'

At Mile 364 the road will leave the Stikine River, not to touch it again for nearly 200 miles; and climb 105 feet on to a plateau, and proceed across

Mile 369
3,165'
Mile 369½
3,170'

this excellent pine flat 5 miles (Photo 6-1) and descend to the Spatsizi River. At Mile 369½, the Spatsizi should be crossed. Here it is 275 feet wide, 6' deep, gravel sides and bottom. (Photo 5-12).

Mile 375
3,250'

From this crossing to Hyland's Post (abandoned in 1932) is 5½ miles, all jackpine benches. On this portion of the road are two good sites for airports. The one at "The Battlefield" is a dry level meadow 3 M long and 1/2 mile wide, altitude 3,800 feet; (see Photo No. 6-10); the other one at Hyland's Post is 1/2 M. x 1½ M. altitude 3,250' (Photo 5-5)

SUMMARY - METSANTAN LAKE TO HYLAND'S POST (52M)

<u>Clearing</u>				
and	Medium	336 acres	@ \$265.00	\$89,040.00
<u>Grubbing</u>	Open	80 "	@ 0.00	0.00
<u>Grading</u>	Solid Rock	1/2 M. 14,000 yds.	@ \$1.50	21,000.00
	Loose Rock	2 M. 15,000 yds.	@ 60¢	9,000.00
	Clay sidehill (35°)	1½ M.		
		105,000 yds.	@ 50¢	52,500.00

.....

<u>Elevation above sea-level</u>	Class A (level) 38 M. @ 228,000 yds. @ 40¢	\$91,200.00
	Shallow muskeg 10 M. @ \$5,000 per M.	50,000.00
	<u>Ditching</u> 10 miles (both sides) - 88,000 yds. @ 40¢	35,200.00
	<u>Bridges</u> Stikine R. 150 ft. @	30,000.00
	Spatsizi R. 275 ft. @	75,000.00
	Sanabar Cr. 80 ft. @	10,000.00
	5 others of 30 ft. @ \$2,500.00	12,500.00
	<u>Culverts</u> 75 6x6 @ \$100.00	7,500.00
		<hr/>
		\$482,940.00

HYLAND'S POST TO BUG LAKE (39 MILES)

- Mile 375 Proceeding up the left bank of the Spatsizi, it is all
3,250' easy, dry going for many miles, jackpine flats or benches, with a few narrow and shallow swamps to be filled across (photos 5-9, 4-11 and 4-12) and some small creeks to cross.
- Mile 390 The first creek of any size is Cache Creek, M.390;
3,430' which is in a poorly defined channel 50' wide. Then ensues a long pine flat to Mink Creek; the road keep-
- Mile 397 ing well back from the Spatsizi, and not actually
3,550' coming to Mink Creek at all.
- The climb now becomes steeper, climbing on to benches
- Mile 404 paralleling Mink Creek but choosing the driest ground;
3,975' and at Mile 404 Coldfish Lake is seen on the left.
- The road would now follow the N.E. shore of Coldfish Lake; near the shore is rather wet, 150' higher is dry but many small gulleys. Side slopes are about 15° where only 10° or so swamp occurs, but could be drained; where 15° or more, the ground is dry. (Photo 4-10).
- Mile 410 The lake is followed for 6 miles; then a flat gravel
3,975' country is entered; crossing Black Fox Creek, 40' wide,
- Mile 414 the pass is reached at Mile 414. (Photo 4-9.
4,020'

Elevation
above sea-
level

SUMMARY - HYLANDS POST - BUG LAKE (39 MILES)

<u>Clearing and Grubbing</u>	Open 24 acres @ 0.00	0.00
	Medium 288 " @ \$265.00	76,320.00
<u>Grading</u>	Clay Sidehill - 1 M. - 70,000 yds. @ 50¢	35,000.00
	Shallow muskeg 5 M. @ \$5,000. per mile	25,000.00
	Class A (level) 33 M. - 198,000 yds. @ 40¢	79,200.00
<u>Bridges</u>	2 of 50' @ \$4,500.00	9,000.00
	3 of 30' @ \$2,500.00	7,500.00
	4 of 15' @ 500.00	2,000.00
<u>Culverts</u>	80 - 6' @ \$100.00	8,000.00
<u>Ditching</u>	5 M (both sides) 44,000 yds. @ 40¢	17,600.00
	TOTAL	<u>\$259,620.00</u>

BUG LAKE TO FOX LAKE (17M)

Mile 414
4,020'

Leaving Bug Lake the road would follow an open, treeless pass over flats of gravel and small rocks (1"-12") for five miles; (Photo 4-9) then follow the right bank of Cullivan Creek; either ascending and descending the benches, or keeping near water-level. The former would be cheaper but would entail a good deal of climbing.

