CONSTRUCTION OF

THE ALASKA HIGHWAY

Reports by Theodore A. Huntley, Senior Administrative Officer on construction by the Public Roads Administration in 1942

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The Decision To Build a Highway

Construction of a highway through the great wilderness that separates the United States and the settled portions of Canada from Alaska has been advocated for many years. In past years, two congressional commissions studied the proposal and made favorable reports, one in 1933 and the other in 1940. Further steps, such as field studies, to determine the best route, and construction costs had not been authorized at the time the United States entered the World War.

In the months that followed Pearl Harbor, our ability to defend Alaska, particularly the shipping lanes of the Gulf of Alaska, against Japanese attack was uncertain. Failure to adequately defend it would result in the establishment of enemy air and naval bases for operation against the western part of the United States and against Pacific shipping. Defenses of Alaska and the Aleutians were supplied almost entirely by the Pacific water route, then being attacked by enemy submarines.

In view of the urgency of the situation, a special committee of the Cabinet, consisting of the Secretary of War, Secretary of the Navy, and Secretary of the Interior, was called upon to decide if a highway to Alaska should be built, and to select a route.

On February 2, 1942, this Cabinet committee, together with representatives of the War Department General Staff concluded that construction of a highway connecting the United States and Alaska was advisable and, further, that this highway should be located along the line of the then existing chain of airports from Edmonton, Alberta, to Fairbanks, Alaska, furnishing a supply route to Alaska and, at the same time, servicing and supplying the airfields along the route and providing a means of safety for personnel engaged in ferrying aircraft from the United States to Alaska.

The project, approved by the Chief of Staff, Army of the United States, on February 6, 1942, and by the President on February 11, 1942, authorized the construction of a pioneer road from Fort St. John to Big Delta (connecting at these points with existing road nets in Canada and Alaska). This pioneer road would be constructed by United States Engineer troops, and be followed by contractors furnished by the Public Roads Administration, who would improve the pioneer road to the authorized standard of a highway. On February 14, 1942, the Chief of Engineers was directed to proceed with the project as outlined above.

The existing air route from Edmonton, Alberta, was via Fort St. John, British Columbia; Fort Nelson, British Columbia; Watson Lake, Yukon Territory; Whitehorse, Yukon Territory; and thence into the interior of Alaska. This is said to be the most direct air route to Alaska from the greater part of the United States. The early stepping stones along this route were small airfields,

1Condensation of a report by Theodora A. Huntley, Senior Administrative Officer, prepared in the early months of 1943 while preparations for constructing a final highway were under way.
lacking in personnel, shops, hangars, and radio facilities. There were no emergency landing fields between the widely spaced airfields, adding greatly to the hazard of plane movements. A critical deficiency was dependent upon air transportation for aviation gasoline, food, and other supplies for all personnel at the intermediate points. Military strategy dictated that the air route to Alaska be conditioned for the movement of whatever number of planes might be required in operations in the Northwest Pacific area, and for providing Alaska with essential supplies should the water route become too hazardous. This has required grading and surfacing a connecting highway and building airport service facilities.

The need was immediate and urgent, and while the general situation soon improved, the necessity remained for both a highway and an air route suitable for large operations as a part of the permanent Alaska defenses. It was evident that a highway to Alaska would have a variety of peacetime uses and would contribute to development of both Canada and Alaska, but the decision to build the highway was based solely on military considerations.

**Agreement With Canada**

On February 16, 1942, a declaration of military necessity concerning the highway was made by the Secretary of War to the Secretary of State with the view of securing rights-of-way through Canadian territory. Informal discussions were begun with Canadian officials, who agreed to the immediate beginning of reconnaissance surveys by United States Army engineers and suggested that the question of construction be referred to the Permanent Joint Board on Defense—United States and Canada. This board recommended construction of the highway on February 26, 1942. On March 6 the Canadian Government announced approval of the recommendation of the Board and its acceptance of the offer of the United States to construct the highway. Formal agreement between the two Governments was consummated by an exchange of notes, that from the American Minister to Canada on March 17, 1942, and that from the Canadian Government on March 18, 1942.

These notes provided, in summary:

1. The United States Army would make the necessary surveys and construct a pioneer road by the use of engineer troops.

2. The highway would be completed under contracts made by the United States Public Roads Administration, with a view to finishing the project with all possible speed.

3. The United States would maintain the highway for the duration of the war and for six months thereafter, unless the Government of Canada preferred to assume earlier responsibility for maintenance of the Canadian section.

4. At the conclusion of the war, the Canadian part of the highway would pass to Canadian control, with the stipulation that citizens of the United States should not be discriminated against in its subsequent use.

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Memoranda of Agreement between the Chief of Engineers and the Commissioner of Public Roads are presented in the appendix.
In consideration of these undertakings, the Canadian Government agreed (a) to provide the right-of-way for the highway; (b) to waive all import duties, sales taxes and license fees on equipment and supplies required for its construction; (c) to remit income tax on the income of the United States citizens employed in its construction or maintenance, and facilitate their admission to Canada; and (d) to permit the use of timber, gravel and rock along the route of the highway as required in its construction.

Copies of notes exchanged between the Hon. W. L. MacKenzie King, Canadian Secretary of State for External Affairs, and United States Minister Pierrepont Moffat were made public with announcement of the agreement in Ottawa and Washington.

Work Under Way

The announcement was an anti-climax. For a month planes had been flying over the wilderness and through the mountains in search of the best route.

Col. William H. Hoge of the Corps of Engineers, later promoted to Brigadier General, was joined in Canada by C. F. Capes, construction engineer for the Public Roads Administration, ordered north from its Denver office to assist in the early reconnaissance. Day after day these two, later joined by others, studied and photographed all the possible routes from Dawson Creek to Alaska.

There were mountains everywhere, linked and overladen with illimitable forests. Sprawling river systems, scores of glaciers, vast swamp areas and a multitude of lakes presented problems seldom encountered in a similar undertaking. Canyon floors were explored by low-flying planes, dangerously guided through jumbled mountains.

These flights gave the North country the first intimation that a highway was planned, stirring it from its slumbers and setting rumors afloat weeks before the construction program was announced.

Meanwhile there were major problems of organization, transportation and supply to be solved before work on the highway could be started. There were regiments to be moved north by the Army with equipment and supplies sufficient to carry them through the spring and into the summer until overtaken and reinforced by other contingents or civilian construction crews. There were contractors to be lined up and heavy road-building equipment to be transported to the scene of operation. There were camps to be built, contracts to be signed, a plan of operations to be developed and supervision forces to be organized.

Instant Action Required

There was no time for leisurely solutions. The program called for instantaneous action. District organizations of the Public Roads Administration throughout the west were given specific assignments in preparation for the task confronting them. Dr. Hewes, in San Francisco, notified by telephone of the impending agreement, started an immediate search of the San Francisco area for water transportation. There were no vessels available, large or small. The search was extended to Seattle, Puget Sound and later to Vancouver. Hidden in out-of-the-way places and locked in Lake Washington and Lake Union at Seattle, a small fleet of yachts, cargo vessels, tugs and barges was assembled for the
northbound movement of men and supplies. A management contractor for transpor-
tation and camp building was found in Seattle.

Simultaneously the Public Roads Administration began to gather its forces
for their most formidable assignment. Never in its history had the American
Government, through its principal road-building agency, attempted an undertaking
of equivalent magnitude and presenting similar problems of organization and
supply.

From the camps of the Civilian Conservation Corps in Minnesota, Montana,
Washington and Oregon, hundreds of camp structures and large quantities of
trucks, tools and other materials were started North. Later additional sup-
plies, including quantities of road-building equipment, office furniture,
office machines and tools, were obtained from the Work Projects Administration.
Fortunately these agencies were rapidly curtailing or terminating their own
programs, making these supplies available for other governmental use. Probably
never in the history of the Government have such quantities of surplus equip-
ment been salvaged for immediate use by another Federal Agency.

Field headquarters for the task ahead were established early in the spring
at Whitehorse, in Yukon Territory, and Fort St. John in British Columbia, 48
miles from the head of the highway at Dawson Creek. Subsidiary camps were set
up near Fort Nelson and on the Liard River, 210 miles west of Fort Nelson.
Administrative offices were opened also in Fairbanks and Gulkana, Alaska.

**Equipment Moves North**

It soon became evident that a project headquarters would have to be or-
ganized nearer the scene of action, and on April 20, J. S. Bright, who had
been called East from the San Francisco office and appointed District Engineer
for the Alaska Highway project, arrived in Seattle to start the work of organi-
zation. By this time the preliminaries were far advanced. The project was
under way. Troops and civilian engineers were on the ground.

The first equipment used on the highway had been started north from Denver
as soon as the agreement was reached between the United States and Canadian
governments. Six hundred carloads arrived by rail at Dawson Creek within a
period of five weeks in preparation for the construction program. At one time
200 carloads were awaiting shipment at Prince Rupert. In addition to its own
equipment, the Army transported food and other supplies for the civilian forces
to the scene of action.

A rutted provincial road between Dawson Creek and Fort St. John afforded
the only approach to the southern base of operations. A narrow winter road
from Fort St. John to Fort Nelson, 258 miles north, provided the only access
to the forest itself. From Fort St. John north and west for almost 1,500 miles
the wilderness was broken only by dog and pack trails or short stretches of
winter road, serviceable only until made impassable by the spring thaw.

