August 27, 1951

Mr. Jos. T. Flakne
Chief, Alaska Division
Office of Territories
Department of the Interior
Washington 25, D. C.

Dear Joe:

Your letter of August 16, 1951, regarding John Reed's assignment to the Naval Petroleum Reserve contract at Fairbanks and the possible study regarding the road from Fairbanks to Umiat by way of Anaktuvuk Pass was held pending my return from the interior. I note that you requested a quick reply and hope that this information will not be too late for your use.

I have previously been in contact with Commander M. H. Aubey, Officer in Charge of the Point Barrow contract and assured him that the Alaska Road Commission stands ready and willing to construct the road to Umiat whenever the oil investigations justify a road and a pipeline. Commander Aubey has indicated that his recommendations would provide for all road work to be handled by the Alaska Road Commission.

I am glad to see that John will be in the Fairbanks office and I will make an effort to contact him during my next trip to the interior. I hope that he will advocate that the Alaska Road Commission be responsible for all road work in connection with the petroleum reserve development.

Attached is a preliminary study which was made of the general features and economics involved in the development of a road from Livengood north to Umiat. I believe this information will be of value to you and possibly to John Reed in connection with his study. An alternate route not discussed in the attached study has recently been further advocated by the military. This route would be from Livengood to Rampart by way of Eureka on the present Manley Hot Springs highway system. The military considers the connection of the Manley system, together with the extension to Rampart, to be of very high military importance, and therefore its construction probably will be justified in an early program, whereas the Livengood-Umiat Road might not be started at such an early date. Extension of the road from Rampart north obviously would be easier than initiating construction directly north

from Livengood, though the resultant distance to Umiat would be somewhat greater.

I hope this information will meet your requirements.

Sincerely yours,

A. F. Ghiglione
Commissioner of Roads
for Alaska

Enclosure - 2 copies

AFG:lcs

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO : G. M. Tapley, Chief, Engineering Division DATE: August 24, 1951

FROM : F. E. Baxter, Chief, Road & Facility Design Branch FEB

SUBJECT: Livengood to Umiat Road

As requested by you, a short office study has been made of a proposed road from Livengood to Umiat. Following is a brief summary of findings.

ROUTE

The route traversed by such a road would follow a survey made in 1948 by John M. Cooley of the Alaska Road Commission from Livengood to old Fort Hamlin on the Yukon River. Fort Hamlin is 38 air line miles upriver from Rampart and 9½ air line miles downriver from Stevens. After crossing the Yukon, the route would proceed in a generally northwesterly direction, paralleling the Dall River on rising ground well west of the river to a point near Dall. Here the route would swing to the west, crossing a low pass (1500') to the east of Caribou Mountain and crossing the headwater tributaries of Kanuti River; then northwesterly again, crossing Fish Creek, Bonanza Creek, Jim River, the South Fork of the Koyukuk River, and thence to a point on the Koyukuk River near the Bettles airfield. From the crossing of the Koyukuk, between the John and Wild Rivers, the route would follow the John River valley on the east side to its headwaters in the Endicott Mountains of the Brooks Range, crossing Anaktuvuk Pass at a comparatively low elevation of 3000'. From the Pass the route would proceed down the Arctic slope on the west side of the Anaktuvuk River to a point about 40 miles north of the Pass where it would swing to the west, crossing the headwaters of the Tuluga River and the Siksikpuk and Chandler Rivers. It would then ascend the valley of the Ayiyak River to its headwaters, swing north across a low pass (under 2000') and proceed to a point on the south bank of the Colville River opposite Umiat.

A possible deviation from the above described route hinges upon plans of the Bureau of Reclamation for future development of Alaska's hydroelectric potential. One of their most ambitious schemes is a 290' dam at Rampart on the Yukon River. According to their figures such a dam could have an installed power capacity of 1,500,000 kilowatts. Also according to their figures the total installed capacity of all types of power plants in Alaska at the end of 1948 was 77,000 kilowatts. Thus the adjective, ambitious, is used without hesitation. But the Bureau has considered such a damsite in published literature so it must be taken into consideration in considering the route from Livengood to Umiat.

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Construction of a dam at Rampart would make the Fort Hamlin crossing a physical impossibility, due to the lake which would be formed. Therefore, the route would proceed from Livengood due west to the dam, cross the Yukon on top of the dam, then proceed northerly along the Yukon, rejoining the previously described route at a point approximately 12 miles northwest of the Fort Hamlin crossing. This alternate would add 33 miles to the total length of the route but would eliminate a most expensive bridge.

LENGTH OF ROUTE

The total length of route would be 360 miles. Main points are listed below, with continuous mileage started at Livengood:

Place	Milepost
Livengood	0
Fort Hamlin, Yukon River	50
Arctic Circle	120
Bettles, Koyukuk River	153
Anaktuvuk Pass	252
Umiat	360

TERRAIN

From Livengood to the Yukon River the country is steeply rolling. Forest cover consists of spruce and birch, much of it stunted or dwarfed, and ranging in density from scattered to heavy.

From the Yukon River to the Koyukuk the country is gently rolling with trees becoming smaller and more sparse. From the Koyukuk up the John River valley there is probably a moderate growth of small trees and brush, gradually fading out as Anaktuvuk Pass is approached.

From Anaktuvuk Pass to the Colville River at Umiat the country is gently rolling to relatively flat with many small lakes. This north slope is the true Arctic tundra country, treeless and barren.

ELEVATION

In general the route would follow an elevation of about 1000', dipping somewhat lower across the larger valleys, and

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crossing a few low passes of approximately 2000'. Highest point on the route would be Anaktuvuk Pass at 3000'.

Steepest grades would be on the section between Livengood and the Yukon River where a few 8% grades would be necessary. Grades would be gentle for the rest of the route, with the possible exception of one or two of the passes. These passes, however, seem to rise with good supporting elevations on both sides and so should not prove too great a problem.

CLIMATE

The whole route lies in the arid part of Alaska, with annual precipitation ranging from about 10 inches on the Yukon to about 5 inches on the Arctic slope noth of the Brooks Range.

The mean January temperature is -15 to -20 degrees and the mean July temperature is 55 to 60 degrees. Extreme temperatures, from -70 degrees in winter to 100 degrees in summer in the valleys, have been experienced.

The whole area traversed by the route may be expected to be underlain by permafrost. In addition, much of the country is poorly drained.

POINTS OF SUPPLY

Most of the materials, supplies, and equipment required for construction of a road would have to be winter-freighted by tractor trains from Livengood. This means of transportation could be augmented in summer by river boats operating out of Fairbanks or Nenana. By this means supplies could be taken to two widely separated points on the route, one at or near Fort Hamlin on the Yukon, and the other at Bettles on the Koyukuk. This would permit simultaneous construction at several points on the route.

From Bettles to Umiat there is no alternate means of supply. Bettles would be the local supply point for the northerly 207 miles, greater than half the total length of route.

Air supply for personnel, perishable foods, and emergency parts would be a necessity, requiring construction of airstrips at every major camp site.

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BRIDGES

A large number of streams are crossed on this route. A listing follows, with major crossings requiring total spans of 500' or over, and minor crossings requiring spans from 50' to 450'. These listings must be considered as approximate only, since very little data is available.

Major Crossings

Yukon River
Koyukuk River
Colville River

Minor Crossings

Hess Creek
Kanuti River
Fish Creek
Bonanza Creek
Jim River
South Fork Koyukuk River
Siksikpuk River
Chandler River
Ayiyak River

Bridge crossings, particularly of the larger rivers, will be complicated by the vast quantities of ice which come down the rivers during the spring breakup. Spans will be long, piers will be massive and expensive, and extra height will be required in all cases to clear possible ice jams.

ROAD STANDARD

The road would be built to Alaska Road Commission feeder road standard. Construction cost per mile would be high, due to difficulties of supply, terrain, and climate. Permafrost will be a problem for the entire length of the route. Fills would have to be of ample height due to permafrost and poor drainage, with resultant high yardage per mile. Road building material is probably available at frequent points along the route, however, there are some stretches where long hauls may be anticipated. Permafrost trouble may be expected in the majority of the borrow pits developed.

COST

On the basis of the foregoing description of difficulties which will confront the road-builder, it is evident that a high cost per mile will be experienced and that all stream crossings

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will be expensive. The following is estimated:

360 miles @ $60,000 per mile	$21,600,000
Yukon Crossing	2,500,000
Koyukuk Crossing	500,000
Colville Crossing	2,000,000
Other Crossings	1,400,000
Estimated Total Cost	$28,000,000

ECONOMIC JUSTIFICATION

Justification for the construction of this road would have to come very largely from the military, since the country it would serve is very sparsely populated and is rather poor in natural resources.

The Navy probably has the biggest stake in such a road in connection with the development of its Naval Petroleum Reserve No. 4, which covers a vast area in the most northern portion of Alaska. Much time and money has already been spent on this development but little data is available on actual results obtained. If the Navy should succeed in establishing an oil field with large productive capacity, such a road, with a pipe line paralleling it, would be a necessity.

The Army would have considerable interest in such a road in connection with the defence of Alaska. They should be approached to determine just how much monetary value they would place on the road as an addition to their defences.

Further justification of the road may be found in the fact that from Bettles north the route traverses an area known to be heavily mineralized. In spite of the present remoteness of the whole area, there have been extensive gold placer mining operations, and there is doubtless much ground still to be mined. In the Wiseman area there has been heavy gold production, and very promising prospects of antimony have been found. In the Chandalar Lake area some rich oil shale has been found as well as gold. To the west of the route are excellent possibilities of high grade asbestos near Kobuk, which is also the source of Alaska jade. The Endicott Mountains in the vicinity of Anaktuvuk Pass are known to be mineralized but little work has been done

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TO :

DATE:

FROM :

SUBJECT:

because of inaccessability. It is the opinion of mining men that such a route as is proposed would be a great stimulus to prospecting and should result in important discoveries.

The fourth possible justification for this road is agricultural. Fort Hamlin, the proposed crossing of the Yukon River, is at the westerly extremity of the Yukon Flats, an area believed to have a large acreage of agriculturally valuable land. A report by the Alaska Department of Agriculture indicates a potential agricultural area of 457,000 acres in the Yukon Valley, of which perhaps 150,000 acres lies in the Yukon Flats. It should be mentioned, however, that if the previously described dam at Rampart were built, it would inundate this area with resulting loss of most of the agricultural land. The proposed crossing of the Koyukuk at Bettles is at the northeast extremity of a potential agricultural area in the Koyukuk Valley, having an area of 64,000 acres. Summing up, it can be stated that the first 153 miles of the proposed road would open access to 214,000 acres of land which have agricultural possibilities. In addition, the road as a whole would bring modern transportation to the backdoor of the great reindeer ranges, and smaller ranges which may be suitable for sheep or cattle.

FEEDER ROADS

The following feeder roads could be constructed at a later date to more fully develop the surrounding country and add to the justification of the main route.

Bettles to Coldfoot	45 miles
Coldfoot to Wiseman	10 miles
Coldfoot to Chandalar River	37 miles
Chandalar River to Chandalar Lake	10 miles
Chandalar River to Venetie	50 miles
Bettles to Kobuk	160 miles
Yukon Flats Access Roads (farm)	
Koyukuk Valley Access Roads (farm)	
Endicott Mountains Access Roads (mining)	

C O P Y

R4/N2
RES:llb
Serial: 919

9 August 1951

AIRMAIL

Commander M. H. Aubey, CEC, U. S. Navy
OICC, Contract NOy-13360
Box 1310
Fairbanks, Alaska

Dear Mill:

Your letter Serial 1479 of 2 August on the subject of a road from Livengood to Umiat has been received. I concur with your statement that construction and maintenance of this road cannot be economically justified at this time.

Dr. John Reed of the USGS is expected to report to this office for a month's temporary active duty commencing on or about 15 September. It is planned to discuss with him the possible interest by others in such a road or parts of it. You will be advised of any developments in this connection.

With kindest regards.

Sincerely yours,

R. H. MEADE
Captain, CEC, U. S. Navy
Director, Naval Petroleum Reserves

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF TERRITORIES
Washington 25, D. C.
Air Mail

AUG 16 1951

Mr. Angelo F. Ghiglione
Commissioner of Roads for Alaska
Alaska Road Commission
Juneau, Alaska

Dear Ghig:

Attached for your information is a copy of letter from Captain R. H. Meade dated 9 August 1951.

Since Dr. Reed may submit a report to the Navy on a road from Livengood into the Arctic, I would appreciate any suggestions and justifications you could supply that might be incorporated in his report. Since Dr. Reed will be leaving Washington soon, I would appreciate an air mail reply.

Sincerely yours,

Jos. T. Flakne
Chief, Alaska Division

Attachment C.W.

(1) Ghiglione
(2) Chf. Engr. WSY
Admin.
Op'ns.
(3) Engrg. 8/24
Acc't.
Per.
Supply
Baxter

FRC BOX 65413

8 04/05

COPY

58th Congress,) HOUSE OF REPRESENTATIVES (Document
3d Session.) (No 192.

WAGON ROAD FROM VLADEZ TO FORT EGBERT, ALASKA AND MILITARY TRAIL BETWEEN YUKON RIVER AND COLDFOOT, ALASKA

LETTER

from

THE SECRETARY OF WAR,

transmitting,

With a letter from the Chief of Engineers, A preliminary report of survey and estimate for a wagon raod from Valdez to Fort Egbert, in Alaska, and of a military trail between the Yukon River and Coldfoot, Alaska.

January 5, 1905--Referred to the Committee on Appropriations and ordered to be printed with illustrations.

War Department
Washington, January 3, 1905.

Sir: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated December 29, ultimo, submitting, pursuant to the provisions contained in the army appropriation act approved April 23, 1904, preliminary report of a survey and estimate for a wagon road from Valdez to Port Egbert, on the Yukon River, Alaska; also for a survey for a military trail between the Yukon River and Coldfoot, Alaska.

Very Respectfully, Wm H. TAFT.
Secretary of War.

The Speaker of the House of Representatives.

War Department,
Office of the Chief of Engineers,
Washington, December 29, 1904.

Sir: The army appropriation act approved April 23, 1904, contained provisions appropriating $25,000 for a survey and estimate for a wagon road from Valdez to Fort Egbert, on the Yukon River, Alaska,

and $2,500 for a survey for a military trail between the Yukon River and Coldfoot, Alaska, both to be made under the direction of the Secretary of War.

I have the honor to forward herewith for transmission to Congress, the preliminary reports of both of these surveys, each bearing date of December 15, 1904, submitted by Maj. John Millis, Corps of Engineers. There being but one map with both of these reports, they are submitted together.

Very respectfully,

A. Mackenzie
Brig. Gen., Chief of Engineers, U. S. Army

Hon. Wm. H. Taft
Secretary of War.

Prelimary reports, with estimates, for Wagon Road from Valdez to Fort Egbert, Alaska, and for a military trail between the Yukon River and Coldfoot, Alaska.

Survey, with estimate, for Wagon Road from Valdez to Fort Egbert.

United States Engineer Office,
Seattle, Wash., December 15, 1904.

General: I have the honor to submit preliminary report of survey and estimate for a wagon road from Valdez to Fort Egbert, Alaska, as follows:

I was directed to make the survey, also that for the military trail from the Yukon River to Coldfoot, by telegram from the Chief of Engineers of May 13, 1904, and also by letter of the same date. Provisions for the survey was made by the army appropriation act approved April 23, 1904, as follows:

For a survey and estimate of cost of a wagon road from Valdez to Fort Egbert, on the Yukon River, to be made under the direction of the Secretary of War, twenty-five thousand dollars, to be immediately available; said survey and estimate herein provided shall be submitted to Congress at the earliest practicable day.