Cullivan Creek construction is very easy from Bug Lake to the head of the canyon; only grading on flat benches, with a few pitches from one bench to another of 20 feet or so.

Charley Creek can be crossed a little higher than the trail with a 30 ft. span.

The canyon is about $2\frac{1}{2}$ miles long, from M.421 $\frac{1}{2}$ to M.424 but is not continuous. By blasting altogether not over 2,000 feet of soft conglomerate rock points, a road can go right through near water-level. Some protection will be needed at bends in the creek.

(Photo 4-8).

Elevation
above sea-
level

Mile 421 $\frac{1}{2}$
3,700'
Mile 422 $\frac{1}{4}$
3,950'
Mile 423 $\frac{1}{4}$
3,720'

Mile 424
3,400'

Mile 425
3,270'

Mile 431
4,040'

To avoid the canyon, a climb will have to be started at M.421 $\frac{1}{2}$; by M.422 $\frac{1}{4}$ the line will be above high bluffs, having risen 250 feet. At M.423 $\frac{1}{4}$ it will have fallen 230 feet but still be 150 feet above the creek; and at Mile 424 the canyon ends and the road will be near water level having descended very steeply. By going above the canyon the rockwork would be cut to 500 feet, the going being mostly gravelly, with side slopes of 35°. Another advantage would be that the snow would disappear much earlier than in the canyon. (Photo 4-7)

At M.425 Cullivan Creek will be crossed; it is about 50 feet in width at average water and its bed is 100 feet wide; its depth at H.W. is 4 feet.

The road is now at what is locally called "Fort Graham Portage"; and will have to ascend 430 feet to the plateau level on the left bank of Cullivan Creek, by a cut up a sidehill of mixed clay and loose rock with some spurs of sandstone, sloping at 35°.

Once on top the line follows benches of spruce and pine for the next six miles to Fox Lake, (Photo 4-5) 1 $\frac{1}{2}$ miles being swampy and 4 $\frac{1}{2}$ miles solid. Drainage and carriage location could likely improve this.

SUMMARY - BUG LAKE-FOX LAKE (THROUGH CANYON)
(17M)

<u>Clearing</u>	Spruce and pine 96 acres	
<u>and</u>	@ \$265.00	\$ 25,440.00
<u>Grubbing</u>	Open 40 acres @ 0.00	0.00
<u>Grading</u>	Solid Rock 1/2 M. -	
	20,000 yds. @ \$1.50	30,000.00
	Loose rock 1 $\frac{1}{4}$ M.	
	105,000 yds. @ 50¢	52,500.00
	Class A (sidehill) 4 M.	
	280,000 yds. @ 40¢	112,000.00
	Class A (level) 66,000	
	yds. @ 40¢	26,400.00
	Protection of roads against	
	creek	10,000.00

Elevation above sea- level	<u>Bridges</u>	Cullivan Creek 100' @ \$12,500.00	\$ 12,500.00
		Charley Creek 30' @ \$2,500.00	2,500.00
		3 of 15' each @ \$500.00	1,500.00
	<u>Culverts</u>	35 6' @ \$100.00	3,500.00
		TOTAL	<u>\$276,340.00</u>

(AROUND THE CANYON)

<u>Grading</u>	Rock 880 ft. - 5,000 yds. @ \$1.50	\$ 7,500.00
	Loose rock 2½ M. - 175,000 yds. @ 50¢	87,500.00
	Class A (sidehill) 5 M. - 350,000 yds. @ 40¢	140,000.00
	Class A (level) 9 1/4 M. - 55,500 yds. @ 40¢	22,200.00
	Clearing, bridges & culverts the same	45,440.00
	TOTAL	<u>\$302,640.00</u>

Mile 431
4,040'

FOX LAKE TO GRASS CREEK, VIA BAKER CANYON
OF STIKINE AND TSAYBAR PASS (58)

This route was investigated with the idea of connecting with J.H. Gray's projected route of 1930, coming from the North via the Gnat-Ptarmigan Pass (see J.H. Gray's report).