But men and machines were arriving by the thousands for its final con-
quest. Within six months the first vehicle to travel overland to Alaska would
roll into Fairbanks.

Thus was a Highway born.
The Route

From the beginning there was no question as to the general routing of the Alaska Highway. The Army desired that it follow the air route. The explanation was simple. In addition to providing a traffic artery serviceable for the year-round movement of through freight to Alaska by truck, it was imperative in a military sense that the road serve:

1. As a supply route for the airports, and
2. As a ground guide for flyers on the Alaska run.

These were the determinants which shaped the recommendation of February 28, 1942, by the Permanent Joint Board of Defense to which the question of building the highway had been referred at the suggestion of the Canadian Government. Both sections of the Board, respectively representing the governments of the United States and Canada, favored "The construction of a highway along the route that follows the general line of airports—Fort St. John, Fort Nelson, Watson Lake, Whitehorse, Boundary, Big Delta—the respective termini connecting with existing roads in Canada and Alaska."

It was noted in the official correspondence released in Washington and Ottawa three weeks later (see appendix) that this recommendation, subsequently approved by the two governments, was based on "military considerations and military considerations only," and that it had the endorsement of the military services of both countries.

The general location was fixed before there was any public announcement that the project had been approved. All discussion of alternative routes thereafter was academic, notwithstanding the arguments ably advanced by advocates of other routes.

Nearest Production Centers.—From the viewpoint of moving large quantities of freight to Alaska, as well as safety from attack, the route followed was considered to be abundantly justified. The line from Fairbanks to Fort St. John leads straight to the Chicago area, the population and industrial center of the United States. Existing rail and highway systems afford ready access to the highway at its southern terminus. No other route would provide for the movement of an equivalent volume of goods in a given length of time, considering points of origin. This is particularly true of military supplies, originating largely in the East and Middle West.

With the general routing fixed, there remained for determination only the question of which canyons and rivers should be followed, the crossing points of three divides, and locations likely to avoid much of the muskeg encountered throughout the entire area traversed by the highway. These were problems for the engineers. Reconnaissance was conducted by plane and by foot, and with pack trains and dog sleds.

Aerial reconnaissance, which provides opportunity for visual observation and photographic mapping, was of great value in determining how the road should be routed through the difficult mountain sections in the Canadian Rockies. From Fort Nelson, the first foothills are encountered approximately 45 miles west. Five miles farther the road plunges into the mountains. From there on
for 150 miles the route crosses the range from east to west, following the
canyons where possible, but crossing two relatively low divides before it
emerges a short distance east of the lower Liard River crossing, 210 miles west
of Fort Nelson.

Good Location for Highway Found.—West of the Rockies the course of the
Liard River offered a natural line for a further 150 miles, as had the ridges
and the line of the Prophet River between Fort St. John and Fort Nelson. The
Liard River route was selected as the highway line from the Rockies to Watson
Lake. From there the Rancheria and Swift Rivers, the elongated western half
of Teslin Lake, Marsh Lake and Lewes River, a branch of the Yukon, guided the
locators to Whitehorse.

West of Whitehorse also, stream and lake courses were followed for the
first 200 miles to the Duke River crossing near the western end of Kluane Lake,
and for the last 200 miles of the route along the Chisana and Tanana Rivers,
in Alaska, to the junction of the Alaska Highway with the Richardson Highway
at Big Delta. This left only a 150-mile section from the Duke to the Chisana
for determination of the general routing, and here the topography of the coun-
try served substantially as a natural guide, as the highway follows the line
of the St. Elias Mountains at the foot of the back range and then turns sharply
north to the ridges above the Chisana and Tanana Rivers to avoid the largest
swamp areas encountered anywhere on the route.

Trails Point Way.—There were additional guides in the dog-team trails and
winter roads found all the way from Fort St. John to the Alaskan boundary,
except in the middle sections where lakes and rivers supplied ready solutions.

It is an interesting commentary on the final location of the highway that
it follows so closely in general direction the trails long used by Indian trapp-
ers and prospectors. The Indians and trappers know the country better than
anyone else could know it. They followed natural trails which often were the
shortest distance between two points, considering the terrain traversed. How-
ever, there was this difference between the travel of the trappers and the
problem of the highway builders:

The Indian trails could be used only in winter and the men who followed
them were not concerned with muskeg or swamps, since the ground was frozen.
The flat swamp areas, generally offered easier access to a given destination
than a route through rougher country. The so-called winter roads in the North
are useful only when the ground is frozen. The few wagon roads, while of
incidental value in guiding the location of the highway or as access roads in
sections such as that between Whitehorse and Kluane Lake, were of slight ser-
vice otherwise. It was weeks, for example, before the pioneer road between
Whitehorse and Kluane could be made serviceable by grading and graveling for
the movement of motor traffic.

Air Reconnaissance Valuable.—Aerial reconnaissance was a principal guide
in locating the highway through the Rockies and between Watson Lake and White-
horse.

Early in the discussions it was necessary to reach a decision as between
the route finally followed and an alternate route which would have run con-
siderably to the north. Although the length of the alternative routes was
substantially the same, that chosen was considered to afford the better soil conditions for road construction, and to offer fewer objections as a guide to flyers who cross the Rocky Mountains at this point. It follows the Muskwa River, a branch of the Liard having its origin on the eastern slope, to another tributary, the Tetea River, which has its headwaters in the main range of the Rockies near Summit Lake, the highest point reached on the highway. The elevation at this level is 4,250 feet.

All of the streams originating in this section of the Rockies, whether flowing east or west from the summit, eventually find their way north into the Liard, which in turn becomes part of the Mackenzie River system. The Mackenzie has its outlet in the Arctic Ocean, approximately 150 miles east of the Alaskan boundary.

Between Watson Lake and Whitehorse, where the highway crosses the divide between the Mackenzie and Yukon River systems, it was necessary to scout out the lowest summit, which available maps indicated had a prohibitive elevation. This is all mountain country. The highway is never out of sight of mountains at any point from Fort Nelson to its western terminus in Alaska.

It was a "bush flyer," Les. Cook, who pointed out the best crossing on this divide, 80 miles east of Teslin. The summit at this point has an elevation of 3,208 feet, which is substantially lower than that indicated on published maps of the region. Cook died in an aircraft accident a few days before Christmas, 1942, when his plane crashed in the streets of Whitehorse. The divide between the Rancheria and Swift Rivers, where the highway crosses it at this point, has been named Cook's Pass in memory of this intrepid flyer. The highest point west of Whitehorse is Bear Summit, slightly over 3,200 feet, 30 miles east of Kluane Lake.

Dog Sledding Used.—But aerial reconnaissance was only the beginning in fixing the route of the highway. Thereafter, and even while location engineers of the Army and Public Roads Administration were flying almost daily over the general route chosen, foot and dog-sled examination of the area to be traversed were still necessary to check conclusions from air reconnaissance. Even then there were problems of grade and curvature to be solved before locations could be determined definitely.

There was a further and final problem also in fixing the line for the permanent highway after the pioneer road was built, and in laying out the general line while it was under construction. Because of the time element or other factors, it was not always possible for the truck trail to follow what seemed to be the best line for the permanent highway. The routing of the pioneer road was determined in part on the basis of reconnaissance and survey, but likewise in part by conditions encountered as the road was built, and governed always, and finally, by the necessity for speed in its construction.

Lines Often Diverge.—Location engineers of the Public Roads Administration completed their surveys for the permanent route in December 1942, and plans were prepared during the winter.
Inevitably, the lines of the pioneer road or truck trail and of the permanent highway diverge at many points. With rare exceptions, however, including instances where it has been possible to save considerable mileage or avoid difficult areas in rerouting the road, the two lines are seldom more than a mile or two apart and at times follow the same clearing or incorporate straight stretches of the tote road in the permanent highway.

As built in 1942, the pioneer road extended approximately 1,480 miles from the railhead at Dawson Creek, in British Columbia, to a junction with the Richardson Highway, 100 miles southeast of Fairbanks. Thus the latter highway, previously built by the Alaska Road Commission, became a part of the Alaska Highway. At Fairbanks the extended route meets the Alaska railroad, and thus finds a direct rail connection with an Alaskan port.

There is a branch of the highway also which extends 135 miles from a point near the junction of the Tok and Tanana Rivers in Alaska to Gulkana on the north-and-south section of the Richardson Highway, providing coastal connections with Anchorage and Valdez.

On October 20, 1942, General O'Connor directed that there be added to the Alaska Highway system a new branch, 154 miles in length, to connect the port of Haines on the Lynn Canal, near Skagway, at the head of the Inland Passage, with the main highway 108 miles west of Whitehorse, in Yukon Territory. This branch road, was scheduled for completion by midsummer of 1943, to provide a new and vitally important service route for supplies destined for points in Alaska.

The length of the pioneer road, estimated from speedometer readings made in 1942, fixed the distance between Dawson Creek and Fairbanks at 1,619 miles. The length of the final road is 1,590 miles.

