A GEOGRAPHIC ANALYSIS OF SURFACE TRANSPORT IN ALASKA

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A GEOGRAPHIC ANALYSIS OF SURFACE TRANSPORT IN ALASKA

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ABSTRACT

A GEOGRAPHIC ANALYSIS OF SURFACE TRANSPORT IN ALASKA

By Alan L. Weintraub

The purpose of this study is to show how the pattern of surface transport within three regions of Alaska has materially influenced and is integrally related to the physical and economic elements of the Alaskan scene.

The necessity for a flow of adequate traffic has particular significance for Alaska. This region occupies one-fifth of the land area of the United States and great distances within the state separate areas of production and consumption. Alaska focuses upon the production of materials destined for distant markets and relies upon distant sources of consumer goods. Transportation has therefore played a decisive role in the economy of the state. The adequacy and extent of this system in turn reflects factors of location, economics, and physical features.

Economic development in Alaska occurred in two stages. A first phase was introduced by the discovery of gold in the interior in 1896. This caused an influx of

Alan Weintraub

prospectors and miners. After a period of fluctuation in population, a stabilized mining industry flourished. Until recently, mining--along with fishing--was the basis of the economy. The advent of World War II and recognition of the importance of Alaska in the national defense initiated another stage of growth in the area. Substantial government expenditures for the construction of military facilities, combined with the demand for service industries to serve the large construction forces, resulted in rapid growth, far exceeding that of the mining industry.

In the first stage, the transport pattern of South Central and Interior Alaska expanded to serve the needs of the mining industry. Routes were determined by valleys and plateaus, mountain passes, and water-level lines. Rugged topography made construction of highway and rail lines costly. The Coast Ranges presented a formidable barrier to the more productive areas, creating needs for expensive grades and tunnels. Natural water-level routes were found solely in the Susitna and Copper River valleys. The Alaska Range further blocked and complicated transportation. Water routes offered some solution: ocean and inland waterways saved the region from complete isolation during its pioneer period.

During the mining period reliance upon surface transport routes limited activities to the immediate r.

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proximity of the land and water transport network. This pattern still exists today. Movement of men and freight into the Interior was accelerated with completion of the Alaska Railroad in 1923. By permitting the shipment of larger and heavier equipment the railroad provided a stimulus to the region's economic growth. However, with mining as one of the two major basic industries, economic development was still limited in scope.

Military needs led to expansion and improvement of the roads. The Alaska Railroad was reconstructed and modernized. The transportation network brought to the area various types of economic development, spurring recent heavy gains in population.

Increase in population during the military period fostered the growth of cities in South Central and Interior Alaska. Urban activity stimulated intraregional trade between urban and rural areas. Both imports and exports increased in volume. The transport system fostered urban growth by lowering time and costs of both passenger and commodity movement. Most of the rail- and road-borne trade moved through the city of Anchorage. The location of the latter at the convergence of rail and road routes contributed much to its dominant position.

Southeast Alaska depends upon shipping. Topography, climate, use of resources, and location of settlements all combine to impose this reliance on water transport. The water transport system played a role in the regional development of Southeast Alaska similar to that played by the road and railroad system in South Central and Interior Alaska.

North and West Alaska depend upon water and air for transportation. Land transport facilities are scarce, handicapped by sparse population, lack of development, terrain, and climate. Roads generally serve the gold mining operations and other industries added during World War II. Short stretches of road are found around populated centers. Trails or winter sled routes--used mostly by natives and trappers--connect isolated settlements by land. As a result, much of the area is inaccessible during most of the year.

The conclusion reached by this study is that the geographical character of Alaska has been greatly influenced by surface transport. It is evident that modern transportation is indispensible to economic development and settlement. The transport network is in turn a reflection of physical and economic factors. Expansion of the system will depend upon the character of these physical and economic elements away from the core region of the state.

A GEOGRAPHIC ANALYSIS OF SURFACE

TRANSPORT IN ALASKA

Ву

Alan Weintraub

A THESIS

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CHAPTER I

INTRODUCTION

Purpose and Method of Study

The vital issue of transportation in the Arctic and Subarctic is a problem causing concern to governments with possessions in polar regions in which they are trying to increase productivity. The problem is important to the United States. Alaska, the 49th state, is one-fifth the size of the entire United States. It is also separated by a vast distance from the other 48 states, with their centers of economic activity.

It is the purpose of this study to examine the activity of surface transportation in Alaska, particularly in the South Central and Interior region. The study further inquires into physical and economic factors affecting the growth of transportation routes, and the relation between land transportation and these conditions.

A study on regional geography contains the follow ing:1

Knowing the number of miles of railroads in . . . [a country] is less important than knowing the patterns of distribution and interrelation which the railroads reflect and stimulate . . . the role of railroads in

¹Rhoads Murphey, <u>An Introduction to Geography</u> (Chicago: Rand McNally and Company, 1961), p. 52.

the regional economy, and the part which these patterns or factors may play within the whole of the . . . regional unit.

In the present study, surface transportation in Alaska is not considered an autonomous segment of the economy, artificially isolated from its environment for purposes of analysis, but rather, an intimate part of the local pattern of living.

Addition of a functional element to patterns of distribution adds a perspective which results in better understanding of the function of a particular region in Alaska's economy, and gives meaning to patterns of activity within homogeneous regions. An examination of surface transport patterns, then, is basic to geographic understanding of particular regions and the interrelationship between areas.

Alaska is one of the last American "frontiers" remaining to be developed. Forethought concerning future developments will affect future ventures. The problems of Alaska are similar to those in other parts of the Arctic. Consequently, before attention is turned to the particular case of Alaskan transport, it is desirable to view the topic against the background of the problem of Arctic economic development in general.

The Arctic and Subarctic--An Undeveloped Region

The arctic and subarctic regions comprise thousands of square miles of unattractive land. The area is immense;

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the climate is generally inhospitable; building is hindered by the presence of frozen ground; and great distances separate the region from major centers of development. These factors produce an environment that is unattractive to settlement. Dense population is not to be found anywhere. Agriculture and manufacturing are seldom found. The provision of even minimal transportation services is costly and difficult. The arctic regions are characterized by such physical and economic hardships that they must be classified as unfavorable to human progress. Despite all this, much has been done already in advancing the northern frontier.

The interests of nations in the Arctic.--The economic and strategic potential of the Arctic region gave it new significance in the middle of the 20th century. Depletion of natural resources, particularly minerals, raised the value of high-quality supplies from remote areas, and increased interest in the high-latitude regions. This was accompanied by accelerated development of techniques suitable for "far north living," and for efficient conduct of industrial enterprises. The strategic importance of the area was advanced by rapid progress in aviation and longrange aircraft after 1940. The great circle course for airplane traffic obviated the difficulties of climate and terrain, giving impetus to military and commercial enterprises. During World War II, air bases in Greenland, and

in the Alaskan, Canadian, and Soviet Arctic were developed. Routes were pioneered, and weather stations established. Starting in the 1950's, planes were used regularly to gather data about the weather; air traffic between Eurasia and America grew rapidly.

Concepts of global war aided new evaluation of the Arctic. The International Geophysical Year of 1957-1958 found scientists from sixty-six nations working on the study of glaciers, permafrost, magnetism, northern lights, and weather. Other research was undertaken by governmental and private agencies throughout the world.

The Problem of Economic Development in the Arctic

In spite of numerous efforts by individual countries to develop the polar regions, problems of the Arctic and Subarctic remain. There is still insufficient capital for full development. Industrialized sectors of both continents must still provide the basic materials for industry. Large-scale manufacturing is retarded by inaccessibility, limited resources, labor, and absence of markets, as well as competition from more favorably situated areas. Agriculture is limited by poor soil, ground frost, and a short growing season. The high dependence on extractive industries, such as mining, lumbering, and fishing, has not disappeared. The climate continues to impose seasonal fluctuations in trade and industry.

The population remains small. The psychological handicaps of long winters continue to be difficult to overcome. Wealth is drawn off to other parts of the earth that are more mature economically. Trade is limited because of the short shipping season, the small population, the high cost of living, the remoteness, and poor transportation facilities. Transport costs are still high because of distance, terrain, and climate. Federal funds still supply most of the capital for the expansion of the transportation network; private investors are not attracted to such limited profits. It is unlikely that even new ambitious construction projects will do much to solve the transportation problem.

<u>The role of transportation in the Arctic and Sub</u>-<u>arctic.--</u>The significance of the transportation problem is explained by Stone in the following:¹

Only the northwestern continental parts of it have year-around sea transport available, so most of the region is dependent upon more expensive (in money and time) methods of moving goods and people. Railroads and roads within the region, and connecting it with the mid-latitudes, are best developed in the Fenno-Scandian mainland part, and the European Soviet part is probably second best. River traffic is most significant locally and seasonally in Siberia, and throughout the region it is of minor significance in solving the problem of regional isolation. Throughout the Arctic Region private and commercial air travel is of considerable local value, and regionally it is of increasing importance;

^LKirk H. Stone, "The Arctic Region," in <u>Military</u> <u>Aspects of World Political Geography</u> (Alabama: Air University, Maxwell Air Force Base, 1959), p. 200.

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but the region is still largely a "fly-over" area for most international flights.

The greatest need of the Arctic is that for transportation, by rail and road. Millions of dollars are being invested in the improvement of transportation routes of the region.¹ These may be sufficient, if put to effective use, to bring development of resources in the Arctic and Subarctic.

<u>Alaska and the Soviet Far Northeast</u>.--In attempting to make an appraisal of the transport network and economic development within this undeveloped region, Alaska is often compared to the European Arctic, which it closely resembles both in climate and terrain. The American north is, however, better compared to the Soviet Far Northeast, with which it shares a large portion of the Arctic region. A brief note on Northeastern Siberia must also be added if only because the Soviet Arctic is

¹According to some geographers military considerations may be the only basis for developing the transport network in the Arctic: "Canadian control of the Northland and the extension of communications and transportation routes in that direction are also uneconomic. However, they must be considered in the light of political geography rather than judged by the criteria of physical geography and economics. An uncontrolled northern frontier would be a threat, not only to Canada, but to the safety of the whole North American civilization." Donald E. Putnam (ed.), <u>Canadian Regions, A Geography of Canada</u> (New York: Thomas Y. Crowell Company, 1952), p. 570. The military value of this area was also noted by S. B. Jones, who stated: "A realistic appraisal of the northern high latitudes must place military considerations in the forefront." S. B. Jones, <u>The Arctic: Problems and Possibilities</u>, Memorandum No. 29 (New Haven: Yale Institute of International Studies, 1948), p. 24.

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so often mentioned in discussions of northern development.

The Soviet Far Northeast is in many ways the counterpart of Alaska. Immediately across the Bering Strait from Alaska and fronting the Pacific, it stretches from the Lena-Aldan River past the Sea of Okhotsk and the Kamchatka Peninsula to the Chukchi Peninsula. This enormous district is the least developed in transportation facilities and the most sparsely populated in the Soviet Union. In many respects it is much more underdeveloped than Alaska. The only main road runs north from Magadon, on the Sea of Okhotsk and at the same latitude as Anchorage, to the Upper Kolyma mining district. It acts as a supply base and transshipment center for the interior. Winter roads lead west from it to Yakutsk. Yakutsk, with a position similar to that of Fairbanks, is the service center for the vast interior of Northeast Siberia. A road, 620 miles long, connects Yakutsk with the Trans-Siberian Railroad, forming the only outlet for communication between this huge area and rail transportation. Air transport is therefore of vital importance, connecting south with north, and the mainland with Kamchatka.

As to water transportation, navigation of the North American Arctic Ocean by surface vessels is possible in the summer for only a short period, and only south of the polar ice-pack. On the Siberian coast, navigation is much easier than along the Arctic coast of Alaska: the

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ice-free belt is wider, and the Soviets can navigate the route from two to four months during the summer.

Many of the large rivers flow north. The Lena, Yana, and Indigirka are all navigable in summer by boats which utilize the Northern Sea Route. These rivers allow penetration far into the interior. Like the Yukon they serve a region otherwise isolated from surface transport. Permanent towns and cities have been founded along the Asian sector of the Arctic in recent years. They are transfer points for local exports and imports. Most are at or near the mouths of rivers, and their commerce is mainly of Arctic origin.¹

Northeast Siberia is one of the least well developed regions within the Soviet Union, but the whole area has both strategic importance and rich natural resources in the zones already explored. Inaccessibility, however, will continue to impede development as is the case in Alaska.

The case of Alaska.--In 1959, Alaska became the 49th state of the United States and greater attention was

¹Ports not serving river systems on the Pacific are also of considerable importance. The port of Provideniye Bay is one of the three most important points on the Arctic route, serving the whole Chukchi Peninsula as a center of distribution. South of Provideniye is the port of Anadyr. It is also a distribution center for a large area. Further south the Soviet Union has an icefree area for naval operations--Petropavlovsk; but the port lacks overland connection with sources of supply. George H. T. Kimble and Dorothy Good, <u>Geography of the</u> <u>Northlands</u> (New York: John Wiley and Sons, 1955), pp. 480, 484.

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focused on the economic importance of this area. The development of the North American Arctic has been more than matched in the Eurasian Arctic. However, because of certain basic differences development of Alaska and utilization of its potentialities must follow its own course. The immensity of the area, the climate, the difficulties of transportation constantly hinder progress. Despite all this, much progress has been made in the development of However, it will require strong economic incen-Alaska. tives to produce any major increase in population in the People will not undertake the hardships of pioneer area. life until better markets and transportation facilities are provided.

Transportation--or lack of it--has had a great influence upon the inhabitants of Alaska. In a region of vast distances which is moreover somewhat removed from the Pacific Northwest states to which it is bound by economic and cultural ties, this is inevitable. The people of Alaska depend heavily on steamship lines, highways, and airways for contact with other states, as well as for that between points within the state itself. A map of population distribution shows how the people cling to developed routes (Fig. 32).¹

¹One of the major differences between Alaska and other states is that of size. This factor dominates spatial relationships of the entire state. The fact that much more of the Alaskan populace has utilized the small airplane, as compared with other places in the world, is

Definition of transport regions.--In order to analyze Alaska's transport pattern and to better evaluate the role of transportation in the state's development, I have divided the study area into three regions, all exhibiting some degree of functional unity (Fig. 1). Each of these transport units is demarcated by a specific type and pattern of transport. Waterways dominate one region, a railway and highways the second, and airways the third. Besides differing in types of transportation the three areas also differ in their stage of road and rail penetration. Distinctive physical settings, points of focus, and economic activities have influenced and in turn have been influenced by transport, further emphasizing the division of the above delimited areas.

The designation "South Central and Interior Alaska" refers to that area which lies south of the Brooks Range, and east of longitude 151°.¹ The total area comprises 205,500 square miles--an area slightly larger than that of

a direct result of this factor.

The sheer size of geographically homogeneous areas further illustrates this aspect peculiar to the Alaskan landscape. For example, the Cook Inlet Basin is approximately 300 miles long and varies between 50 and 100 miles in width. This is nearly two-thirds the size of the Great Valley of California, which is approximately 400 miles long and only 40 to 75 miles wide. The significance of these relative sizes is illustrated by the fact that the Cook Inlet Basin represents less than 3% of the total area of Alaska whereas an equivalent portion of the Great Valley of California covers approximately 15% of the State of California.

¹It will henceforth be referred to as the "Area." The geographic boundaries of the area approximately coincide with census districts in order to facilitate the collection of data.



Illinois, Iowa and Missouri combined. The South Central and Interior region, the economic core of the state, is the area in which most of the nonindigenous population live and where the greatest economic development has occurred. A good road and rail system exists. The highway portion of the pattern spreads east and south, from Fairbanks to Anchorage and the South Coast. It links the major urban centers. The western section is served by the Alaska Railroad which runs from Seward and Whittier, through Anchorage to Fairbanks. The Yukon and Tanana rivers serve the north of the region and act as feeders to the rail and road system. The economic unity of the region is furthered by the fact that the principal defense establishments are located there.

Rail and road lines determine the boundary of North and West Alaska. In dealing with North and West Alaska we are concerned with an area north of road and railhead, a fact which in itself imparts distinctive characteristics and problems to the area. North and West Alaska is still a pioneer region with a small population. Only a few resources are exploited.

The limits of the Southeast area consist of the territory immediately accessible by the coastal waterway. Southeast Alaska exhibits the highest degree of regional unity in physical features, natural resources, and economic development.
<u>Arrangement of topics</u>.--In the following analysis of the geography of transportation in Alaska, particular attention will be paid to the following topics:

- a) How natural conditions and human needs have tended to influence the construction and maintenance of the pattern.
- b) Stages in the development of the present surface transportation system.
- c) Scale and direction of economic growth in individual regions in relation to the evolution of the land transport pattern.
- d) How Alaska functions as a producing and consuming area as revealed by analysis of commodity movement.
- e) Relation between the growth of Alaskan rail, road, and river freight and the technical renovation of the land transport pattern serving the region.
- f) Plans for future development of roads and railways as related to economic development within Alaska.

CHAPTER II

THE REGIONAL SETTING OF SURFACE TRANSPORTATION IN SOUTH CENTRAL AND INTERIOR ALASKA

The Regional Setting

Physiography

The history and economic development of this large area is affected by the physical factors of the landscape. Without an understanding of the Area's chief physical features, it is difficult to appreciate the evolution of the transport pattern. The purpose in this section is to sketch the principal physical features emphasizing those which directly affect the land transport pattern.

South Central Alaska: the Zone of Mountains.--A vast mountain zone occupies most of South Central Alaska (Fig. 2). The broad belt of high glaciated mountains and intermontane plateaus contains the Alaska, Chugach-Kenai, Talkeetna, Wrangell, and St. Elias Ranges. The highest elevations in the United States are found in the Alaska Range: Mount McKinley rises 20,320 feet above sea-level, while Mount St. Elias in the St. Elias Range attains an elevation of 18,008 feet.