The route would follow down Fox Creek on either bank, until its junction with Ford Creek; and thence over rolling country, keeping well to the west of Ford Creek (Photo 4-3). The latter (in common with all creeks entering the Stikine from the south in this vicinity) has cut itself a tremendous canyon and cannot be followed.

When investigating, we took a line about half way between Ford Creek and Mutt's Creek and found fair going, but undulating; rising to 4,380' at the small

Mile 438
4,380'
Mile 439
4,440'
Mile 441
3,960'
Mile 445
2,510'

lake shown on Nash's map of 1930 (Photo 4-1). From 1 M. north of this lake begins a descent to the Stikine River. This descent is very steep as the river is approached and falls 1,300 feet in two miles.

Elevation
above sea-
level

It is good dry sandy material but if this route were to be used, some development would be needed to obtain a better grade. Also it faces north, so no doubt the snow lies a long time. At the foot of the mountain, Mutt's Creek is to be crossed. This creek was fairly high and was 30' across water, 2' deep, very swift. It does not seem to remain in one channel and its bed is 200' wide, one side high, the other low, both sand.

Mile 454
2,385'

2,600'

Below Mutt's Creek is one mile of good pine bench; then two miles of 35° sidehill, facing north with the Stikine at its foot; 750' of this is rock, the balance clay and liable to slide, being wet; the balance is flat bench going, sometimes dry jack-pine, sometimes wet flats (clay etc.). Approaching River level. Baker Canyon, the river flats reach to the head Top of cliff. of the gorge; a shoulder cuts across the valley of the Stikine; it is about elev. 2,600' on top, while the river is 2,385'. Its banks are solid rock and rise 100-200'. (Photos 2-12 and 2-11). This bench sweeps around and up the Klappan; and can be seen on the left of Photo 2-9, with the entrance of Tsaybar Pass just beyond it. 1 3/4 miles below Baker Canyon, the Klappan joins the Stikine. At Baker Canyon, connection could be made with either bridge-site mentioned by J.H. Gray in his report, page 19. His elevation of junction of Ptarmigan and Stikine is 2,841', mine is 2,385'. Mine is based on trigonometrical elevation of trail crossing up the Klappan, where it is 2,543'. Gray speaks on page 30 of his report of trouble with his aneroids.

Mile 460
2,450'

If going ahead via Tsaybar Pass, the road will follow the bench at about 2,600 feet up the East side of the

Elevation
above sea-
level

Klappan, and cross just below Tsaybar Creek. This is not a good crossing; nor is there any on the Klappan. It is a rapid stream, averaging 350' in width; it swings from side to side of its valley; with a cut bank on one side where the current hits; islands and sloughs on the other. Gravel banks and bottom. (Photo 2-7).

The ascent to Tsaybar Pass is up a sidehill all the way; in six miles it rises 1,850 feet. The lower four miles are dry, sand and gravel; the upper two much wetter, (clay) with four gullies to circumvent.

Mile 466
4,300'

The pass itself is a narrow meadow, 1 mile long, elevation 4,300'. On August 3rd there was still a patch of snow left in it. (Photo 2-6).

For the first mile west of the Pass, the descent is rapid, falling about 300. Then it flattens out and becomes excellent all the rest of the way. (Photos 2-5 and 2-4). The going down the creek is now benches of jack-pine or open meadow.

Mile 474
3,400'
Mile 476
3,150'

At Mile 474 Tsaybar Creek (60') is crossed and from there on down keep to the left bank. At Mile 476 the huge flat area of Morchuea Flats is entered and by following gravel ridges, at Mile 480, Elder's Ranch is passed. These flats have a very light snow-fall and horses run loose all Winter, rustling for themselves. So do innumerable moose; this is the best moose area in the country. Elder's ranch consists of several hundred acres of meadow and three or four log buildings. (Photos 2-1 and 2-3). From here the line goes over flats of pine and poplar, to Grass Creek, 9 miles. (Photo 1-16).