**Methods and Results**

Almost immediately after construction began it was discovered that because of ground and weather conditions and the necessity of clearing over 1,400 miles of virgin forest, Army forces assigned to the task of building the pioneer road could not complete it by the end of the year without assistance. Early results indicated that with the aid of civilian contractors and the engineering organization of the Public Roads Administration a truck trail could be pushed through. An Army directive withdrew them from their original assignment for concentration on this road.

**All Efforts Merged.**—Calls for help began to be received by the Public Roads Administration with the arrival of the first contractors on the scene. They continued in rising volume until on August 8, 1942, the civilian and military efforts were in effect merged for the remainder of the construction season. The consolidated effort was successful. The pioneer road was built.

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1 Instructions issued by the Chief of Engineers and Commissioner of Public Roads, dated August 8, 1942, are presented in the appendix.
How It Worked Out.—Specifically, the contribution of this first year by the forces organized by the Public Roads Administration included:

1. Construction to high standards of a 36-foot permanent highway from Dawson Creek to a point 27 miles north of Fort St. John (British Columbia). Miles

2. Construction without Army assistance of 51 miles of highway east of Whitehorse (Yukon Territory) and 103 miles from Big Delta to Tanacross (Alaska) which with additional surfacing, was later incorporated in the permanent highway.

3. Widening, regrading and graveling of Army road between Fort St. John and Fort Nelson beyond the end of the permanent highway, 229 miles; from Whitehorse west to the White River (Yukon Territory), 254 miles; and from Tagish Cutoff to a point 20 miles east of the Nisutlin River, 100 miles.

4. Regrading and improvement of Army road from Fort Nelson west, including mountain sections, 117 miles; from Slana to Tanacross (Alaska), 73 miles; and from Tanacross to the end of the gravelled section east of the White River, 203 miles.

5. Clearing or construction of connecting sections between Gakona, Gulkana and Slana (Alaska), 12 miles.

Total 1,225

Proportion of total mileage constructed in 1942 on which contractors worked 78%

Construction of many of the temporary bridges, was assumed by the Public Roads Administration at the Army's request and in turn assigned to civilian contractors. Design and engineering supervision on these structures were supplied by the Public Roads Administration.

There was a further diversion of contractors' forces to house Army contingents during the winter, construct headquarters and bases and provide the Army forces with many facilities.

Thus was the emergency met.

The Original Plan

It had been contemplated originally that the military and civilian forces would be separately assigned to specific tasks, with a clear division of authority.

The Public Roads Administration planned a completed highway built to the standards adopted in the United States for park and mountain roads. These called for a well drained and stabilized roadbed with an over-all width of 32 feet, 3 degree curves in prairie terrain and 18 to 19 degree curves in mountain sections; and with a maximum of 5 percent grades in the lower levels.
and 7 percent in the mountains. The highway was to be furnished with 18 inches of completed gravel or rock. Dust was to be controlled by use of an oil or asphaltic coating after the highway was built.

In the original plan of operation, (see map), Public Roads Administration project heads worked out a schedule which called for completion the first year of 295 miles of the permanent highway from Slana to Tanacross and east to Klune Lake, and 303 miles from Dawson Creek to Fort Nelson. The middle sections were to be graded, stabilized and maintained the first season and completed to permanent standards in 1943.

The first Engineer regiments were started on their way to Valdez, Skagway and Dawson Creek in March. They were accompanied or preceded by Public Roads engineers and survey parties.

Management Contractors Employed

The Public Roads Administration has always favored the performance of highway construction under contracts awarded to the lowest bidder. This method has been used throughout the history of Federal-aid highway construction. It would have been preferred on the Alaska Highway had conditions permitted its use.

However, it was necessary to move men and equipment to the job immediately and begin work. The detailed location of the highway was not yet fixed. It would be months before plans, estimates of quantities of work, and specifications could be prepared to form the basis of the usual form of contract. There was neither time nor means of transportation to permit contractors to inspect the work they were to do as a basis for bidding.

Even if these obstacles had not existed there was another reason why reasonable bids could not have been obtained. The work was to be done in a wilderness region far from all sources of supply. It would be necessary to establish complete facilities for housing, feeding and medical care of men and for repair and servicing of equipment. Contractors were in no position to know what these things would cost in the Canadian and Alaskan wilderness under war conditions. Normally highway work is done by small contractors whose men live where they please and report to the job each day. For repair work the contractor calls on the nearest machine shop and his equipment dealer. At times he hires extra trucks from local people. He goes to the employment agency for men. An oil company delivers fuel regularly as needed. None of these services would be found in the northwest woods. Everything must come from outside and largely from the United States. Utter confusion would have reigned, had 40 or 50 contractors each undertaken to establish his purchasing and transportation service under wartime conditions. The cost would have been prohibitive. But, the equipment, personnel, and experience of highway contractors organizations were necessary if the job was to be done within the time limit established. Since few highway contractors are equipped to build over 15 or 20 miles of road in a construction season it would be necessary to obtain the services of some 40 or 50 of them to do the work already assigned to the Public Roads Administration.

A special form of contract was prepared to meet these conditions and machinery devised for dealing with supplying contractors. It was necessary
to establish offices in parts of the country nearest the highway to acquaint contractors with the terms of the contract offered, conditions of the work, enter into agreements with them and arrange for transportation to the job. Subsequently it would be necessary to send them a continual stream of supplies, provide repair services, recruit and transport additional workers, and keep accurate records of men employed and work done.

All available Public Roads personnel were already on the highway engaged in establishing engineering headquarters, making surveys, investigating bridge sites and locating surfacing materials. It was necessary to expand the size of the organization immediately. To do this through the normal Civil Service procedure and under conditions of 1942 would take months if it could be done at all. A new organization created to deal with contractors would be subject to all the ills of a new machine with cogs not yet ground in to run smoothly. The need was for a machine to begin operation at once and at high speed.

In this situation negotiations were begun with engineering firms experienced in the business management of large construction jobs. It was decided to divide the highway into four sections, each to be assigned to a management contractor and a fifth management contractor was to be employed to provide transportation to the job. Under the direction of the Public Roads Administration these management contractors were to recruit highway contractors, move them to the job, provide subsistence, repair and other services on the job, and keep all records necessary for proper accounting with each individual contractor. All procedures and records were to be as prescribed by the Public Roads Administration and its representatives were to be in daily contact with the management contractors.

It is believed that this is the only procedure under which a large number of contractors could have been recruited and moved to the job within a matter of weeks. Services were obtained of men acquainted with construction work, needs in equipment operation, the supplying of construction forces and transportation of heavy machines.

The form of contract entered into with both management and construction contractors was one chosen by the War Department and approved by Congress for use during the war where time did not permit preparation of detailed plans. Negotiations were entered into with each contractor for the construction of a particular section of road. Probable quantities were estimated as accurately as available data permitted and a fixed fee agreed upon. Should the actual amount of work depart greatly from the estimates the amount of the fee would be subject to renegotiation. The government would pay the actual cost of supplies and all labor on the job. Rent was to be paid for contractors' equipment used, according to a fixed scale. Under this plan it was not possible for a contractor to increase costs and be assured of any increase in his fee.

Management contractors were assigned as follows:

E. W. Elliott, Seattle—Transportation and camp construction.

R. Melville Smith Co., Ltd.—Highway construction between Dawson Creek and Port St. John; also Port Nelson and Watson Lake. Total, 250 miles.


These were the initial assignments. Subsequent changes in the plan of operation resulted in changes in the mileages shown.

Because of wartime construction elsewhere it was exceedingly difficult to get enough contractors and equipment together for the task ahead. But with the assistance of the management companies it was done in a remarkably short time, and equipment and men were moving north by May. During 1942, 47 construction contractors were placed on the job.

Many Lytle and Green men were flown to Alaska by the Air Transport Command and commercial airlines. Others reached the project by railroad, airlines, motor transport and by sea.

As compared with the 10,000 soldiers employed on the project, the contractors by the end of the season had brought approximately 7,500 civilians to the scene of their operations.

As the several sections of the general route were agreed on by the Army and Public Roads Administration engineers, survey crews were sent in to locate the line. Public Roads Administration survey parties, averaging 15 men each, were started out as rapidly as they could be organized and assigned, and from whatever points proved feasible as a base of operations. Some of them were completely out of touch with their headquarters for weeks at a time.

Design Work Rushed

Meanwhile the work of design went forward as rapidly as reports were received from the field. Bridges were being designed in the San Francisco office of the Public Roads Administration long before the construction crews reached the streams to be bridged.

The search for gravel and other surfacing materials along the route paralleled the preliminary engineering on the road itself. Soil tests were made in Fort St. John from samples brought back by surveying parties and other scouts. Similar work was done in the Whitehorse Division.

Satisfactory road-building materials were found along practically all of the general route followed by the highway. For 100 miles north of Fort St. John, no gravel or other hard surfacing material had been located after a two-month search. The glacial silt of the eastern slopes of the Rockies is worthless for this purpose. Eventually, sandstone ledges discovered along part of this section made it possible to stabilize the lower end of the highway by hauling surfacing material considerable distances. The subgrade soil for practically the entire distance from Dawson Creek to Sikanni River is classified by road engineers as A-7 or A-8—about the poorest to be found anywhere.
Starting in March from Fort St. John and Fort Nelson and in April from Whitehorse, ground reconnaissance and surveys were a continuous operation on all sections of the route until it was finally smashed through. The last surveys for the permanent line were completed about December 1, several weeks after the pioneer road was opened.