I. C. Russell led an expedition attempting to scale Mount St. Elias in 1891. His description of the



area follows:1

I expected to see a comparatively low forested country, stretching away to the north, with lakes and rivers and perhaps some signs of human habitation. What met my astonished gaze was a vast snowcovered region, limitless in expanse, through which hundreds, perhaps thousands of bare, angular, mountain peaks projected. There was not a stream, not a lake, and not a vestige of vegetation of any kind in sight. A more desolate or utterly lifeless land one never beheld. Vast, smooth snow surfaces without crevasses stretched away to limitless distances, broken only by jagged and angular mountain peaks.

The relief of the coastal region of South Central Alaska makes it impracticable to build and maintain highways or railroads in many parts of the area. Mountains around the Gulf of Alaska and Prince William Sound are cut by deep fiords with precipitous walls rising thousands of feet high. The deltas of streams and the offshore islands offer the only flat land. Transportation is limited to boats and planes.

The topography of the coastal region is so rugged that land routes cannot be considered: only a limited number of access routes reach into the interior. The route through the Kenai Peninsula and the Susitna-Cook Inlet lowland is the most significant one (Fig. 3). The route along the Copper River is increasing in importance for the development of Interior Alaska. Coastal land

¹Howel Williams, ed., <u>Landscapes of Alaska, Their</u> <u>Geologic Evolution</u> (Berkeley: University of California Press, 1958), p. 38.

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connection between the two routes is cut off by mountains.¹ Communities have grown up at the coastal termini of these routes. While relatively isolated from one another, the economy of each community relies heavily on transportation services.

The mountains of South Central Alaska rise sharply from the coast. Streams draining into Prince William Sound and the Gulf of Alaska cascade in falls or cataracts. There are no ready avenues for water traffic inland. Only the Susitna and Copper Rivers are navigable by shallowdraught motor launches. In flood periods, traffic can ascend the Copper River 150 miles. Regular service is not practicable because of silt accumulation, vagaries of the river course, and the turbulent current. On the lower reaches of the Susitna River, traffic can move for 70 miles.

To the north is a mountainous region with an eastto-west trend. With the exception of a few lower passes which have been utilized for roads or railroads there are no feasible routes across this mountain belt.

Where passes are high or non-existent, routes form actual switchbacks for trains and trucks. The 63-mile line from Portage Junction on the Alaska Railroad south to Seward crosses the Kenai Mountains with steep grades

¹Transportation routes are shown on Fig. 14, and distances between local communities and other points over established routes by each mode of transportation are given on Table 5.

on both sides. In one district the track makes a complete loop in climbing to the summit of the mountains.¹

The general latitudinal trend of the mountains subjects the passes to dangers from landslides and rockfalls. That pattern of east-west ridges is indicated in the following:²

A striking feature of this segment of the Alaska Range, particularly noticeable from the air, is the pattern of parallel east-west ridges, about 15 miles apart, separated by long narrow valleys. Strangely enough, the drainage does not follow these valleys but has a dendritic pattern roughly at right angles thereto, the rivers cutting directly across ridges and valleys alike. In some places the parallelism of the northward-flowing streams is as conspicuous as that of the ridges and valleys perpendicular to Each river as a consequence crosses the them. range alternately across a lowland in a broad terraced valley and then plunges into a narrow gorge. This makes north-south travel along the rivers much more difficult than east-west travel along the longitudinal lowlands. Hence, except for the Alaska Railroad, which follows the Nenana River, all roads and highways, such as the McKinley Park Highway, follow east-west valleys. The Alaska Railroad crosses the high ridge between McKinley Park Station and Healy in one of the most spectacular gorges along its route, and so is subject to the danger of landslides and rockfalls.

Interior Alaska--the Lowland Zone.--North of the Alaska Range plateaus and lowlands are drained by the upper reaches of the Yukon River and its tributary, the Tanana. The plains through which the rivers flow vary in

¹Department of the Interior, The Alaska Railroad, "Operating Conditions on the Alaska Railroad" (Anchorage: Traffic Division of the Alaska Railroad, mimeographed).

²Williams, p. 52.

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elevation from 2,000 feet at the Canadian border to 200 feet at the junction of the two rivers. These lowlands are flat "muskegs" and support growth of stunted spruce and birch, with occasional willows, alders, and poplars. The rivers are aggrading and flow in braided channels.

Navigation of the rivers is hazardous. Pilots operate from years of experience. Upstream movement of freight is limited, traffic being slowed by the rapid river current.

In contrast to South Central Alaska terrain has not much affected location of roads in this area. However, long straightaways found at newly-designed sections--such as one from Big Delta to Tok Junction on the Alaska Highway--are not common. Roads built before 1942 run along high ground, the builders evidently preferring curves and steep grades to swamps and the danger of floods.

Diversification is the chief characteristic of the physical landscape. The intricate physical setting has rendered arduous and costly the task of transport. It has produced a checkered pattern of human settlement, increasing the difficulties and expense of transport. By road and rail, transport services serve productive districts only at the cost of crossing, with great difficulty, unproductive tracts with no prospects for remunerative traffic.

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<u>Climate:</u> its effect on transport.¹--Climate interferes with local transportation media. Heavy rains in the coastal region of South Central Alaska cause flash floods. Lakes impounded behind glacial barriers are suddenly released resulting in extensive damage.² Bridgeand rail-beds suffer from flooding and erosion during the wet season or the spring melt.

Floods are annual occurrences. Where man has ventured into floodways he has endured loss of property, and cost of readjustment has been great. Roads built

The Alaska and Wrangell mountains lying to the north of the Cook Inlet lowland and Copper River Plateau form an effective barrier to the flow of maritime polar air off the north Pacific Ocean. Because of the lack of the moderating influence of maritime air, greater temperature extremes occur inland than on the coast of the Gulf of Alaska. The climate of Interior Alaska is continental in nature and is characterized by cold dry winters and warm but relatively moist summers (Fig. 5). U. S. Department of Commerce, <u>Climatic Summary of Alaska</u>--Supplement for 1922 through 1952 (Washington: Government Printing Office, 1958); U. S. Department of Commerce, <u>Climatological Data, Alaska Annual Summary</u> (Washington: Government Printing Office).

Floods from ice-dammed lakes often wash out sections of the Anchorage-Palmer Highway and the Alaska Railroad. Kirk H. Stone, "Alaskan Ice-Dammed Lake: Lake George," <u>Annals of the Association of American Geographers</u>, Vol. 43, No. 2, pp. 192-193.

¹The coastal mountain barrier formed by the Chugach-Kenai Mountains effectively divides the climate of South Central Alaska into two types. On the south side of the ranges bordering the Gulf of Alaska the climate is maritime in nature and is characterized by heavy precipitation and relatively mild temperatures. Within the Copper River Basin the climate is colder and considerably drier. The area has climatic conditions which are transitional between those of the relatively wet and mild coastal regions bordering the Gulf of Alaska and the dry, winter-cold interior of Alaska north of the Alaska Range.

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Fig. 5

hurriedly during World War II sometimes followed low-lying river beds and swamps. Roads today are built, as many before 1942 were, on high ground.

Settlements and roads of the gold-rush period came into existence within a short period of time and were laid on level ground subject to flooding. Later relocation was not always feasible because of investments involved. Many of these settlements and routes are still in existence.

Valdez started as a kind of beachhead for the invasion of the gold fields. It was the coast terminus of the Richardson Highway, the first route to the interior. Flood damage became so severe that the Alaska Road Commission constructed a dike above the townsite in 1912. It diverted the summer floods of Valdez Glacier away from the port and the highway.

Seward, at the head of Resurrection Bay, lies at the foot of a steep slope. An alluvial fan formed by a glacial stream at a nearby canyon mouth diverted flood waters into new channels which encroached upon the town. Private property at Seward was destroyed and rail operation curtailed with far-reaching effects on the economy of the interior. The Alaska Road Commission in 1927 built a flume across the townsite to tidewater.

A large proportion of the ground in Interior Alaska is permanently frozen from a few to several hundred feet (Fig. 6). Permafrost (permanently frozen ground),



subjected to seasonal freeze and thaw in its upper layers, hinders engineering projects in arctic areas. It affects ground-water supply, structures, agriculture, mining, forestry, roads, railroads, and airfields. Permafrost prevents normal drainage of surface water. Removal of the insulating cover of vegetation causes melting of permafrost and consequent slumping. Surface thawing and freezing provides a shifting, unstable base for road and rail construction. Gravel roads corrugate in dry weather, dirt roads become impassable mud channels after rain. Even surfaced highways cannot withstand extremes of temperature and shatter.

The preparation of foundations for structures in permafrost areas poses problems which require special treatment. This consists of controlled thawing and consolidation prior to construction, or complete prevention of thawing by insulation, or use of mechanical refrigeration. Road builders generally use the stage-construction method. Some work is done each summer until the project is completed. The frozen areas are thus exposed over a number of years to permit thawing. The road bed, in time, is made to conform with regular specifications. However, constant regrading, rebuilding, realigning, and even abandonment of sections are necessary.

Maintenance of railroads poses even greater problems in permafrost areas. Great care must be exerted in

leveling and realigning rail track. Maintenance is very expensive along stretches of the Alaska Railroad underlain by permafrost.

Mountain highways and railroads suffer from snowstorms, both because of physical problems presented and shortness of the working season.¹

Glaciers constitute a threat if sufficiently close to highways and railroads:²

Beginning in September 1936 and continuing in February 1937, the front of Black Rapids Glacier moved forward a distance of almost four miles, threatening to overrun the Richardson Highway, which at that time was Fairbanks' only land link with the outside world. Had this forward movement continued the highway along a one- to two-mile front would have been overridden and obliterated. Water rising behind the dam of ice would have created a lake, inundating several additional miles of highway. Had this happened it would have been necessary to relocate the highway by moving it onto the steep mountain side. Such locations in the Alaska Range are at best rather precarious and extremely difficult to maintain because of the danger of landslides caused by spring thawing of the deeply frozen soil.

¹Total annual snowfall at Thompson Pass, on the Richardson Highway, averaged fifty feet during a nine year period. In the winter of 1952-53 a record 975 inches was recorded on the Pass.

²Dyson, James L., <u>The World of Ice</u> (New York: Alfred A. Knopf, 1962), p. 35. The Copper River Highway, which follows the Copper River, and Northwestern Railway must cross the valley numerous times to avoid Childs, Miles, and Ellen glaciers. All experienced one or more advances during the early part of the century. Had they overrun the Copper River and Northwestern Railway, the region's most important industry--mining--would have ceased since no other route existed between the mines and coast.

Glaciers also border the Richardson Highway and Alaska Railroad. The latter must go through a long tunnel to avoid a valley blocked by Portage Glacier. . .

South Central Alaska ports on Prince William are Seward is the northernmost ice-free port in ice-free. Alaska, while Anchorage and ports northwest of it on the Bering Sea are closed part of the year. However, water transport in Southcentral Alaska is subject to the hazards of climate also. Ice forms in winter in some sheltered inlets of Prince William Sound, impeding small-boat progress. Glaciers discharge ice into the fiords of the sound. But conditions do not interfere with coastal steamers. Mean range of tide in the sound is 9½ feet. Insufficient depth and strong currents make some passages navigable at only favorable stages of the tide. Heavy fogs are troublesome, and violent winds an occasional threat.

Cook Inlet is hampered by floating ice from December to late March. Even when large vessels reach Anchorage in winter, strong tidal currents and large ice floes hamper cargo handling. In mild weather, ships can reach Anchorage to unload cargo on lighters.

Any new transportation lines in Alaska will be strongly influenced by physical features. The extent of this control will wane with progress in technological development. Turbulent glacial rivers and mountain barriers

¹U. S. Department of Commerce, Coast and Geodetic Survey, <u>U. S. Coast Pilot: Alaska, Cape Spencer to</u> <u>Arctic Ocean</u> (Washington: Government Printing Office, 1956).

no longer present insoluble difficulties.¹ Each stage of advancement in technology will give man greater power in surmounting the physical obstacles encountered in the Area.

Population and Settlement

The distribution and growth of population in the area has been influenced by the nature of the land, the various economies, and changing surface transport routes. Population has had, in turn, an effect on the land transport network. It is the purpose of this section to show the interrelationship between the pattern and trend of population and the land transport system since the coming of the white man to Alaska.

Russians were the first explorers and settlers in the area.² They crossed easily from Siberia, investigating the area for the establishment of trading centers. The enormity of the shoreline and the broken character of

¹Bernt Balchen, "Engineering Problems in the Arctic," <u>The Military Engineer</u>, XLIV (November-December, 1952), pp. 426-428. H. A. Stoddard, "The Problems of Alaska Road-Builders," <u>Western Construction News</u>, XXVI (February, 1952), pp. 71-73.

²For a comprehensive description of this period in Alaska's history see:

C. L. Andrews, <u>Story of Alaska</u> (Seattle: Lowman and Hanford Company, 1938).

Ernest Gruening, <u>The State of Alaska</u> (New York: Random House, 1954).

Clarence C. Hulley, <u>Alaska 1741-1953</u> (Portland: Binsford and Mort, 1953).

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the Pacific seaboard with its fringes of islands, harbors, and deep waters encouraged exploration and settlement. Furthermore, the coastal waterways, except for parts of Cook Inlet were ice-free throughout the year. In contrast to this southern coastline they found the even shores of North and West Alaska inhospitable with their few harbors and shallow waters, locked in ice most of the year. Because of these conditions, the Russians established only one northern settlement--St. Michael, for the Yukon fur trade.

The first Russians encountered a few small native settlements on the Pacific coast, a region bountiful in furs and fish. The new settlers founded trading posts for dealing with the natives for furs. Since Indians did most of the trapping, trading posts were set up near native concentrations. Kodiak and Kenai were the major Russian centers. They were abandoned when Russian attention turned to Southeastern Alaska.

No system of transportation to the interior was devised. Not even trails were built, though Indian routes were used by the Russians. The mountain barrier of South Central Alaska closed the interior to direct penetration. The valleys could be ascended only with great difficulty by the Russian boats. The Susitna River afforded more favorable conditions, but because of the difficulty of navigating the Upper Cook Inlet, was not adopted as an

inland route. Thus the landforms of the area effectively limited settlement and greatly influenced the early transport pattern.¹

For many years after the purchase of Alaska in 1869, no attempt was made by the United States to develop the coastal area. In 1889 salmon canning was begun, but it was the beginning of the gold rush in 1898 that brought the first sharp increase in population; the effect continued through 1910 (Fig. 7). Towns near the gold mines grew, but did not prosper long. Ports of entry to the Klondike region flourished, and continued to function as ports after the gold rush.

The decline of the gold rushes brought a decrease in population, as Fig. 7 shows. The relative decline was less spectacular and the subsequent upswing more conspicuous in South Central and Interior Alaska than in North and West Alaska or Yukon Territory (Table 1). The stabilizing factors were several: fisheries, exploitation of minerals other than gold immediately after the gold rush, construction of the Alaska Railroad between 1914 and 1923, expansion of building by the Army and the Alaska Road Commission, and the settlement of the Matanuska Valley in

¹The Russians, however, explored and exploited areas in the lower Yukon and Kuskokwim valleys. The penetration remained ineffective because the upper portions of both rivers were unnavigable.

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Fig. 7

TABLE 1

GROWTH OF POPULATION IN SOUTH CENTRAL AND INTERIOR ALASKA

Census year	Population
1880	5,580
1890	6,939
1900	20,200
1910	24,724
1920	16,984
1930	18,272
1940	23,427
1950	71 , 435
1960	138,110

Sources:

U. S. Bureau of Census, Tenth
to Seventeenth Census of the United
States, 1880-1950, Population; Alaska
Resource Development Board, "Popula-
tion Estimates of Towns in Alaska,
1957," Financial Data Regarding the
Incorporated Towns and Cities of
Alaska, 1957.

Thus mining and transportation were controlling factors in population fluctuations during the period.

¹World War I and opportunities for employment afforded in continental U. S. during the period probably accounts for a decline in the 1920 census. This condition remained practically unchanged until the depression of the early thirties, when attention again turned to Alaska because of the advanced price of gold. Marginal gold properties abandoned became profitable and attractive to mining interests and prospectors.

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Military activity from the advent of World War II accounts for recent developments in Alaska. World War II caused a complete change in economy and population. Alaska's military importance was recognized by the U. S. government, which spent large sums of money annually to build military establishments. Construction and maintenance of military bases, airfields, and roads have played a dominant role in the economy since that time. Increase in population and service industries still continues. Most prosperous are the towns located in the "defense heartland" of Alaska from Ladd airfield near Fairbanks to Elmendorf airfield near Anchorage.¹

During the military period communities gained significantly in population because of the ubiquitous need for defense. Population increases are largely the result of immigration. Military personnel and their families account for the increases, as do the workers involved in the construction and maintenance of military, railway, and highway projects (Fig. 7).²

¹Defenses established during World War II in North and West Alaska were abandoned after the war since hostile planes could cross the Bering Sea or the Arctic Ocean too rapidly to permit warning. The time required to cross the 500 miles of relatively empty terrain between the coast and the defense line in South Central and Interior Alaska is supposed to allow for preparation.

²The 1939 census shows a total population in the region of 23,427 of which 17,079 were white, 6,348 natives. The 1956 census totals 138,110, or a growth of 114,683 in the past 27 years. According to the 1939 census, the indigenous population constituted 27.1 per

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service industries, and increased population have forced

cent of the population, while the proportion of whites accounted for 72.9 per cent. In the 1956 census the indigenous population numbered 6,500 or 4.7 per cent of the total population, while the proportion of nonindigenous races numbered 131,610 or 95.3 per cent of the total. The classification of total population by indigenous and nonindigenous races demonstrates the heavy dependence of population increases upon migration from outside (Fig. 8).