Upon receipt of the instructions Mr. J. M. Clapp, assistant engineer under this Office, was detailed to have immediate charge of all preparations for both surveys and subsequently to be in immediate charge of the field work of the Valdez Fort Egbert survey. For the latter work four parties were organized, each to cover approximately 100 miles of the proposed road. Two of these parties and three men for the Coldfoot survey, 25 men in all, sailed from Seattle May 31, 1904, for Skagway. From the latter point they proceeded by way of the White Pass and the upper Yukon to Fort Egbert, and then took the field for the work. The remaining two parties, 26 men with 25 horses, sailed June 1, 1904, for Valdez, and started in on the survey from that end.

Mr. Clapp was directed to traverse the whole line in

person, so as to be better able to supervise the operations of all the parties and to correlate the results of their work, and this he did.

Field work was completed about August 14, 1904. A portion of the force returned by way of the upper Yukon and Skagway and the remainder by vessel from Valdez. The last parties to arrive reached Seattle on September 29, 1904.

Mr. Clapp prosecuted the work with great energy, and his success in accomplishing the survey as contemplated by the law and the instructions of the Chief of Engineers is highly commendable. The respective chiefs of party and the various other employees are also entitled to great credit.

Special acknowledgment is also due to the commanding general, Department of the Columbia, his adjutant-general, the officers of the quartermaster's and signal departments on duty in the department, and the commanding officers and post quartermasters at Fort Egbert and Fort Liscum for the assistance rendered. Without their assistance it is very doubtful if the survey could have been completed in one season.

Mr. Clapp makes a preliminary estimate of $3,500 per mile, or, in round numbers a million and a half dollars, as the cost of constructing the entire road, 430 miles long. His report is herewith.

Very respectfully, your obedient servant,
JOHN MILLIS,
Major, Corps of Engineers

Brig. Gen., A. Mackenzie,
Chief of Engineers, U. S. A.

Report of Mr. J. M. Clapp, Assistant Engineer

United States Engineer Office,
Seattle, Wash., December 10, 1904

Major: I have the honor to submit the following report of a survey for a military wagon road between Valdez and Eagle, Alaska, made during the past summer.

On May 16, 1904, I was relieved from my duties in local charge of the Lake Washington Ship Canal and orally instructed to immediately begin the preparations for a survey for a wagon road between Valdez and Eagle and for a survey of a trail from the Yukon River to Coldfoot, Alaska.

* * * * *

By your direction Mr. Oscar A. Piper, Mr. Edwin A. Tyler, Mr. C. E. Hansen, and Mr. Walter Barrow were detailed to assist

me in the compilation of such information as I might find useful and to assist generally with the work.

Lists of equipment were prepared and made ready for requisition. All available literature, including the reports of Major Abercombie and his assistants on the exploration in Copper River Valley, 1898-99, and on the construction of a military trail across Alaska, were read. Reports of the Geological Department, extracts from the Congressional Record, and other literature of a varied nature which were supplied from the Office of the Chief of Engineers were read. Maps were studied and some prepared to take along.

* * * * *

To be correctly informed as to the present conditions, telegrams of inquiry were forwarded to the commanding officers at the posts of Fort Liscum and Fort Egbert. Valuable information was obtained from these officers. It was learned that at Fort Egbert the United States maintained suitable pack animals and equipment which if properly authorized could be utilized in transporting the supplies and equipment for three parties from that point. From Fort Liscum it was learned that ten equipped animals could be spared for the season for the assistance of transportation from that point.

* * * * *

The department commander issued orders through the proper channels to the commanding officers at Forts Liscum and Egbert to turn over to the United States Engineer Department certain equipped pack animals and to render all practical assistance to the survey parties.

Having obtained this valuable assistance, the work of completing the preparations was undertaken. It was found that there would be required an equipped pack train of 25 animals in addition to those loaned by the department commander.

* * * * *

The general plan of campaign was then submitted and approved by you, as follows:

One small party was to go to Fort Egbert and there obtain 8 equipped pack animals and all supplies needed, except instruments, and from there proceed to a point on Yukon River near its confluence with Dall River and survey and mark a trail from Yukon River to Coldfoot, a point on the Upper Koyukuk River, as contemplated by the law.

The commanding officer at Fort Egbert was to purchase supplies necessary for 6 men for a period of ninety days, he having kindly volunteered to do so.

The Valdez-Eagle road survey was to be divided into two divisions, and each division into two sections.

Division No. 1 was to have its base at Valdez.
Division No. 2 was to have its base at Eagle.
Sections 1 and 2 made up division No. 1.
Sections 3 and 4 made up division No. 2.

Section 1 was to begin at Valdez and survey the coast mountain section to Copper Center, a distance estimated at about 100 miles.

Section 2 was to begin at Copper Center and survey northward and meet section 3 coming from the north, an estimated distance of 100 miles.

Section 3 was to begin at Ketchemstock and survey southward to meet section 2 coming from the south, an estimated distance of 100 miles.

Section 4 was to begin at Eagle and survey south to Ketchemstock an estimated distance of 100 miles.

Division No. 1 was to leave Seattle and proceed to Valdez, Alaska, with its entire equipment, including 25 pack animals.

Division No. 2 was to leave Seattle and assemble at Eagle, Alaska, with its entire equipment, save the pack animals.

Equipment: Your instructions were that all Alaska parties were to be ready to leave Seattle promptly by June 1, that economy was to be practiced in the requisitions for equipment, and all expenses kept to the lowest possible limit. The selection of equipment and supplies involved a most studied list, which was finally adjusted, approved, and the articles assembled. A complete set of instruments was of necessity to accompany each section. Two complete sets were available, and the purchase of the additional sets meant the expenditure of approximately $1,000. This included one spare transit for use in case of accident. The full expenditure was not made necessary, as instruments were rented from some of the engineers who were employed to assist with the survey. Camp equipment for both divisions as well as subsistence stores were obtained at Seattle and freighted to the supply bases.

The undertaking was to be in charge of one engineer, to be designated before the date of sailing. He was to make the trip over the whole route between Valdez and Eagle and to direct the survey work through his assistants in charge of sections, using therefor the military telegraph as might be necessary. The Coldfoot work was to be in charge of one man, who would be with the party.

On May 30 the charge of the Coldfoot survey was given to Mr. Oscar A. Piper, an employee of the engineer department for this district, and the writer was relieved of all further work with this party, the preparations having been completed. About this same date the assistants to have charge of sections were determined upon as follows:

Section 1 - Mr.A.B.Lewis, an engineer of Valdez, Alaska, who furnished a part of the instrumental equipment, was assigned to the charge of this section. Mr.E.A.Tyler, an employee of the engineer department for this district was his principal assistant.

Section 2 - Mr.W.L.Goodwin, an engineer of Seattle, was assigned to the charge of this section. Mr.R.W.Sweet, of Seattle, who furnished part of the instrumental equipment, was second in charge of this section.

Section 3 - Mr.A.Wold, an engineer of Tacoma, and a former employee of the engineer department, was assigned to the charge of this section. Mr.John Bernard, of Tacoma, was his chief assistant.

Section 4 - Mr.E.G.Hunt, a civil engineer and surveyor of Aberdeen, Wash., was assigned as in charge of this section and designated as the principal assistant of the engineer in charge of the whole work, and whom he would have succeeded in case of necessity. Mr.Hunt was assisted by Mr.R.W.Fulton.

The preparations for the Coldfoot party and division 2 were completed on May 30 and 31, respectively, and on the latter date they left Seattle on the steamer Humboldt for Skagway, enroute to Eagle. On June 1 the preparations for division No. 1 were completed and on the evening of this date it left Seattle on the steamer Excelsior for Valdez. On June 1 the writer was instructed to take charge of the Valdez-Eagle wagon-road survey, and he accompanied division 1 to Valdez.

* * * * *

After a remarkably smooth voyage division 1 arrived in splendid condition at Valdez on June 11. On the way up Mr.C.E.Hansen, who had charge of the transportation train, had the pack saddles all fitted with pads, sling ropes, cinches, etc., in readiness to fit to the horses. The supplies and equipment were unloaded from the steamer and removed to temporary camp in a vacant hotel at Valdez, where that belonging to each section was separated. The animals were rested from noon June 11 until morning June 14 in a large corral belonging to Mr. James Fish, mail contractor, who kindly placed it at my disposal without charge. In the meantime the saddles were adjusted to the horses' backs, and some minor bruises and rubbings received by the horses on shipboard were dressed and treated by the packers.

* * * * *

A slight change in the plan of campaign was made before I left Valdez in that section 2 was to begin its work at Tonsena instead of at Copper Center, as originally planned. This was thought advisable on account of the coast mountain section being rough and requiring more time to survey.

* * * * *

On June 20 section 2 began its work at Tonsena.

On June 13 section 1 began operations at Valdez. I remained with this section until 10 a.m., June 15, when in company with Mr. Lewis, who was in charge of this section, I took saddle horses and rode over a part of the route to be surveyed by section 1, including that part known as "Keystone Canyon". Mr.Lewis returned to his camp from the upper end of the canyon after receiving my instructions, and I proceeded on to overtake the outfit of section 2.

* * * * *

The winter trail by way of the creek bottom was impassable. Many snow banks were crossed along the summer trail, which follows along the shaded side of the valley of Ptarmigan Creek and Tsina River. Crossing the snow banks was very fatiguing to the animals. Many of them sank deep into the snow, requiring to be unpacked to extricate them, while others slid or rolled down the hills. One unfortunate mule rolled and slid fully 200 feet. The small feet of the mules caused them a great deal of extra labor in snow banks and at soft places. While all this was fatiguing to the animals I must mention that the men waded the cold glacial streams, four in number, soon after leaving Valdez, and bore the unpleasantness uncomplainingly. The trail was wet and muddy most of the distance, and on the sixth day out everybody walked 18 miles to Tonsena.

* * * * *

Section 2 pushed its work rapidly along, the 13 animals with it being barely able to keep the camp advanced. The line was produced to Copper Center on June 28. On July 2 camp was moved across the Tazlena River, 8 miles north of Copper Center. On July 3 Chief Packer Crane reported with the balance of the outfit belonging to section 2, having made a remarkably quick trip to Valdez. On July 7 this section with its entire outfit went into camp at Dry Creek, a point 40 miles north of Tonsena.

On July 8, I, with one packer and Mr. Jasper Wilson, son of the Secretary of Agriculture, started for Eagle, taking with us four horses, two of which carried our camp supplies and blankets. Mr. Wilson, who was making the trip across Alaska in the interest of the Agricultural Department, requested to be allowed to accompany me across to Eagle. He reached my camp on July 3 and was shown every courtesy. Mr.Wilson made himself useful and assisted very materially with the labors incidental to the trip. His assistance allowed me more time to make observations on and away from the trail.

* * * * *

At Chestochena on July 9 I got a saddle horse, which Lieutenant Orchard, U.S.Army, the new quartermaster at Liscum, kindly placed at my disposal, and pushed on with my train of five horses. Here I learned that section 3 had begun operations on July 8; that the pack train had returned to North Fork for the balance of the outfit, and that the section would be delayed some until its return. There were 21 animals in the train. I arrived at Mentasta Indian village the evening of July 12, and at Tanana River crossing the afternoon of July 15. Here I was delayed twenty-four hours by the horses straying. On the 16th the horses were taken across the river by swimming. At this point it was about 500 feet wide and from 5 to 12 feet deep.

* * * * *

On July 22 I camped at Ketchemstock, and on the 24th met

Mr.Hunt at North Fork. He reported his camp at the mouth of Hutcheson Creek, 5 miles away, whither he had moved it a few days previously by small boats. He had been making satisfactory progress, and had found a good line with easy grades and one presenting no very great engineering difficulties. His progress had been delayed some by the pack train and the poor trail. Mr.Hunt explained to me a length the route his survey followed, and estimated he would reach Ketchemstock with his line about August 15.

On July 25 I left North Fork and proceeded along the military trail, which while practically paralleling the survey, follows the ridges and saddles of the Forty Mile Hills, instead of the valleys, to Eagle. The elevations of the valleys crossed average about 2,000 feet above sea level; those of the saddles vary from 3,000 to 4500 feet above sea level, and those of the ridges vary from 3,200 to 5,500 feet above sea level. The climb from valley to ridge is in many places most steep and dangerous. Apparently the object of the trail following the altitudes was to keep above timber line (about elevation 4,000), where the traveling would be over the barren rocky country, and allow the traveler to find his way with less difficulty than by the way of the valleys.

On July 28 I arrived at Eagle.

* * * * *

After resting the horses for three days I started back over the trail for Valdez. On the night of the 3d of August I camped at North Fork. On the 4th I remained at North Fork on account of the heavy rain which fell all day long. On the 5th the camp of section 4 was passed 15 miles up Hutcheson Creek. Ketchemstock was reached August 7 and Tanana August 11.

The trail from Tanana to North Fork as I proceeded north, while not a good one, was a fair Alaskan trail. On my way south, however, it was about as bad a one, I believe, as it was possible to find in Alaska. The animals mired in places, requiring assistance to extricate them. In other places it was necessary to use care in picking a trail that was firm enough to bear the horses' weight. Frequently that usually traveled was abandoned and the horses led through the timber to avoid trouble in passing the worst places. Fully 50 percent of the distance was exceedingly bad. At Tanana Crossing I telegraphed the operator at Valdez for the sailing dates of steamers from Valdez for Seattle, and found that it would be impossible to catch a steamer before the 16th of September. Here also I caught up with section 3's pack train, which had come back for the rear of that outfit. I camped with section 3 on the night of August 12, 15 miles south of the Tanana River. On August 13 section 3 moved its camp to Mica Creek, 22 miles south of the Tanana, and on this date the camp of section 2 was moved to Mica Creek. About 5 p.m. on this date the survey lines of the two interior sections met at a point 2 miles south of Mica Creek, having surveyed 250 of the 430 miles of main line between Valdez

and Eagle. Of this length section 2 surveyed 165 miles.

On Sunday, August 14, both sections rested at Mica Creek. The animals were carefully examined and cared for and preparations made for the return journeys. The animals borrowed from Egbert were to return there, and the outfits for sections 2 and 3 were to return to Valdez with our own train. The worn-out and useless articles were abandoned, thereby reducing the equipment by their weight. On August 15 sections 2 and 3 started south for Valdez.

The frost had made its appearance and had virtually taken the nutriment from the grass. This worked a hardship on the animals while going through the mountain passes, and the weaker ones showed its effects.

The outfit reached Chestochena on August 20, with one horse nearly played out and several little better off. Here the animals were rested for three days, the weak ones being fed dry hay and grain, which I obtained from the Government cache at this station. During this time both sections were engaged in running 20 miles of alternate lines to try and eliminate a swampy route taken by the former line. That part of Copper River near Chestochena was meandered at this time also. The mouth of Tolsona River was reached August 24. Here another halt was made, during which time the horses again rested in good pasture. Both sections were engaged here in running and exploring new routes to improve upon the line already run and which followed closely the swampy military trail. A much drier and better line was found and surveyed. On August 28 camp was moved to a point 6 miles north of the Gokona River, and the line which started at the Tolsona River was produced southward to the Gokona, where it was tied on the main line on September 1. Over 30 miles of alternate lines were run between Chestochena and Gokona. On September 1, the horses having been pretty well rested and the two interior sections having completed their duties, the return march was resumed. Copper Center was reached on September 3 and Valdez on September 9.

At Mentasta on August 17 I received telegrams from Mr. Hunt and Mr. Lewis, informing me that each had completed his line and joined that of the adjacent section on August 14: thus the survey of the whole main line was wound up at practically the same time. Section 4 was to return via Eagle. I had instructed Mr.Hunt, in charge, to survey a cut-off line about 15 miles long as he returned to Eagle, provided he could find practical grades. This was done and a saving in distance made of about 12 miles. Mr.Hunt, with his section, reported at Seattle on September 15.