Crushing plants and sawmills were set up as rapidly as they could be moved by any method to the places where they were needed to supply lumber and surfacing material. Crushing plants were not needed in the Whitehorse Division in 1942 as ample supplies of pit-run gravel were available.

**Camps Constructed**

Simply as a start, coincident with preliminary work on the highway, approximately 100 prefabricated buildings, including barracks, warehouses and maintenance shops, had to be erected at such points as Valdez, Skagway, Gulkana, Gacoma, Tanacross, Big Gerstle, Big Delta, Whitehorse, Carcross, Fort Nelson and Dawson Creek. The largest camps were built at Whitehorse and Fort St. John, headquarters respectively for the western and eastern sectors. Sewer and water systems had to be provided.

At Prince Rupert, British Columbia, which with Seattle served as a shipping point for equipment and supplies routed via the Inland Passage, a dock was repaired and a warehouse and barracks built.

Aircraft were employed continuously for all purposes—for reconnaissance, to transport men and supplies, and as a means of communication. Army planes were used when available. Four planes were purchased and several were leased. "Bush flyers" and commercial airlines supplied additional facilities as required. While the snow remained on the ground the "bush flyers" could drop in on skis wherever there was space to land. Later these same flyers, whose pioneering in the air over the whole North country had brought them a wealth of experience which proved invaluable in the construction of the pioneer road, continued to be called in for a variety of purposes which taxed even their ingenuity and skill.

**The New Formula**

In August, questions of routing and procedure came to a head in conferences between Army authorities and Public Roads Administration project heads during an inspection of the project. Decisions reached at that time and confirmed in letters and memoranda exchanged between General Sturdevant and Public Roads Administration executives (see appendix) established the following procedure for the remainder of the construction season:

a. Construction to the original standards of the permanent highway, by that time carried 77 miles from Dawson Creek to a point 27 miles north of Fort St. John, was halted forthwith.

b. All operations on all sections of the route were coordinated under a single directive to complete the pioneer road in 1942 or "at the earliest date possible," without insistence on permanent highway standards.
c. Field engineers were given wider latitude to undertake revisions and reasonable departures from established procedure on their own responsibility where this would accelerate construction.

d. A new sequence of operations for work on vital sections of the road was adopted.

e. "Hit-skip" operations designed to improve the worst sections first were introduced as part of the new plan.

Compromises Necessary

Sector commanders and project engineers were instructed to so dovetail their efforts as to incorporate as much as possible of the pioneer road in the permanent highway. This directive contemplated relaxation of approved standards on questions of grade and curvature, and stricter adherence in pioneer road construction to the permanent line where it could be followed without sacrifice of speed.

Under this revised program, with Engineer troops and civilian contractors pulling together, the pioneer road was cut through in a single short season.

Highway improvement between Fort St. John and Fort Nelson was interrupted by movement of grading equipment to the section west of Fort Nelson and the diversion of additional equipment for construction of a flight strip at Dawson Creek.

The Army required assistance in building warehouses, barracks, mess halls, water and sewer systems at Dawson Creek, necessitating withdrawal of Elliott Company construction crews from other work on the highway project.

By forbearance, patience and persistence all difficulties and obstacles were surmounted and road construction carried forward at constantly increasing tempo. Contractors were rushed to uncompleted sections of the pioneer road to back up the work of the 97th and 18th Engineer regiments, which in October were headed toward their final rendezvous near White River, east of the Alaska boundary. This was the last stretch built—and is one of the roughest. When the two regiments met finally, the contractors' crews were stepping on their heels.

Lack of surfacing and stabilization on mountain sections and absence of bridges on both sides of the Alaska boundary, coupled with the more dangerous grades and curves, left much to be done to make the pioneer road a usable highway for movement of freight. From the viewpoint of permanence and serviceability for the movement of heavy traffic under all weather conditions it was not only far from ideal, but some sections were little more than started.

Operational methods during the construction season varied with conditions. In the western region the problems were dust and ice. Muskeg was an incidental annoyance. Eastward, muskeg and mountain construction were the chief obstacles to rapid progress.

The Muskeg Story

It is estimated that more than 100 miles of muskeg were corduroyed in the course of pioneer road construction—one-third of it in the 300-mile stretch between Fort St. John and the Rocky Mountains west of Fort Nelson. This work was tedious and troublesome.
Ordinarily muskeg is not more than two or three feet deep. In general, the line for the permanent highway runs straight across muskeg areas where they cannot be readily avoided. Temporary crossings were made by covering with poles and brush. In building the final road it was the invariable practice to remove all organic material and backfill with gravel or selected soil.

It is an interesting commentary on the character of the country that muskeg, which is nothing but peat or decayed vegetation existing in varying degrees of saturation, is found not only in glacial basins and former lake beds, but on hillsides elevated well above the nearest rivers and lakes. The identity of the forest has prevented the sun from reaching these moist pockets of peat. Because of this, or subsurface conformations, they continue to hold water which in more open terrain would evaporate or, under more favorable drainage conditions, seep through the subsoil.

Many miles of muskeg were avoided by routing the road along ridges and mountainsides, but this in itself was not a guarantee that muskeg pockets would not be encountered even in these locations.

*Water Flows When Air Temperature Is 60° Below Zero*

Beyond Fort Nelson and particularly on the western section of the highway from Champagne northwest into Alaska the road builders encountered permanently frozen subsoil beneath the moss-covered surface. In the Yukon region and Alaska, the moss serves as an insulating blanket which permits heat penetration only for a few inches beneath the surface during the winter and from one to six feet during the summer. The subsoil is often frozen.

Curiously enough, at many places water continues to flow from beneath this moss covering during the coldest winter temperatures, when the mercury stands at 50 or 60 degrees below zero. This is particularly true on mountain slopes at the foot of glacial ranges and on the south banks of streams. During winter months formation of ice in ditches, on the road and in streams constituted a problem for the road builders and complicated the problem of maintenance.

During the summer engineer troops and contractors' construction crews worked in shifts around the clock under conditions of practically continuous daylight.

"Walked 'Em Down"

Twenty-ton caterpillar tractors—bulldozers or "cats" with blades set squarely or at an angle—led the attack on the forest to clear the way for the road builders. As the men on the project put it, speaking of the clearing of millions of spruce from the route followed by the road: "We walked 'em down."

Because of subsurface moisture or ice conditions and absence of wind strains in the dense forest, all of the trees in the area traversed are shallowly rooted. The "cats" simply pushed them over, scooped them up, roots and all, shoved them aside and left the surface clear for the graders and surfacers.
Although the first truck-trail specifications called for a 32-foot clearing, a cleared strip from 60 to 100 feet wide was finally cut through practically 1,600 miles of spruce spruce—chiefly spruce—as a trail for the highway builders. The clearing crews started slowly. West of Fort Nelson, early progress was at the rate of one mile a day. But in the final drive the clearing and preliminary trail building was stepped up to three miles a day as easier going was encountered.

The original Army road averaged 12 to 18 feet in over-all width, or at the maximum, 24 feet. On most sections it was built with a high crown and at places became a one-way road. Grading and graveling operations by contractors' crews in the late summer and early fall did much to correct these conditions.

Communications were a problem at all times while the road was under construction. The Army forces used radio, including "walkie-talkies," radio trucks and jeeps. Aircraft were used for communication between operational bases and field parties.

A Negro soldier described the wilderness through which the road was built as "miles and miles of nothing but miles and miles."

Work Performed for the Army

In addition to improvement or construction of approximately three-fourths of the pioneer road, contractors brought to the project by the Public Roads Administration were engaged variously during the construction season and later in building camps, supply bases, transportation terminals and other facilities for the military forces, most of which necessitated their withdrawal from assignments directly related to the construction of the highway.

Specifically, this construction for the Army included the following projects, although the list is by no means complete:

Whitehorse

1. Erection and equipment of 40 prefabricated CCC buildings; storage tents, garage, fire station, post exchange and service club and other structures for the Northwest Service Command.¹

2. Construction of power, sewer and water connections, oil storage and distribution facilities.

3. Reconditioning Whitehorse steam laundry.

4. Grading and surfacing streets of Whitehorse as required.

5. Construction of hangars and shelter house at airport; improvement of landing field and airport road.

6. Erection of 100-bed hospital, kitchen, dining room, nurses' and attendants' quarters, doctors' quarters, and central heating plant (originally intended for Public Roads Administration use, but given to the Army).

¹The Northwest Service Command was created September 4, 1942. The Commanding General, Northwest Service Command was vested with the authority of a Division Engineer and directed to establish Engineer Districts as necessary by General Order No. 37 of Chief of Engineers issued September 22, 1942.
7. Hauling fuel and other supplies; building furniture and equipment required for headquarters use; maintenance of headquarters buildings; construction of 150 12-foot ladders and four 18-foot ladders, and supplying skilled labor for miscellaneous tasks as required.