A study of the total employed labor force for the years 1956 and 1957 estimated that of a monthly average of 85,800 persons employed, government accounted for 65% of total employment (military for 48%, civilian government for 17%) and private employment only for 35%.

For all three regions of Alaska the number of military increased from the 500 reported in 1939 to a monthly average of 9,000 during the year 1941. Military personnel reached a monthly average of 152,000 during the year 1943. With the cessation of hostilities it dropped to 18,000 in 1946. The years since saw a rapid and sustained recovery in the military economy, military personnel being close to 50,000 for most of the period (Table 2). The population implications of the shift to guided missiles and electronic detection barriers is not yet clear. Alaska will undoubtedly continue to be an important outpost of hemisphere defense. However, construction may not continue at the relatively high levels of the past twenty years and the labor-saving aspect of the new technology of warfare cannot be overlooked. "Military Alaska" may pass its final peak in the near future with associated reduction of military personnel and out-migration of civilians. This may be partly offset by continued large natural increase.

Data used in this section have as their source the following:

U. S. Bureau of the Census, <u>Tenth to Seventeenth</u> <u>Gensus of the U. S., 1880-1950</u>, <u>Population</u> (Washington: <u>Government Printing Office, 1882-1952</u>).

Alaska Resource Development Board, "Population Estimates of Towns in Alaska, 1957," Financial Data Regarding the Incorporated Towns and Cities of Alaska, 1957 (Juneau, 1958).

Bureau of Vital Statistics, Alaska Department of Health, Estimated Population of Alaskan Cities--1956 (Juneau: Bureau of Vital Statistics, June 6, 1958).

Alaska Rural Development Board, <u>Alaska Village</u> <u>Census-1958</u> (Juneau: Alaska Resource Development Board, Jan. 1959.

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POPULATION OF A	LASKAN REGIONS BY INDIGENOUS AND NON-
REGION & CENSUS YEAR	INDIGENOUS RACES, 1939, 1950, 1956
1939	NONINDIGENOUS RACES INDIGENOUS RACES
SOUTH EAST	
SOUTH CENTRAL "INTERIOR	
North & West 1 <u>950</u>	
SOUTH EAST	
SOUTH CENTRAL «INTERIOR	
NORTH	
SOUTH EAST	
SOUTH CENTRAL + INTERIOR	
NORTH + WEST	
PERCENT	0 10 20 30 40 50 60 70 80 90 100
Sources:U.S.Bur United Alaska Citics-	eau of Census, <u>Sixteenth and Seventeenth Census of the</u> States, <u>1940-1950; reputation</u> ; Bureau of Yitsi Statistice, Department of Health, <u>setimated Population of Alasian</u> 1 <u>950;</u> Alaska kural Development board, <u>Alaska Yillage Census</u> -

Fig. 8

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TABLE	2
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ALASKA POPULATION, MILITARY AND CIVILIAN, 1939-1956

	Regions					
Populati on categ ory	Southeast		South Central and Interior		North and West	
	Number of persons	Percent of total	Number of persons	Percent of total	Number of persons	Percent of total
1939 Total	25 , 241	100.0	23,427	100.0	23,856	100.0
Military Ci v ilian	475 24,766	1.9 98.1	10 23,417	* 100.0	15 23 , 841	* 100.0
1950 Total	28,203	100.0	71,389	100.0	29 , 051	100.0
Military Civilian	660 27 , 543	2.3 97.7	16,236 55,199	22.7 77.3	3,511 25,494	12.1 87.9
1956 Total Militarr	34 , 600	100.0	138,110	100.0	33 , 290	100.0
Civilian	34,000	98.3	98,710	71.5	28,290	85.0

Sources:

U. S. Bureau of Census, <u>Sixteenth and Seventeenth Census</u> of the United States, 1940-1950, Population: Alaska Resource Development Board, "Population Estimates of Towns in Alaska, 1957," <u>Financial Data Regarding the Incorporated Towns and Cities</u> of Alaska, 1957.

expansion of the internal transportation system. Growth of population after construction of the transport network can be traced to increased activities in connection with the transportation into the interior of materials for military construction and supplies for the population.

Since 1942 growth in Alaska has been the outcome
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of the defense program. However, Alaska's economy is subject to sudden changes in military planning resulting in curtailment of construction projects and associated unemployment and emigration. It is apparent that an economy based upon changeable military requirements is not a stable one. The state, and in particular the South Central and Interior region, will no doubt continue to experience great fluctuations in population.

CHAPTER III

THE EVOLUTION OF THE LAND TRANSPORT PATTERN

IN SOUTH CENTRAL AND INTERIOR ALASKA

The Development of the Land Transport Pattern

Three factors account for the development of the surface transport pattern after 1898. They are: the changing patterns of production, military strategy, and competition between different forms of transportation.

> The Evolution of the Rail Pattern 1898-1913.¹--Discovery of gold in the Klondike in

¹Listed below are various selected sources of information regarding this period of railroad development: U. S. Congress, House, Railroads in Alaska, Hearings before the Committee on the Territories, 61st Cong., 2d Sess. (Washington: Government Printing Office, 1910). U. S. Congress, Senate, Alaska Northern Railroad, Hearings before the Committee on Territories, 62d Cong., 2d Sess. (Washington: Government Printing Office, 1910). U. S. Congress, Senate, Railroads for Alaska, Hearings before the Committee of Territories, 62d Cong. 2d Sess. (Washington: Government Printing Office, 1912). U. S. Congress, House, Railway Routes in Alaska, House Document 1346, 62d Cong., 3d Sess. (Washington: Government Printing Office, 1913). U. S. Congress, House, The Building of Railroads in Alaska, Hearings before the Committee on the Territories on H. R. Bills 1739, 1806, and 2145, 63d Cong., lst Sess. (Washington: Government Printing Office, 1913).
U. S. Congress, Senate, Construction of Railroad in Alaska, Hearings before the Committee on Territories, 63d Cong., 1st Sess. (Washington: Government Printing Office, 1913).

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1896 provided the first impetus to railroad construction in South Central and Interior Alaska. Government hesitated over building roads before that time; there were only 33,000 people in the territory, about 4,500 of them Caucasians. Further deterrents to action were the formidable mountain ranges. Served by 26,000 miles of coastline and a number of navigable rivers, the Federal Government concluded that the main commerce of Alaska was destined, during the formative years, to be water-borne.

No further consideration was given to railroad construction until the gold-rush days. In 1897 and 1898 supplies were moved inland on the backs of gold-seekers or by sled. More than 30,000 tons of freight were carried inland at a cost of 15 to 16 million dollars. An equal quantity of freight was sent inland by steamers on the Yukon and Tenana Rivers.¹ Population increased from 6,939 in 1890 to 20,200 in 1900 (Table 1). But the influx of freight and population was somewhat reduced by the difficulty of reaching the inland area.

In 1897 there were two routes from Skagway to Dawson. (Fig. 9 shows the routes described here.) One ran by way of White Pass to Lake Bennett, the other by Chilkoot Pass to Lake Lundeman. The first went through swamps and became less used than the other. Frederick

¹U. S. National Resources Committee, <u>Alaska--Its</u> <u>Resources and Development</u> (Washington: Government Printing Office, 1938), p. 183.

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Funston, who crossed the latter in 1896, wrote as follows:¹

As we looked up that long trough of glistening ice and hardcrusted snow, as steep as the roof of a house, there was not one of us who did not dread the remainder of that day's work. . . Three hours later . . the narrow crest of snow and ice that divides the Valley of Yukon from the sea . . . was reached. . . . Standing at the summit . . . behind us and to the right and to the left was a jumble of ice peaks, and below the zigzag trail up which we labored so breathlessly. But these things were of small interest and our gaze was fixed ahead where stretching away in billows of spotless white was the valley of the great river of the north.

In order to overcome these difficulties eleven companies proposed lines running from the Gulf of Alaska to Fairbanks or the Upper Yukon in the brief period between September 1897 and March 1899. Choice of routes was limited to the Susitna or the Copper River valley because of the coastal topography. The lack of harbors in the Gulf of Alaska created further problems. The best harbor was on Resurrection Bay, where the town of Seward was established. The Alaska Central Railroad Company laid track to a point midway between Seward and Turnagain Arm between 1903 and 1907. The Alaska Northern Railroad Company took over the project in 1907, completing track to Kern Creek on Turnagain Arm by 1910. The "Trans-Alaska" railroad started at Illiama Bay, west of the mouth of Cook Inlet, was built for a colonization project on the

¹Article by General Frederick Funston in <u>Scribner's Magazine</u>, November, 1896.

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Yukon River. It was planned in order to traverse the Kuskokwim River to tap the Yukon River traffic at Holy Cross. In 1904 the former Tenana Valley Railway was established in anticipation of Klondike gold field traffic. It was constructed between Chena, river traffic terminus on the Tanana, and the northern gold district. This railroad, about 46 miles long, was later bought by the government for incorporation into the Alaska Railroad.

Various companies attempted to build a line along the Copper River connecting the Gulf of Alaska with the navigable waters of the Interior. The coastline presented difficult engineering problems. Right-of-ways were taken simultaneously from Valdez and Katalla, since it was not known which of these would prove the less difficult. From Valdez a pass 2722 feet high had to be surmounted (Fig. 3). At Katalla there was no harbor. Finding difficulties too great to overcome, the Guggenheim Corporation, the most active enterprise, turned its attention to seven miles of track which had been laid out of Cordova by a small com-This route was bought by the New York company. pany. Between 1906 and 1911 the route was extended 200 miles to the Kennecott copper mines. It became the Copper River and Northwestern Railroad, transporting ore and concentrates from the copper mines. The line was abandoned when the mines were closed in 1939. The right-of-way reverted to the Federal Government. In 1905 the Alaska Reynolds

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Company tried to build a railroad along the abandoned right-of-way from Valdez. The project failed, and plans for a railroad from Valdez to Fairbanks were abandoned.

Both the Alaska Central Railroad--later called the Alaska Northern Railroad--and the Copper River and Northwestern Railroad ran close to coal fields. They depended on the marketing of coal for building and operating The Alaska Northern Railroad ran within 80 expenses. miles of the Matanuska coal fields; the Copper River and Northwestern Railroad ran within 30 miles of the Bering coal fields. In 1909 Congress withdrew the coal fields because of monopoly interests' use of fraudulent means to control this resource. The Alaska Northern Company, with little traffic generated between Seward and Turnagain Arm, ceased building. The Copper River and Northwestern Railroad was able to continue operations, its primary purpose being the transport of copper from the Kennecott mines to Cordova. But it could not start work on the Fairbanks branch until the coal fields were reopened. If sufficient tonnage had come from the coal fields, construction and operation costs could have been met: both railroads would have been extended to the Interior Alaska gold fields around Fairbanks.

The first railroad to offer access to the interior gold fields from tidewater was the White Pass and Yukon Railroad, running from Skagway in Southeast Alaska to the

Yukon basin at Whitehorse in Yukon Territory. Construction of the railroad was begun in 1898. By 1901, 110 miles of this narrow gauge railroad was built; only 20 miles of it were in Alaska; it was British-owned. Freight rates were reduced from \$1.00 per pound to 4% cents through the building of this road. Although outside the area under consideration, early completion and absorption by this route of traffic into Interior Alaska had a definite effect on rail development in South Central and Interior Alaska.¹ This railroad discouraged further investments in the Area. The necessity for soliciting funds to support some means of access to the Interior other than the British-owned White Pass and Yukon Railroad became more urgent. Attempts to obtain Federal aid in the form of subsidies or grants of land were of no avail. Consequently several railroad companies in the region went bankrupt.

Although the gold strike of 1896 stimulated the building of railroads, few companies went beyond planning or construction of short stretches of road. Competition from existing routes and the disinterested attitude of the Federal Government could not be overcome. However, if one considers how limited the rail pattern was before the gold strike, it becomes manifest that the early mining activities had an impressive effect upon the regional transporta-

¹The White Pass and Yukon Railroad is discussed in greater detail under the section "Southeast Alaska" (chap. vii).

tion network. Rail lines, though in some cases rather short, were built from Cordova and Seward. These seaports were situated where passes through the mountains to the interior gold fields could be found. An early writer drew attention to the interrelationship between transport growth and mining as follows:¹

Less than two decades ago no Alaskan valleys had echoed to the whistle of the locomotive, and a score of its navigable rivers had never felt the rhythmic chug of the steamer. Now there are over 700 miles of railroad in the Territory, and some form of steamboat service is found on nearly all Alaskan rivers. Of the tens of thousands who essayed the heart-breaking task of dragging and carrying their supplies through the passages in the mountainous coastal barrier, there were probably few who could realize that within a few years it would be possible to reach the Yukon by rail in not as many days as they took months for the journey.

<u>1914-1940</u>.--Considerable interest and some initial settlement in South Central Alaska followed the discovery of coal in the Matanuska Valley at the turn of the century. Congress tried to develop the mineral resources in the Area. In 1914, the President was authorized to locate, construct, and operate a railroad in the Territory of Alaska. It was established that two land routes led to the interior through South Central Alaska: one by way of the Copper River, the other across the low divide of the

¹Alfred Hulse Brooks, <u>Blazing Alaska's Trails</u> (Caldwell, Idaho: The Caxton Printers, Ltd., 1953), P. 399.

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Kenai Peninsula to the Susitna River system.¹ Construction was authorized along the latter route from Seward to Fairbanks with a branch to the Matanuska coal fields. The Alaska Engineering Commission was assigned the work of planning and constructing the railroad to connect the interior with water routes to the states.²

In 1915 the government bought and took over from the Alaskan Northern Railway 76 miles of low standard trackage from Seward. It had been laid in 1903 in an effort to reach the Matanuska coal fields.³ The Commission also acquired and rehabilitated the Tanana Valley Railway from Fairbanks to the Chatanika mining district.⁴

Both lines were incorporated into the main line from Seward to Fairbanks, construction beginning in 1915. The Alaska Railroad was scheduled for completion in 1919, but World War I intervened, delaying completion until 1923.

The Alaska Railroad was the first means of land

^LU. S. Congress, House, <u>Railroad Routes in Alaska</u>, pp. 8-9, 140.

²U. S. Congress, House, <u>Report of the Alaska En-</u> <u>gineering Commission for the period from March 12, 1914</u> <u>to Dec. 31, 1915</u>, House Document 610, 64th Cong., 1st Sess. (Washington: Government Printing Office, 1916).

³U. S. Congress, Senate, <u>Alaska Northern Railroad</u>.

⁴A. W. Greely, <u>Handbook of Alaska, Its Resources</u>, <u>Products and Attractions in 1924</u> (New York: Charles Scribners & Sons, 1925), p. 96. .

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transportation, other than trail, between the coast of South Central Alaska and the Interior.¹ It was believed that large hauls of export coal would provide substantial revenue and that with low cost transportation and a flourishing mining industry a stable economy could be developed.² A branch from Matanuska to Sutton at the edge of the subbituminous coal fields was built as part of the main line between 1914 and 1920. In 1922 the Alaska Engineering Commission contracted with the Healy Coal Company to build a 4.4-mile spur from Healy to Suntrana in the Nenana Coal district. Upon completion this spur became the property of the Alaska Railroad and was referred to as the Suntrana Branch. The coal deposits were not as extensive or of as high quality as anticipated, nor was there a market of sufficient size. In addition, the extensive agricultural and mining expansion (other than coal) expected after the rail completion did not materialize. In 1930 the Tanana Valley Railroad, which had been incorporated earlier, was abandoned.

The railroad had been built with substandard surplus rails and rolling stock from the Canal Zone. Expenses

²U. S. Army, <u>Annual Report of the Engineers to</u> the Secretary of War, 1926, Part II (Juneau: 1926), p. 30.

¹There were already in existence the White Pass and Yukon Railroad from Skagway to Whitehorse and the Copper River and Northwestern Railroad running from Cordova into the Copper River Valley and Kennecott copper mine in South Central Alaska.

were high. Furthermore, there were no new appropriations until after 1940. Costs had to be met from revenues. In the absence of anticipated heavy hauls high freight rates were adopted, nullifying much of the benefit of the railroad to industrial development.

In an effort to further development, the Geological Survey conducted additional mineral surveys in 1931.¹ Results of the surveys in South Central and Interior Alaska were inconclusive. In 1935, the Federal Government supported the settlement of 160 families from the United States as colonists in the vicinity of Palmer, in the lower Matanuska Valley. The colony was not notably successful.

<u>1941-1960</u>.--The Japanese invaded the Aleutians in 1940. The armed forces recognized the uneconomic character of the long haul from Seward to Anchorage over adverse grades. It advocated a short line from Passage Canal on Prince William Sound as a military measure to overcome the vulnerability and low capacity of the line from Seward. The Department of Interior, faced with competition by independent boat operations into Anchorage and by trucklines from Valdez to Fairbanks over the Richardson Highway, encouraged efforts to build this line.

The people of Seward opposed the cut-off. In

¹National Resources Committee, <u>Alaska--Its Re-</u> <u>sources and Development, Part VII</u> (Washington: Government Printing Office, 1938), pp. 81-82.

1941 \$5,300,000 was appropriated to the Corps of Engineers for construction in spite of opposition. The railroad was put in operation in 1943 between Whittier and Portage Junction on the main line (Fig. 10).¹ Without this new terminal and short line it would have been difficult to handle traffic for the Army without restricting civilian supplies. Total tonnage rose from 232,755 in 1939 to 767.053 in 1944.² Instead of a seasonal operation the railroad now transported every month more freight and passengers than previously carried in peak months. The great increase in traffic resulted in a surplus in operating funds at the end of 1945. However the wartime need made the purchase of obsolete equipment necessary. In addition, there was a shortage of material and labor for maintenance, repairs, and improvements. This placed the railroad in an even worse position than before to face a postwar period when traffic and revenues would decline.