Section 1 had obtained an 8 per cent grade line over Thomson Pass and had reported it practicable to find a 5 per cent grade. I had instructed Mr.Lewis, in charge, to actually run the 5 per cent grade line over the pass as he returned, to get some additional notes at the canyon, and to run a line to connect Fort Liscom, which would show the eastern end of Valdez Bay. This work was completed on September 9, and on the 10th his

outfit came to Valdez and went into camp. The next nine days were spent in awaiting a steamer for the States, settling up the business of the undertaking, and in computing the coordinates for the transit lines for sections 1, 2 and 3. On September 19 the steamship Santa Clara sailed from Valdez with sections 1, 2 and 3 on board, and arrived at Seattle on September 29.

The animals taken to Alaska were disposed of as follows: Twenty-one horses were turned over to the quartermaster, Fort Liscum, as directed by telegram on September 9 from Seattle office. One horse was drowned while swimming Tazlena River. Three horses were abandoned, having strayed from the herd. Those turned in to the quartermaster were used in carrying out the President's order to transport 10,000 rations to Copper Center to be used in supporting the Indians there during the winter.

DESCRIPTION OF THE TERMINII, THE COUNTRY INTERVENING, THE MILITARY TRAIL, AND THE ROUTE OF SURVEY.

The Terminii - The terminal points of the survey as authorized by Congress are Valdez, on Prince William Sound, North Pacific Ocean, and Fort Egbert, near Eagle City, on the Yukon River. The route surveyed lies wholly in American territory throughout its full length of 427 miles.

The town of Valdez has a population estimated at about 1,000. It is located on the northeast side of a perfectly landlocked ice-free harbor, known as Port Valdez, an arm of Prince William Sound. The geographical position of Valdez is: Latitude, 61° 07' north; longitude, 146° 13' west.

Prince William Sound is an immense arm of the North Pacific Ocean, exceeding in area the famous Puget Sound of the State of Washington, and is always accessible from the open sea. Excessive depths of water are found in this sound, but there are numerous roadsteads and harbors within its boundaries. One of these harbors, known as Port Valdez, connects with the sound by an entrance channel about a mile wide and of unknown depth. Vessels can always enter the port, but during snow storms or fog it might be dangerous to navigate it. A system of lights and fog signals would certainly aid navigation here.

After passing through the entrance, known as the Narrows, and which is located at the extreme western end of the port or bay, vessels turn abruptly eastward and enter a bay 12 miles long and whose average width is about 3 miles. This bay is perfectly landlocked and would accommodate many vessels. Its depth varies from 10 to 140 fathoms and might prove troublesome in the matter of anchorage for vessels unprovided with cables of great length. The town of Valdez is located upon the terminal moraine of the receding Valdez glacier. The floor plane of the glacial stream surrounds the town on its north, east and west sides. The Valdez Bay lies to the south. The shores of the bay are generally bold, and high hills, which might well be termed mountains, rise almost from the water's edge. The scenery is rugged and picturesque.

From the eastward Lowe River enters the bay. This is an unimportant stream, usually fordable anywhere, and has a normal width approximating 100 feet. During the rainy times its flood plane has a width varying from 75 feet at the canyon to a mile and a half at a point 5 miles from salt water. The course of the river is approximately 20 miles in length. The Valdez glacial stream enters the bay from the north, has a normal width of about 100 feet, and is fordable except during rain storms or during hot weather. Its flood plane varies from one-half to 1 miles wide. These two streams are the only important ones finding outlet into Valdez Bay.

Eagle City has a population of about 500 people. It is located upon the left bank of the Yukon River, about 1,475 miles from its mouth. Its elevation is about 900 feet above mean sea level. The town site is a very pretty one and well drained. Its formation is sandy loam soil, and upon it vegetables and grasses are successfully cultivated. Adjoining the town is the beautiful two-company post, Fort Egbert, which borders on the Yukon River and Mission Creek. The Alaskan headquarters for the Signal Corps is located here. The Yukon has a width at Eagle estimated at 1,000 feet. Lying in front of the town is an island which I was informed was rich in gold. During the last winter prospecting was done, and the dirt taken out averaged 30 cents to the pan. In consequence of this the territory was staked for some distance up and down stream from the island. The business men of Eagle, with whom I talked about it, informed me that it was certainly a good prospect, but I am unable to state that this is so. Beyond the Yukon the flats extend for a long distance. In response to my inquiry I was told that very little was known of the hill country, as prospectors had not penetrated the interior in this vicinity more than 100 miles; that it took one whole season to take a supply of food that far sufficient to prospect only a few months the following season, and the expense incident to it was so great as to make any showing impracticable.

Communications - Valdez is the northern terminus of the Seattle-Valdez cable, through the medium of which Alaska is brought in telegraphic communication with the States and the world by an all-American line.

A military telegraph line connects Valdez with Eagle, where connections are made over the Canadian government's line via Ashcroft with the outside. Branch telegraph lines lead from the Valdez-Eagle line to Fairbanks, Fort Gibbon, and St. Michael.

The deepest draft merchant and war vessels can enter Valdez Bay and anchor. A fortnightly steamer service is maintained with Seattle. Eagle City is reached during the summer months by river steamers from St. Michael at the mouth of the Yukon River and by the river steamers from the upper Yukon ports as far as White Horse, the inland terminus of the White Pass and Yukon Railway which leaves salt water at Skagway. There is a military

trail between Valdez and Eagle, over the greater part of which the Government maintains a mail route throughout the year. The mail leaves both Valdez and Eagle on the 1st and 16th of each month. The contractor can refuse all over 200 pounds mail per trip. In summer the mail is carried on a pack horse and is relayed five times. In winter it is carried on sleds hauled by dogs, and sometimes it is hauled by men. There is also a winter mail route between Valdez and Fairbanks, which follows along this trail as far as the Gulkana River. The distance between Valdez and Eagle by the military trail is 412 miles; by the mail route it is longer.

The country between Valdez and Eagle - Valdez to Tonsena: Leaving Valdez for the interior, a traveler first encounters a glacial stream lying close to the town of Valdez. To cross this stream one must wade its several branches - there are from two to five - or wait till some friendly disposed person on horseback comes along and asks you to ride behind his saddle. Leaving this stream behind, one enters the Lowe River Valley and follows a rather extensive bottom land for about 5 miles. This bottom land is partly covered with timber and partly native meadow. The alder and cottonwood trees grow to a fairly large size, and the native red top grass (Calamagrostis langsdorfi) grows luxuriantly. Leaving the bottom land, the trail crosses one channel of the Lowe River and follows along the flood plane of this river for about 4 miles to a point where it recrosses the river channel and enters another bottom well covered with spruce trees. Here a road house is maintained, known as Camp Comfort, 10 miles from Valdez. Above Camp Comfort the flood plane of Lowe River is followed to the gorge known as Keystone Canyon, 13 miles from Valdez. The canyon has a length of about 3½ miles, is flanked on its southeastern side by a wall nearly vertical and rising to a great height for a part of its length. On its western side the walls are of varying slopes and heights, and benches occur frequently, along which a trail or road would be located. Good alignment can be obtained. There are several points where the work will be heavy, but they are short. At one or more points slide rock would be removed from the south side of the canyon and the road constructed with it along the wall on the north side of the canyon. Through the canyon the work will be rock, mostly slate formation, either solid or slide. That in place can be easily drilled.

At the upper end of the canyon the flood plane of the Lowe River again widens into what is known as Dutch Flat. This plane occupies the principal part of the flat for some distance above the canyon. A ravine joins the river just at the head of the canyon. Here snowslides occur each winter, which pile up to great heights and would undoubtedly make the cost of maintaining any road crossing it excessive. To obviate this it will be necessary to cross the river at the head of the canyon by a bridge approximately 150 feet long and then cross back to the north side of the valley on trestle bents a short way above the canyon, where the benches and bars make any construction cheaper than the rock sidehill on the south side. As the

upper end of Dutch Flat is approached the valley widens some and the flood plane narrows, the river eventually being confined between banks separated by about 60 feet. At the upper end of Dutch Flat there are two routes into the Copper River Valley. One of these leads over the divide known as Marshall Pass, the elevation of which is about 1,700 feet above sea level. The other leads over the divide known as Thompson Pass, the elevation of which is 2,750 feet above the sea. Following over Marshall Pass, the traveler would find himself soon in the immediate valley of Copper River, about 100 miles from its mouth and above the obstructions to navigation known as the Cataract, Miles Glacier, Childs Glacier, etc.

Following over the higher pass, however, and the one at present followed by the military trail and the survey, one finds himself traveling over a very broken country, rocky, and in places precipitous, down the narrow valley of Ptarmigan Creek to its junction with the Tsina River; thence down this narrow broken valley to its junction with the Kanata River, where the two last-named rivers form the Teikhell River. From this point, distant from the summit of Thomson Pass wl miles and 1,650 feet below it, one follows up the valley of the Kanata to its headwaters, crosses a low divide at Ernestine into the valley of Mosquito Creek, a tributary of the Tonsena River.

Here one has the choice of two routes - one following the river, the other following over a rather high divide known as Kimball Pass into the valley of Bernard Creek, also a tributary of the Tonsena River. Mosquito Creek joins the Tonsena about 5 miles above the mouth of Bernard Creek. I made the trip over both routes and feel satisfied that the survey down the valley of the Mosquito Creek follows the one along which a road would be built.

At the summit of Kimball Pass, along the present summer trail, the great valley of the Copper River comes into view, and is indeed a magnificent relief from the rocky, broken, narrow, gorge-like valleys followed all the way practically from Valdez.

Copper River Valley - This immense tract of country extends north and south fully 100 miles and east and west over 100 miles. The divide between this valley and the valley of the Shushitna is hardly noticeable, and the two valleys make up an immense area of flat land. The valley is traversed from north to south by the Copper River, whose source is the glaciers of Mounts Wrangell and Sanford. The fall of the river is rapid, being five-tenths foot to the hundred at Copper Center. The current is swift and the channel which winds from bank to bank splits up into minor channels, giving the river a wide and shallow appearance under normal conditions.

To illustrate its general character, take a locality where the river passes a point confined between banks 400 feet apart, with depths greater than 10 feet, and bears off, for

instance, toward the right bank. Shortly after passing this point a channel makes off to the left, separated from the main channel by a gravel island; a short distance below another channel will make off to the left from the main stream; farther down other channels make off to the left, and ultimately, all joined, become the main channel, the original main channel now being a minor one. In one place, not far above the mouth of the Gokona River, seven of these channels were noted. There is, however, one well-defined main channel which appears to carry more water than of the others. At no place is the Copper River fordable below the mouth of the Chestochena River. It has a width of 250 feet at the mouth of the Sanford River, an estimated depth of 12 feet, and an estimated velocity of 7 miles per hour.

At this point and for a distance of 1 mile above and 1 mile below there is a cut bank about 200 feet high, which is continually sloughing into the river. Any wagon-road location would of necessity follow along the top of this high bank.

It is doubtful if the Copper River could be navigated above Copper Center or below the mouth of the Taznuna. From information I was able to obtain, it would seem that the part of the river between the above-named points was in its present state navigable, but there are those who question this. It would require a careful examination and perhaps a survey to determine even this.

Important tributaries join the Copper from both sides. Below the Tonsena they come chiefly from the eastward, while above the mouth of the Tonsena they flow from the westward. Those met and crossed by the trail and the survey are as follows:

Tsina River, a glacial stream, a branch of the Teikhell River.
Kanata River, a clear-water stream.
Tonsena River, a glacial stream.
Klutena River, a glacial stream.
Tazlena River, a glacial stream.
Gulcana River, a clear-water stream.
Gokona River, a glacial stream.
Tolsona River, a clear-water stream.
Chestochena River, a glacial stream.
Indian Creek, a clear-water stream.
Ah Tell Creek, a clear-water stream.
Salana River, a glacial stream.

The first four, except the Kanata, are crossed at present by crude bridges badly in need of repair. The Kanata is forded. The next three have ferries - small roughly built boats - upon which foot passengers are crossed. Animals are made to swim these streams, the Tazlena always and the other two at highwater. The Tolsona, Indian Creek, and Ah Tell Creek are usually fordable.

The Chestochena River under normal conditions can be forded. It is a most uncertain river, however; its fords are continually changing and its several channels shift about considerably. First, one is the most important one, then another, and so on, making it a puzzle to the traveler as well as a crossing to be dreaded. Neither ferry nor bridge crosses this river. It is estimated that about 200 people crossed this stream during 1904.

The Salana, or Slahana, is confined to one stream most of the time, but at flood times the plane is extended to fully a mile in width, through covered with only a few inches of water. Except at high water this river can be forded, and the ford is rather permanent. Neither bridge nor ferry is maintained here.

The Copper Valley is made up of benches more or less regular in their altitudes, directions, and formation. Those near the water courses are from 10 to 30 feet above the rivers, are usually well drained, fairly dry, covered with alder or quaking asp, and would be the ones used where practicable for any road location. The higher benches are usually covered with moss, spruce timber, more or less scrubby, and swamps. The trees have roots which spread over considerable area and are quite close to the ground. This forms a combination very difficult to travel over, and a trail through it is a very bad one indeed.

Where moss is found the frost is just below it, or at most only a few inches below it. In many places fire has run through sections of the country, and this illustrates the possibility of the country when systematically cleared. Where the fire has been of recent date traveling through it is tedious on account of the mud and unpacked ashes; but where the burn is two or three years old the moss has disappeared, the ashes have become packed, the scrub spruce thickets have died, and the sunlight is allowed to reach, to warm up, and to thaw out the ground. Grass takes the place of the moss-covered thickets, the drainage is greatly increased, evaporation is more rapid, the swamps lose their source of supply, and a section of country which was formerly wet, mossy, and difficult to travel through has become an easy and desirable location for trail, road, or meadow.

Where a trail, such even as that constructed by Major Abercrombie for the Government, follows through a moss and tree covered country, it soon becomes a mudhole or a bog. After a pack train or two has passed over it the moss becomes packed close to the ground and thawing begins. Soon the moss becomes torn up or worked up into pulp, when the thawing operations become more rapid. The trail then becomes worn below the adjacent moss beds and tree roots. At the sides of the trail thawing continues, and the water thus formed finds its way into the trail, which now becomes the drain or reservoir

for this basin, and soon becomes well-nigh impassable. This is practically the condition of the military trail throughout nearly its whole length.

At the mouth of the Klutena River is the important trading point - Copper Center. Here is located the experimental farm, operated by the General Government. Upward of 20 acres has been cleared and placed under cultivation. On the way into the interior I noticed the growing grains, grasses, and vegetables. All looked thrifty and gave promise of good results. Early in August a severe frost occurred and blighted some of the grains and vegetables, but did not injure the oats or the hardy vegetables. I visited the farm as I returned in September. The farmer was harvesting the crops and expressed himself as pleased with the season's results, but regretted the occurrence of the early frost, which had it been delayed a week would have caused but little damage. The season, I was informed, was an unusual one, being cold and wet and backward. Frost occurred earlier than usual.

The Government maintains a school for the education of the Indians at Copper Center.

From Copper Center to the Gokona River the country is rather well drained, except in places, and some settlement has already begun. Little difficulty will be experienced in locating or constructing a road over this section.

From the Gokona north to the Chestochena the trail passes through a country about the swampiest I have ever seen trails or roads located over. The survey line follows the trail, which follows a bench 300 feet higher than the Copper River and distant from it from 1 to 3 miles. The impracticability of an economical road being constructed along this route was so apparent that I caused another line to be surveyed which follows close to the Copper River. This line has not the objectionable features of the trail route.

The country followed by the trail over this section consists of an immense swampy meadow covered from a few inches to a foot and a half with water. Here bunch grass grows on stump-like clods called locally "niggerheads." These are about a foot in diameter, 1½ feet tall, and are joined to the ground by a neck only a few inches in diameter. The drainage of this flat country is at present poor, the fall being slight and the flow interrupted by moss, niggerheads, and grass.

From Chestochena to the upper end of the valley the survey follows for a distance of about 20 miles along a low bottom near to the river. This bottom is covered with scrub spruce timber and moss which, if removed, would make a good hay country, and the country would be ridded of a great deal of its objectionable dampness. The valley of the Salana is reached by following slightly up grade to the Ah Tell Creek,

which it crosses some miles from its mouth. From Ah Tell Creek the line follows through a very pretty pass known as Indian Pass, which cuts through the high hills separating the watersheds of Ah Tell Creek and Salana River. No difficulty would be experienced in locating a road on easy grades and good alignment through this pass.