Dawson Creek

1. Construction from new materials or materials supplied by the Army:
- 40 warehouses 48'x200' with 10-foot loading platforms on each side; three maintenance sheds, two 96'x85' and one 60'x60'; one headquarters building equivalent to 20'x240'; administration building 20'x200'; maintenance building 20'x120'; twenty-one barracks 20'x120'; one mess hall 20'x180'; officers' quarters 20'x300'; hostess house 20'x60'; pumphouse, sewage pumphouse, etc.

2. Constructing from old materials (CCC buildings, etc.) eight mess halls equivalent to 20'x210'; one mess hall 20'x160'; 32 barracks 20'x120'; officers' quarters 20'x300'; office and storeroom 20'x120'; washrooms and barracks 20'x70'; repair garage 30'x10' with lean-to 40'x10'.

Fort St. John

1. Construction of a 500,000-gallon capacity water reservoir with 76-foot bottom diameter, 21 feet deep; water distribution system; sewer system with septic tank; fire protection system; officers' quarters 180'x140'. Other work was required in addition.

Miscellaneous

1. At Fairbanks freight distributing center, 7 miles east of Whitehorse, construction of warehouse 20'x120' for motor and machine parts; installation of oil heating units.

2. Building winter camps, winterizing existing structures and supplying skilled labor to assist in preparing camps for Army occupancy on the Richardson Highway and at Haines, Champagne, Kluane Lake, Big Delta, Cathedral Rapids, Big Gerstle, Beaver Creek, Lewes River, Judith Creek, Squanga Lake, Robinson (north of Carcross), and between Nisutlin Bay and Watson Lake.

3. Constructing 25 houses on sleds 10'x20'.

4. Clearing right-of-way for telephone and pipe lines over parts of highway route.

5. Supplying tractors, cranes and other equipment as required by the Army.

6. Supplying linemen to assist in Signal line work between Northwest Service Command headquarters and receiving and transmitting stations.

7. Temporary bridge over Tanana River at Big Delta on Richardson Highway.

8. Repair of Army equipment at Fort St. John and Whitehorse.

First Year Chronology

An understanding of the time element and the month-by-month progress made on the project from the beginning of construction is essential to a clear conception of the conditions under which it was built. The broad fact is that practically all of the pioneer road was built in less than five months and
most of it in four months. This includes the time devoted to clearing the
right-of-way.

The following month-by-month progress summary is taken from weekly field
reports of Public Roads Administration engineers:

March

Brigadier General William Morris Hoge, then Colonel Hoge, was assigned as
Commanding Officer of the Alaska Highway at its inception. He was promoted
to brigadier general on March 27, 1942. Later in the spring the Alaska Highway
was divided into sectors, with Brigadier General—then Colonel—James A. O'Connor
having command of the southern sector and General Hoge responsible for the
northern sector, with General Hoge retaining general control over the entire
project.

Fort St. John.—Preceding all engineer troops, an Army quartermaster de-
tachment reached Dawson Creek March 9, 1942, to arrange for arrival of later
contingents. This became the supply center for Army forces assigned to the
Fort St. John sector.

Public Roads Administration Senior Highway Engineer Capes arrived at Ed-
monton March 14. Twelve engineers came in from Denver the following day.
(Capes had made aerial reconnaissance flights over the route in February with
Colonel Hoge.) Construction Engineer Levant Brown, Capes and the Denver party
left for Fort Nelson March 16, traveling by night when the ground was frozen
to avoid the muddy condition during daytime. Additional engineers arrived at
Fort St. John the following week.

Temporary quarters were established in Edmonton. Brown reported map studies
showed three possible routes to Alaska, and discussed the probable advantages
of each route.

Dog-team reconnaissance parties were started from Fort St. John and Fort
Nelson. Guides were employed and ground reconnaissance began both west and
south of Fort Nelson.

Whitehorse.—There was no activity in this sector in March. The first
troops and Public Roads parties reached Skagway early in April.

A communication addressed by General Sturdevant to Commissioner MacDonald
indicated that it was desired, as a first step, to widen and stabilize existing
roads between Galena and Slana, Alaska, and from Whitehorse to Kluane in Yukon
Territory; and to construct a new road to adopted standards from the south shore
of Kluane Lake northwest to the Donjek River. It was suggested that the loca-
tions in these areas be surveyed as soon as possible for the purpose of fixing
the route for the permanent highway.

Under date of March 31 General Sturdevant authorized immediate construc-
tion on these two sections. Construction of the road from Whitehorse eastward
for 25 miles to the junction of the Lewes and McClintock Rivers was likewise
authorized. These were the first three construction authorizations received
by the Public Roads Administration from the Army.
April

Fort St. John.—District Engineer Bright arrived in Edmonton April 7 to inspect the southern sector. In addition to continuing reconnaissance of the "airport route" finally chosen for the highway, but at this time not decided on definitely, Levant Brown reported that three weeks were devoted to ground reconnaissance of the Vancouver-Kamloops-Prince George-Hazelton area, on the alternative Prince George-Sifton Pass-Watson Lake route (Route B) favored by the Alaska International Highway Commission. This study was made at the Commissioner's request.

Colonel Hoge arrived in Edmonton from Washington April 2 and arranged to accompany Capes and Highway Engineer E. E. Erhart on a reconnaissance flight north of Fort Nelson. Dog-train reconnaissance parties had been started out ten days earlier. Ground and aerial reconnaissance continued all month. A new Peace River crossing was decided on and location engineers started work on the highway line between Dawson Creek and Fort St. John.

Sixteen University of Alberta students were added to survey parties in this area. Maintenance work was begun meanwhile on the existing Dawson Creek-Fort St. John road and several contractors were informed that contracts for the first section would be awarded almost immediately. New survey parties were organized and started out at the rate of two a week as rapidly as personnel could be recruited. Soil survey work was started.

With adoption of the airport route in April as the route for the highway the general line between Fort St. John and Fort Nelson was agreed on with Colonel Hoge. A route from Fort Nelson to Watson Lake via the Tetsa River, Muncho Lake and Liard River was tentatively approved, but a difference then developed as to whether it would not be better to go more directly to the Liard from Fort Nelson. Public Roads engineers favored the route on which the highway is located, basing their recommendations on soil surveys and ground reconnaissance of this route by dog train and conclusions drawn from air reconnaissance of the other route. Colonel Hoge preferred the direct approach to the Liard which would have required construction through the Grand Canyon of the Liard.

Formal authorization for construction of the road between Fort St. John and Fort Nelson on a route generally following the Blueberry and Prophet River drainage was received by Commissioner MacDonald under date of April 27 from General Sturdevant.

Whitehorse.—The first survey party on the western division reached Whitehorse April 9-12, headed by John McGillivray, J. B. Becher and H. A. Stoddart. An office and warehouse were leased and the staff quartered in two hotels. Surveys were started April 13 from Champagne and the Takhini River crossing.

Construction Engineer Frank E. Andrews reported under date of April 23 that a transportation bottleneck was developing on the White Pass and Yukon Railroad and that "this situation could be very serious to construction progress."

Several contractors interested in construction between Gulkana and Tanacross reported that considerable equipment was available from mining companies in Alaska and planned if possible to assemble and use it.
Forty-four Public Roads engineers and assistants left Seattle for Whitehorse. By the end of April, six survey parties were in the field, working in both directions from Whitehorse.

It was estimated that the ice would remain on Kluane Lake for plane landings until May 15.

Authorization was received from General Sturdevant for widening, improvement or relocation and construction of an existing winter trail from Whitehorse to Kluane Lake.

May

Fort St. John.—Sixty packhorse outfits were organized at the beginning of the month to accompany survey crews working out of Fort Nelson. The first two carloads of maintenance equipment reached Dawson Creek about the same time.

Experimental clearing of the route west of Fort Nelson was started by engineer troops, with Public Roads engineers flagging out the Army road in advance of the clearing parties.

Satisfactory gravel deposits were located between Dawson Creek and Fort St. John.

On May 13, Levant Brown reported a final decision by Colonel O'Connor, who had been made sector commander at Fort St. John, approving Public Roads Recommendation of a routing on the south side of the Liard River via Muncho Lake and the Trout River.

Construction was started on maintenance and supply facilities at Dawson Creek and Fort St. John, and contractors were arriving to inspect the project as a prelude to construction.

Army and Public Roads Administration location parties, with an Army access trail crew, moved north together from Fort St. John in establishing the truck-trail location. Survey and reconnaissance were continuous. The first grading was begun at Fort St. John during the last week of May.

Whitehorse.—Reher reported that from 10 to 30 feet of snow covered the pass on the proposed branch road to Haines for ten months in the year.

Highway Engineer C. G. Polk was sent to Fairbanks to take charge of Alaskan construction and start work on the link from Big Delta to Tok Junction. This section was advanced to first priority over the Gulkana-Slana-Tok Junction section on August 3, because of Japanese occupation of the Aleutians.

Pack-train survey parties were working in the Kluane Lake area and west to Northway.

Polk reported the road between Valdez and Gulkana in bad shape owing to slides, thaw and loss of a bridge in a breakup, ending any prospect of getting supplies and equipment over this road immediately.

At the end of May engineer troops were still working on the old trail between Whitehorse and Champagne. It was not yet passable.

There were no communications of any kind between headquarters and field parties except by runners or planes, and at times weeks passed with no word from men in the field.
June

Fort St. John.—Contractors were arriving, establishing bases of operation and starting construction early in June. A new 60-ton ferry arrived at Peace River and was being operated by engineer troops in conjunction with the old 20-ton ferry.