The conclusion of the war brought declining earnings because of a decrease in military tonnage. In order to operate the railroad efficiently a reduction in main-

¹U. S. Congress, House, <u>Alaska, 1955</u>, Hearings before the Subcommittee on Territorial and Insular Affairs of the Committee on Interior and Insular Affairs on House Resolution 30, 84th Cong., 1st Sess. (Washington: Government Printing Office, 1956), pp. 85-108.

²The Alaska Railroad Traffic Division (Anchorage, Alaska); Alaska, <u>Annual Report of the Governor of Alaska</u> to the Secretary of the Interior (Washington: Government Printing Office, 1940-1945).

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Fig. 10

tenance costs was achieved by a 5-year rehabilitation program begun in 1947. At the end of 1949 half the track was relaid with heavy rails and new ties. Roadbeds were widened and ballasted, roadway and yard structures modernized. New rolling stock was obtained. Some coal-fired locomotives were replaced by diesel-powered ones. The entire line between Portage and Fairbanks was graded and otherwise improved in the last two years of the program. Originally no plans were made for rehabilitating the line between Portage and Seward. This high-cost section was to be abandoned with Seward replaced by Whittier as southern railroad terminus. Later, the military situation required the entire capacity of Whittier for military and related cargo. This made it mandatory for Seward to handle all civilian cargoes until such time as alternate facilities could be made available elsewhere.

Because of its advantageous location, construction began in 1960 on a secondary port at Anchorage. However, until adequate year-round facilities are provided, at least part of the civilian cargoes must enter through Seward.² Deterioration of facilities between Seward and Portage required improvements in the railroad. Additional facilities were also provided at Seward to augment in-

²U. S. Department of Commerce, <u>Alaska, Its Economy</u> <u>and Market Potential</u> (Washington: Government Printing Office, 1959), pp. 6, 20.

^{1&}lt;u>Ibid</u>., 1947-1952.

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adequate import capacity.1

The Evolution of the Road Pattern

Alaska had no communications which could be called roads before 1905 (Fig. 11). The Russians built only five miles of wagon road during nearly a century of occupation. Up to the time of the Klondike discovery, the United States Government added five additional miles of wagon road. The gold strike in the interior, however, exerted a definite influence on the road pattern of the Area. It necessitated the building of new roads from the coast. The Alaska Road Commission was formed to provide for roads and trails in mining areas and for supply of prospectors and troops needed to maintain order in the gold camps. Gradually improved, many of these new routes became feeders for the railroads and river boats. However, their prime function was to serve as routes in winter when river travel was suspended.

The most important trail extended from Valdez to Fairbanks. It was commonly called the "Gold Trail." Built by the Alaska Road Commission in 1906, it gave yearround access to the interior,² whereas the route by the

¹Letter from Edwin M. Fitch, Assistant to the General Manager, The Alaska Railroad, Dec. 30, 1960. ²During the winter of 1906-1907, some twenty five hundred persons and about two thousand tons of freight moved over the route. U. S. Army, <u>Report of the Board</u> of Road Commissioners for Alaska to the Secretary of War, <u>1907</u> (Washington: Government Printing Office, 1907), p. 10.

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Fig. 11

Yukon River was closed in winter. Official reports of this Alaska Road Commission state that the route was suitable for dog team travel by 1909. In 1910 the Gold Trail was converted to a wagon road and renamed the Richardson Highway (Fig. 11). On completion of the Alaska Railroad in 1923, it was reduced to secondary importance. Following gradual improvements, it became an all-year highway in 1942.¹ It was paved during World War II, being for the first time open to winter traffic in 1949-1950. It has remained open all year and is now used for civil as well as defense project supplies.

The road extension to Circle is called the Steese Highway. It was built between Fairbanks and the Yukon River in 1902, to serve the mining camps. At present it serves the gold-dredging operations on the creeks near Fairbanks.

A second extension from the Richardson Highway is the Elliott Highway. It was started in 1906 and completed as an automobile road in 1937. Its original objective was the gold-mining camp of Livengood. The road will ultimately become part of the Fairbanks-Nome Highway.

The extension to Chitina is the Edgerton Highway. Before 1939 it--with the Copper River and Northwestern

¹Alaska Road Commission, <u>Report upon the Construc-</u> <u>tion and Maintenance of Roads, Bridges, and Trails, Alaska,</u> <u>Annual Report of the Chief Engineer to the Secretary of</u> War, 1924, Part II (Juneau: Alaska Daily Empire Print, 1924), p. 46.

Railroad--linked Cordova and the mineralized area south of the Wrangell Mountains with the Richardson Highway. Today, without the railroad, the highway has little importance.

Although short local highways were constructed prior to 1942, no connection with points outside the Anchorage area existed until completion of the Glenn Highway. This road was completed for military purposes in 1943. Its primary function was to serve as an access to the Alaska Highway during its construction. It is one of two major east-west routes, connecting with the Alaska Highway near the Canadian border.

The most important project attributed to military pressure is the Alaska Highway. Despite previous studies to determine the most desirable location for highway facilities to Alaska, military considerations in World War II dictated the location of the Alaska Highway.¹ It followed

¹The Alaska Highway, except for a small portion within the Area, will not be considered in this investigation. It received intensive study both during and after World War II. The recently published Battelle report is confined to a study of railway and highway transportation between the other States and Alaska. U. S. Congress, House, <u>Transport Requirements for the Growth of Northwest North America</u>, Vols. 1-3, 87th Cong., Ist Sess. (Washington: Government Printing Office, 1961). Also see: U. S. Congress, House, <u>Report of the Alaskan</u> <u>International Highway Commission</u>, House Document 711, 76th Cong., 2d Sess. (Washington: Government Printing Office, 1941); <u>The Alaska Highway</u>, House Document 1705, 79th Cong., 2d Sess. (Washington: Government Printing Office, 1946); various typewritten and mimeographed reports of the Public Roads Administration and the U. S. Corps of Engineers.

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a series of airfields extending northwest through Canada toward Alaska and Russia. The air route was located sufficiently to the east to provide security from attack from the Pacific Coast. The line served as a ground guide for planes being ferried to Russia; the highway supplied a surface link for construction of the highway itself, airfields and their operations, and military facilities in Interior Alaska. No consideration was given to the proximity to natural resources, the opening of undeveloped areas, and its integration with future channels of transportation. As a result, developments in mining, agriculture, and industry are lacking in the area. The highway does not follow a scenic route, nor was this intended. Primarily it was a road to connect airports and a military supply route. Most important, however, was its influence on the extension of roads in Alaska, notably the Glen Highway.

The Taylor Highway, begun in 1946, extends from the Alaska Highway to Eagle on the Yukon River. The first 11 miles were converted from old pack trails to gravel roads. All 150 miles were finished in 1954. The road serves the gold-mining localities between the Tanana and Yukon Rivers. It offers access to the Mayo road in the Dawson area in Yukon Territory. Military needs have also been fulfilled by this highway. In 1955, a winter overland supply system was set up to serve construction camps

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during the building of the Distant Early Warning bases on the Arctic Coast. Supply trucks were driven to Eagle, crossed the Yukon, and continued to snow trains which took the cargoes across the trackless tundra of Northern Alaska. Since the completion of the "DEW" line the primary function of the road is once again to serve the highly productive mining area.

Three other important roads were built in the area after 1950: the Seward-Anchorage Highway, the Sterling Highway, and the Denali Highway.

The Sterling Highway is on the west side of the Kenai Peninsula. It was begun in 1935 and completed in 1960. It opens the hunting and fishing areas of the peninsula to people outside the region and affords access to farming establishments near the settlements of Kenai and Homer. The highway is also used in recent exploratory oil activity and in the service of military installations on the west side of the peninsula.

Completion of the Seward-Anchorage Highway in 1951 opened the Seward area to Anchorage, and this linked the extreme south of South Central Alaska with the continental highway system via the Alaska Highway.

The Denali Highway was constructed to stimulate prospecting in the mineralized area between the Richardson Highway and Mt. McKinley National Park. It was expected to supplement rail transportation to the park. The road

was completed in 1957.

<u>Tractor trains</u>.--Figure 11 shows that much of South Central and Interior Alaska is inaccessible by road. A new development in transportation is the use of tractor equipment. Modern tractors can carry heavy loads across the tundra zone. A five-ton tractor can pull as much as thirty tons of freight. Their usefulness was demonstrated in 1955 during building of the Distant Early Warning bases on the Arctic coast.

Development of River Transportation

Three major routes into Yukon Territory were established after the Klondike strike of 1896. One was the "Gold Trail" previously mentioned. Another went through the "Inside Passage" to Skagway, from which point prospectors crossed Chilcoot and White Passes to the headwaters of the Yukon. They continued 500 miles down the Yukon River to the mouth of the Klondike River. Others entered the country from St. Michael's on the Bering Sea, going up the Yukon River to Yukon Territory.¹

¹It has been estimated that, of the 50,000 gold seekers who reached Alaska in 1898, 30,000 entered Yukon Territory by the White Pass and Yukon routes (Brooks, p. 368). In 1897 only 2 ocean-going vessels discharged freight and passengers at St. Michael. The following year more than 20 vessels carried gold-seekers intent on reaching the Klondike via the Yukon River. Whereas 5 river steamers supplied the needs of Dawson and vicinity in 1897, the next year a total of 47 river steamers were in operation. U. S. Customs Service, Office of the Collector, Annual Commerce Report (Juneau).

After the White Pass and Yukon Railroad was built in 1901, the route from Skagway to the Klondike River dominated traffic movements into the interior. Steamer services were established by the railroad on the Yukon and Tanana Rivers. The services were operated in Canada by a subsidiary, the British Yukon Navigation Company, and in Alaska by its affiliate, the American Yukon Navigation Company. For several years, the White Pass and Yukon Route enjoyed practically a monopoly over river transportation from Whitehorse to Fairbanks (Fig. 13).

With the completion of the Alaska Railroad from Seward to Fairbanks in 1923, the American Yukon Navigation Company agreed to relinquish its traffic on the lower Yukon River to a government-owned line of river boats operated in conjunction with the railroad. The latter in turn agreed not to operate vessels upstream from Tanana into Yukon Territory.

For some time after the dissolution of the American Yukon Navigation Company steamers of the British Yukon Navigation Company made trips to Circle and Fort Yukon to transport supplies to merchants. In 1939 the Alaska Railroad extended its steamer service upstream from Tanana to Fort Yukon. In 1940 it handled all freight and passenger business there via the Nenana and the Alaska Railroad from Seward (Fig. 13).

Cargo and tourist boats still bring supplies to

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isolated settlements along the Yukon. Some of the tributaries are important. The Tanana River is the largest, connecting the Yukon boat service with the Alaska Railroad at Nenana.

The Susitna and Copper Rivers also have commercial importance. The Susitna flows south to Cook Inlet near Anchorage. It is navigable by small river boats. The Copper River empties into the Gulf of Alaska. It is not navigable along its lower course except for short distances by small boats.

Until other avenues of transportation are provided along the Yukon River, it will continue to meet requirements, and aid in whatever expansion may occur in Interior Alaska.¹

Development of Regional Trade Routes

<u>Time-Distance Relationships: 1896-1960</u>.--An evaluation of the effectiveness of land transport in South Central and Interior Alaska can be made by means of four maps which show areas accessible to early and modern means of land transport and the rapidity of transport by means of isochronic lines centered at Fairbanks-Circle (Fig. 12). Between 1896 and 1900 the 24-hour line with a radius of

¹Until completion of the Alaska Highway the Yukon River system was the natural artery of travel in Yukon Territory. After 1942 points in Northeast B. C. and Yukon Territory both east and west of Whitehorse were more easily reached by the highway. See Fig. 13.

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200 miles reached east to Dawson and west to Tanana on the Yukon River. The radius of 24-hour service extended south into Central Alaska only 12 miles during this period. This was the maximum distance for travel in one day by backpack or packhorse. The Bering Sea shoreline from St. Michael to the mouth of the Yukon was within four days' travel time from Fairbanks-Circle. Whitehorse was also four days' travel time from Fairbanks-Circle. Skagway at the head of Lynn Canal could be reached on the eleventh day. Valdez on the Gulf of Alaska lay within the twenty-second travel day from Fairbanks-Circle.¹

More than relative distance from Fairbanks-Circle is shown in Fig. 12. There is also an explanation of the increasing inroads made by railroads and trucking into river freight traffic. The White Pass and Yukon Railroad reduced the time required to reach the interior between 1901 and 1922. With the completion of the Alaska Railroad in 1923 goods could be supplied to Fairbanks more quickly at about one-half the price of river and ocean freight.² From 1923 to 1939, 24-hour service from Fairbanks by fast regularly scheduled merchandise cars included most points

¹Statements of individuals and statistical records in numerous historical documents were used in computing travel time and freight movement at various periods.

²The relative efficiency and approximate cost of the most important means of transport in Alaska are shown in Table 3. Actual rates between points in Washington and Alaska are shown in Table 4.

TABLE 3

RELATIVE EFFICIENCY OF ALASKAN MEANS OF TRANSPORT

Туре	Weight carried	Miles traveled in 24 hours	Approx. cost per ton mile
Back packing	50 lbs. per man	12	\$25.00
Pack horse	200 lbs. per horse	12	12.00
Dog sled	100 lbs. per dog	15	2.50
Wagon road	500 lbs per horse	20	•60
Railroad ^a	700 tons per train	300	•08
Canoe or poling boat River steamers	1000 lbs. per boat 500 tons	20 250	1.50 .05

^aU. S. Congress, <u>House Railway Routes in Alaska</u>, pp. 114-130.

Source:

Alfred Hulse Brooks, <u>Blazing Alaska's Trails</u> (Caldwell, Idaho; The Caxton Printers, Ltd., 1953), p. 400.

along the Alaska Railroad within 250 to 300 miles of the city. These cars touched most stations within 400 miles and some as distant as 500 miles within two days. All points along the railroad were within one day of Fairbanks after 1940. Since then road carriers have made inroads into both river and rail traffic. Highway carriers reach a wider area in less time than the fastest of regular trains. The time between the loading of freight at origin and actual departure of the cargo from the city is less than that required to handle the same shipment by rail.

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TABLE 4

FREIGHT RATES, SEATTLE OR TACOMA TO SELECTED ALASKA POINT, 1923

Commo	odity	Carload	Less than carload
	Joint Rates, Water an to Fairb	d Alaska Railroad anks ^a	
Grocerie Flour, i Mining n	es, mixed in sacks nachinery. no	\$41.00 28.20	
piece (over 4000 lbs	30.00	
per 100	00 board feet	27.10	
	Water Rates	to Nome ^a	
General	merchandise	\$16.00	\$19.00
piece d	over 4000lbs	13.50	16.00
Coal, sa Lumber	acked	13.65 21.00	15.65 23.00
	^a Ton units unless othe	rwise indicated.	
	^b Add \$8.00-\$12.00 per	ton for lighterage	9.
Source:	Norman L. Wimmler. Pla	cer Mining Methods	s and Costs.
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Winnier, <u>Placer Mining Methods and Costs</u>,
Bureau of Mines, U. S. Dept. of Interior, Bulletin No. 259
(Washington: Government Printing Office, 1927), p. 19.
R. L. Monahan, "The Role of Transportation in the
Fairbanks Area," <u>Yearbook of the Association of the Pacific</u>
<u>Coast Geographers</u>, Vol. 21 (1959), pp. 7-21.

The center of population of the area and the agricultural settlements of the Matanuska Valley, the outlying coastal forest belt, and the ports of the Gulf of Alaska all lie within 24 hours' travel time by highway from Fairbanks. In 48 hours the trucker may reach over half of the area and three-fourths of the population of South Central and Interior Alaska. Transportation by motor vehicles links Fairbanks more closely with major producing and consuming areas than ever before in its history.

<u>Importance of routes: 1896-1960</u>.--A comparison of the traffic pattern of the major routes during various periods indicates the relative roles they played in the development of the present regional traffic pattern (Fig. 13).

The Yukon River system provided the principal route into Alaska and Yukon Territory from 1867 to 1900. The alignment of Dawson, Circle, and Fairbanks induced a southeast-southwest orientation of traffic. The river route connecting these settlements roughly paralleled the northern border within the region under study. Routes northward or southward to the coast were secondary in importance in traffic volume. The settlements were not major generators of traffic. They were self-contained units within the Yukon River traffic pattern at the far end of interregional steamer freight and passenger flow in Alaska and Yukon Territory.

Much of the movement on the lower portion of the Yukon River was absorbed by the White Pass and Yukon Railroad between 1901 and 1922. South Central Alaska was still separated by poor wagon roads from the primary arteries of



Fig. 13

the interior. Major connections were still southeastward to the principal rail-ocean transport junction at the tip of Lynn Canal in Southeast Alaska and southwestward to the mouth of the Yukon. Short rail lines to mining areas from the Gulf of Alaska were established, but were entirely separated from broader regional traffic patterns.

A new traffic pattern emerged upon completion of the Alaska Railroad in 1923. This shorter route soon dominated the trade into Interior Alaska and brought about a decline in steamer service. Completion of the Richardson Highway during this period further enhanced the position of South Central Alaska. Anchorage, astride the major freight and passenger band of Alaska, became a focus and integral part of the regional traffic network. Between 1940 and 1960 it stood first with respect to connection with major roads, and intraregional highway and rail freight traffic volume.

Present Pattern of Land Transportation

There are three main routes of penetration into the Area. All enter from the South or Southeast--two by road and one by railroad (Fig. 14). The westernmost route is the Alaska Railway. The line--470 miles long-runs northward from Seward through Anchorage to Fairbanks on the Tanana River. It joins the Alaska Highway road services at Fairbanks and with boats on the Tanana-Yukon River at Nenana. The boats operate under agreement with

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Fig. 14

the Alaska Railroad; they supply interior ports between May and late September.