About a mile north of the Salana is the village of the Mentasta Indians to the number, all told, of about 40. It is located on a little clear-water stream which drains Lake Mentasta. The lake has an area of about 1 square mile. At the upper end of the lake the survey enters the Mentasta Pass, a naturally easy route through the hills which separate the watersheds of the Tanana and Copper Rivers. In this pass is to be found about the best quality of timber (spruce) met with along the whole route. The small creeks along the northern slope of the Mentasta Pass form the headwaters of the Little Tokio River, the course of which is short. About 5 miles north of the north end of the pass the Little Tokio joins the main Tokio River. The trail and survey line follow along the Little Tokio, cross it, and finally cross the Tokio a few hundred yards below the junction of the two rivers. From the crossing of the Tokio they follow across a wet flat to the hillside of the west of the valley. A reconnaissance of the country shows that it is unnecessary to cross the Little Tokio and that a great deal of the wet flat could be eliminated, as well as one bridge crossing.

Both trail and survey follow this hillside to Mica Creek, a tributary to the Tokio. From here they cross a bottom about 7 miles, where the ground is soft and firm alternately, but over which a good road can be constructed. Suddenly this soft flat disappears, the foothills of the Tanana Hills bear off to the west-ward, and the valley of the upper Tanana is entered. This wide valley, upon which small quaking aspen trees grow abundantly, is dry and firm. Both trail and survey line lead in almost a direct line to the crossing of the Tanana River, 15 miles. This stretch of valley is low, being less than 50 feet above the Tanana anywhere and about 15 feet above it at the crossing. The construction of a road over this 15 miles is simply to remove a few stumps and fill in a few hollows.

At the crossing Tanana River has a width of 550 feet, a velocity of about 5 miles per hour, and depths of from 5 to 11 feet. On the north side of the river is Tanana Island, which has a length of about 7 miles and a width of about 3 miles. It is formed by the main Tanana and a cut-off channel known as the Little Tanana River. After crossing the island the line follows in a northeasterly direction over the Ketchemstock Hills, which separate the Tanana and Forty Mile Valleys. The trail follows over the hills, often raising 2,000 feet above the valleys. The survey follows the sidehills and low saddles, the grades being in all instances less than 4 per cent.

Descending from the hills, the valley of the South Fork is

entered and crossed near its headwaters. A low divide separating the south and middle of Mosquite Fork valleys is crossed on easy grades and the extensive valley of the Mosquite Fork of the Forty Mile River is entered. This valley has a length of about 50 miles and a width of about 15 miles. It is flat and in places poorly drained. One of the softest places met with along the whole line (from the Mosquite Fork stream to Indian Creek, 8 miles) lies in this valley. Wild meadows of red top grass (Calmagrostis langsdorfii) extend over a great part of this valley. The trail and survey follow this valley more or less separated for a distance of 24 miles to the telegraph station on Ketchemstock Creek, a tributary of Mosquito Fork. There is a fall of 60 feet in the 24 mile of this valley as followed by the survey. At Ketchemstock the trail and survey separate, the former following up Mitchell Pass to the summits of the Forty Mile Hills, the latter following down the valley to Gold Creek. The trail follows the ridges and valleys of these hills, often descending into valleys whose elevations registered 2,000 feet above the sea level from hills whose elevations registered 4,000, 5,000, and 5,500 feet above sea level. It continues along in this way through to the Yukon at Eagle. The survey follows up Gold Creek to Willow Creek; thence up Willow Creek to Craigie Pass, over which it follows to the watershed to the North Fork of Forty Mile River. Leaving Craigie Pass, it follows down Humbug Creek to Confederate Creek; thence down Confederate Creek to Hutcheson River; thence down Hutcheson River to the North Fork at Forty Mile River.

The valleys of all these creeks are narrow, offering little promise from an agricultural point to view, but may some day prove of great value for their mineral wealth. Very little prospecting has been done, however, owing to the great cost of bringing supplies into the country and the length of time now necessary to concentrate a food supply for a few months' prospecting.

Like those of the creeks, the valley of the North Fork River is narrow and confined between high hills, from which lead innumerable creeks. From North Fork the line goes to Champion Creek by two routes. One route follows up North Fork to the mouth of Champion Creek and thence up a very wet nigger-head swampy bottom to a point opposite Limestone Butte. The other route follows up an unnamed creek, which joins North Fork near its junction with Hutcheson River to the saddles of the hills near Limestone Butte, and thence down another small creek to the valley of Champion Creek. The first route is longer by 12 miles and has the single advantage of a flat easy grade. The second route while it is shorter has the disadvantage of steeper grades. These approximate 7 per cent for a distance of 3 miles, but it is thought that a lesser grade might be developed. This would be a dry route and passable all the year.

Following up Champion Creek, the summit of a low divide is reached by easy grades, and the line then begins its last section of the route down American Creek to Eagle. The route down

American Creek is a practicable one, with easy grades, but there will be some rock work to do in the canyons. The narrow valley of the creek makes it necessary in places to cut the road out of the solid rock hillside. The crossing of this narrow stream at frequent intervals is necessary to avoid some heavy work. Timber suitable for bridges grows near by and could be brought to the bridge sites with but little cost. This section, like the section over Thomson Pass, is more or less rocky, and it would prove more expensive to construct a road over this than over other sections.

The survey consists of a continuous transit line from Valdez to Eagle. The whole distance was carefully measured by steel tapes. Levels were taken at frequent intervals, usually at every 100 foot station, but occasionally at greater intervals. The topography was closely sketched - using clinometer - for a distance of from 100 to 200 feet on each side of the line, and approximately taken for a considerable distance farther. I regret my inability to turn over at this time complete maps, profiles, and estimates, as required, but the exhaustion of available funds makes this an impossibility.

The line of survey follows the trail wherever the trail follows the best route or a route that passes through representative country. This was done for various reasons, chief among which are:

(a) The brush had been cleared away, which permitted of progress being made rapidly enough to admit of the preliminary survey being completed this season.
(b) It was desirable to use as much of the trail as practicable, as communications had been established, public houses had been installed, and camp grounds and feeding places for stock established along its route.
(c) Impracticable routes along this trail would have been determined by actual survey.
(d) The line was a preliminary one.

It is to be understood that when it is to come to the actual construction of the road advantage will naturally be taken of any opportunity to improve the details of location, and that additional reconnoissances and in places extensive revision of surveys will no doubt be found advisable.

Probably three-quarters of the supplies carried in over Thomson Pass during the past season were taken into the Chitina Valley, a tributary to the Copper, lying between the mouth of the Taznuna and Copper Center and extending eastward from the Copper River. The largest deposits of copper found in Alaska are in this valley, I am reliably informed. Development work is now in progress, and is being most systematically and thoroughly done. The isolation of the district and the cost of constructing means of transportation have made it necessary to determine beyond

doubt that copper or other mineral exists in sufficient quantities to guarantee the construction of any means of transportation other than a trail, along which to move the supplies necessary to do the development work.

Prospecting and placer mining are being carried on in various parts of the country tributary to the trail, but to a limited entent. In the Chitina Valley some placer mining is being carried on and prospecting by a few men backed by persons of means is in progress. Placer mining is also being carried on on the creeks tributary to the Chestochena River. Placer mining and prospecting are being carried on on the creeks tributary to Forty Mile River. The trailand line run through country where whole creeks have been staked, but had been abandoned. There is no doubt that more prospecting would be done and many more persons would be engaged in hunting for gold in the interior if more economical means for transporting supplies existed than at present. There are thousands of square miles of country, no doubt tributary to this trail, over which no man has been. The life of a prospector is too hard a one under the present conditions for men to engage in it to any great extent. Only the strongest of men have any business in this country of long marches, few settlements, scant provisions, and short seasons.

In the district tributary to the Forty Mile River things are very much like what they are in the Copper River districts. Supplies for miner and prospector come from either Dawson, Forty Mile, or Eagle. At present the miner of this district finds it cheaper to buy his goods at Dawson or Forty Mile, pay the duty, and freight it in winter season up the Forty Mile River to where wanted. A number of creeks along the trail have been staked by miners and abandoned for various reasons, presumably on account of discoveries in other districts more accessible or giving greater returns for the labor of mining.

The theory was advanced by Mr. Stephen Birch, a mining engineer of New York, in letters to the Hon. R. Wayne Parker, Referred to Major Millis by indorsement of the Chief of Engineers on June 20, 1904, for his information in connection with the survey of road from Valdez to Fort Egbert, that a road might be built over the Marshall Pass to the Copper River, and a line of steamers placed upon the river, which, it is claimed, is navigable as far as Copper Center.

It has been argued by Mr. Birch in personal interview that the expense of a road would be lessened thereby, as in summer the steamers would form the connecting link and in winter the frozen river would make an excellent road with an easy or water grade. This is a strong argument, but all depends upon a steamer being able to navigate the river with ease and without delay. I obtained no definite knowledge that the river is navigable, but accept that it is, and it is seen that the continuity of any such highway is interrupted in summer by the open river and delays

are bound to occur. In the winter season there is danger of unfrozen patches of river, as well as the freeze up and break-up of the ice to be considered. It seems to me, therefore, that the idea is not a good one so far as a wagon road is concerned, and that any road constructed between the Yukon and the coast should be one graded all the way over the land, and be located so that it could be used during both the summer and winter seasons.

Feed for stock grows in abundance between Valdez and Ketchemstock, but there are places where forced marches have to be made to reach it. There should be regular camps established, small clearings made, and some grass seed down. This would lighten the hardships and burdens of the immigrant, settler, or ordinary traveler. To this end it seems advisable to recommend the setting aside of certain reservations for such purposes and the improving of them. This, I believe, could be done at small expense. Between Ketchemstock and Eagle the feed is poor and scarce. Animals actually go hungry and wander away from the camps. A small crew of men in a single summer could provide suitable feeding places along the route and scatter some seed that would provide good pastures. If the country is ever to be opened up by the immigrant, aid must be extended in the construction of roads, trails, and pastures. It is impossible for the person just passing through the country to do anything along this line, and the spirit predominating appears to be to let the other fellow do it.

Along the route whole outfits of miners' tools were found in caches, where I was informed they were abandoned on account of a worn-out pack train being unable to proceed farther with them.

Along the route Indians are living in settlements at the following places:

Copper Center, about	50	
Gokona, about	15	
Tolsona, about	5	
Chastochena, about	2	
Mentasta, about	40	(Seven men, 20 women, balance children)
Tanana, about	50	
Ketchenstock, about	30	
Total, about	192	

GENERAL FEATURES ALONG ROUTE OF PROPOSED ROAD:

The construction of a road across Alaska virtually means the excavation of two parallel ditches across the country, except, of course, in the canyons, and on high levels. By this means a drainage system will have been provided for, which feature is really the key to any practical road building in the swamp regions of Alaska.

I would recommend that a strip of country 1 chain wide be cleared completely of all moss and trees and the rubbish burned,

and that the middle width of 33 feet be cleared of all roots and bowlders. By so doing the sun's rays are allowed to thaw out the ground readily, thereby promoting drainage, and the air currents are allowed to strike the ground and evaporate the moisture, which means a dry road. All of that part wherein lies' the roadbed is freed from a nonconducting mantle, and the roadbed is flanked by ditches into which the water can drain. By means of lateral ditches it can be carried to levels lower than the road elevation. Berms lie without the ditches, freed of this same mantle, which allows the ground to dry readily and removes the damp, spongy ground a safe distance from the roadbed.

In winter the conditions are very different than in summer. There are the snow, ice, and winds to consider. At present in crossing the summits the winter sled routes follow the sidehill saddles and benches in the order of their occurrence. The labor of keeping the sled from overturning is great, as there is no grade upon which to break a winter road. Oftentimes the sidehills are improved by piling brush on the lower side to level them. A graded road over the summit would provide a foundation upon which to break a winter road.

Slides and snowdrifts are bound to occur in the mountain sections, and it is doubtful if any economical plan could be devised whereby a road could be kept free from them. The cold winds and the absence of fuel on the summits make it necessary to cross them in as short a time as possible. Wherever the river parallels the road the former will be used as the winter highway, as it presents no adverse grades, and there would be fewer snowdrifts and slides to contend with. That part of the road along the flat sections would be used entirely, as there would be no tree roots or other obstructions to interfere with the passage of the sleds. At the present time this is a source of annoyance. Practically all supplies are now hauled into the interior on sleds during winter, and this is a most severe operation. It is probable that there would be more freighting done in the summer season than in winter with a roadway constructed. West of the Coast Range the snowfall is as great as 10 feet, and on the summits banks of greater depth are sometimes found. East of the Coast Range the snowfall averages from 3 to 4 feet. Ice on the sloping sides over the summits is a most difficult thing to contend with. A great deal of the objectionable features would be removed by the graded roadbed.

The spoil taken from the fitches is to be cast upon the axis of the alignment and given a surface. This forms the roadbed and will be elevated above the ground level from 1 to 2 feet. In most instances the spoil is sufficiently charged with gravel to make a firm roadbed without ballasting. There are sections where ballast will have to be used, and there are short sections where corduroy would prove the most economical. There are other sections where plank roads on trestle bents will be necessary.

In the mountain sections the work will consist largely of

sidehill work, where some rock removal will be necessary, both solid and loose. Lateral ditches, which from the fall of the plains will for the most part be short, should be provided at intervals of at least one-half mile, for the purpose of freely draining the main ditches.

In cross section the roadbed should have at least a width of 10 feet - 15 feet would be preferable - except where it is constructed in rock canyon, where it may be reduced to a width sufficient to pass an ordinary vehicle with safety going at slow speed. Where narrow roadbeds are used frequent turn-outs should be provided.

The maximum grades will be 5 per cent, except in one instance, where there may be a few miles of from 7 to 8 per cent grade, in order to save 12 miles in distance. Maximum grades are used only in descending from the higher plains to the valleys at river crossings and in crossing the summits of divides.

Bridges should cross every stream, except, perhaps, the Tanana River, which differs from the others in that it is an important one and navigable. A drawbridge here would be most expensive. A good ferry operated here would answer every purpose, at least for the present. Timber suitable for bridge construction at all the river crossings is comparatively handy. In some instances it may have to be floated down the stream several miles, but this will not be a very difficult or expensive operation. Many of them can be crossed by a trestle of pile bents supporting a plank roadway. There will be some 30 of these bridges, the most important of which will be at the following places:

Valdez glacial stream, about 1 mile of trestle and plank road.
Lowe River, upper end canyon, span about 125 feet.
Lowe River, about canyon, 500-foot trestle.
Tsina River, about 500-foot trestle.
Stewart Creek, 60-foot span.
Kanata River, two crossings, each 60-foot spans.
Fall River, one 50-foot span.
Mosquito Creek, one span 75 feet.
Tonsena River, three 50-foot spans.
Willow Creek, one 30-foot span.
Klutena River, repairs to present bridge, 250 feet.
Tazlena River, two 60-foot spans; one 75-foot span.
Gulkana River, 300 feet of bridge.
Gokona River, 400 feet of bridge and approach.
Tolsona River, 60-foot bridge.
Chestochena River, three channels aggregating 600 feet and a flood plane aggregating 1,000 feet more.
Indian River, 200 feet of trestle.
Ah Tell Creek, one 75-foot span.
Salana River, 200 feet; includes 100-foot approach.
Tokio River, 500 feet of trestle, probably.
Mica Creek, trestle, 250 feet.
Tanana River, ferry, 500 feet.
Mosquito Fork, 75-foot trestle.

Ketchemstock Creek, 75 feet of trestle.
Gold Creek, 100-foot trestle.
North Fork, bridge, 300 feet wide in aggregate, or a ferry.
American Creek, several crossings on trestles from 20 to 30 feet long.