Mile 489
2,700'

Elevation
above sea-
level

SUMMARY, FOX LAKE-GRASS CREEK, VIA BAKER CANYON
AND TSAYBAR PASS (58M)

<u>Clearing and Grubbing</u>	Open meadow, 88 acres @ \$ 0.00	\$ 000.00
	Medium 376 " @ \$265.00	99,640.00
<u>Grading</u>	Class A 37½ miles - 225,000 yds. @ 40¢	90,000.00
	Rock 1/2 M. - 14,000 yds. @ \$1.50	21,000.00
	Class A (sidehill) 18M - 1,260,000 yds. @ 50¢	630,000.00
	Shallow swamp, 2 miles @ \$5,000.00	10,000.00
<u>Bridges</u>	(1) Ford's Creek (20') @	700.00
	(2) Mutt's Creek (100') @	15,000.00
	(3) Klappan River (350') @	125,000.00
	(4) Tsaybar Creek (60') @	10,000.00
	(5) Consuel-Tuey Cr. (40') @	4,000.00
	(6) Morchuea Creek (50') @	5,000.00
	And 10 others of 15' @ \$500	5,000.00
<u>Culverts</u>	4 per mile average - 232	23,200.00
		<u>\$1,038,540.00</u>

(This route is not recommended)

FOX LAKE TO GRASS CREEK, VIA EALUE LAKE

Mile 431 Leaving Fox Lake, cross the swamp at its outlet to
4,040' the west side and ascend to the Pass opposite through
which the packtrail runs. By keeping to the north

Mile 434 side of the approach to the pass, close to where
4,350' the trail goes, good going can be had over dry
ridges. The Pass is reached in 3 miles, and con-
sists of an open meadow. It falls away gradually
to the west, following down the right bank of
McEwan Creek for 8 miles. It then leaves McEwan
Creek and cuts off to the north, alternating
through timber and meadows (which need to be
drained) to the Klappan Crossing, the last mile
being along the river.

Mile 451 The best crossing of the Klappan is 3 miles below,
2,543' where it is 310 feet wide, with gravel banks
each side; on the west side a small creek comes
in from near Ealue (pronounced E-ah-luey) Lake:

<u>Elevation above sea- level</u> Mile 454 2,500' Mile 458 3,000' Mile 461 2,820' Mile 470 2,672' Mile 477 2,672' Mile 485 3,000' Mile 498 2,700'	<p>By following this, it saves climbing over a hump at the trail crossing. An ascent is made to 3,000' and then a gradual descent to Ealue Lake, 2,820'; follow around the west shore and cut across to Eddontenajon Lake as shown on the plan, keeping close to the east side of the latter lake. This detour from M.460 to M.480 is to avoid a 1,000 ft. climb over the Klappan Summit. A gradual climb through open parkland brings the line to a low summit, 3000'. It next parallels the North bank of Canyon Lake and the creek outletting therefrom; crossing the latter twice, and also Morchuea and Consuel Tuey Creeks to join with the Tsaybar route at Grass Creek, Mile 496 (c.f. 489 via Tsaybar). The last 10 miles are all jackpine flats, except 1/2 mile of sidehill, ascending to the plateau mentioned on the other route.</p>
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To compare the two proposed ways:-

The only advantage of the Tsaybar Pass is that it is seven miles shorter.

The Ealue Lake Road would have lower summits, a better crossing of the Klappan and more attractive scenery.

SUMMARY, FOX LAKE-CRASS CREEK, VIA EALUE
LAKE (65M)

<u>Clearing and Grubbing</u>	Open meadow 24 @ 0.00	\$ 0.00
	Medium 496 @ \$265.00	131,440.00
<u>Grading</u>	Rock 1 M - 28,000 yds. @ \$1.50	42,000.00
	Class A, 59 M - 354,000 yds. @ 40¢	141,600.00
	Class A (sidehill) (35°) - 350,000 yds. @ 40¢	140,000.00
<u>Bridges</u>	(1) Fox Creek 15' @ \$500	500.00
	(2) Klappan R. 310' @120,000	120,000.00
	(3) Morchuea Cr. 50' @ 5,000	5,000.00
	(4) Consuel Tuey Cr. 40' @ \$4,000	4,000.00
	And 10 others of 15' each @ \$500	5,000.00
<u>Culverts</u>	4 per mile average - 260 @ \$100	26,000.00
		615,540.00

NOTE This area was gone over by the
writer in 1929 and 1930 and this estimate is from

Elevation
above sea-
level

notes made at that time.