One branch, 25 miles long, serves the Matanuska Valley and Jonesville-Eska farm and coal mining areas. A 4.7 mile spur extends to the Healy coal mining district, and a 27 mile spur serves the Eielson Air Force base near Fairbanks. Also a 12.4 mile spur from the Army port of Whittier on Prince William Sound connects with the main line at Portage. This spur, the Whittier-Portage Cutoff, was built to accommodate military traffic. It eliminates 52 miles of difficult rail operation over the Kenai Mountains and establishes Whittier, an ice-free harbor 50 miles from Anchorage, as the second southern terminus of the railroad.¹

The recently constructed highway network supplements the Alaska Railroad in meeting the economic needs of the Area. Of major importance is the 365-mile Richardson Highway. It connects Fairbanks with the seaport of

¹Alaska's second most important line, the White Pass and Yukon Railroad in Southeast Alaska, connects steamer service from the States and Canada with Yukon River transportation and by means of the Mayo road and Alaska Highway with other interior points in Yukon Territory and Alaska. Only 20 miles of the line's lll miles are in Alaska. This route is discussed in greater detail in Chapter VII, "The Role of Surface Transport in the Regional Economy of North and West Alaska and Southeast Alaska." The Copper River and Northwestern Railway was the third most important railroad in Alaska until the copper mines it served ceased operation in 1939. This line, 195 miles long, operated between Cordova and Kennecott. At present the Copper River highway is being constructed along this route. Plans call for completion by the end of 1962.

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DISTANCES	BETV	VEEN	COLI	IUN]	TIES	IN.	SOUI	Η	CENTRAL	AND
INTEF	IOR	ALAS	KA I	BY I	EACH	MODE	OF	TR	ANSPORT	

	Air	Ocean	Highway	Railroad
Seward to: Anchorage Cordova Fairbanks Valdez	75 216 350 195	332 170 169	129 569 434	114 ••• 470
Valdez to: Anchorage Cordova Fairbanks Seward	120 55 390 195	450 87 169	305 366 434	• • • • • • • • •
Cordova to: Anchorage Fairbanks Seward Valdez	141 411 216 55	502 170 87	• • • • • • • • •	• • • • • • • • •
Anchorage to: Fairbanks Seward Whittier Valdez Cordova	270 83 52 120 141	332 440 450 502	440 129 305	356 114 62
Fairbanks to: Anchorage Seward Whittier Valdez Cordova	270 350 300 411	• • • • • • • • •	440 569 371	356 470 418 •••

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Valdez. A major branch of the highway is the Edgerton Cutoff, which is 40 miles long. It runs from Willow Creek to Chitina. It is gravelled and closed during the winter.

Fairbanks is the northern terminus of the Richardson Highway. From it, the 162-mile-long Steese Highway runs to Circle on the Yukon River. It is gravelled and closed during the winter. The Richardson and Steese Highways form a 518-mile stretch of automobile road from Valdez to Circle.

The Elliott Highway is a branch of the Steese Highway. It extends 72 miles to Livengood. A gravelled road, it can be used only in summer. It has an extension of 75 miles, most of it sled road, to Manley Hot Springs on the Tanana River. Another sled road runs 30 miles northeast from Fairbanks to Chena Hot Springs.

The Glenn Highway connects the Alaska Highway at Tok with Anchorage on Cook Inlet. The section from Gulkana was built as an access road to the Alaska Highway during its construction. It was first known as the Tok Cutoff, then as the Slana Tok road, still later as the Glenallen Highway. It is now given the name Glen Highway on most maps. It is 328 miles long, the second longest highway in Alaska. It is blacktop and is open throughout the year. With the Anchorage-Seward Highway (126 miles) and the Taylor Highway (152 miles), it totals 606 miles, the longest stretch of continuous highway in Alaska.

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Nabesna Road is the only major branch off the Glenn Highway. It is 45 miles long. It runs from Slana on the Glenn Highway to Nabesna, a region rich in minerals. It is gravelled and closed most of the year.

Two important additions to the highway system since 1950 are the Seward-Anchorage Highway and the Taylor Highway. Two others are the Sterling and the Denali Highways.

The Seward-Anchorage Highway opened the port of Seward to highway traffic in 1951. It is a 126-mile link in the Alaska Highway system. It is paved and open throughout the year. The Alaska Railroad runs parallel to the highway route from Seward.

Sterling Highway joins the Seward-Anchorage Highway near Kenai Lake, skirting the western side of the Kenai Peninsula to Homer on Cook Inlet, 137 miles distant. Paved to Kenai and gravelled from Soldatna to Homer, it is in use all year.

The Taylor Highway runs 152 miles from Tetlin Junction on the Alaska Highway to Eagle on the Yukon River. A branch to Boundary on the Yukon-Alaska border connects with a road to Dawson, Yukon Territory. This is the only road connection besides the Alaska Highway with Canada from South Central and Interior Alaska. It draws heavy traffic from Yukon Territory, although the latter has its own road and river services based on the port of Whitehorse.

The Denali Highway was completed in 1957. It is the first road approach to Mt. McKinley National Park. The 151-mile route begins at Paxson on the Richardson Highway. It leads to the park entrance at McKinley Station on the Alaska Railroad. It is gravelled and closed in winter, but poor conditions also limit summer travel. The park contains 94 miles of road.

The two principal routes from the Pacific into the Area are the Alaska Railroad on the west and the Richardson Highway in the center. The Alaska Highway is the third most significant route into the area. It starts at Dawson Creek on the Peace River in British Columbia and ends at Big Delta near Fairbanks on the Richardson Highway, a distance of 1600 miles. The Alaska Highway was surveyed in the winter of 1941 and 1942 and opened in November, 1942. It connects, via the primary highway system, the cities of Anchorage, Valdez, Fairbanks, and Seward with the other 48 states. The section in Alaska--305 miles long--and the first 40 miles of the southern end have been paved. The remainder is still in unsatisfactory condition for travel.

The primary highway system is paved and open throughout the year except for some high mountain passes. Only within the last few years was the important Richardson Highway opened to year-round traffic. Formerly, it was closed during the winter months. The opening of

Thompson Pass near Valdez provided Interior Alaska with a new year-round artery of transportation from the coast.

The secondary system of roads is gravel-surfaced, with paved sections within or near urban centers. About two-thirds of the system--including the Edgerton, Steese, Taylor, Elliott, Sterling, Denali, and Nabesna Highways-is connected to the primary network. It is generally closed during the winter months. Several of these short stretches of highway, connected to the main network, have been built on the Kenai Peninsula and along Prince William Sound. A series of inland roads also connect the Matanuska and Tanana Valleys with the primary network. The balance is composed of short stretches of highway which connect isolated communities and various economic activities with water, rail, or air transport facilities.

Only a few short secondary roads feed into the primary network. Great distances between population centers and the undeveloped character of areas between them account for the absence of more roads. A trend of development is evident pointing toward the growth of secondary gravel-surfaced roads into a year-round interconnected paved road system. This network will provide ready access to the population centers of the State.

> Organization of the Components of the Land Transport System

Government-financed operations play an important

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part in the transport system of Alaska. The Alaska Railroad is owned by the Federal Government and operated by the Department of the Interior. Boat and barge lines are operated on the Yukon and Tanana Rivers by private individuals under lease from the Alaska Railroad.¹

The other common-carrier line is the White Pass and Yukon Railroad. It was under British control and operation until its recent purchase by Canadian interests. The same company owns and operates river steamers on the Yukon and a bus line.

Individual road haulers move persons and goods by privately-owned buses, trucks, and cars. Small-scale road haulage was common before 1940. Transport matters were usually tied to local retail and produce establishments or with the needs of businessmen for transportation to and from the shops. The feature still characterizes Southeast, North and West Alaska where road haulers can only travel a few miles outside the city limits. A large number of small firms have formed in South Central and Interior Alaska since 1940. There is a trend toward formation of large road transport concerns. Buses and taxi services are found in such urban centers as Anchorage and Fairbanks.

The Alaska Road Commission, under the direction

¹Letter from Mr. Edwin M. Fitch, Assistant to the General Manager, The Alaska Railroad, Washington, D. C., January 24, 1961.

of the Department of the Interior, was responsible for the construction of the Alaska highway system. Annual federal appropriations supported the work. The 1956 Highway Act made the former Territory of Alaska eligible for federal aid funds. The Bureau of Public Roads, which formerly served only the two National Forests, was given responsibility for constructing all highways in the Territory. The Alaska Omnibus Bill, enacted by the 86th Congress, transferred the function to the State of Alaska. It also established a formula for participation in federal highway funds similar to that of other states.¹

The Alaska Omnibus Act, passed in 1960, provides for Alaska to be treated as are the other states. It will come under the full land area formula rather than the onethird formula. This will mean Federal aid of \$37 million a year to which Alaska must contribute 1314% in matching funds or \$5.7 million. The total for road building then will be \$42,700,000 annually. U. S. Congress, House, Operation of the Alaska Road Commission, Hearings before a Subcommittee of the Committee on Government operations, 84 th Cong., 1st Sess. (Washington: Government Printing Of fice, 1955); U. S. Congress, Senate, Federal-Aid Highway Act of 1960, Hearings before a Subcommittee of the Committee on Public Works on H. R. 10495, 86th Cong., 2d Sess. (Washington: Government Printing Office, 1960), pp. 45-76.

¹Until 1956 Alaska was totally excluded from Federal aid highway legislation. Since 1956, the Federal contribution has been \$13,829,881 annually, with Alaska contributing funds on a 10-percent matching basis. The 10 percent contribution thus amounted to \$1,382,988 per year, making a total of just over \$15 million available annually for both construction and maintenance. The formula was based on using only one-third of Alaska's total land area in computing the amount of Federal aid. The State is still totally excluded from the interstate or throughway part of Federal programs except that Alaska is included in the collection Of the taxes which support the interstate program.

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CHAPTER IV

THE LAND TRANSPORT NETWORK AND ITS ROLE IN THE ECONOMIC DEVELOPMENT OF SOUTH CENTRAL AND INTERIOR ALASKA

The Regional Economy and the Land Transport Pattern

A chronological review of the establishment of the first main routes of penetration into the Area shows that the two chief factors influencing the initial progress of regional intercommunications were the physical landscape and the mining industry.

In contrast to the early phase of transport development, the growth of regional transport facilities after 1940 was caused by economic and political pressures, which can be grouped as follows:

- 1) the strategic significance of the Area.
- 2) the non-indigenous settlement.
- 3) the expansion of agriculture.
- 4) the promotion of tourism.
- 5) the development of forestry.

Functions of transportation services.--After a network of communications has been established in a given region, the various transportation services perform multiple functions. Regional transportation services accelerate internal and external distribution of produce and the mobility of persons. Such services also affect raw material and agricultural production, the growth of urban centers, and of rural areas. The transport industry employs a segment of the labor force, providing a stable source of income. Finally, transport is valuable in time of war. The following discussion is concerned with these relationships between the regional economy and the land transport pattern.

The needs of the mining industry.--Although World War II slowed down mining activity in the Area, the industry continues to be a strong influence on the economy of Alaska. Between 1949 and 1953, mining accounted for 27.1 per cent of total production of natural resources; between 1954 and 1957, it accounted for 29.5 per cent (Fig. 15).

Stone, sand, and gravel, with a value of \$5,344,000, constituted about one-third of the Area's total mining product of 1949 to 1953, the total averaging \$15,155,000. The total 1954-57 production was \$18,536,000, including mineral production valued at \$12,321,000--mostly gold and coal--and sand and gravel valued at \$6,215,000.¹ The

¹The value of "mineral products" and "stone, sand and gravel" are commonly grouped together in statistical summaries and general articles on Alaska's mineral industry. They have been separated in this study since sand and gravel are the source of various road- and rail-building materials and have been and are an important factor in the evolution

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Fig. 15

demand for metals and the availability of risk capital have accelerated interest in Alaskan minerals. There were 276 mining operations in the region in 1958.

Considerable tracts of land are still to be thoroughly explored.¹ Government research began early in the present century. However, mineral investigations were

of the present road and rail system.

Data for the years under consideration have been published by the U. S. Bureau of Mines in annual area reports entitled <u>Mineral Production in Alaska</u>, Preliminary Annual Figures, Mineral Industry Surveys, Area Report A16 (Washington: Government Printing Office): Report of the Commissioner of Mines, Department of Mines, State of Alaska (Juneau, Alaska); Bureau of Mines, U. S. Department of Interior, "The Mineral Industry of Alaska," <u>Minerals</u> <u>Yearbook, Vol. 3, Area Report</u> (Washington: Government Printing Office, Annual).

¹The extent of the resource base in Alaska is unknown. In 1950 only 0.3% of the State had been mapped at a scale large enough to permit detailed analysis of geological conditions and other data relevant to the detection of mineral occurrences. An additional 3.2% had been mapped with greater detail, and 51% of Alaska had not been geologically mapped at all. Although large portions of the State have been geologically mapped since 1950, far from a complete inventory of the State's resource base is available. U. S. Geological Survey, "Potential Alaskan Mineral Resources for Proposed Alaskan Metallurgical Industries" (Juneau: December, 1950).

In spite of limited knowledge about the Area mineralization seems to have been widespread as indicated both by mines now in production and potential mineral resources. "Altogether about 100,000,000 acres in Alaska are classified as geologically favorable for the presence of oil, and private interests are spending about \$300,000,000 for exploration alone. Yet it is estimated that less than 1 per cent of the land has been explored for minerals. Several American companies are active, while the Japanese have shown interest in iron ore, coal, mercury-producing cinnabar, and other minerals." The Christian Science Monitor, January 10, 1961, p. 11. • • •

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deterred by the vast and rugged terrain.¹ Exploitation was also delayed by the prospect of costs of transporting the ores. Few bodies of ore would lend themselves to exploitation profitable enough to warrant a capital investment in a rail line or road--which would be a prime requisite for a continuous flow of ore from the mines and supplies into the mining works.²

Production from the region's mines has been characterized by high value - low volume mineral products such as gold and platinum which can be concentrated into marketable form at the mine. Gold is the leading mineral, but coal, oil, base metals, non-metallic metals and construction materials promise to increase mining output, as the following indicates:³

Gold, \$734,632,000 of which has been mined in Alaska in eighty years, seems on the point of being overtaken by coal as the state's most productively valuable mineral . . Alaska's gold production last year was valued at \$5,558,000. In second place was coal, valued at \$5,485,000. Sand and gravel, at \$5,100,000, ranked third.

¹S. H. Lorain, "Government Assistance to Mining in Alaska," <u>Second Alaska Science Proceedings</u> (College: American Association for the Advancement of Science, Alaska Division, 1953), pp. 173-178.

²Alan M. Bateman, "Geographic Factors in the Utilization of Mineral Deposits," <u>Proceedings of the United</u> <u>Nations Scientific Conference on the Conservation and</u> <u>Utilization of Resources</u>, U. N., Department of Economic <u>Affairs (New York, 1951)</u>, pp. 13-16.

³<u>New York Times</u>, September 11, 1960, p. 32.

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Mineral traffic would be desirable for regional railroads and roads, minerals having the advantage of uniformity of character, high value in relation to bulk, and absence of seasonal variations. It is unfortunate that distance delays mining until pertinent rail and road extensions will be made. Only large mineral-bearing areas with high concentration of metal, formerly too remote to attract mining capital, have been or are now being brought within reach of highway and rail transportation.

Mining in the Gulf Coast and Copper River Region.--The Copper River region is known chiefly for the copperbearing lodes mined in the Nizina district. These lodes were extensive and exceptionally high grade, averaging 8 per cent copper. The volume and quality of the ore warranted construction of the Copper River and Northwestern Railroad between 1906 and 1911. The Kennecott properties provided most of the ores until 1936, the ores being sent to the seaport of Cordova for shipment to a smelter in Tacoma, Washington. Operations ceased in 1938 after exhaustion of the principal mines. Until 1938 the railroad had supplied the major means of access to the Copper River region and was the principal factor accounting for the growth of Cordova, its ocean terminus and headquarters.

Low-grade copper deposits have since been discovered in the Nebesna district.¹ Lack of adequate trans-

¹U. S. Department of Mines, Bureau of Mines, <u>Mineral Yearbook, Vol. III</u>, 1957, p. 96.

portation prevents the working of the properties. With the continued improvement of transportation facilities, development of some of these deposits should become economically feasible. A recent improvement in transport is the construction of a road between Cordova and the Richardson Highway following the route of the old railway mentioned above (Fig. 16).

Other minerals from the Copper River region are Coal, oil, gold, and silver.¹ No additional laying of rail or road has been carried out thus far for the exploitation of these deposits. The main bodies of gold and silver were both discovered close to existing transportation. Oil was produced and refined at Katalla, on Prince William Sound, eliminating the need for surface transport. A large proportion of the refined product was used locally, with only small quantities shipped to Cordova for redistribution. In 1933, the refinery was destroyed by fire and operations ceased. In the Bering River area southeast of Cordova, coal deposits were discovered in 1910. The western deposits are subbituminous, whereas the eastern are anthracites. Inaccessibility and badly faulted coal veins, resulting in excessively high mining costs, have prevented large scale development.²

¹<u>Ibid</u>., 1959, p. 96.

²U. S. Geological Survey, <u>A Review of the Geology</u> and Coal Reserves of the Bering River Coal Field, Alaska, Circular 46 ((Washington: Government Printing Office, Nov., 1951), pp. 1-11.


The availability of coal for commercial purposes is being examined by private companies in the Bering River area. The intended market is Japan. Direct loading from mines to ship is under study. This method would possibly make economically feasible the exploitation of the Bering River coal deposits.¹

Mining in the Alaska Railroad belt.--The Alaska Railroad was built after the gold strike. It was not laid specifically for the need of the gold mining area surrounding Fairbanks. After 1910 a continual decline of gold, the scattered character of the gold mining sites, and the erratic development by small companies and single operators were already evident. Unlike large concerns these small operators could not assure the railroad a steady revenue.