Estimates--There has not been the opportunity to work up the notes or to prepare more than a rough approximate estimate of the cost of constructing a road along the line of survey, but from the best information at hand and the experience gained by practical road building in the Dawson country, as found out by my assistants and myself, I respectfully submit that a wagon road can be constructed between Valdez and Eagle as contemplated by the law providing for the survey at an average cost of $3,500 per mile, or for the total sum of $1,505,000. It is quite possible that when the notes are worked up and detailed estimates are made it will be found that the cost of the whole length of road will be less. It is certain that there are sections where the cost per mile will be many times the amount estimated for the average, and there are sections where but little work and expense will be necessary to make a good road.

Very respectfully, your obedient servant,

J.M.CLAPP,
Assistant Engineer

Maj. John Millis,
Corps of Engineers, U. S. Army

SURVEY FOR A MILITARY TRAIL BETWEEN THE YUKON RIVER AND COLDFOOT, ALASKA

UNITED STATES ENGINEER OFFICE,
Seattle, Wash., December 15, 1904.

GENERAL: I have the honor to submit preliminary report upon survey of a military trail between the Yukon River and Coldfoot, Alaska, as follows:

I was directed to make this survey by telegram from the Chief of Engineers of May 13, 1904, and letter of the same date. Provision for the survey was made by the army appropriation act, approved April 23, 1940, as follows:

> For surveying and locating a military trail, under the direction of the Secretary of War, by the shortest and most practicable route, between the Yukon River and Coldfoot, on the Koyukuk River, twenty-five hundred dollars, to be immediately available, and a report and estimate upon said trail to be submitted to Congress at the earliest practicable day.

The instructions were to complete the survey and report with estimate at the very earliest date possible, consistent with a

proper execution of the work, and I was directed that it was all important to complete the field work during the past season. In pursuance of the above instructions, Mr. O.A. Piper, one of the regular employees under this office, was directed to make the survey.

Mr. Piper and two assistants sailed from Seattle on May 31 for Skagway. The party proceeded to Fort Egbert, near Eagle, on the Yukon River, where pack animals, camp outfit, and additional men were procured. They then took steamboat on the Yukon and landed near Fort Hamlin. From this point the trail to Coldfoot, which is near the headwater of the Koyukuk River and about 75 miles north of the Arctic Circle, was traversed, and on the return trip over the same route the trail was marked. Photographs (not printed) were taken along the route, observations, notes, and sketches were made, and these, together with the map when it is completed, and Mr. Piper's detailed report, will identify the trail so it can be recognized and followed by those desiring. Mr. Piper and the men taken from here returned from Fort Hamlin by the Upper Yukon, the White Pass Route, and Skagway, the same way they went, and reached Seattle, on August 31.

The results as contemplated by the law and the instructions of the Chief of Engineers were accomplished, and Mr. Piper's work and the success with which it was attended was in all respects commendable. It is understood that the law contemplates an estimate for marking the trail in a more permanent manner than could be done under the appropriation available. Mr. Piper estimates the cost of this at $6,000. I think, however, if this is undertaken it should be with a view of completing the whole trail, 126 miles in length, with certainty during one working season, and that the chance of weather conditions being less favorable than Mr. Piper found them, the possibility of the working party having to return down the Yukon after the upper river is closed as well as numerous other contingencies, should be taken into account. I would suggest an appropriation of at least $15,000. Mr. Piper's report is herewith.

Very respectfully, your obedient servant,

JOHN MILLIS
Major, Corps of Engineers

Brig. Gen. A. Mackenzie,
Chief of Engineers, U. S. Army

REPORT OF MR. OSCAR A. PIPER, SURVEYOR

Seattle, Wash., October 18, 1904.

MAJOR: I have the honor to submit the following report of a survey made in accordance with an act of Congress approved

April 23, 1904, for surveying and locating a military trail, under the Secretary of War, by the shortest and most practicable route between the Yukon River and Coldfoot on the Koyukuk River, Alaska.

Under verbal instructions given May 20 I was assigned to aid Asst. Engineer J. M. Clapp in his preparations for the survey of a wagon road from Valdez to Fort Egbert on the Yukon and of the trail between the Yukon and Coldfoot. On May 30 I was assigned to the task of the latter survey and also to the general charge of two of the road survey parties while enroute to Fort Egbert.

Choice of Route

As the act of Congress specified no definite point of departure from the Yukon, the first problem to present itself was choice of route. Available information on the subject was limited, and in the end the question was largely decided by such information as could be gathered by the party enroute from Seattle. Routes via the Chandlar, the Hosana, and the Dall rivers were considered as evidently the most practicable, as well as for the reason that the shortest distance between the Yukon and Coldfoot lay through the region drained by these rivers.

The Chandlar River joins the Yukon near the one hundred and forty-sixth parallel. Starting from Fort Yukon, travelers have followed this route to the Koyukuk to a considerable extent since 1898. The route is, however, mainly a winter one, travel in summer usually being up the river by boat. The principal objection to this route for a trail survey were its length and the long stretch of flats to be crossed near the Yukon. Mr. A. E. Carr, of Fort Yukon, who has made 24 trips over this route, carrying mail to Coldfoot, says it is a difficult route for winter and impracticable for summer. His winter trail crosses 32 lakes and sloughs in 28 miles, and all efforts on his part to find a practicable pack trail have met with poor success.

Of the Hosano, Hosiana, or Swift River little could be learned. Whether the mouth was approachable by steamboat or far distant from the main traveled channels of the Yukon flats could not be learned. In the language of a trader, it would probably take an Indian pilot to find the river, its character being probably similar to that of all the rivers joining the Yukon in the flats, a network of sloughs. In the probable location of the river low hills could be observed not more than 20 miles distant from the Yukon, but whether they were continuous or isolated could not be determined. The Hosana offered a new and consequently the most interesting field for the surveyor, but the limited time allowed by the appropriation for the work rendered it imperative that that route be chosen which was known as practicable and offered the best chances of success in getting through and back again during one season. In consequence the Dall River route was chosen as offering the best advantages for a trail which could be followed both winter and summer.

ITINERARY

The party, consisting of the writer and two assistants, H.W. Boetzkes, surveyor, and J.R. Mackay, surveyman, together with two of the Valdez-Fort Egbert road-survey parties, left Seattle on the steamer Humboldt on the evening of May 31. Skagway was reached on June 4, and here the party was delayed until June 9, while awaiting the departure of the steamer from White Horse. Leaving White Horse on June 9 on the steamer Victorian, Dawson was reached on the night of June 14, several days being lost owing to low water in Lake Lebarge and the Thirty Mile River. Eagle was reached on June 16. In accordance with previous arrangements, supplies were here purchased for the expedition. A pack train of eight animals and camp equipment were obtained from the Government post at Fort Egbert. Two packers and a cook, previously engaged, were added to the party. Leaving Eagle on June 19 on the steamer John Cudahy, the party and outfit landed opposite Fort Hamlin on June 21.

As but little could be learned of the existing trail leaving Dall River, and it was evident that an extensive timbered area had to be traversed to the headwaters of the Dall River, it was deemed of advantage to go through to the objective point first and gain a first-hand knowledge of the country. In this the party was aided to some extent by the previous knowledge and cordial cooperation of Mr. J.C. Hatch and others enroute to Coldfoot. After cutting trail for a day and a half through dense spruce and birch thickets the party left the Yukon on June 24. As the outfit was more than could be carried by the animals in one load it had to be carried ahead by relays, camp being moved every two days. On June 28 a bewildered prospector, two days without food, was found wandering aimlessly through the flats and was given food and directions.

The course pursued from the Yukon was northwesterly and skirted the edge of the hills on the western rim of the Yukon flats. The exertions of the whole party were continually required in picking out and cutting the trail. On July 2 the old trail was crossed about 20 miles from the Yukon, and here a cache was built and the outfit reduced to one load. From July 2 to July 5 fair progress was made, though considerable difficulty and loss of time were occasioned by the animals miring. Footing for the animals was, on the whole, very good, but in certain places, particularly in birch thickets recently destroyed by fire, the protecting mantle of loam and sod was destroyed and the ground seemed to thaw 2 or 3 feet deep. In such places our small-hoofed mules sank down helplessly, though horses with their broader hoofs got through without miring. After much loss of time the plan of corduroying suspicious places with brush and limbs was adopted, and thereafter no trouble was experienced. About 1 mile of such ground was encountered though on the return trip in August the same places were as firm as pavement.

On July 5 the divide between the Dall and Kanuti or Old Man River was reached and here another portion of the outfit was

cached. The divide was wet and mushy, owing to the recent disappearance of the snow. Travel was in consequence rather difficult, being ankle deep in tundra and water. This condition prevailed throughout the rest of the journey. Good progress was made, however, no other delays occurring than those incident to picking out the route. The best day's travel was 18 miles, a day's travel for loaded pack animals being about eight or nine hours. On July 8 two prospectors were met, bound for Coldfoot, guiding their way by a rough sketch map and such evidence as could be picked up on the way. Without further incident Coldfoot was reached on July 12. Here the party delayed until July 16, gathering information relative to routes and conditions and taking necessary observations. Charles McKnight was engaged to assist on the return trip, which was made without incident over nearly the same route followed in. The Yukon was reached August 14. On August 15 passage up river was taken on the steamer Monarch. Eagle was reached on August 20 and the pack train and camp equipment returned to the quartermaster at Fort Egbert. The party returned to Seattle on August 31.

METHODS OF WORK

Having a good knowledge of the country to be traversed and the approximate distance aided materially in determining the amount of work which could be done.

A continuous transit line was maintained from Coldfoot to the Yukon, distances being determined by stadia measurements, and where densely timbered areas were to be crossed, by triangulation. Elevations were carried by vertical angles. The elevation of the Yukon River, near Fort Hamlin, was assumed as 300 feet above sea level, this value being deduced from data contained in reports of the United States Geological Survey. Elevations determined from this datum agree closely with those given by the Geological Survey.

Where possible, prominent landmarks were located by intersections, and in some cases by estimated distances. These are shown on the accompanying map by contours.

A barometer was provided for the party, but was found to be defective. For temperature a maximum thermometer was carried.

(Not printed) Photographic records were secured along the whole route, though in some cases they are not as satisfactory as hoped for.

Stations along the line of traverse were marked with poles and a mound of rocks. As much of the country crossed was devoid of timber and covered only with moss, grass, and stunted shrubbery, a sufficient number of poles for each days work was carried on a mule. Across stretches of country where no trace of a trail was visible a pointer was left at each station and the proper direction of the trail marked. This work was not as thorough and permanent as could be desired, owing principally to the want of material

at hand. It is hoped, however, that sufficient marks were left to enable the traveler to find his way where traces of the old trail cease.

Latitude and azimuth observations were taken as often as conditions permitted, and the magnetic variation was determined at each station. Many of these were not satisfactory, owing to the continuous cloudy condition of the weather.

The length of the trail as determined by the survey is 126 miles. The apparently wide detour to the westward after passing the Dall River divide is made necessary in order to reach timber and forage. A straighter course is possible, but is much rougher, and the traveler is out of reach of timber and the shelter it affords him.

DESCRIPTION OF ROUTE

Near Fort Hamlin the water of the Yukon emerges from the flats and narrows into a single stream, flanked on either side by densely timbered ridges, here 1,000 feet above sea level. The Dall River joins the Yukon 9 miles above Fort Hamlin. From the mouth of the Dall River the old pack trail, cut through by prospectors in 1898, leads westward across the flats to the hills, skirting their western rim, and then follows along the hills, slightly northwest, to the headwaters of the river. The portion of the trail near the river's mouth crosses a slough, and in early spring is often flooded. Avoiding this difficulty, another trail begins at the Yukon about 5 miles above Fort Hamlin, at the point where the ridges and flats meet. After passing along the ridges for about 5 miles it again descends to the flats and joins the old trail. The route traversed by the survey was in the same general direction as the old trail, but for the first 18 miles more to the southward. Crossing the ridges from a point 2 miles above Fort Hamlin, the line follows a northwesterly course and almost directly toward a prominent mountain some 3,200 feet in elevation and 18 miles in an air line from the point of departure from the Yukon. Near the Yukon the ridges crossed rise quite quite abruptly and are deeply cut by ravines. A few miles to the westward they give way to lower bench-like plateaus and rolling country, containing numerous small lakes, but somewhat above the general elevation of the flats. These benches and low ridges are dry and in some cases sandy. A few years ago they were covered with a dense belt of green timber, but now show the devastation of fire.

Travel over this section of the country was very good, though a few narrow stretches were crossed which are swampy at some seasons of the year. Near the base of the mountain on the westward the ground is much more broken, more densely timbered, and somewhat softer underfoot. From the base of the mountain the course of the trail is somewhat more north along the eastern flanks of low but densely timbered ridges, trending northwest, and not far from the edge of the flats. At a distance of 36 miles from the Yukon by the trail and drained on the north side by Coal Creek is a range of hills 2,000 feet or more in elevation and having

three culminating points, the easternmost of which is a castle-shaped cluster of rocks and a prominent landmark. The trail crosses the ridges at a lower elevation 2 miles to the east of these rocks.

In going through our party crossed directly over these ridges and somewhat northwest across the deep canyons of the Dall, a route involving too much climbing.

The drainage at the southern base of the ridges is both eastward to the Dall and westward, presumably to Ray River. The route surveyed crosses the divide of this drainage basin, which is almost flat, and swings 2 miles to the eastward, intersecting the old trail, which is then followed to Dall City. From Dall City the trail follows north and west along the crest of a ridge separating the two main forks of the Dall. Timber line is reached 6 miles from Dall City at an elevation of 2,000 feet, and the summit of the divide, 3,200 feet high, 5 miles farther. Near the summit, but at a somewhat lower elevation, and on the north side of the trail is an isolated knob surmounted by a cubical mass of rock, which serves as a prominent landmark. At the summit the trail turns due north, and at a distance of 5 miles from the knob above mentioned passes between the headwaters of the Kanuti, or Old Man River, on the left, and the Hosana, on the right. Four miles farther and slightly northwest a low gap is reached, and the westward-flowing stream, probably a branch of Fish Creek, is followed for 4 miles, when a low divide on the right is crossed to a branch of Bonanza Creek, also a supposed branch of Fish Creek. Bonanza Creek if followed down 6 miles to the junction of the second fork on the right. This place is known as "Happy Camp." Here the first timber and grass are reached after leaving timber line on the Dall River.

From Happy Camp the trail climbs north 3 miles to the summit of a divide 1,250 feet high, and then turns slightly to the right, at the end of 6 miles crossing what is probably the most northern tributary of Fish Creek. From this stream at a distance of 2½ miles across a low divide, a tributary of Jim River is reached. Following up this stream for 1 mile the trail passes northeast up a timbered slope, and swinging around the head of small feeders of a stream on the left crosses a divide 650 feet high to the main branch of Jim River. From Jim River the trail climbs northeast over a divide 1,400 feet high, and at a distance of 6 miles descends to what is probably the most northern fork of Jim River. From this point the trail is very plain. Following upstream a distance of 2 miles it crosses through a low pass known as "Good Pass" to the headwaters of Granite Creek. From Good Pass, after passing northeast 2 miles, and then north over two divides between tributaries of Granite Creek, Mosquito Fork is crossed 1½ miles from its mouth. The trail then follows the hillside along the east side of the South Fork of the Koyukuk, crossing the latter at the end of 5½ miles from Mosquito Fork. Two miles west of the South Fork the trail leads through Sitkum Pass to Slate Creek; thence

directly down that stream to Coldfoot at its mouth. In summer, after the middle of July, the trip from the Yukon to Coldfoot can be made by good travelers and pack animals with moderate loads in seven or eight days. In spring and early summer it takes ten days or more according the load carried.

Snow usually disappears from the divide sufficiently for pack animals to pass early in June. During the present year the earliest travelers with horses left the Yukon on May 23, but near the divide they were obliged to wait until about June 10, owing to deep snow.