GRASS CREEK TO MILE 515 (KLASTLINE RIVER)

Mile 496
2,700'

Crossing Grass Creek (20'), keep to the bench (alt. 2,600' more or less) at the foot of a steep rocky mountain (Photo 1-15), crossing Nigger Creek (15') and following the edge of this bench (Photo 1-14 and 1-13) around to Mile 503, planning to be down to the level of the Klastline at the mouth of Joker Creek (Photo 1-12). Below here is a steep bank 1,200' long, of which 200' is rock spurs. Level country ensues

Mile 507
1,923'

close to the Klastline (Photo 1-11) which should be crossed at M.507, at the lava beds, a short distance above the trail bridge. (Photo 1-8) From here to Mile 515, (the end of this reconnaissance) the banks are all lava benches; sometimes covered by gravel or silt (Photos 1-7, 1-6 and 1-5). It might be cheaper to cross the river twice more to cut off a corner.

Mile 515
1,800'

Photo 1-4 shows a view down the Klastline to the last point seen, which appears to be about 2 miles above where Clarke saw to. Indians tell me it is good going on the benches, to be seen on either side of the river. And (say) two more miles to Clarke's mile 231 (see Clarke's report, 1939) from Atlin, or 266 to the Yukon Boundary - 783 in B.C.

Mile 517
1,780'

SUMMARY GRASS CREEK - MILE 515 (KLASTLINE RIVER) (19M)

<u>Clearing</u>	Medium 136 acres @ \$265.00	\$36,040.00
<u>and</u>	Open 16 " @ 0.00	0,000.00
<u>Grubbing</u>		
<u>Grading</u>	Rock 1 M - 28,000 yds. @ \$1.50	42,000.00
	Lava bed 5M - \$10,000 a mile (?)	50,000.00
	Class A (flat) 10M - 60,000 yds. @ 40¢	24,000.00
	Class A (sidehill) 3M - 210,000 yds. @ 40¢	84,000.00
<u>Bridges</u>	Grass Creek 20' @ \$1,000.00	1,000.00
	Klastline Cr (& foundation) 70' @ \$12,000.00	12,000.00
<u>Culverts</u>	40 @ \$100.00	4,000.00
	TOTAL	<u>\$ 253,040.00</u>

By adding the foregoing figures we have:-

TAKLA LAKE ROUTE

FORT ST. JAMES - METSANTAN LAKE (TAKLA SHORE-LINE)	#	\$3,821,550.00
METSANTAN LAKE - MILE 515 (VIA BALUE LAKE)	#	1,887,480.00
TO MILE 517 TO JOIN CLARKE	SAY	30,000.00
		<u>\$5,739,030.00</u>

FORT ST. JAMES - METSANTAN LAKE (USING BENCHES)		\$3,586,490.00
METSANTAN LAKE - MILE 515 (VIA BALUE)		1,887,480.00
MILE 515 TO JOIN CLARKE	SAY	# 30,000.00
		<u>\$5,503,970.00</u>

ADD \$2,000.00 PER MILE FOR GRAVELLING	#	\$1,034,000.00
CLARKE'S ESTIMATE TO ATLIN (231 M)	#	3,319,700.00
PLUS 35 MILES TO YUKON BOUNDARY	SAY	# 525,000.00
		<u>\$3,844,700.00</u>

. . . TOTAL FOR 783 MILES IN B.C. #		
. . . (VIA TAKLA SHORELINE)		\$10,617,730.00

AIKEN LAKE ROUTE

AIKEN LAKE - METSANTAN LAKE VIA MOOSE VALLEY		\$1,529,230.00
METSANTAN LAKE - M. 515 VIA BALUE LAKE		1,887,480.00
M. 517 JOIN CLARKE		30,000.00
GRAVELLING 321 MILES @ \$2,000.00		642,000.00
		<u>\$4,088,710.00</u>
TO YUKON BOUNDARY (SEE ABOVE)		3,844,700.00
		<u>\$7,933,410.00</u>

TOTAL FOR 587 MILES IN B.C.

(Sgd) Philip M. Monckton,
B.C. Land Surveyor.