Heavy brush and windfall areas north of Fort St. John slowed up both reconnaissance and trail parties here. Heavy rains and mud were also hampering the work.

Thirty carloads of demountable CCC buildings were received at Dawson Creek for use of the contractors. Road equipment was arriving in large quantities.

Contractors working under Oakes' management put equipment and men at the Army's disposal to expedite clearing and construction north of Fort St. John.

Design work for the permanent highway was being carried on simultaneously in Dawson Creek, Fort St. John and Fort Nelson.

Whitehorse.—Army forces got the road west of Whitehorse in shape to permit contractors' equipment to reach a point 65 miles west.

Steam-wheeler steamboats were being used to transport troops on Teslin Lake. The Teslin River was in flood stage, yet would not be open for navigation after August 1, because of shallow water, leaving only a short season for river operations.

General Hoge advised that transportation of heavy Army equipment over the White Pass and Yukon Railroad had reached the point where the engineers could now plan for substantial shipments of contractors' equipment starting about the middle of June. The estimated rate of shipment was 300 tons a day.

Whitehorse headquarters buildings were under way.

Early in June General Hoge requested that contractors ballast the pioneer road from Whitehorse to Kluane, build a permanent road from Slana to Gulkana and likewise build the road from Big Delta to Tana across without Army assistance. An agreement was reached by which the Army bypassed a section south of Kluane Lake to permit contractors working under Elliott management to proceed with the permanent road in this area.

Dowell and Elliott camps were established in Whitehorse in June and advance troops of engineer regiments reached Kluane Lake.

The 340th was established in camp on Morley Bay and the 97th engineers at the end of the month were working north from Slana.

Public Roads Administration and Army engineers were in agreement over general routing from Watson Lake west. The river and lake courses and the terrain guided the line for both the pioneer and permanent roads.

Contractors' forces were assigned to construction between McClintock River and Tagish River, to improve an access road in this area. General Hoge also asked that contractors build the road along the east shore of Marsh Lake from the McClintock River south, to release troops for work east of Teslin.
July

Fort St. John.—Levant Brown reported July 1 that with completion of the Fort St. John base, Public Roads Administration personnel at Edmonton were being moved north to be closer to the scene of operations. Ten Canadian contractors under Smith management were allocated to road sections from 2.7 to 7 miles in length between Dawson Creek and Fort St. John.

There was still no evidence of gravel deposits between Fort St. John and Pink Mountain, 100 miles north. From Fort St. John to the Sikanni River, construction of the pioneer road had become a partnership affair. Contractors were clearing, stripping and grading parts of the road and elsewhere aiding Army forces on construction and maintenance of the truck trail.

Clearing to the Sikanni River, 120 miles north of Fort St. John, was completed by mid-July. Early in July engineer troops had completed a trail road. Contractors followed, putting it in shape for hauling.

West of Fort Nelson the Army had completed approximately 45 miles of tote road to the foothills of the Rockies, with an additional 15 miles cleared. Progress was rapid from this point on. The rains had stopped and dust was becoming a problem on the lower road.

By the end of the month a narrow truck trail had been built 170 miles north of Fort St. John, but had to be widened and drained by contractors' crews before it could be used for hauling. West of Fort Nelson, construction had been completed for 85 miles, the road rough graded for another 30 miles and cleared for an additional 15 miles, carrying it beyond the first divide at Summit Lake, 102 miles west of Fort Nelson, in the heart of the Rocky Mountain range.

Whitehorse.—East of Whitehorse the weather was bad, equipment was lacking and progress on the pioneer road was slow. District Engineer Bright, in Whitehorse for inspection of work on this division, made arrangements for purchase from Alaska mining companies of camp supplies and equipment sufficient to carry Lytle and Green contractors until arrival of their own equipment from Valdez.

The 97th engineers had progressed 40 miles beyond Slana, but construction was only 67 percent complete. General Sturdevant inspected the project and on July 18 asked that Public Roads contractors take over maintenance and grading of the pioneer road for all-year operation. Bright notified Seattle and arranged to bring in necessary equipment.

Toward the end of the month contractors were shifted about and reorganized both in Alaska and Yukon Territory to supplement and speed up construction of the pioneer road, without regard to prior arrangements by which they were to confine their operations to the permanent road.

Equipment was always a critical problem. There never was enough.

August

On August 3 General Sturdevant indicated an intention to withdraw the request of July 18 that Public Roads forces maintain the Army road during the coming winter. He stated "It was therefore contemplated that eight companies will be retained along the route to care for stored equipment and to relieve
Public Roads Administration of winter maintenance." This plan was not placed in effect, but it led to uncertainty in planning operations.

Fort St. John.—August brought a decision that contractors were to follow the tote road routing from Fort St. John to Fort Nelson, to hasten completion of a usable road between these points. Public Roads engineers accordingly abandoned the plan for a new crossing of the Sikanni Chief River which would have bypassed Fort Nelson in providing a more direct route to Alaska.

An inspection visit by General Sturdevant, marked by conferences with Public Roads project engineers as well as project and sector commanders of the Army, led to a decision on August 7 to discard the original formula for building the highway, under which the engineer troops and contractors' forces were to perform separate and sequential functions, and concentrate their combined energies on construction of the pioneer road during the 1942 season.

Contractors' crews and equipment were sent ahead into areas of Army operations to support and supplement the work of engineer regiments in preliminary clearing and construction as well as grading and surfacing of the truck trail to make it passable.

In line with the new program, Public Roads reconnaissance engineers were assigned to work in conjunction with Army pioneer road location crews ahead of construction, while contractors followed closely in widening, grading and graveling operations.

By the end of August the truck trail had been opened all the way to Fort Nelson and contractors were working on the road west, through the Rockies.

Whitehorse.—As a result of General Sturdevant's visit and the adoption of the new formula, all military and civilian forces were coordinated in this sector also to speed up work on the truck trail.

General Hoge advised Andrews that regimental commanders had been instructed to follow Public Roads Administration locations as closely as standards of truck trail construction would permit. Public Roads engineers in turn supplied Army commanders with as accurate location data as possible in advance of construction.

There remained an unsurveyed gap in the Public Roads location between the head of the 340th's advance eastward from Teslin Lake and a point on the Liard River. There was another gap between Tanacross and the White River, covering areas on both sides of the Alaska boundary. Transportation in these sections was extremely difficult, owing to the absence of pack trails and properly spaced landing places for planes. However, it was arranged to give the Army a marked line to follow, thus enabling engineer troops to hold their construction more nearly within the limits of an acceptable standard for the permanent highway than would be possible otherwise.

By the end of August the 18th engineers, headed west, had reached a point 75 miles from the Alaska boundary. The 97th had started eastward from Tanacross toward the boundary. The 340th working east, was headed for Watson Lake, and due to reach there September 3.
Contractors were following the troops everywhere and at times taking over complete sections of the road, without Army aid, usually at the request of General Hoge. It was possible by this time to hope for completion of the truck trail before the freeze-up.

**September**

*Northwest Service Command Formed.*—War Department General Order No. 44, dated September 4, 1942, created the Northwest Service Command, effective September 2, 1942.

The order stated "all activities of the Army of the United States in the Provinces of British Columbia and Alberta, the Territories of Yukon and Mackenzie, Canada, together with the operation, supply, and construction activities connected with the White Pass and Yukon Railway, and the highway from Whitehorse to Fairbanks in Alaska, together with such base installations as may be necessary in Skagway and Fairbanks, Alaska, will be combined in the Northwest Service Command..."

Brigadier General James A. O'Connor was named Commanding General of the new organization, and headquarters was established at Whitehorse. General Hoge was recalled for other duties.

*Fort St. John.*—By September troubles were piling up once more. Army construction requirements in connection with railroad improvements at Dawson Creek made it necessary to divert contractors' equipment from the highway for this work. The labor situation became acute. Rumors of labor freezing and income tax reductions from pay rolls led many men to quit the project.

Equipment was breaking down under severe usage. Parts required for repairs failed to arrive. Wire cable for tractor-scraper units was not available. Equipment between Dawson Creek and Fort St. John at this time consisted approximately of 50 major units. There were 13 power shovels, 3 draglines, 23 tractor-scraper units, 10 crushing and screening plants and 1 clam-shell excavator in this 50-mile stretch.

First fall rains and snows were bogging down travel, causing additional delays. In mid-September nine contractors were working on the pioneer road north of Fort St. John to put it in shape for use. West of Fort Nelson the same difficulties were being encountered.

Many trucks had broken down and no parts were available for replacement.

Contractors' forces had been withdrawn from the highway to build a pipeline, flight strips and for other construction.

Brown reported September 29 that reports had trickled back of a meeting east of Watson Lake of Army forces working west from Fort Nelson and east from Whitehorse. (The date of contact was later established as September 25.) But much work remained to be done to put the road in usable condition.

Toward the end of the month many Canadian students resigned to return to school. Personnel replacements were difficult.

*Whitehorse.*—The 18th engineers were assigned to complete a corduroy and gravel road to the White River, east of the Alaska boundary. From there to the junction with the 97th engineers, they were directed simply to strip forest
growth and moss so traffic could move during the winter over frozen ground, without attempting to improve the road.