From the Yukon to 6 miles above Dall City the country is thickly timbered and good camping places and forage are found everywhere. The old trail is narrow and tortuous, and up to the middle of July it is in a few places difficult for heavily loaded animals. No places dangerous for pack animals were seen.

The timber line at the head of Dall River stands at 2,500 feet, and until the divide is crossed and the vicinity of Happy Camp reached no other suitable camp or forage is found.

Timber and grass can be found in the headwaters of the Hosana, but it is difficult to reach. From the divide no timber can be seen on any branches of the Kanuti or Old Man tributaries. Between Happy Camp and Coldfoot good camps and forage are found every few miles.

Locality	Distance from - Yukon Miles	Coldfoot Miles
First large creek crossed after leaving the Yukon	11	115
Base of Bald Mountain	18	108
Cache Camp, second largest creek	20	106
South side of ridges, south of Dall City	36	90
Coal Creek	41	85
Dall City	43	83
Timber line on the trail	49	77
Knob near summit of divide	52	74
Summit	54	72
Headwaters of Hosana and Kanuti rivers	57	69
Headwaters of Fish (?) Creek	61	65
Bonanza Creek tributary	67	59
Happy Camp	73	53
North tributary (?) of Bonanza Creek	79	47
South tributary of Jim River	81.5	44.5
Jim River	91	35
North tributary of Jim River	97	29
Good Pass	100	26
Granite Creek	101	25
Mosquito Fork	106.5	19.5
South Fork crossing	112	14

Locality	Distance from - Yukon Miles	Coldfoot Miles
Sitkum Pass	114	12
Slate Creek, junction of creek at north end Sitkum Pass	120	6
Myrtle Creek	121	5
Coldfoot	126	--

MOUNTAINS, PASSES, AND RIVERS

Physically the country traversed by the trail on the Koyukuk side of the divide is very different from that near the Yukon, being continuously through hills and mountains. The highest elevations are perhaps less than 5,000 feet. Granite composes a great portion of their make-up. In the beds of streams are various kinds of schists and some quartzites. Where bare and weathered the mountains look very black. In general appearance most of them are smooth and rounded.

Except in the creek bottoms and on sheltered north and east slopes, the country is devoid of timber and is covered with a thick tundra growth, over which travel is quite arduous.

The divides between streams and the mountain passes are not difficult, though in some cases quite high. The lowest portions of the passes are nearly always too deep with moss, niggerheads or bunch grass, and mud to afford good traveling. It was much easier for our animals to climb higher on the mountain sides where the footing was firmer. Usually the passes are well defined and easily identified from a distance. Sitkum Pass, lying between Slate Creek and the South Fork, can be easily seen from near the headwaters of Jim River. The trail through this pass is well beaten, but is one of the worst parts of the trip, being deep in mud and niggerheads.

The rivers crossed by the trail present no difficulties. The Dall where crossed spreads out over a width of 100 feet and is usually quite shallow. In August it can be crossed dry shod by stepping from one stone to another. The tributaries of Fish Creek and Jim River are small, varying from 10 to 30 feet wide. The main branch of Jim River where crossed is a stream 100 feet wide and quite swift. In freshets it may present some difficulties, but it is always fordable with horses. Mosquito Fork is a swift stream, ordinarily about 60 feet wide and of considerable volume. It rises and subsides very rapidly and at high stages can not be forded. The South Fork where crossed is 200 feet wide and when crossed in July was 2½ or 3 feet deep.

As a winter trail the route surveyed is practicable, but admits of cut-offs. The divides, however, though not high or difficult, are in some places quite steep for sledding and expose the traveler to the wind. Winter travelers usually prefer the bottoms of streams, where they are always within reach of fuel

and shelter. A route successfully followed lies directly across the flats from the mouth of the Dall to its headwaters, thence across the divide and down Fish Creek or other tributaries to the South Fork.

SETTLEMENTS

No settlements or camps exist along the route traversed by the trail. Fort Hamlin, on the Yukon, was abandoned, but late in the present summer was reoccupied, principally on account of the Beaver Creek discoveries. Near the mouth of Dall River is an Indian village and a small trading post. Dall City consists of a few abandoned prospectors' cabins. Except on the Yukon and at Coldfoot no natives were met, though evidences of their old camps were seen on Jim River.

COLDFOOT

Coldfoot is situated at the confluence of Slate Creek and the Middle Fork of the Koyukuk River, and approximately in latitude 67° 17' north and longitude 150° 16' west. The camp contains about 80 well-built cabins. In summer the place is quite deserted, the reported winter population, including a few natives, being about 60 people. Previous to 1902 the Alaska Commercial Company maintained a post at the place, and this is now operated by Stevens & Plummer, a local firm. Supplies are freighted up from Bettles, 65 miles away, by boat in summer and in winter over the snow. The town was established in 1900 at the time of the gold discoveries on Slate and Myrtle creeks. The commissioner and recorder for the district reside here. Mail is delivered by carrier from Fort Yukon once a month, but it is expected that this service will be improved. The head of navigation on the Koyukuk is Bettles. During the open season a steamboat makes a trip once a month.

MINING

Mining operations on the upper Koyukuk are carried on about three months during the summer in a radius of 40 or 50 miles from Coldfoot. The diggings are shallow and usually very little work is done in winter. The present season was a favorable one for mining purposes and satisfactory results were reported by miners coming out for the winter. In the Coldfoot district Nolan Creek is reported as the most promising. No new discoveries were reported in the district which includes mainly the tributaries of the upper, middle, and north forks of the Koyukuk.

Crevice Creek, a new discovery 60 miles above Bettles, on John River, is reported as attracting considerable interest.

The mining population of the Coldfoot district for the present season was about 150-300 being reported operating in the whole Koyukuk Valley. Government reports give the gold yield of the Koyukuk district between the years 1900 and 1903 as $700,000.

CLIMATE

In the Koyukuk Valley winter temperatures of 60° or 70° below zero are reported, though these conditions are usually of short duration. Windy weather is infrequent. The settled snowfall at Coldfoot in 1902 is reported as 12 or 14 feet. Comparatively very little snow fell during the winter of 1903. Meteorologic records are being kept by Mr.Howard, the recorder of the district, but on the occasion of our visit his outfit was as yet incomplete. Summer temperatures vary from 50° to 80° F. Vegetables, such as cabbage, lettuce, radishes, and turnips are successfully grown at Coldfoot. During the progress of the survey rain fell during twenty-nine days. Morning and evening temperatures varied from 30° to 75°.

VEGETATION

An attempt was made to collect the flora of the country traversed, but owing chiefly to want of facilities for preserving specimens, but little was done. The country contains numerous flowers, very generally distributed, and in places growing in great profusion, brightening an otherwise dull landscape. There are a number of wild fruits, among which the most common are the bilberry, red currant, red raspberry, mountain and high-bush cranberries, and salmon or cloud berry. The bilberry is a variety of huckleberry, and is the most widely distributed. On the Yukon side the red currant grows in abundance along streams and in ravines.

Except on the high divides, grasses, furnishing good subsistence for pack animals, are very plentiful. The most common are a variety of blue grass or redtop, rye grass, and varieties of bunch grass. The blue grass, or redtop, known scientifically as Calamagrostis Langsdorfii, is the most abundant, and attains the rankest growth in recently burned ground. Arborgal vegetation is composed of spruces, birches, alders, willows, and poplars. The spruces compose by far the greater portion of the forest, and attain a maximum diameter of 18 to 24 inches, and a height of 50 to 80 feet. Birches attain their best growth on hillsides. On the western edge of the Yukon flats they grow to a height of 50 or 60 feet, and have a maximum diameter of 20 inches. Poplars, including Balm of Gilead and aspen, are found on the drier ridges and knolls. Willows, varying from small shrubs to fair sized trees, are found on all the water courses. The alder grows along water courses in the flats and in clusters on the mountain sides above timber line.

FISH AND GAME

Fish and game are not as plentiful as supposed. Some of the lakes in the Yukon flats contain white fish, and in the hills nearly all the streams contain greyling.

Above the timber line a number of caribou were seen and four were killed during the season. On the hilltops ptarmigan were quite common, and a few Canada grouse were seen in the spruce thickets

On the Yukon side moose and bear were found, but they are not much hunted by the Indians. Muskrats, squirrels, and rabbits are common. Near the Mosquito Fork a small ground rodent played havoc with pack straps and saddles. Widgeon ducks with young were found in ponds and lakes.

COST

Present developments in the Koyukuk mining district do not warrant a large expenditure of money, such as would be necessary for a broad highway of selected grades. Besides being accessible by steamboat in the open season, the distance is too great to make any sort of freighting profitable. A well-defined trail would fulfill an important present need, and as an aid to the future development of a region as yet little known but of proven resources, making it also more accessible, would be a decided step in its favor. Future surveys will undoubtedly find a route easier to travel than via the Dall River, but as a general route to the Koyukuk Valley none more direct. Most of the overland travel has been by this route, though in the last year or two it has been considerably less than formerly. During the present year over 25 people are known to have gone over this route. Of these the greater portion lost their way, and some are reported to have returned to the Yukon. Since 1900, 5 people are known to have lost their way and perished.

The cost of constructing a trail by the route surveyed, such as would be plainly marked and sufficient for the use of pack horses, is estimated at $6,000; $70 per mile through the timbered region and $30 per mile over the barren divides. Sixty miles of the route passes through timber, usually of small diameter, which can be rapidly cut. Over the divides guiding marks are necessary. The best guides would be high signposts, with directions and distances marked. For this purpose timber can be found not more than 6 miles distant at any point of the route.

A map of the route of the trail is submitted herewith.

Very respectfully,

OSCAR A. PIPER, Surveyor

MAJ. JOHN MILLIS,
Corps of Engineers, U.S.Army

P.O. Box 1961

September 8, 1953

Mr. Andrew S. Day, Sr.
Dayville, Alaska

Dear Mr. Day:

Reference is made to your letter of August 25 regarding the possibility of work on the road between Valdez and Dayville. I appreciated your comments regarding the status of the road tax situation and certainly hope that the highway use tax structure will be improved in the special session of the Legislature. Such adjustment in the tax structure will permit the accomplishment of many worthy projects such as yours.

I believe Mr. Irving McK. Reed, the Territorial Highway Engineer, is aware of the importance of your project and I know that this and many similar projects were recently considered at the first meeting of the Territorial Board of Road Commissioners. The Alaska Road Commission is now depending upon this Territorial Board for recommendations as to priority for road extensions throughout the Territory. It is therefore suggested that you present to the Territorial Board the details concerning your road request, together with the information as to the cooperation so far provided by you.

By a copy of this letter, I am advising the Territorial Highway Engineer of the availability of the Alaska Road Commission to accomplish work on your project, should Territorial funds be set up to cover the cost. As you suggested, it would be possible to accomplish considerable work this fall after most work has been shut down in the Interior.

With kindest personal regards,

Sincerely yours,

A. F. Ghiglione
Commissioner of Roads
for Alaska

AFG/bn

cc: Mr. Irving Reed

LUMBER TIMBERS NATIVE PILING

DAYVILLE **LUMBER** COMPANY

Wholesale and Retail

DAYVILLE (VALDEZ) ALASKA

August 25, 1953

Comm. of Roads
Chf. Engr.
Admin.
Op'ns.
Engrg.
Acc't.
Pers.
Supply

Mr. A. F. Ghiglione
Commissioner of Roads
Alaska Road Commission
Juneau, Alaska

Dear Mr. Ghiglione:

Have been expecting to see you while you were on some of your field trips, but somehow or other we always seemed to just miss each other.

You will recall I was in Juneau trying to get a piece of road finished, also a higher gas tax. We were successful in eliciting the support of various senators and representatives but, apparently, nothing has as yet been done to get construction started.

We have been unable to personally see Highway Engineer Irving Reed. He was supposed to be in this area around August 20 but must have got detoured somewhere else. In his correspondence Reed stated we could expect action on the road just as soon as money was available.

Was just wondering if you had ever discussed the matter with him. With his cooperation you would be able to divert some of your equipment to the job that would ordinarily be idle when the freezeup comes.

Looks as if a special session of the legislature will have to be called to get more gas money. Then they'll probably slap on a tax way too high. But I'm for it, anyhow.

Kindest personal regards to both you and Ben Stewart.

Sincerely yours

Andrew S. Day, SR.

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO : B. D. Stewart, Jr., Chief, Operations Division DATE: January 29, 1952

FROM : L. D. Taylor, Administrative Officer, Valdez L.D.T.

SUBJECT: Attached report - Dayville Road (Valdez to Dayville

13/8-3

I am forwarding the above mentioned report with the idea that it might best be kept in the Juneau files as historical data which may have some future value in the event that this road should ever be constructed.

Chf. Engr. .....
Admin. .....
BWS
L. .....
Asst. .....
P. .....
Sup. .....
.....

North Pacific Sea Foods

DAY & SONS

Packers of Choice Salmon

Valdez, Alaska

CARL RUBINSTEIN
Seattle Agent
633 Pioneer Bldg.

March 28, 1936

Ike P. Taylor
Juneau, Alaska

Dear Mr. Taylor,

In answer to your letter of March 12th, I admit, according to th petition that the road we asked for does appear to be altogether a private road. I also admit that we want the work done more for a selfish cause than any one else that I know of.

However, it is not altogethr private, since the prince William Sound and Power and Light Co. will connect their road from their upper plant to this one and haul their supplies direct from here (I believe the Alaska Road Commission built their road for them).

I may also add that there is a school here and a voting precint. We have offered to help all we can, and if your department can spare a few dollors or your equipment I think we can make out.

I am sorry that your department is short on cash for more roads is what Alaska needs.

Yours very truly,
A.S. Day

March 13, 1936

Mr. A. S. Day,

Valdez, Alaska.

Dear Mr. Day:-

Referring to your letter of February 27, and copy of petition sent to the Governor of Alaska for the construction of a road from Swanson to your cannery will say that it has not been the policy of our board to build private roads and it is believed that this could hardly be considered as anything else.

The matter of road projects for the ensuing year will not however be considered before April at which time your petition will be brought to the attention of the Territorial Road Board.

13/87-3

Yours very truly

Highway Engineer

March 12, 1936

Mr. A. S. Day, Manager
North Pacific Sea Foods
Valdez, Alaska

Dear Sir:

Receipt is acknowledged of your letter of February 27 enclosing copy of petition addressed to Governor Troy requesting the construction of a road from your cannery to your dock.

Funds under the control of the Alaska Road Commission for road work in Alaska this summer, are very limited and will not permit undertaking new projects.

While there is no doubt that the operation of your cannery is of great benefit to the local community, it is nevertheless a commercial enterprise. It therefore appears that the construction of the road requested is entirely a part of your privately owned operations.

Very truly yours,

Ike P. Taylor,
Chief Engineer.

CC Governor, Reese, Huddleston
IPT:IW

Plant at FORT LISCUM, ALASKA

A. S. DAY, Manager
W. H. DAY, Secretary

North Pacific Sea Foods

DAY & SONS
Packers of Choice Salmon
Valdez, Alaska

CARL RUBINSTEIN
Seattle Agent
633 Pioneer Bldg.

Valdez, Alaska
Feb. 27, 1936

Mr. Ike P. Taylor
Chief Engineer Alaska Road Commission
Juneau, Alaska

Dear Sir:

I am inclosing a petition signed by the business men and other residents of Valdez and vicinity asking for an appropriation of Two Thousand Five Hundred Dollars ($2,500.00) for a road project from my cannery plant to Swanport.

Owing to the other improvements I am making this winter, I am hard pressed to finance the road project myself; but the road is needed this spring to carry out my plans for next season's work, and I am anxious to co-operate to the extent of my ability. That is, to furnish transportation, free, for the equipment of the Alaska Road Commission and the workmen from Valdez to Fort Liscum and back again.

It is obvious that unless I get assistance for the road project my pack of salmon will be curtailled and many local people who are willing and able to work will be left out of employment.