As the fields were worked more intensively the shallow, richer deposits were exhausted. However, extensive gold-bearing gravels, frozen to great depths, were still available. Completion of the Alaska Railroad in 1923 enabled mining companies with heavy modern equipment to develop vast low-grade deposits which could not be worked by individual miners. These companies, in turn, promoted the growth of roads into the gold belt north of

¹U. S. Department of Interior, Bureau of Mines, <u>Mineral Yearbook, Vol. III, 1958</u>, p. 94. Alaska International Rail and Highway Commission, <u>Transport Hearing</u>, <u>Anchorage, Alaska</u> (Washington: Government Printing Office, 1959), p. 26.

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Fairbanks. The slow rate of gold recovery provided a fairly stable basic industry which, up to 1940, had been the prime factor in the growth of Interior Alaska.

Coal, a major resource of the Rail Belt, was one of the resources that made the Alaska Railroad and its principal branch lines possible. The original report of the Alaska Railroad Commission assumed that coal would furnish tonnage for export, and that a railroad would result in rapid settlement of the area. Neither assumption was borne out by ensuing events.

Coal is found in a number of areas along the Rail Belt. The most intensively worked beds are in the Matanuska Valley and the Nenana Fields near Healy on the Alaska Railroad between Fairbanks and Anchorage.¹ Other fields occur along the Susitna River (northwest of Anchorage) and on the west side of the Kenai Peninsula, the latter presently inaccessible by rail. The Rail Belt and the western side of the Kenai Peninsula are estimated to have lignite and subbituminous coal reserves of almost 25 billion tons, 2½ billion tons of bituminous and a billion tons of coking coal.

The Alaska Railroad consists of 483 miles of mainline with 60 miles of branch lines to coal fields and air

¹Farrell F. Barnes and Daniel Sakol, "Geology and Coal Resources of the Little Susitna District, Matanuska Coal Field, Alaska," <u>Geology Survey Bulletin 1058-D</u>, Geological Survey, Department of the Interior (Washington: Government Printing Office, 1959), pp. 121-138.

bases. The most important of these branch lines is 19 miles long and leads from Matanuska to Sutton at the edge of the sub-bituminous fields. The following branches extend from this branch line: from Sutton to Jonesville 2.9 miles; from Sutton to Eska 2.3 miles; and from Moose Creek to Premier 3.8 miles. The coal is shipped to the city of Anchorage and to the military forces stationed in the Area.

A 4.4 mile spur leads from Healy to Suntrana in the Nenana coal district. Short feeder roads in the vicinity of Healy are also used to move coal from the mines to the Alaska Railroad main line. The Nenana mines supply Fairbanks and the two adjacent air bases.¹ Limited shipments go to Anchorage.

The Kantishna mining district is in the Railroad Belt north of the Alaska Range and is served by a road running from Mt. McKinley Park railroad station to Kantishna. Antimony and gold have been mined, copper and zinc lodes are known to exist.

Near the northern end of the Alaska Railroad, the Fairbanks placer district is served by trucks using the Steese Highway, and the Livengood-Eureka section of the Elliott Highway, the latter serving the placer mines in

¹U. S. Congress, Senate, <u>Alaska Coal Lands</u>, Hearings before the Subcommittee on Territories and Insular Affairs of the Committee on Interior and Insular Affairs relating to Secretary of the Interior's alleged failure to build the Alaskan railroad spur, 84th Cong., 1st Sess. (Washington: Government Printing Office, 1955), pp. 110-195.

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the Hot Springs District.

The Fairbanks placer district contains deposits of numerous minerals, but several factors hamper commercial exploitation. Known deposits of minerals in the Fairbanks district are of small size and of poor grade. Only small quantities of minerals have been extracted so far, because of the great distances to smelters. To overcome operating expenses most were mined in conjunction with other minerals.

Antimony is one of the few minerals mined independently. Sporadic shipments have been made from several mines in the Fairbanks district. Silver, tin, and tungsten have been produced with gold from placer operations. Outside market prices usually determine the amounts shipped from placer operations. Lead and zinc also occur in the district but development has been slow because of low grade ore, high cost of transportation, and absence of a local smelter.

In the same district, building materials--limestone, sand and gravel, granite, brick, clay, and pumice-have been developed. The Bureau of Mines studied limestone deposits at Windy, at the edge of Mt. McKinley National Park, to determine their usefulness for cement.¹ Such a plant would provide the Alaska Railroad with a much-needed

¹U. S. Department of Interior, Bureau of Mines, <u>Mineral Yearbook</u>, Volume III, 1954, p. 77.

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back haul to the major market around Anchorage. High production costs, distance to markets, and rail rates encouraged substitutes or imports instead. Cement manufactures have considered installing cement bins at Anchorage for bulk shipments from Washington. This could save 25% of present costs on cement shipped from Windy.¹ An adequate deepwater port at Anchorage would aid in solution of the problem. At the same time, it would discourage future development of limestone deposits along the railroad.

Coarse riprap for the Alaska Railroad is provided by granite quarried in the region, and sand and gravel are used in construction of roads and airfields.² However, the transport network has not been influenced by the distribution of building material. Sand and gravel are widely distributed and require little processing. High ocean rates have further encouraged use of local construction material.

The pattern of mining development within the area has not only materially shaped but is integrally related to land transportation. This was brought out clearly by

l<u>Ibid</u>.

²F. A. Rutledge, R. L. Thorne, W. H. Kern and J. J. Mulligan, <u>Preliminary Report: Nonmetallic Deposits</u> <u>Accessible to the Alaska Railroad as Possible Sources of</u> <u>New Material for the Construction Industry</u>, (Washington: <u>Government Printing Office, March, 1953</u>), pp. 11-129.

an early Alaskan historian as follows:¹

The extra-ordinarily rich gold deposits of the Klondike and later those of Fairbanks, Nome, and other camps made possible certain industrial advancements, but these constituted no permanent prosperity. It is only the construction of railroads and roads which has led to the development of the resources of inland regions other than the rich placers.

Surface Transportation and Agricultural Activities

Three areas of South Central and Interior Alaska can be considered as agriculturally developed: the Matanuska Valley near Anchorage, the Tanana Valley near Fairbanks, and the Kenai Peninsula (Fig. 18).² The growth of agriculture in Alaska is closely related to land transportation because it has been influenced by and has in turn exerted some influence on the surface transport pattern.

One of the purposes of the Alaska Railroad was to aid in the development of agriculture and settlement of land. In 1929, the railroad instituted a colonization project and brought 100 families to the Matanuska Valley.

¹Brooks, pp. 399-400.

²Annual average value of agricultural produce from this land totaled \$1,840,000 during the period 1943-53 and \$2,750,000 during the period 1954-57 (Fig. 15). Value of agricultural products in the area is based on reports in R. S. Andrews, H. A. Johnson, <u>Farming in</u> <u>Alaska</u>, Bulletin 20 (Alaska Agricultural Experiment Station, Palmer, Oct. 1956); and other periodic releases of the Station giving reports on the annual value of agricultural products by areas.

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In 1935, the Federal Emergency Relief Administration was aided by the railroad in settling 895 colonists from Minnesota, Michigan, and Wisconsin.¹ They were subsidized by the government in a colonization project intended to relieve national unemployment and, at the same time, develop agricultural resources in Alaska. Served by a branch line from Palmer to Sutton they were expected to furnish freight and passenger traffic. In 1938, however, many colonists returned to the states and financial support was withdrawn.

During the period of the Matanuska project, 4.5 million dollars was supplied to clear 8,000 acres and construct necessary buildings, serviced by an extensive road system. Prior to the project the homesteaders had no roads. Improvements and natural endowment have made the valley the most important agricultural region in the state.

About 12,000 acres of the 318,000 acres in the Matanuska Valley have been cleared.² Potential farm land totals several times this amount (Fig. 18).³ Farm products

¹Kirk H. Stone, "Populating Alaska: The United States Phase," <u>Geographic Review</u>, Vol. XLII (July, 1952), pp. 384-404.

²U. S. Department of Agriculture, <u>Land, the 1958</u> <u>Yearbook of Agriculture</u> (Washington: Government Printing Office, 1958), p. 433.

⁹U. S. Department of Agriculture, Bureau of Agricultural Economics, <u>Some Economic Aspects of Farming in</u> <u>Alaska with Chief Attention to the Matanuska Valley (Washington: Government Printing Office, 1950), pp. 27-28.</u>

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come from dairying and poultry, and the cultivation of vegetables and potatoes.

The Matanuska Valley has access to one of the largest market areas in the State.¹ A branch line of the Alaska Railroad to Sutton passes through the community center. The valley is linked to Anchorage, forty miles to the south, and to the Alaska Highway by the Glen Highway. A network of gravelled roads offers every settler direct access to a road in the main settled portion (Fig. 19).

Most of the agricultural products are marketed through the Matanuska Valley Farmers' Cooperative. Fluid milk, butter, cheese, eggs, and fresh produce are furnished to military establishments, the valley communities, and Anchorage. The workers at the mines are within easy trucking distance and also use produce of the valley.

The expansion of farming has been limited by the offer of high wages in other fields of work, especially thise connected with military activity and construction. High transportation costs and the short growing season have also been limiting factors. Markets are therefore

¹The Matanuska Valley - Anchorage area supplied 67 per cent of the gross value of farm products of Alaska sold in 1957; the Tanana Valley, 16 per cent; Southeastern Alaska, 9 per cent; the Kenai Peninsula, 4 per cent; and Kodiak and the Aleutians the remaining 4 per cent. U. S. Department of Agriculture, Land, the 1958 Yearbook of <u>Agriculture</u>, p. 434; and periodic releases of the Alaska Agricultural Experiment Station.

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Fig. 19

restricted to the Anchorage area. Since a merchant must provide for his needs with produce from outside sources during most of the year, he hesitates to upset his source of supply. Because the quality of local produce may be inferior, some farm products are often flown in from states to the south.¹ Although freight rates for imported goods provide a kind of tariff protection for the Alaskan farmer, the advantage is diminished as transportation from the other states improves, and freight rates decrease.²

The Tanana Valley in the Fairbanks area ranks next to the Matanuska in agricultural importance, although only 2,400 acres are cleared for cultivation.³ A network of gravel roads serves the area. Most settlers live close to the existing transportation lines.

Agriculture is relatively unimportant now because of environmental conditions, the small market, and the great distance and poor transport facilities to distant markets. The region is noncompetitive as a source of agricultural products for all but the small local market. Tanana farmers depend largely on the Fairbanks market.

¹W. F. Eiteman and A. B. Smuts, "Alaska, Land of Opportunity Limited," <u>Economic Geography</u>, XXVII (January, 1951), p. 38.

²<u>Ibid.; Kirk H. Stone, "Alaskan Problems and</u> Potentials," <u>Journal of Geography</u>, L, No. 5 (1951), p. 183.

³E. Willard Miller, "Agricultural Development in Interior Alaska," <u>Scientific Monthly</u>, Vol. LXXII (Oct., 1951), p. 248.

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Military bases and mining camps purchase some provisions from local farms. The town of Nenana, sixty miles from Fairbanks, receives goods for steamboat shipment on the Tanana and Yukon Rivers (Fig. 27). Air freight serves communities lying beyond the reach of surface transport.

Farmers in the Tanana Valley face marketing problems similar to those in the Matanuska Valley. Various studies indicate that Tanana Valley buyers perfer competing products from outside Alaska.¹ In addition, competition from imported products increases with improved transportation service. The greater distance and resulting higher transport costs, however, afford more of a theoretical protective tariff to the Tanana Valley farmers than to those in the Matanuska Valley.

Large areas of potential farm land lie on the west coast of the Kenai Peninsula. Very little development has occurred because of the lack of transportation and markets. The former has limited the market to the level of local needs. The Sterling Highway was built recently along Cook Inlet to serve both the Kenai farms and the rapidly expanding oil industry. The highway connects peninsula communities with Anchorage, providing

¹U. S. Department of Agriculture, Bureau of Agricultural Economics, <u>Markets for the Products of Cropland</u> in Alaska (Washington: Government Printing Office, 1950). U. S. Department of Agriculture, Agricultural Marketing Service, <u>Marketing and Transportation Situation</u> (Washington: Government Printing Office, 1956).

an outlet for farm products. It has increased the demand for agricultural land and large areas have been withdrawn for colonization purposes.

Other potential cropland lies in small non-contiguous tracts interspersed with lakes, streams, and swamps. The number of roads required and low yields obtained have not justified an expanded transport system.

Homesteading is improbable in areas not served by highways or access roads. Many potential farm areas have not been developed because of dependence on air transportation or seasonal river navigation. Costs of airfreighting machinery and tools to homestead sites are prohibitive. If homesteaders should overcome these obstacles--as some have in isolated farm valleys--then, again, the cost of transporting harvested crops to markets is restrictive.

Building and maintaining good roads require great expense. Small population, great distances, and unfavorable environment are obstacles to road-building and the farming activity that could follow it. This is why agriculture is unimportant now and will probably continue to be so.

Strategic Significance of the Transport System

Government investment greatly influences the

economy of the Area.¹ Future military expenditures are likely to remain of substantial magnitude, making the future economic growth of the Area dependent upon its strategic status.

From 1954 to 1957 wages paid in construction, primarily for defense establishments, averaged better than those in salmon canning.² Total Federal government obligations during the same period totaled five times the value of products from the fisheries, which constitute Alaska's major natural-resources industry (Fig. 15).

High wage scales for government employees delayed development of resources, increasing labor costs. However, permanent benefits did result from the military program: improvement in communication and transportation, and added permanent military payrolls. Kimble and

¹During the seven-year period ending June 30, 1954, the Federal Government's obligation in Alaska totaled 2.98 billion dollars. During the period the development programs (primarily construction) of the Department of Defense alone totaled 1.17 billion dollars. The government spent 105 million dollars on defense in 1955, 95 million dollars in 1956, and 96 million dollars in 1957. U. S. Department of Commerce, <u>Alaska, Its Economy and</u> <u>Market Potential</u> (Washington: Government Printing Office, 1959), p. 19.

²Wages from all of Alaska's fisheries, salmon canneries, lumber and pulp mills, mines, and farms were exceeded by military payrolls, equalled by wages paid in service industries, and just above that arising from the single industrial classification "construction." U. S. Department of Commerce, <u>Income in Alaska</u> (Washington: Government Printing Office, 1960; U. S. Bureau of the Budget, <u>Projection of the Alaska Economy</u> (Washington: Government Printing Office, November 24, 1958).

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Good contribute the following:¹

The benefits of her strategical status accrue to Alaska in two ways: first, by creating a demand for the expansion of the military establishment, with consequent employment, improvement of facilities valuable also to civilians, and stimulation of local resource exploitation; and second, by focusing attention upon the demands of Alaskans for statehood, a step that would insure her development by giving her a voice in Congress and more revenues from her own industries and properties. In return, this would enhance Alaska's strategic value.

Military needs were a major factor in the construction and improvement of port, highway, and rail facilities during World War II.²

Rapid expansion of military installations resulting in a large influx of military and civilian populations engaged in construction increased the demand for highway facilities to coastal ports. So did the function of these ports as transshipment centers. The demand for transportation facilities resulted in larger annual federal appropriations for the construction of highways and ports. Growing military and civilian traffic and need for alternate transport routes hastened reconstruction of the Alaska Railroad. Growth of population after construction of the transport network was primarily due to activities

¹George H. T. Kimble and Dorothy Good, <u>Geography</u> <u>of the Northlands</u> (New York: The American Geographical Society and John Wiley and Sons, 1955), p. 312. ²John R. Noyes, "Transportation's Role in Alaska,"

John R. Noyes, "Transportation's Role in Alaska, <u>National Defense Transportation Journal</u>, XII (March-April, 1956), p. 5.

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in connection with transportation into the interior of materials for both military and civilian use.

Mobility of forces is dependent largely on roads. Construction of the Alaskan Highway through Canada aided mobility during the early part of World War II. The military has used the highway since completion for movement of troops, equipment, and supplies.¹ Troop movements within Alaska are restricted to the State's few existing highways and thus are confined to the area of South Central and Interior Alaska. Rapid deployment of troops and equipment to any other point in Alaska must be by air or slow-moving barge, steamer and tractor trains. In the roadless areas, mass build-up of troops is not feasible, because of the lack of a primary road-system connecting all major Alaska regions.

The position of coastal settlements as transshipment centers for all waterborne cargo has made their industries sensitive to changes in the economy of the interior, and more particularly to activities in the military sector. Estimates of future growth of coastal settlements are based on the expectation that the military build-up and population in the Interior will increase in the future.

^LEdwin M. Fitch and Colonel Thomas Weed, "The Forty-Ninth State," <u>National Defense Transportation</u> <u>Journal</u>, VI (Sept.-Oct., 1950), p. 10.

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Fig. 20

It is evident that the post-war economic status of Alaska is based on defense expenditures. Government spending increases costs, contributing to cost barriers to other developments within the state. However, creation of local markets and air and surface transportation improvements were beneficial, rendering an impetus to developments of a non-military nature.

Surface Transportation and the Lumber Industry

Two classes of forest are found in South Central and Interior Alaska. One is the coastal coniferous forest covering an estimated area of more than four million acres. The other is the interior white birch and spruce forest, chiefly confined to river valleys (Fig. 21).¹

Almost all of the usable timber lies in the coastal Chugach National Forest. About seventy-five per cent of the timber is within two and one-half miles of tidewater.² Most of the timber can be transported by cheap water transport. Short roads are used for access to shipping routes and mill and homestead sites. They serve both the lumber

¹U. S. Department of Agriculture, <u>Trees, Yearbook</u> of Agriculture, 1949 (Washington: Government Printing Office, 1949), pp. 361-372.