Toward the end of the month a conference of representatives of the U. S. Engineer Department of the Army, Northwest Service Command and Public Roads Administration engineers resulted in adoption of a bridge-building schedule for the western sector which placed responsibility on Public Roads Administration for construction of two-way bridges over the Tanana River at Big Delta, Big and Little Gerstle, Johnson, Robertson, Chisana, Beaver, Gardiner, Takini, Lewes, McClintock and Teslin Rivers, and Nisutlin Bay. The Army also asked Public Roads to build a bridge over the Tagish on the Carcross connection, and over Slims River at the lower end of Kluane Lake. The 18th engineers were directed to build a pile trestle over the White River of sufficient strength to withstand spring high water.

The 340th was building timber bridges over the Liard River near Watson Lake and on smaller streams between Teslin and the Liard.

Public Roads engineers were asked also to build a temporary pile trestle over the Nisutlin River at the Army ferry crossing. This bridge program was to be carried out during the winter and the streams crossed on the ice meanwhile.

October

Fort St. John.—By October 10 the pioneer road between Dawson Creek and Fort Nelson had all been graded, and it had been surfaced for more than half its distance.

West of Fort Nelson engineer regiments went back over the pioneer road and began the process of widening it, lengthening culverts and making other improvements. Contractors were moved into the same section to regrade and widen the road from Fort Nelson to Summit Lake before winter made further improvements impossible, and to begin preliminary work on the permanent line at several points where the Army had approved deviations from the truck trail to improve grades and curves. Army forces concentrated on the road west of this point.

Public Roads contractors built a pile trestle bridge over the Peace River.

Contractors operated three sawmills south of Fort Nelson to supply Public Roads construction and west of Fort Nelson they operated two to supply the Army.

Construction activities were gradually halted as winter settled in and contractors turned to preparations for the coming season, maintenance of the pioneer road, construction of winter camps and cleaning up odds and ends.

Whitehorse.—Construction operations in the western sector were rushed to their finale at a junction on Beaver Creek between eastern and western construction crews, thus making it possible for a few vehicles to travel the entire length of the highway. The road was not good enough for any considerable movement of freight. Grading and surfacing operations on the section between the Donjek River and the Alaska boundary were hurried and sketchy, as the ground had frozen for the winter before the construction crews met.
East of Whitehorse the 340th engineers were improving the road west from Watson Lake and building a temporary bridge across the Liard River. The 231 engineers were supporting them from Teslin Lake to the Rocky Mountains.

Construction by Public Roads contractors of Army headquarters and hospital buildings in Whitehorse was delayed by the grounding of the freighter "Daylight," one of the Public Roads Administration fleet, while en route to Skagway with supplies.

A considerable percentage of Public Roads personnel was returned to the United States, leaving only a few men to be placed with construction parties. It was decided to transfer permanent Civil Service personnel to home offices in the United States to work on design for the permanent road during the winter, retaining temporary employees on the project to handle construction engineering.

Andrews received a call from the Army in October asking that the contractors be assigned to grade and widen western sections of the pioneer road. The Army road was 12 to 18 feet wide, too narrow for two-way traffic, and otherwise unsuited for heavy traffic as well. Only a short time remained before the ground and gravel deposits would be frozen too solidly for any work.

However, contractors were distributed over the road from a point 32 miles east of the Nisutlin River at Teslin Lake, with instructions to grade and surface it to a 24-foot width. This operation included cutting off a high crown on the truck trail, filling ditches and smoothing the road traffic. The road was lightly graveled before the season ended from east of the Nisutlin to a point several miles west of the Donjek, a total distance of approximately 400 miles.

With supply and equipment shortages piling up and transportation bottlenecks developing at all supply and transportation centers, the winter outlook was made gloomier by storms which grounded several vessels in the Inland Passage while en route between Skagway, Prince Rupert and Seattle.

A fire at Gulkana October 31 destroyed a storage garage, shed and two trucks. Holes had to be chopped in the ice to get water to fight it.

Except for the gradual curtailment of construction operations on the highway as winter arrived, the situation would have been desperate.

**November**

**Fort St. John.**—In November General O'Connor approved proposed departures from the truck trail route by the permanent route in the section between Fort St. John and Fort Nelson. These departures, however, did not contemplate a return to the original Public Roads line, and required a new Sikanni River crossing. Locations were considerably west of the preliminary line.

The temporary Peace River bridge was opened to traffic November 21.

Public Roads Administration was still chiefly responsible for road maintenance at this time and contractors were carrying on this work although it had been indicated that maintenance would be done by Army units.

Contractors began to wind up their operations and send crews home, retaining only skeleton forces in winter camps. Practically everything had been done which could be done in this sector before the full onset of winter.

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The road had been given a smooth surface over most of the distance from Dawson Creek to Fort Nelson and was usable for winter hauling over the remainder of the route.

Capes reported advance clearing operations for the permanent road between Fort St. John and Fort Nelson had been practically halted by the shifting of most of the labor forces to Army construction work, and that it was impossible to recruit woodsmen for clearing operations so late in the year.

Whitehorse.—Contractors rushed final pre-winter improvement of the truck trail wherever possible. Andrews reported November 7 on operations near the Alaska Boundary: "The 97th Regiment, with the very material assistance of the civilian contractors, continues to make excellent progress and it reported that they have reached a point within 20 miles of the White River. In all probability this organization will reach the White River with the pioneer road without any assistance from the 18th Regiment."

On the Haines cutoff (Haines to Champagne) the progress of the survey had developed the fact that 9 miles of 8 percent grade would be required to reach the summit of this branch section of the highway from its start north of Haines. It was roughly estimated that on the southerly 50 miles, 2,250,000 cubic yards of excavation would be required, of which approximately half would be rock. The Public Roads survey party was housed on skids and moved forward over the winter trail by tractor equipment.

Seepage water flowing on the road and freezing was developing ice deposits at places near Tanacross and on the Gulkana road.

South of the Dezadeash River an ice deposit half a mile wide developed. Ice built up six feet thick over the truck trail.

Owing to the impossibility of obtaining adequate penetration for piling, the Army placed frame bents for the temporary White River bridge directly on the ice except in the channel of the shallow stream.

Ice deposits formed on the road generally all the way from the Dezadeash to the Big Delta River in Alaska.

Contractors were assigned to build maintenance camps for the Army at several points in Alaska.

November brought the final break-through on the western end of the road and thus marked completion of the truck trail. The achievement was celebrated with a formal ceremony November 20 at Soldier's Summit, above the southern shore of Kluane Lake. A blizzard raged during the ceremony. Approximately 150 persons attended, including representatives of the Army, Public Roads Administration, Canadian Government and contractors.

General O'Connor, who had been given command of the Northwest Service Command, decided that in winter operations first priority be given to maintenance and construction of the road west of the Donjek River instead of on an 80-mile stretch between the Nisutlin River and Cook's Pass, 80 miles east, where contractors had organized for winter improvement.

Bridge troubles were developing as the month closed. Two bents on the Tanana trestle bridge were displaced by ice strains, stopping traffic over the
bridge. The temporary bridge over the White River was iced in when a flood, followed by freezing caused the bridge and all approaches to be covered with ice.

Andrews reported that pioneer road around Nisutlin Bay had been "almost impassable to truck traffic" until the ground froze. It was recommended that this middle section of the Army road be surfaced to facilitate movement of traffic in 1943.

The most difficult section for movement of traffic was the 400-mile stretch from Summit Lake to Teslin Lake—through the Rockies and along the Liard, Rancheria and Swift Rivers. The worst going of all was encountered between Teslin and Watson Lake in a combination of heavy grades, narrow widths and sharp curves. This section had not been widened and gravel surfaced by the contractors.

December

Northwest Division Organized.—On December 1, the Northwest Division of the Corps of Engineers, with Colonel Theodore Wyman, Jr., as Division Engineer, was activated within the Northwest Service Command to carry on the task of completing construction on the highway, Canal Project, telephone line, airport and flight strips. (See General Orders No. 42 of November 14, 1942 in Appendix.)

The Division Engineer was instructed to create Engineer Districts to facilitate the task of executing orders from the War Department, Office of the Chief of Engineers, and the Northwest Service Command. District offices were set up in Edmonton, Dawson Creek, Whitehorse, Prince Rupert, Skagway, and Fairbanks in December.

Fort St. John.—At the beginning of the month 18 American and 10 Canadian contractors still had forces working on the truck trail, engaged in grading, graveling, stockpiling surfacing material, building winter camps, arranging for equipment overhaul, organizing for winter rock work, completing temporary or permanent bridges and assisting the Army in winter maintenance and snow removal. This work continued throughout the month.

Whitehorse.—December presented a dreary picture from the viewpoint of traffic movement over the western sections of the highway, even though the road had been formally opened.

Working in frozen ground and frozen gravel pits equipment was breaking down faster than ever. Temperatures of 50 and 60 degrees below zero caused the steel to break under moderate strain. It was impossible, because of the bitter cold, to make repairs. Much broken down equipment had to be left where it fell, along the road.

Bridges were being covered with ice or going out after ice pushed them out of line. Material for other structures had not arrived.