I am forwarding a copy of the petition to Governor Troy; Ike P. Taylor, Chief Engineer A. R. C.; William A. Hesse, Territorial Highway Engineer; and Superintendent T. H. Huddleston.

Hoping to hear favorably from you at your earliest convenience, I am

Respectfully yours,

C. A. Day

Hon. John W. Troy
Chairman Territorial Road Commission
Juneau, Alaska

Dear Sir:

We respectfully invite your attention to and ask for your careful consideration of the following worthy road project, to-wit:

A. S. Day, son, and family, doing business as North Pacific Sea Foods, at Fort Liscum near Valdez, have operated a cannery for three years. They began with a hand cannery, and thru their own efforts, have built up a plant which last year canned 15,000 cases of salmon.

They are enlarging their plant this winter, expecting to double the capacity next season. The old wharf where formerly the fish were unloaded is too exposed for the safety of the fishing boats. They are building a new wharf at Swanport, a protected cove, which is about three-quarters of a mile from the cannery building. In order to connect the plant with the unloading wharf, a truck road must be provided, the cost of which is estimated at $2,500.00.

Mr. Day employs local labor exclusively. He owns no fish traps, and local fishermen catch all the fish used in his cannery. His family is living in Alaska continuously. Other families with children have made their homes near his plant. He provides free of rent a school room and furnished living quarters for the teacher---the Territory paying the teacher's salary and the cost of supplies. A school of eight months is maintained there (perhaps the only one in Alaska near a salmon cannery). In a word, he has established a cannery business with a permanent population, for which Alaskans are praying.

#2---Petition

In consideration of the foregoing facts, we, the undersigned citizens of Valdez and vicinity, most earnestly petition your Honorable Board to appropriate Two Thousand Five Hundred Dollars ($2,500.00) for the road-building project from Day's Cannery to Swanport, firmly believing that the request is just and reasonable, and that said project would assist in the establishment of a permanent population in Alaska---"A consummation devoutly to be wished."

Respectfully,

NAME	OCCUPATION

The above petition with signatures has been forwarded to the office of Governor John W. Troy.

February 11, 1936

Mr. T. H. Huddleston
Superintendent, A. R. C.
Valdez, Alaska

Dear Sir:

Attached is a letter from A. S. Day asking for the construction of a road one-half mile long from his dock to his cannery. Kindly comment on this letter and make recommendations giving extent of any cooperation he may offer aside from that mentioned and estimated cost of work.

If desirable, reply can be delayed until weather permits you to inspect proposed road, but if possible would like to have information by April 1.

Very truly yours,

Hawley Sterling,
Assistant Chief Engineer.

Enc. copy of letter

HS:IW

Plant at FORT LISCUM, ALASKA

A. S. DAY, Manager
W. H. DAY, Secretary

North Pacific Sea Foods

DAY & SONS
Packers of Choice Salmon
Valdez, Alaska

CARL RUBINSTEIN
Seattle Agent
633 Pioneer Bldg.

Jan 29 1936

The Alaska Road Commission
Juneau Alaska

Dear sirs

We are building a Dock here for the Alaska Steamers to call in and the dock will be nearly one half mile from the cannery there is about seven hundred feet of this road that will be at extreme high tide level and only needs five or six boulders shot and rolled out, the balence of it goes over Jacks Point and when the Gov. was here they had a wagon road over there but it had growed up with Alders we swamed it all out this last Fall and it is a good grade but was made for wagons and Mules and never had any gravel put on the surface

We would like very much and will highly apreciate it if your department will finish it up for us there is plenty of good gravel available and that part at the high tide level could be worked on at any time

We will furnish boats and Scow for transfering machinery men and supplys from Valdez and back to Valdez

There was once a Wagon Road from here to Valdez but it has grown up and bridges are out till it is not passable any more some time in the future we will want to get it repaired and conect with the Richardson Highway

Last year we packed 14.500 case of salmon but had to hall them to Valdez on a scow and transfer them to the dock there which was an awful lot of extra work and expence

There is a Territeroil School here and fourteen voters which causes me to feel justufied in asking for some help on the road as it is not altogether a selfish request

Will be glad to give you any futher information that you may request

Yours very truly

A. S. Day

Chitina, Alas., June 30, 1919

FROM, The District Engineer
TO, The President of the Board, Juneau, Alas.
SUBJECT, Valdez - Fort Liscum Road.

1. On June 21st. in company with James C. Wilson, Chairman of the Divisional Road Commission I consumed some ten hours in the inspection of the proposed location for the wagon road from Fort Liscum to Valdez.

2. The distance from the fort to the junction with the Valdez - Fairbanks Road at 2½ miles from the Valdez Front Street is 4.9 miles (approximate).

The material encountered, structures necessary and a description of the remains of the old military trail constructed 16 years ago are as follows:

SECTION A - B.

For a short distance out of the post there is now a good wagon road beyond the corral and reaching the vicinity of the rifle-butts. The present road is covered by extreme high tide and it would therefore be advisable to relocate back on the

foot of the hill. From the rifle butts on to B the old road has been washed away so that barely a trace remains. The location of this old road was good but too close to the waves. It will be possible to place the new line at about the same elevation (10 feet above H.H.W) and the rocks appearing in the vicinity can be used as protection.

SECTION B-C

This section is on the beach at the foot of a vertical rock cliff. It was built on bribbing with rockfill. A few of the crib logs are still in place as well as a good share of the larger rocks. The smaller stuff has been carried off by the wave action as the top of the road was barely above high tide. The new location should follow the line of the old work but the grade should be at least 5 feet higher.

SECTION C-D

At the beginning of this section we strike the terminus of the Granby wagon road which has a total length of six miles. It is at present in poor shape not having been used since the Granby Company installed aerial tram at "G". The old location at this point has a heavy grade (possibly 12%) to get up on a

a narrow shelf back of a steep cliff. The grade here could be decreased to a maximum of 5% without going to the bottom of the cliff. The present trail has a maximum width of 5 feet.

SECTION D-E.

In places the remains of the old trail are in very good condition although only 5 and 6 feet in width. There are several small bridges necessary. Stretches of 6% are found although a much lower grade might be obtained. A large portion of any new location or the necessary widening of the present trail will necessitate considerable rock work.

The end of this section runs out onto the beach at "E."

SECTION E-F.

This section is constructed on rock fill cribbing although it was possible to locate the road 40 feet above the beach. The higher location would call for considerable rock work but would at all times be beyond the inroads of the sea. At its east end (at "F") is encountered Solomon Gulch which would require a span of 120 ft. minimum for the upper location. Long stretches of cribbing and a considerable portion of the rock-fill still remain on this section and I therefore conclude that by this

ing the grade, storms will cause little injury here. It will be advisable to place the Solomon Gulch bridge near the beach as it will then be possible to bridge the stream with a 40 foot truss and short approach spans.

SECTION F-G.

Light work on an old beach at the west end and on side-hill (earth) on the east half. As located at G the grade will be several feet above the end of the Granby wharf.

SECTION G-H

This work is on an easy side slope and a light rising grade until H is reached. This section should not be expensive as very little rock-work and few bridges will be necessitated. At "H" it will be necessary to use a minimum of 50 or 60 ft to get up onto the bench which extends from H to I.

SECTION H-I.

The work here with the exception of the west end should be very little more than road-grader work as the ground is comparatively flat and there are no indications of rock. Several small bridges or culverts will be needed.

SECTION I-J.

Location here will, for the greater part of the distance, be on hill-side with

easy slopes. There will be little rock work. In a few places grades of ~~for~~ 5 ~~%~~ may be necessary. One sixty foot bridge to span a gorge will be needed.

SECTION J-K.

At J the location leaves the hillside and enters upon the Lowe River flats. From J to K it will be necessary to grade to a height of two feet as the extreme high water ~~sometimes~~ covers this portion. There will be necessitated three spans at sixteen feet.

SECTION K-L.

This is on the Lowe River flats somewhat lower in places than the section J-K. An average fill of 3 feet should be placed. The entire section from J to L will need surfacing of gravel. The several streams shown in the attached sketch were once bridged but there remains now nothing more than crib piers and a few stringers all rapidly turning into punk. All the spans are broken and they are passable only to pedestrians only when each step is carefully taken. The bridge across the Lowe River at X was washed away within a short time after it was

placed, the pack trains never having had an opportunity to use it. Three 40 foot ~~trusses~~ and 280 linear feet of pile and girder spans should be placed here. The other streams between K and X will require at least 260 linear feet of pile and girder bridging all told.

3. An estimate for this work, based on notes taken on the ground, is as follows:

ITEM	UNIT COST	AMOUNT
672 linear feet of culverts or bridges	$8.00	$5,376.00
300 " " " trusses (short spans)	20.00	6,000.00
12000 square feet of cribbing	0.15	1,800.00
16000 cu. yd. of earth work	0.60	9,600.00
5000 " " " loose rock	1.00	5,000.00
7000 " " " solid "	1.50	10,500.00
2800 " " " gravel surfacing	2.50	7,000.00
Total - - - - -		$45,276.00

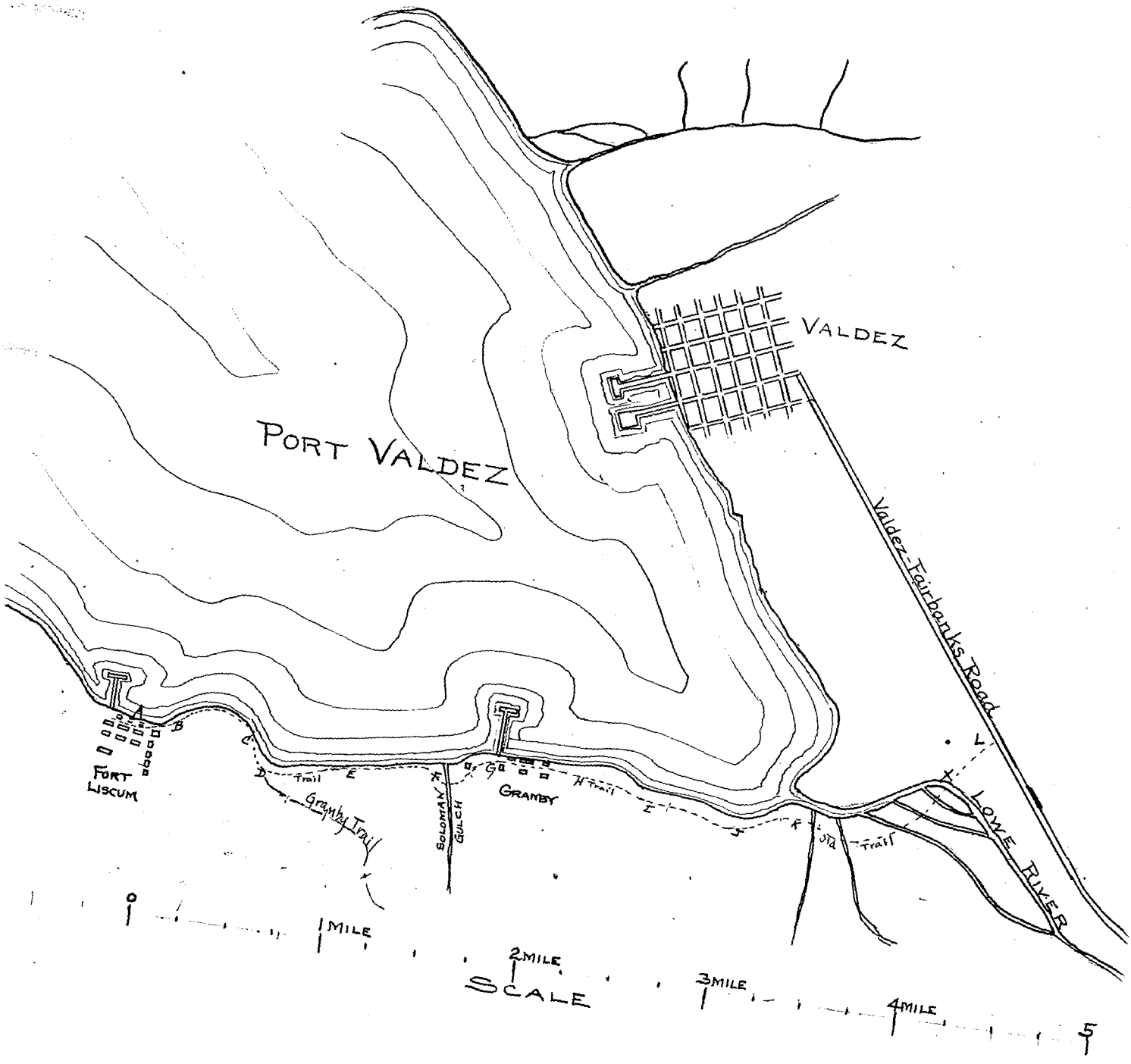
4. While at the Shanby Company's property their superintendent, Mr. Palmer Cook, stated that the company would haul no freight over the road as all their supplies and machinery was delivered at their own wharf and all the ore from the mine was

loaded onto ships at the same wharf. The road would serve as a convenience to the men in travelling to and from Valley and would warrant the purchase of an automobile by himself. He thought the company might improve their old road from "D" up the hill so it might become passable for automobiles. There is no necessity of hauling ~~hauling~~ freight on the old Granby trail as the operation of the aerial tram is at all times perfectly satisfactory.

5. Very little if any freight is transported between Valley and Fort Liscum or vice versa. There is an excellent wharf at this point also.

The proposed road would serve as a convenience for the officers and soldiers, i.e. they would be permitted to enter and leave the post without the necessity of awaiting the launch Donaldson's scheduled trips.