²The average yearly value of lumber and other forest products from this region for the years 1949-52 was \$1,761,000 and \$2,450,000 for the years 1954-57. These figures are based upon values reported in the Alaska Resource Development Board <u>Biennial Report</u> (Juneau: 1951-57); and <u>The Annual Report of the Governor of Alaska to the Secretary of the Interior</u> (Washington: Government Printing Office, Annual).

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industry and the public, offering opportunities to settle adjacent land.

Before forest highways were built, settlement was confined to towns and villages. Rough terrain and dense forest cover precluded settlement where roads did not exist. With the construction of roads, settlers were attracted, particularly adjacent to large towns where transport lines had previously extended only short distances. These roads afforded some towns their only land outlet.

Before statehood, it was the responsibility of the Bureau of Public Roads to expand the road system in the Chugach National Forest. Its policies have had a decisive influence on economic patterns along routeways. The construction practices were often not dictated by conditions in Alaska but long-standing practices in the other states. Since population was small, the main need was for more roads of trafficable quality, rather than for fewer, more costly ones.

Decisions regarding road expansion in national forests were left to the regional forester. This procedure is followed in other western states where the Bureau of Public Roads also constructs and maintains highways in national forest areas. However, in one respect the situation differed considerably. The national forests in the other states were wilderness areas and did not enclose cities. In South Central Alaska, forests extend to the

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The interior forests are of less commercial importance than the hemlock and spruce forests of the coastal region. Commercial development of the former is retarded by poor quality, inaccessibility, and high transportation rates due to dependence on land routes rather than water ways, and lack of local demand resulting from distance to the major population center around Anchorage. The region at present relies almost entirely upon importation of timber and wood products. However, the forests have local value for mine timbers, homestead material, and fuel. Some lumber is marketed in Anchorage and Fairbanks. A proposed increase in production seems feasible, since demand exceeds production and high freight rates to Alaska protect the local producer.¹

Lumbering in the coastal forests is still underdeveloped and in the interior remains small in scale. Since the timber reserve is very large along the coast,

¹Stone, <u>Journal of Geography</u>, L. No. 5, 1951 p. 183; U. S. Department of Interior, Bureau of Land Management, <u>The Forest Resources of Alaska</u> (Washington: Government Printing Office, 1958), pp. 1-22.

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transportation, especially water transport, and accompanying settlement can be expected to expand to meet Alaska's growing demand for lumber.

The Tourist Industry and the Transport Network

The regional tourist industry is responsible for much of the development of the Alaskan land transport network. Transportation, in turn, has affected the regional tourist economy. Intensively promoted by the Alaska Visitors Association, tourism has been most evident along the Alaska Highway.¹

A national park, game reserves, and scenic attrac-

¹This road is the only means of surface access into the Area from the other states, American passenger shipping service having been discontinued during World War II. Passenger traffic over the Alaska Highway has increased substantially since the end of World War II. The highway has moved from a position of carrying one-fourth of the passengers to a position where it carries nearly one-third of the passengers. Most of this movement is by private automobiles. The volume of passenger travel by bus in interstate or foreign commerce is small, being limited to a line operating between Fairbanks and Canadian points. This trend toward increasing highway travel will no doubt continue in the future. South Central and Interior Alaska has gained the most by this change in transport. In Southeast Alaska, Skagway and Juneau have received some of this increased highway traffic through the White Pass and Yukon Railroad and a new car ferry operating between Haines and Juneau. However, ports served exclusively by water transport are steadily losing tourists with this shift toward highway travel. This situation may be corrected when the so-called "A" route, running just west of the coastal range of mountains from Hazelton, British Columbia, to Atlin, Yukon Territory, is completed in the near future and branch roads are built to Ketchikan, Wrangell, and Petersburg. Alaska Resource Development Board, Alaska Passenger Traffic Survey, 1955-1959 (Juneau, annual).

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tions are offered to tourists.¹ In 1957, profits from tourists reached \$29,000,000.² Over 150,000 people visited the state during that year³ (Fig. 22).

Before 1940, only cargo-passenger ships provided means for travel to Alaska from Seattle. Little was offered to attract the tourist trade. A rail trip from Seward to Mt. McKinley Park was the major attraction and represented the only organized means of reaching the interior by surface transport. There were, however, "bush pilots" who operated planes to inaccessible areas. Visitors went mostly to the coastal ports, seeing fish canneries, native villages, and "curio" shops. Inexpensive surface transport was not available. Moreover, development of recreational sites and lodging facilities required considerable investment with small returns.

By the end of 1950, the situation had changed.

¹In Alaska are 31 per cent of the lands in the National Parks System, 65 per cent of the wildlife refuge lands, 64 per cent of the public domain, and 11 per cent of the national forest acreage. The State has the right to select 103,000,000 acres of vacant and unappropriated public lands, but this selection is not expected to affect the supply of recreation resources.

²U. S. Department of Commerce, Business and Defense Services Administration, <u>Alaska its Economy and Market Po-</u> <u>tential</u> (Washington: Government Printing Office, 1959), p. 26. An undetermined portion of this was spent by resident Alaskans.

⁵<u>Ibid.</u>, p. 30. This figure represents total external passenger traffic by air, highway and sea. Regional statistics for individual carriers have not as yet been made available by either the State or Federal Government.

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Fig. 22

Local roads in the Anchorage area and on Kenai Peninsula were interconnected by a new road around Turnagain Arm, providing access from the southern states and Canada to excellent vacation land.

The Copper River Plateau was the corridor through which traffic went to Anchorage and the Kenai Peninsula. Today the tourist industry in this area serves both commercial and recreational highway traffic. Attractions are readily accessible since internal transportation is unusually good for so primitive a region. Fishing sites and the wildlife observation areas are accessible from Chitina, terminus of the Edgerton Highway. Reconstruction of the Slana-Tok section of the Glenn Highway provides easier access to the Upper Copper River area. This area will be more widely advertised in the future with completion of the Copper River Highway, which will offer access to one of the most "scenic" regions of Alaska.

Mt. McKinley Park, with the highest peak on the North American continent, covers an area of 3,030 square miles eighty miles southwest of Fairbanks. Until 1957, only airplanes and railroads gave access to the park. The Denali Highway now connects the park to the state highway system at Paxson. The road is 170 miles long. It serves both the tourist and gold, silver, and copper mines located in the area. An additional 94 miles of road within the park provide access to outstanding park features.

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The tourist industry thus provides an important incentive for building and improving roads and planning some special sightseeing roads. These improvements and extensions of the State highway system in turn create the need for additional lodges and resort facilities.

Several factors however operate against development of tourist facilities. Material shortages and high labor costs on one hand and emphasis on military construction on the other are handicaps for private enterprise. Roads built during the war primarily for military purposes are being improved to serve the tourist trade. However, with the exception of the Denali Highway, only short stretches of road have been built to service scenic areas. Besides poor road conditions, lack of overnight and supply stations have made highway travel slow and expensive. Most facilities are located along the highways to serve the dual purpose of recreation and general supply centers. This combination in one establishment will probably continue to be a characteristic feature of the area.

Scenic resources are not yet developed to make tourist attractions available to a large number of people at reasonable cost. The Area lacks facilities for opening its scenic resources not only to the tourist from the outside but also to residents. Road construction is needed to improve the present situation, but, since building costs are high, maximum patronage is required for a satis-

factory return on investments.

Other Industries

Beside those mentioned, other industries in the Area include refining, lumbering, printing and publishing, food processing, and boat building. All local industries are protected by the high costs of shipping from the outside. However, high transport rates hinder local manufacturing and operation costs, especially labor, are extremely high. Alaskan manufacturers could lose their price advantage in the following three ways:

1) By improvement of transportation facilities from other states.

2) By reduction of freight rates.

3) By expanding production to a point at which importation would become unnecessary.

Improved transportation facilities and lowered freight rates could, however, in turn decrease labor and operational costs.

Even with a protective tariff, export of locally manufactured products to other Alaskan regions is difficult because:

1) Southeastern Alaska is closer to the Pacific Northwest states than to South Central and Interior Alaska.

2) Preferential steamship rates make shipments from Seattle to Southeast, North, and West Alaska less

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costly than the same shipments from South Central and Interior Alaska.

3) Overland transportation to Southeast, North, and West Alaska is poor, and transport rates high.

Manufacturing plays a surprisingly small role at present. In 1954-1957, only 605 people were employed in manufacturing, other than salmon canning (Fig. 23). Authorities, however, predict the development of a pattern of small manufacturing plants.¹ An increase in intraregional trade could come through the practice of processing for the regional market, emphasizing bulky or perishable products having heavy transportation costs when shipped in from other states.

Transportation as a Means of Livelihood²

Private industry employed 21,171 persons in the

¹U. S. Department of Interior, <u>Alaska--A Reconnais</u>-<u>sance Report on the Potential Development of Water Re-</u> <u>sources in the Territory of Alaska</u>, House Doc. 197, 82d Cong., 1st sess. (Washington: Government Printing Office, 1952), p. 112.

²Various sources provide information concerning employment in Alaska. They include the following: Alaska Employment Security Commission, <u>Financing Alaska's Em-</u> <u>ployment Security Program, Analysis of the Alaska Economy</u> <u>and its Future Outlook, Vol. II</u>, pp. 19, 28; <u>Statistical</u> <u>Supplement, Vol. III</u>, pp. 12-15, 42-54 (Juneau, Oct. 1958). U. S. Bureau of the Census, <u>Seventeenth Census of the United</u> <u>States: 1950, Population, Vol. II</u> (Washington: Government Printing Office, 1952). .

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Fig. 23

years between 1954 and 1957.¹ Service industries employed 18,207, or 86.0 per cent of the working populace; mining accounted for 982, salmon canning for 965. Manufacturing, agriculture, and lumbering employed 1,017. In the same period workers in the transport and communications services numbered 3,385, or 16.0 per cent of the labor force. Construction work, principally that connected with military facilities, accounted for 6,175 persons or 29.1 per cent, with 8,647, or 40.9, in all other services. These data demonstrate the influence of government activities on the economy of the Area and the relatively small contribution of the basic industries.

Of the total of 21,171 wage earners 3,385 were employed in the transport and communications services of the region in 1954-1957. This is a high proportion for a service industry, inasmuch as the total number employed in basic industries is but 14.0 per cent. Wages are another indication of the importance of transportation in the regional economy. Annual average total wages paid in

¹During the years 1956 and 1957 approximately 85,800 persons were employed in the Area. Government employment (military and civilian) accounted for almost two-thirds of the total, or 56,000. The Alaska Employment Security Commission study of the total employed labor force for the years 1956 and 1957 estimated that of a monthly average of 110,400 persons employed in the three regions, government accounted for 60% of total employment (military 42%, civilian government 18%) and private employment 40%.

transportation and communication work for the four-year period was \$21,594,000, exceeding the total wages in natural-resources industries (\$13,248,000).¹

Before World War II services in most communities were dependent upon industries extracting and manufacturing local raw materials. Service industries, such as transportation, developed around basic industries. As the economy matured, employment in the transportation industry tended to equal employment in basic industries. After 1940, the region's basic industry changed very little. Mining declined slightly, agriculture experienced a gradual upward trend, and fisheries remained fairly stable. A large increase of employment in the military construction program and attendant expansion in other industries occurred after 1940. Emphasis on military construction and transport brought about a shift in the employment pattern, affecting the ratio of service to non-service industries.

Industrial activity declines during the winter months and the level of employment falls to 10 per cent of the summer peak. Because of the seasonal variation nearly half of the peak-season employees are migratory.²

¹Department of Commerce, <u>Income in Alaska</u> (Washington: Government Printing Office, 1960), pp. 1-35; H. L. Clark, "Alaska: Wages and Working Conditions," <u>Monthly Labor Review</u>, LXXVIII (Dec., 1955), pp. 1388-1392.

²George W. Rogers, "Alaska: The Economy and the Labor Force," <u>Monthly Labor Review</u>, LXXVIII (Dec., 1955), p. 1382.

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Rigors of climate and the character of certain industries affect the pattern. Construction, placer mining, agriculture, and lumbering are carried on in the summer months only. In South Central Alaska seasonal employment is also due to dependence on the fishing industry.

The only relatively stable year-round employment is provided by the service industries. Transportation provides longshoremen, truckers, and railway workers employment throughout the year. Employment opportunities may even increase in winter in certain places when supplies and heavy equipment can be moved over frozen surfaces by tractor-drawn snow sleds to places inaccessible at other times.

It should be added that the number of persons depending directly or indirectly upon the transportation industry for their livelihood is larger than the figures cited above indicate. Regional statistics do not specifically enumerate the number of construction workers building and mainta ining the road and rail network.¹ Because of the rapid development of transport routes after World War II one can assume that most construction employees

Within the private sector, employment in construction alone accounted for 29.1% of total employment in the Area (Fig. 23). The Department of Commerce estimated the average annual total wages paid in the Area for the period 1954 through 1957 at about \$155,215,000. Of this total \$65,226,000 was represented by the classification "Construction." Department of Commerce, <u>Income in</u> <u>Alaska</u>, pp. 1-35.

were in highway building.

Regrading and surfacing of existing roads should be completed in a year or two. Other public works and building construction to be carried through 1975 should maintain the employment record of the years 1954-1957.¹ It is probable that military activity will be maintained at its present level, and that civilian construction will expand. Rehabilitation of the Alaskan Railroad, the enlarged program of the Alaska Division of Highways, and new Civil Aeronautics installations will lead to a further improvement of the transportation system and doubtless provide additional employment opportunities.²

¹Alaska Resource Development Board, <u>Biennial Re</u>port, 1955-1957 (Juneau, 1957).

²Letters from William J. Niemi, Regional Engineer, Bureau of Public Roads, Juneau, Alaska, January 10, 1961; and A. H. Romick, Commissioner, Alaska Department of Commerce, Juneau, Alaska, January 23, 1961.

CHAPTER V

EFFECT OF TRANSPORT ON URBAN AND

RURAL SETTLEMENTS

Alaska has the lowest population density of any political subdivision of the United States. Moreover, the distribution of the population is far from uniform. Important population concentrations are few and widely separated from one another. The bulk of the inhabitants are concentrated in the Southeast and the South Central and Interior district. Large areas of North and West Alaska are virtually uninhabited (Fig. 24).

Urban Centers

The primary zone of settlement in Alaska is the South Central and Interior Area. The most striking population change has been the growth of urban centers. The growth shows a rise in urban population from 32.8 per cent in 1939 to 75.0 per cent in 1956 (Fig. 25). During the same period, rural population rose by 8,964, while urban population rose by 66,329.

Five cities--Anchorage, Seward, Whittier, Valdez, and Cordova--were selected for study, to show in detail population growth within the Area. Population changes





Fig. 25

are shown in Table 6. Each community has a significant size,location and historical background. Examination of these settlements gives a clear insight not only into the actual trend of population in the region but also into the reasons for the trend.

TABLE 6

POPULATION OF THE LEADING CITIES OF SOUTH CENTRAL AND INTERIOR ALASKA

City	1920	1930	1940	1950	1960	
Anchorage	1,856	2,277	3,495	19,000	44,237	
Fairbanks	1,155	2,101	3,455	5,625	13,311	
Seward	652	835	949	2,063	1,891	
Valdez	466	442	529	500	555	
Cordova	955	980	938	1,141	1,128	

Source:

U. S. Bureau of Census, Fourteenth to Seventeenth Census of the U. S. 1920-50; 1960 Census of Population, Series PC(Al)-3, Advance Reports, Final Population Counts (Washington: Government Printing Office, 1960).

The city of Anchorage.--The most striking feature of the Area's urbanization brought out by Table 6 is the rapid growth of Anchorage. Anchorage, a former railway camp, is located on Cook Inlet, where there is good anchorage for boats bringing in men, machinery, and equipment. Rail facilities reached Anchorage in 1918. However, the city did not grow rapidly until World War II; immediate need for military installations prompted an influx of men .

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and material via the Alaska Railroad into the interior. From a settlement of about 2,000 in 1920, Anchorage grew to become the most important city in Alaska. In 1960, the population was 44,237. It is unchallenged as the primate city of the Area. Several factors account for the city's pre-eminent role in the State: (1) the Anchorage area's central location with respect to potential resource development areas; (2) its focal position within the more densely settled part of Alaska; (3) its status as an international air center; (4) its established position as a financial, communication, and distribution center for the Alaskan hinterland; (5) its close proximity to the major farming area in the State; (6) its strategic importance.

The city is the main overland transportation center and distribution point for South Central Alaska and for much of Interior Alaska. The Glenn Highway connects it with the main network of Alaska and the other states. Anchorage is also an important airway station for civil, military, and international aircraft. Two military facilities--Elmendorf Air Force Base and Fort Richardson-are located near the city. With headquarters in Anchorage, the Alaska Railroad operates both passenger and freight service to Fairbanks and to Seward. The city is converting its waterfront into a port; with the completion of the project it will have acquired the "high sea" as a fourth avenue of transportation.



The desirability of a year-round port at Anchorage was recognized in 1903 when investigations were conducted by private interests preliminary to the selection of the Alaska Northern Railroad route to the Matanuska Valley coal fields. It was concluded that ice conditions in upper Cook Inlet made year-round use of the port impossible. In 1914 and 1915, the Alaskan Engineering Commission confirmed the earlier opinion. The Alaska Northern Railroad route was adopted as the route of the Alaska Railway from the port of Seward.¹ The physical limitation imposed by ice in Cook Inlet was thus a major factor accounting for the 164-mile extension to Seward.

A deepwater terminal was built at Anchorage in 1919, to facilitate construction of the Alaska Railroad. In the summer of 1941, the Army expanded the terminal. Although improvements were made during the war, adequate terminal facilities have not been developed. Only small tonnages are discharged directly at Anchorage. The bulk of supplies are received at the water-rail terminals of Seward and Whittier--114 and 63 miles, respectively, from Anchorage by rail.