The White Pass and Yukon Railroad broke down repeatedly and rail deliveries from Skagway became an intermittent trickle. The highway west of Whitehorse had to be closed from time to time. There was practically no truck traffic.
The 97th engineers moved into Public Roads Administration camps west of the Alaska boundary and undertook maintenance of the road in this area. Contractors maintained the road from Klama Lake east to Teslin Lake.

Early in December Colonel Wyman announced at a conference that the Army would assume responsibility for all winter maintenance. This altered directions given by General Sturdevant on July 13 when he requested that Public Roads "... take immediate steps to (1) take over maintenance of certain portions of the Army pioneer road and (2) to make all necessary preparations to maintain the entire road for truck traffic throughout the coming winter." It quickly developed that the Engineer troops remaining on the highway lacked the necessary facilities, and this responsibility was thrown back in part to Public Roads Administration contractors. On December 31 he issued detailed instructions to Public Roads headquarters as to winter maintenance, stated that 95th Engineers would no longer be available for maintenance and directed that contractors begin maintenance from Fort Nelson to Trout River.

January

Fort St. John.—Contractors' operations consisted chiefly of work on permanent bridges across the Peace, Sikanni Chief, Muskwa and Liard Rivers, production of lumber at seven sawmills in addition to those operated at the Liard crossing, most of whose output was taken by the Army, and preparation of camps and equipment for the 1943 construction season. Railroad and other transportation tie-ups, however, so delayed delivery of needed equipment as to slow down these operations materially.

It has been decided to build steel bridges over all major streams on the highway and foundation work for these structures proceeded as rapidly as materials could be assembled. Special emphasis was placed on completion of permanent bridges across the larger streams in order to supply operations in 1943.

In mid-January the Army turned all responsibility for maintenance of the truck trail over to Public Roads Administration. This decision was reached too late to permit equipment and adequate maintenance crews to be brought to the project for winter maintenance.

The entire highway was under snow. West of the Rockies the narrow road and deep ditches were a source of endless traffic troubles.

Equipment continued to break down.

Contractors immediately began building machine and maintenance shops and assigned mechanics to rehabilitate broken equipment as rapidly as arrival of parts made this possible, thus beginning the groundwork for 1943 operations.

Whitehorse.—Dowell maintenance and construction shops in Whitehorse, employing 50 men, worked almost entirely on Army construction and overhauling of Army caterpillar equipment, trucks and passenger cars. Contractors' forces were recruited for winter maintenance and patrol units were organized. Army forces provided labor for the attempted control of icing developing at various points on the truck trail.

A few rail shipments were getting through from Skagway, but the narrow gauge road hauled only emergency supplies and fuel. By mid-January supplies
of food, equipment, materials and fuel were running critically low in Whitehorse. Oldtimers said the winter at Whitehorse, where the temperature dropped to 70 degrees below zero, was the worst since 1917.

Seaport dock facilities were so congested, owing to railroad shutdowns and preferences granted to vessels carrying Army and Canal freight, that the "Daylight" was delayed for weeks waiting to unload a cargo which had arrived in December.

Temperatures dropped to 72 degrees below zero on the upper end of the road. At Fairbanks the mercury did not rise above 25 degrees below zero for six weeks. In the latter part of January all outside work ceased because of low temperatures.

On January 19 Public Roads District Engineers received a communication from Colonel Wyman finally approving specifications for construction of a permanent type highway in 1943 by civilian contractors operating under direction of the Public Roads Administration. Design standards for the road, outlined in a memorandum (see appendix), were substantially those to which the Public Roads Administration had adhered from the beginning. Broadly, they called for a graveled or crushed stone surface 24 feet in width, with an over-all width of 36 feet, dust preventive treatment were practicable, easy curves and maximum grades of 3 percent in lower elevations and 7 percent in mountain sections. Subgrade and surfacing courses were to be provided to support a load of 10,000 pounds per wheel under all weather conditions, with a maximum base course of gravel or crushed rock twelve inches in compacted depth. Completion date was set as November 30, 1943.

Guided by this directive, Public Roads Administration forces began definitely to organize 1943 construction of the permanent highway on the line selected for it, for which surveys were completed in December. Colonel Wyman advised it was not anticipated that troops would be available for any construction work in 1943.

February

Fort St. John.—The month was devoted principally to maintenance and improvement and straightening of road sections intended to be incorporated in the permanent highway. Fills were raised, culverts installed, stream channels diverted, narrow sections widened, guardrails placed on small bridges and muskeg excavated and replaced with stable material.

Insufficient steel deliveries delayed work on some of the larger bridges but work on timber spans across the Kiskatinaw and Sikanni Chief continued day and night. Lack of parts and slow deliveries continued to hamper rehabilitation of contractors' equipment.

Surfacing materials were stockpiled for future use. With arrival of warmer weather in February surfacing operations were resumed. The Army road had become rutted and graveling was necessary to permit movement of traffic.

Brush in forest clearings was piled and burned.

Toward the end of the month cement and steel began to arrive for the bridges, permitting resumption of construction activities at river crossings.
Engineer regiments, with the exception of two companies, were moved to new assignments elsewhere and quartermaster forces moved to the highway to establish control and relay stations for the handling of through traffic. Oil supplies were accumulated at control points.

In preparation for work on the permanent highway, construction contractors at one point along Muncho Lake blasted a solid cliff and moved 100,000 cubic yards of rock with one shot, using 82 tons of explosive, the equivalent of 41 "block busters" such as those dropped on German cities.

Heavier freight movements started north by truck from Dawson Creek during the week of February 21 continued through the month. About half of the freight received represented bridge materials and the remainder equipment and supplies.

Contractors began moving their advance forces to the highway in preparation for 1943 construction.

Whitehorse.—A gasoline line from Skagway to Whitehorse was placed in operation, relieving transportation pressure at this point by making it unnecessary to ship motor fuel over the railroad. An extension of the line to Teslin was nearing completion and progress was being made on a similar pipeline to Fairbanks.

Rapid progress was being made also on construction of the telephone line to Alaska.

It was reported that the Army intended to take the contract for the Haines Cutoff away from Dowell who worked under direction of the Public Roads Administration and give this assignment to another contractor. The rumor proved correct.

On February 28 the U.S.E.D. office at Skagway received a directive to move out the forces and equipment of contractors operating under the Public Roads Administration by March 15. Since the movement had to take place over the White Pass and Yukon Railroad which was badly congested, this was a physical impossibility. However the movement was under way the latter part of March. The three contractors moved were placed on the main highway near its junction with the Haines road. The Army assigned work on the Haines road to Rohl-Conolly-Foley Brothers.

March

As the first year of work on the highway drew to a close the workers had many accomplishments to show for the long hours of work and hardships they had endured. Preparations had been made that would make possible the building of the final highway in the coming season.

The number of contractors' employees had remained near 5,000 from September through January and then climbed upward to 6,500 in February and 7,400 in March. These men were located largely south of Watson Lake as a report from the Whitehorse office at the end of March showed only 1,477 contractors' employees and 154 Public Roads employees.

During March men built barracks, shops and terminal facilities for the coming season. A large amount of equipment, damaged during the previous season, particularly in attempts at winter construction was repaired. A considerable
number of men were keeping the highway open for essential winter hauling. This included snow removal, graveling slippery surfaces, removal of ice deposits on the road and improvement of places left in bad condition at the end of the previous season. Drilling and blasting was in progress to hew a road in the cliffs along Pistol Creek and Muncho Lake.

At the larger stream crossings on the south end of the project, two shifts of men were working 20 hours a day on bridges that would be needed for the heavy hauling during the summer months. These rivers were the Kiskatinaw, Peace, Sikanni Chief, and the Muskwa. Moving great quantities of supplies, equipment and materials across them by ferry or temporary structure had been a serious obstacle in 1942 operations, and would be even more serious in the larger operations of 1943. These operations were to include hauling for all of the varied Army activities along the highway.

From the viewpoint of 1943 plans, the first year of the highway project ended on an optimistic note, except for two unanswered questions:

1. Would available funds be sufficient to build the permanent highway to approved specifications, thus providing an all-weather route permitting the year-round movement of heavy traffic to Alaska as originally intended?

2. Could transportation bottlenecks be broken in time to guarantee delivery of equipment and supplies to the project before the beginning of the 1943 construction season, and thus permit construction activities to continue without interruption until the end of the year?

There was a marked improvement in the general outlook as heavy freight deliveries at Dawson Creek continued into March and the White Pass and Yukon Railroad resumed regular operations between Skagway and Whitehorse.

Design work for the permanent highway, carried on during the late winter in Denver, Ogden, San Francisco, Vancouver, Whitehorse, Fort Nelson and Fort St. John, was sufficiently advanced to permit construction operations to get under way as soon as the necessary forces could be moved to the highway.

Contractors' crews began arriving in March to get started before the April breakup.

Bridge design was carried on in Phoenix (Arizona), Ogden, Vancouver, Whitehorse, Fort St. John, and Edmonton. Bridge steel was being delivered or on the way. At the Sikanni River bridge, contractors' forces were expanded to permit operations to be carried on 24 hours a day.

Equipment repairs were accelerated and plans made for emergency maintenance stations throughout the length of the highway.

These developments promised to give the 1943 program better than a two-months start over that of the preceding year.