E. J. Morrison
Dist. Eng.


VALDEZ
PORT VALDEZ
Valdez-Fairbanks Road
FORT LISCUM
Granby Trail
SOLOMAN GULCH
GRANBY
Trail
LOWE RIVER
0
1 MILE
2 MILE
SCALE
3 MILE
4 MILE
5
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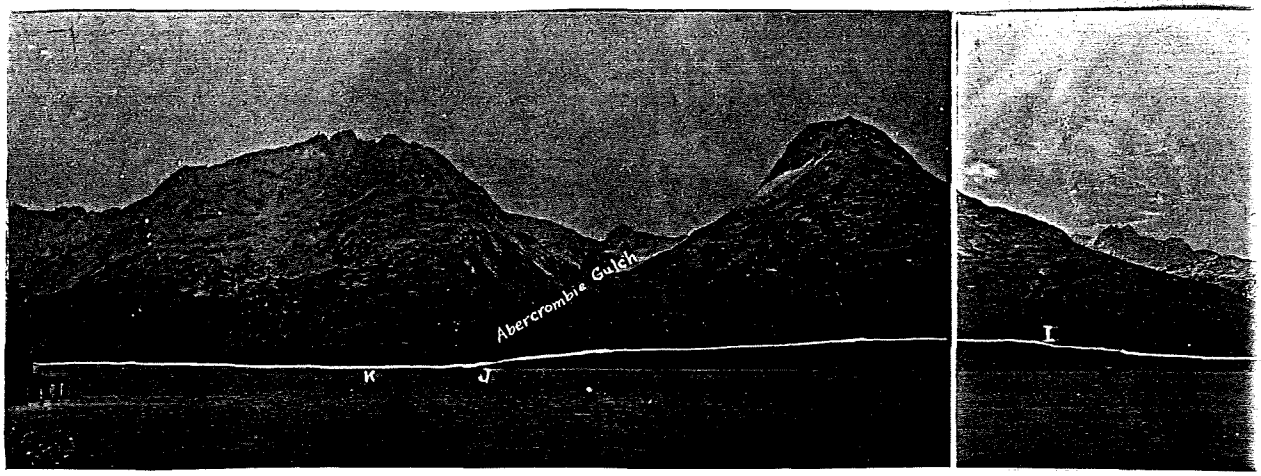
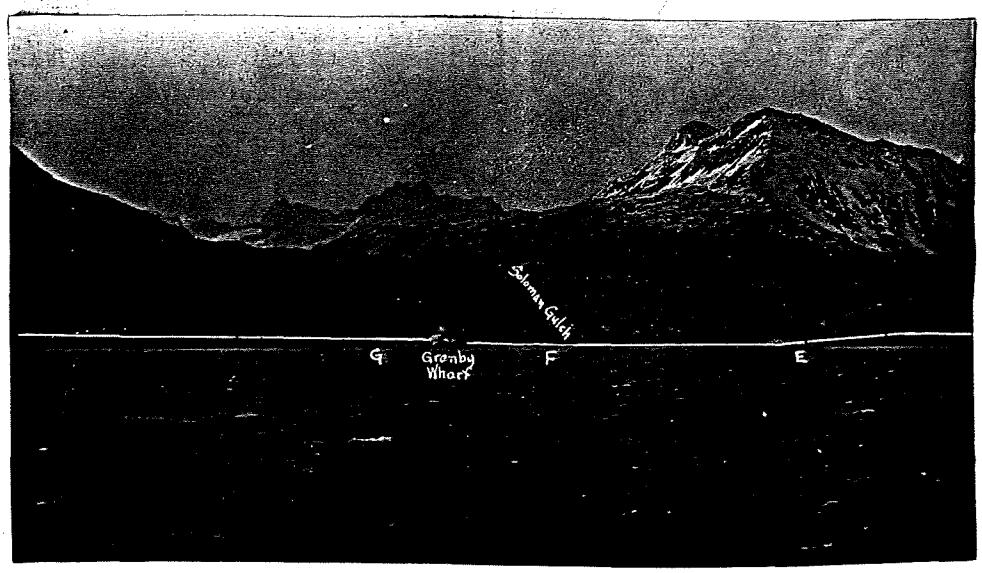
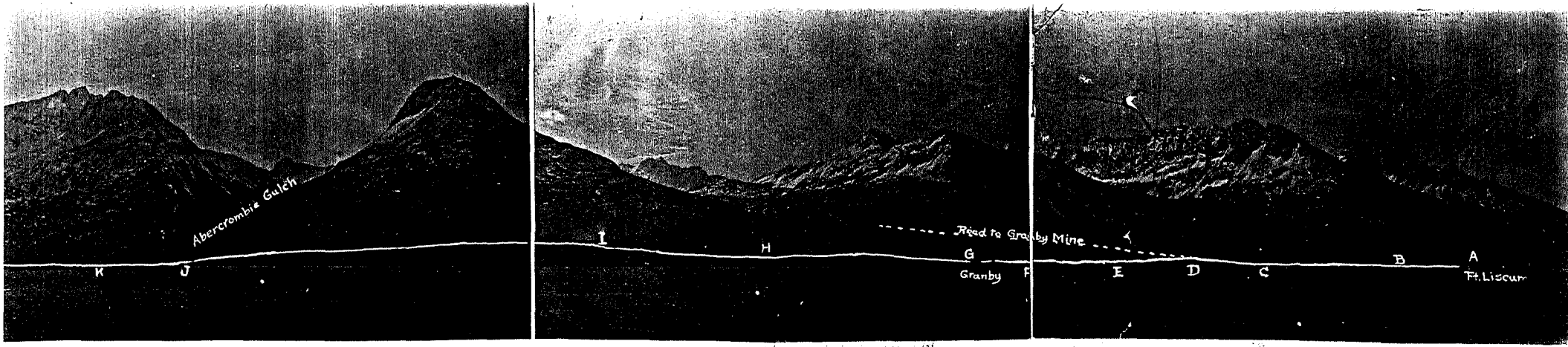
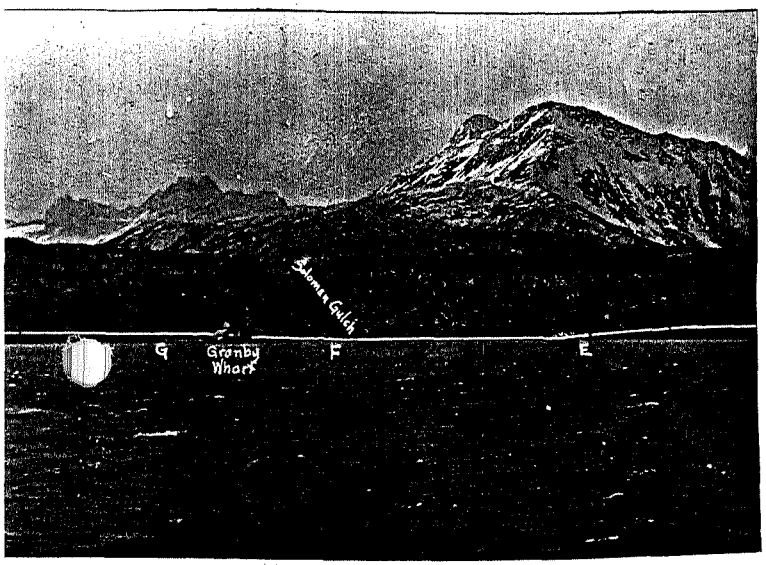
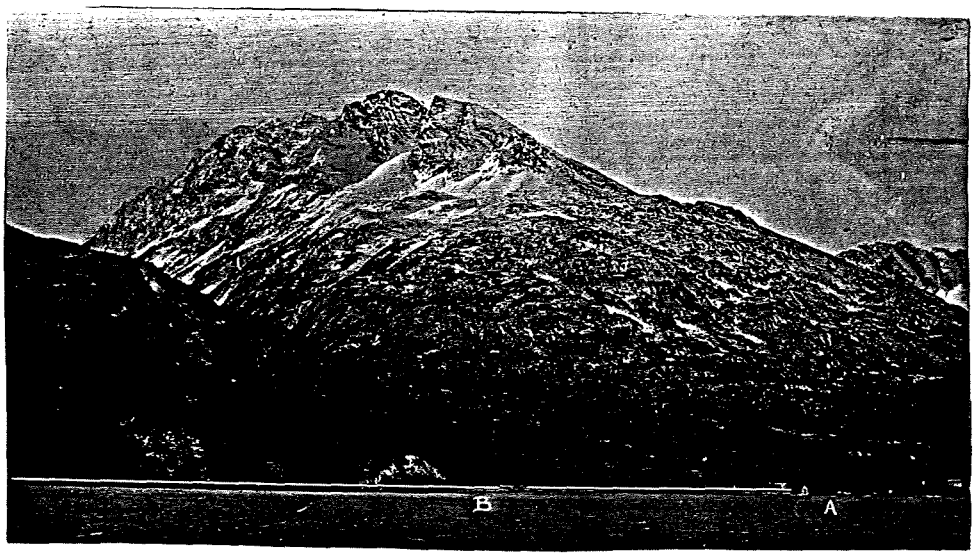
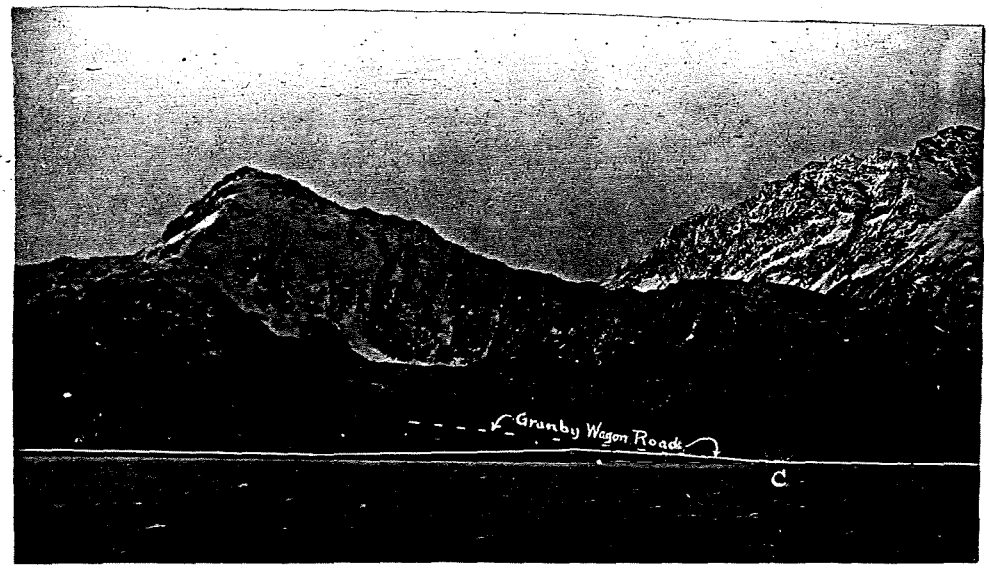

Abercrombie Gulch
K
J
I

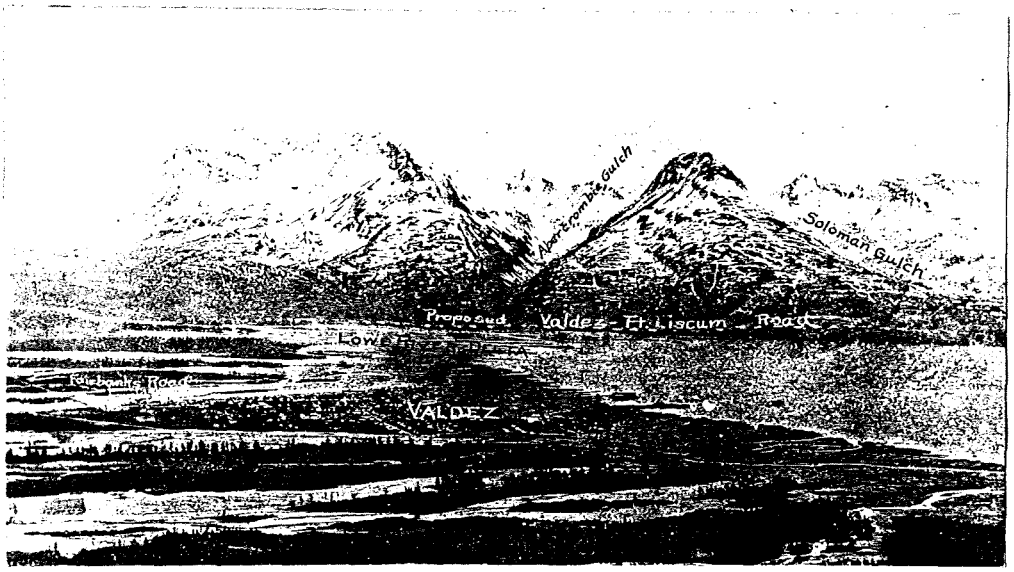

Solomon Gulch
G
Granby Wharf
F
E


Abercrombie Gulch
K
J
I
H
G
Granby
F
Road to Granby Mine
E
D
C
B
A
Ft. Liscum


Solomon Gulch
G
Granby Wharf
F
E


B
A


Grunby Wagon Road
C


Abercrombie Gulch
Soloman Gulch
Proposed Valdez - Ft. Liscum Road
Lowe
VALDEZ

March 13, 1919.

President of the Board.

Mr. A. J. Dimond, Mayor, Valdez, Alaska.

Valdez-Fort Liscum Road project.

1. In reference to your telegram to Representative Patterson, regarding the proposed road from Valdez to Fort Liscum, I wish to advise you that although we hope for an appropriation, there are no funds in sight for the construction of this project.

2. I told Mr. Donohoe that we would be willing to allot $15,000 to this project provided the legislature made an appropriation of $20,000, making a total of $35,000. This proposal was made with the understanding that a safe and suitable bridge could be provided over the Lowe River, and that the road can be completed for the sum named. Full investigation would have to be made to determine this.

3. If we are not given our appropriation of $300,000 by Congress we could do nothing until sufficient funds became available.

WHW/GHS

Major of Engineers

Juneau, Alaska, March 8, 1919.

Diamond
Valdez

Retel Patterson failure appropriation means will not have sufficient money to even maintain present roads and nothing for construction Liscum Road period Have strong hope appropriation by extra session period Letter next mail.

Waugh

WHW/GHS

JUNEAU, ALASKA, July 16, 1918

Valdez - Ft Liscum Road project

Mr. Anthony Diamond, Mayor,
Town of Valdez,
ALASKA.

My dear Mr. Diamond:

I have your letter of the 24th ultimo, with reference to the building of a road from Valdez to Fort Liscum. On account of my long residence in Valdez and the friends I have there, I would feel a personal interest in seeing the proposed road constructed; however, the operations of the Road Commission this seasnn will be confined to a continuance of work planned and laid out by the former members of the Board last year, which calls for all funds at our disposal and will not permit of any new work being undertaken.

I have taken up the subject of your letter with Major Waugh, President of the Board. Major Waugh expects to be in Valdez some time in September and I would suggest that yourself and others interested lay the merits of your request before him at that time.

94/31

With kindest regards.

Very sincerely,

SLC/GHS

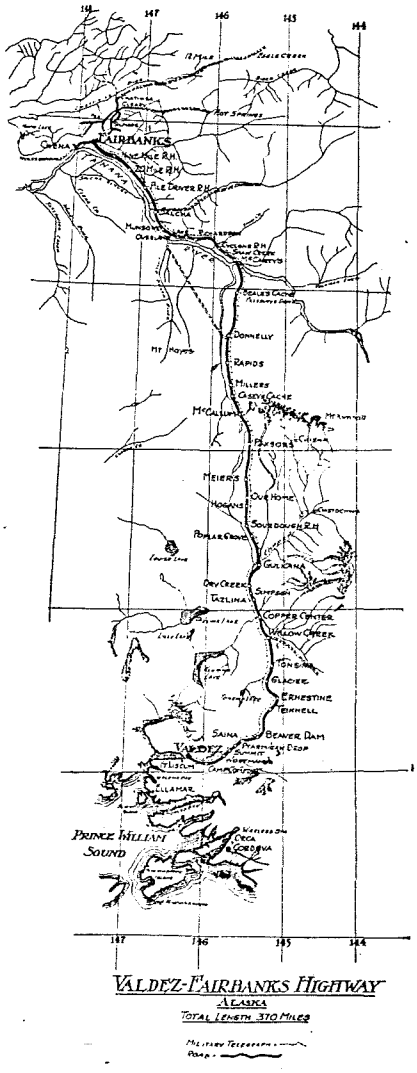
1st Lieut.,Engr. R.C.

TOWN OF VALDEZ

THE GATEWAY TO THE INTERIOR

VALDEZ
ALASKA

June 24, 1918.



VALDEZ-FAIRBANKS HIGHWAY
ALASKA
TOTAL LENGTH 370 MILES

Lieut. Sidney L. Carter,
Disbursing Officer,
Alaska Road Commission,
Juneau, Alaska.

Dear Sir:

The people of Valdez have been endeavoring for some time past to get a road put through from the Town of Valdez to Fort Liscum. It is not necessary for me to describe the situation to you because you are probably more familiar with it than I am. We have talked to Mr. J. E. Wilson the Territorial Road Commissioner of this Division about the subject and he says it will cost too much for his office to handle it. He and some other people have suggested that if the Alaska Road Commission would make a contribution we might be able to get enough from the Territory so that the road could be built. It seems that the bigge items are the cost of certain bridges across Lowe River. Mr. Wilson says that it will be necessary to do considerable work along the mountain west of Lowe River, that is between Lowe River and Fort Liscum.

We believe that if we could get a substantial appropriation from your office that Mr. Wilson would give us some money from his funds and that the Granby Mine also would put in some money or do considerable work and that we could also obtain considerable aid from the officers and soldiers at Fort Liscum. In this way we ought to be able to get the road built. Even if we could not get the road built the first year we might be able to get such a good start on it that it could be completed next year. What chance is there to get an appropriation for this purpose from the Alaska Road Commission. I know of course that you are friendly to Valdez and would personally be glad to do anything that you can for us. I need not assure you that we will all appreciate your giving this request as favorable consideration as you feel justified under the circumstances.

Thanking you in advance in the name of the town, as well as myself, for anything you may be able to do for us, I remain,

Yours very truly,

J. A. McGilvray