In the past twenty years, developments around Anchorage have emphasized the need for a year-round port

¹U. S. Congress, House, <u>Report of the Alaska</u> <u>Engineering Commission for the Period from March 12, 1914</u>, to December 31, 1915.

of a kind to allow admittance to ocean carriers. Various plans have been studied with a view to overcoming the adverse natural conditions which restrict navigation. It is beyond the scope of this study to outline them in detail.¹ Of significance, however, is the effect that they would have on the transport pattern. Shortening the land transport route into the interior, thus eliminating formerly used routes and establishing new ones, would be the most direct result of these plans.

At present, the region depends upon supplies coming

¹While floating ice restricts the movement of small boats through upper Cook Inlet during 4 months of the year, full-powered vessels generally navigate these waters at all times. However, lack of protection from ice moved by strong tidal currents prevents unloading of cargo at Anchorage during this period. In addition, water is shallow at low stages and cargo must be unloaded by placing a barge between the wharf and the ship. This allows the ship to ride in deep water while cargo is loaded onto the barge, which in turn transfers the cargo to the wharf.

It appears that a deep sea port usable 8 months of the year can be developed by extending the wharf and dredging. This period can be extended to 12 months by protecting the ships and breaking up the ice.

Anchorage is served, for the most part, by tankers and barges. Port capacity is estimated at 350 tons per day. In 1958, 214,281 tons of traffic were reported to have moved through this port, largely import cargoes. In spite of numerous physical limitations, the proportion handled by Anchorage of all waterborne freight through the major South Central ports increased from 8.5% in 1949 to over 25% in 1958 (Fig. 31).

The Port of Anchorage is engaged in planning an \$8,000,000 port improvement program to include new dock and warehousing facilities. The bond issues have been authorized by the voters of the city. Also under study is a causeway across Knik Arm. Thus, considerable thought is being given to providing all-year port facilities. through the ports of South Central Alaska. The transfer of shipments to land carriers assures the continued importance of the transportation economy within the Area, especially until more direct and less costly means of shipping develop. If the ports in the South Central area continue to handle traffic for the interior, transportation facilities can be expected to expand. If harbor improvements were made at Anchorage, much of the interiorbound cargo would bypass Seward and Whittier, and possibly Valdez. This might result in their eventual decline. A trend in that direction is already indicated (see Table 6).

The extent of port improvements at Anchorage affects the transport industry of the Area. If the port cannot be held open on a year-round basis, cargo must continue to be handled through Seward, Whittier, and Valdez during the winter, for transshipment on rail and road. Transportation employment would thus be seasonal.

Anchorage as Regional Transport Center.--The city has extensive connections with all parts of the region, but primary traffic volumes lie within the area bounded by the Matanuska Valley on the northeast, and major ports in the Kenai Peninsula on the southeast (Fig. 27). Beyond the limits of the Area, the number of carriers connecting Anchorage with other regional points declines rapidly.

Movement into and out of the city is not uniform in every direction; in highway traffic Anchorage is oriented

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Fig. 27

primarily to the southeast and northeast. The heaviest intercity freight volumes move from the city to the Matanuska Valley, and to settlements along Turnagain Arm. The bulk of this freight consists of manufactured goods, food, and oil received in the city by rail, road, and water transport. Agricultural products from the Matanuska Valley arrive by road. Valdez and the Kenai Peninsula receive less highway traffic from Anchorage than eastern communities along the Glenn and Seward-Anchorage highways. The heaviest freight volumes move southwest to the city from the coal district around the Matanuska Valley, and north from Whittier and Seward. Northern traffic by rail is of less importance. Nonetheless, the connection with Fairbanks and other northern points by rail is second only to the traffic immediately southeast and northeast of the city. The Alaska Railroad route to Fairbanks serves as a supply link between settlers within the Area and Anchorage. While Fairbanks shows almost equal traffic densities in all directions, Anchorage is primarily a collector and distributor of goods for rural communities along Knik and Turnagain Arms.

The situational qualities which have made Anchorage the state's most outstanding commercial center are reflected in the pattern of truck and rail traffic converging on the city. It taps the resources and trade of Alaska's leading

agricultural and mining regions. That the proportion of many commodities received by truck is not greater is due to the city's excellent rail connection rather than to inaccessibility by motor carriers. Nonetheless, highway carriage of manufactured and agricultural goods has made deep inroads into traffic once moved exclusively by rail. The Seward-Anchorage Highway has become one of the major competitors of the Alaska Railroad because motor freight movement is cheaper and faster than that by rail. This route is especially favorable for the transportation of perishables. Thus the highway has gained in tonnage at the expense of the railroad.¹

Anchorage's position as a hub of rail and truck transportation is due in large part to its areal centrality. In both distance and time, Anchorage is physically closer to all major urban centers of the region than are Fairbanks, Valdez, or Seward, its leading rivals as transport centers. Over 70% of the population of Alaska has settled within a 300 mile radius of Anchorage. These locational factors are given special relevance by the fact that Anchorage has become a junction or transfer point between waterborne, airborne, and overland movements of

¹In recent years, the Alaska Railroad has reduced rates by as much as fifty per cent, hoping to encourage traffic. Department of the Interior, <u>Annual Report of</u> the Governor of Alaska (Washington: Government Printing Office, 1955-1958).

goods and people, and hence the business, wholesale, and distribution center for the State. The importance of the position of Anchorage, with the expansion of port facilities, will increase over such secondary centers as Seward or Valdez. Anchorage shipments will be carried to principal markets throughout the region almost entirely without subsequent interline transfer, while freight from other coastal ports must, in many cases, undergo the inevitable delays accompanying one or more cargo interchanges before final destinations are reached.

Ocean terminals.--The growing importance of South Central Alaska's economy stems mainly from the transfer of supplies from ocean carriers to land carriers at ports located within the Area. Such ports are the termini of the principal routes of the internal transportation system. They are therefore of primary importance to the interior. Although other industries may be of more importance to the individual local communities, transportation provides the link between the economy of the coastal towns and the entire area here considered.

Until 1942, transport to Alaska was by steamship, mostly from Puget Sound. Port facilities at the termini of inland routes were developed for transfer of cargo and passengers to the interior. Seward became the major port and transfer point, with connections to Anchorage and Fairbanks. Similarly, Valdez and Cordova developed as the

ocean termini of the Richardson Highway, and the Copper River and Northwestern Railway, respectively.

Seward .-- Seward, on the Kenai Peninsula, with a population of 1,891 in 1960, was the original seaport for the Alaska Railroad. The town owes its economic life to the railroad, receiving incoming traffic from the ocean, and sending passengers and goods into the interior by rail. Much of the military and most of the civilian cargo goes through Seward to Anchorage, Fairbanks, and certain Yukon Completion of the railroad cutoff to Whittier retowns. sulted in a declining commerce for Seward. A new avenue of development was opened, however, by the new Seward-Anchorage Highway, with its feeder roads from the Kenai Peninsula. Threatened abandonment of the rail section between Seward and the Whittier Junction would again bring loss of traffic to Seward.

Whittier.--Whittier was established in 1942 to serve as an alternate terminus of the Alaska Railroad, thereby augmenting the facilities at Seward for the transfer of cargo. The port has almost exclusively military functions. The small civilian population is composed of

¹The people of Seward have fought the abandonment of the rail for a number of years. Many congressional hearings are filled with their pleas. As an example see: Congress, House, <u>Alaska, 1955</u>, Hearings before the Subcommittee on Territorial and Insular Affairs of the Committee on Interior and Insular Affairs on House Resolution 30, 84th Cong., 1st Sess. (Washington: Government Printing Office, 1956), pp. 85-108.

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Fig. 28
sawmill employees and service personnel for the railroad.

The town is surrounded by high mountains. It can be reached only by water and rail. The railroad approaching from Portage reaches Whittier via two long tunnels.¹ The rugged Chugach Range not only hinders the movement of goods to the interior, but limits port facilities to an area five miles long and one mile wide. The port is deep and anchorage is difficult. It is beset by strong winds, heavy rains, and snow. Because of these conditions, the army has considered closing the port and diverting traffic to Seward or perhaps later directly to Anchorage.

<u>Valdez</u>.--Valdez, on Prince William Sound, is located near the natural gateway closest to interior Alaska. In 1898, it was used as a port of entry by gold prospectors. Later, a military trail was constructed from Valdez to the Yukon to avoid crossing Canadian territory or entering via the long Yukon River route. The original camp grew with the development of the original trail into the Richardson Highway. The population of the town was 555 in 1960. The population and the economy are related to the development of transportation and road construction and have fluctuated with the amount of freight being sent into the in-

^LWhittier tunnel, 14,140 feet long, and Portage tunnel, 4,905 feet, were completed on Nov. 20, 1942. In winter, the railroad tunnels are heated to prevent the accumulation of ice. To retain the heat, enormous doors seal the tunnel ends and must be opened for each passing train.



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The town was an important break-in-bulk point until 1958. With increasingly larger freight volumes sent through Seward and Whittier the port function of the town became less relevant and the population of Valdez decreased. The population and economy of Valdez will no doubt continue to be determined, as will that of other ports in South Central Alaska, by events beyond the control of the local population.

<u>Cordova</u>.--Rich copper ores were discovered in the Chitina Valley in 1898. In 1911, construction of a railroad to the ore bodies brought an outlet to the sea. Population within the region began to expand. Cordova was the coastal terminus and headquarters of the Copper River and Northwestern Railway. The population rose from 173 in 1900 to 1,152 in 1910. The rich Kennecott ore was exported from the port. Interior communities grew also: Chitina, Kennecott, and McCarthy. Their combined population in 1920 was 800. They were either centers for mining or railroad facilities.

In 1939, the copper mines closed, rail service was discontinued, and interior towns became nearly deserted.

¹Year-round traffic until 1958 was hindered by an average snowfall of more than 20 feet. After 1958, Thompson Pass, 20 miles north of the port on the Richardson Highway, was kept open by a constant snow-plowing program, and traffic increased.

Population loss at Cordova was slight, thanks to a rapidly developing fishing industry. The town is now the largest fishing center in the state west of the 141st meridian.

In 1960, the population of Cordova was 1,128. The town is not served by highways. Attempts were made to achieve a connection by road to Chitina over the Copper River and Northwestern right-of-way.¹ Although only onethird of the mileage was built by 1958, completion was expected by 1962.² The completed road would serve tourist trade, and permit development of a heavily mineralized area. Cordova may eventually establish itself as the fourth major regional outlet (Fig. 30).

<u>General comment</u>.--Census data for the 1940-1960 period show that South Central Alaskan ports--Valdez and Seward--increased in population by almost 1,000 persons (Table 6). The increase is suggestive of the function of the ports as break-in-bulk points and termini of yearround routes into the interior. They also illustrate the population's rise and fall in direct proportion to the extent routes are used for freighting to the interior. Valdez declined before Seward since most of the freight

¹Alaska International Rail and Highway Commission, <u>Transport Hearing, Anchorage, Alaska, 1959</u>, pp. 9-21. ²Alaska Resource Development Board, <u>Biennial Re-</u> <u>port of the Alaska Territorial Highway Engineer and Super-</u> <u>intendent of Public Works, 1957-1958</u> (Juneau).





passing through Valdez earlier in the decade was passing through Seward. With plans for the construction of the port of Anchorage, the growing importance of Whittier nearer the major population centers, the decline of military activity in Interior Alaska, and the threat of abandonment of the Seward-Portage track, Seward suffered a population decline from its 1959 peak of 3,000 by 1,172 persons.

The fluctuating population of both ports illustrates the uncertainty which besets the area's communities whose prosperity is determined by conditions beyond the control of local inhabitants.

Handling of cargo at regional ports.--The coastal ports are the gateways to South Central and Interior Alaska. The volume of commerce needed for maintenance and growth of this great hinterland flows through the ice-free ports of Seward, Whittier, and Valdez. It is out of proportion to the degree of settlement and development within the coastal region.¹ Seward and Whittier lead as pivots of transportation in annual tonnage of shipping (Fig. 31). In both, imports have been in excess of exports since 1942.

¹See following maps, tables and graphs in Weintraub, "Water Transportation in Alaska's External Trade": Table 5, Waterborne Commerce of Alaska: Major Ports, 1955, p. 128; Table 7, Trips of Vessels at Ports, 1955, p. 130; Map (Fig. 11), Total Traffic, Principal Alaskan Ports, 1955, p. 129; Graph (Fig. 5), Alaskan Trade with the U. S. by Region and Port, 1955, p. 27.



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Fig. 31

This is true also of Valdez and Anchorage. New economic development programs are responsible. Equipment and other supplies move through these terminals for rehabilitation of the Alaska Railroad, the enlarged program of the Alaska Road Commission, the added installations of the Civil Aeronautics Administration, and for the increased activities of the military. Cordova, with no major programs for the development of its hinterland, preserves a balance between imports and exports.

The bulk of the civilian commerce passes through Seward. It is served throughout the year by Alaska Steamship Company vessels, tugs, barges, and tankers. Port capacity is estimated at about 4,000 tons per day.¹ In 1958, the port is reported to have handled 450,705 tons, of which about 85 per cent were imports consisting of foodstuffs, manufactured goods, construction materials, and petroleum products.

The Army port of Whittier handles only military cargo. Port capacity was estimated at 2,600 tons per day. In 1958, the port handled 129,969 tons of cargo from carriers transporting for the military.² The Military Sea Transportation Service also handles a substantial portion

¹Tonnage figures are based on the Army Corps of Engineers reports.

²This figure includes tonnage moved for the military on commercial vessels, but excludes tonnage moved in Department of Defense vessels.

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of the military tonnage to Alaska. Shipments are discharged and warehoused at Whittier and later shipped to military establishments along the rail belt. Military water-borne cargo during the year ending June 30, 1958 totaled 170,000 (short) tons.

Besides controling overseas trade, Seward and Whittier act as entrepots for domestic coastwise trade. Since direct land routes between coastal settlements, except between Whittier and Seward, are impractical, a large number of fishing boats and other small craft operate in the local trade. These vessels visit both ports regularly and accounted for about 15,000 tons of local traffic in 1957.

Valdez is the southern terminus of the Richardson Highway. The port is served by Alaska Steamship Company, barge service, Standard Oil, and Union Oil tankers. Over 1,000 tons of cargo can be worked daily at this port. The Corps of Engineers reports a yearly average cargo of 90,000 tons since 1950, virtually all imports. Except for supplies used locally, all water-borne cargo is shipped inland by truck. Traffic is fostered by the fact that this is the northernmost ice-free port on the American continent.

The port of Cordova handles only local cargo, since it is not reached by any surface transport. A highway under construction at present will connect Cordova with the

main Alaska road system. At that time traffic is expected to increase. In 1957, port traffic at the community totaled 21,000 tons. Capacity is estimated to be 1,000 tons daily. Half of the present tonnage consists of fish landings and exports of fish products.

Fairbanks .-- The only important increase in population among the areas of interior Alaska has occurred within and adjacent to the city of Fairbanks. The city first served as a supply and distribution center for mining districts. Its initial importance was due to its position at the head of navigation on the Tanana and Chena Rivers. Supplies were brought in by boat from the Yukon and Tanana Rivers and the town developed as the trade center of the interior. By 1904 Fairbanks was the most important center in Interior Alaska, eclipsing Circle, Eagle, Fort Yukon, Tanana, and other interior towns.¹ Between 1905-1906 Fairbanks was a mail distribution center for the interior and such distant points as Nome.² Additional impetus to growth was provided by the termination of the Alaska Railroad and the Richardson Highway, and by construction of the Ladd and Eielson Air Force bases near the

¹L. M. Pindle, <u>The Gold Placers of the Fortymile</u>, <u>Birch Creek and Fairbanks Region</u>, Alaska Geological Survey, U. S. Department of the Interior, Bulletin No. 251 (Washington: Government Printing Office, 1905), p. 69. ²U. S. Congress, House, <u>Mail and Pack Trails in</u> <u>Alaska</u>, House Report No. 3875, 59th Cong., 1st Sess. (Washington: Government Printing Office, 1906), p. 23.

city.

The population of Fairbanks in 1960 was 13,311. Population growth continues, because the city is the northern terminus of the rail and highway system, and the air transport center for North and West Alaska, except for two areas--the Alaska Peninsula and the Aleutian Islands--which focus on Anchorage (Fig. 36). From Nenana, a Tanana River port on the Alaska Railroad near Fairbanks, river boats take supplies to remote points on the Tanana and Yukon Rivers. Finally, Fairbanks is the southern terminus of the Steese and Elliott Highways. As such, it serves an extensive placer mining region.¹ A geographer

¹The area northwest of Fairbanks provides an ideal location for one of the largest potential hydroelectric installations in the United States. At Rampart Canyon, on the Yukon River, a power dam could have an installed capacity of nearly 5 million kilowatts. It would create more power than Grand Coulee and provide all the power needs of Interior Alaska. If built, it would impound 1.5 billion acre feet of water and form a lake 150 miles long and 50 miles wide. Climatologists indicate that this lake would modify the climate of Interior Alaska. Both temperature and precipitation are expected to rise.

Under optimum conditions, the Corps of Engineers estimates it can begin to produce energy by 1972. They contemplate two years to design the dam and then 8 years to build it.

Fairbanks, located approximately 100 miles from the Rampart Canyon Dam site, would be greatly affected by construction of this dam. The dam would supply the city with an abundant source of low-cost power and speed establishment of industry. During construction, workers and allied business enterprises would increase and substantially change the character of the economy. Interview with an official of the Corps of Engineers, January 28, 1963.

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drew attention to the interrelationship between the growth

of Fairbanks and development of transport as follows:

The centrality of Fairbanks has made it possible for this small interior city of 13,000 (with an estimated 30,000 within a ten-mile radius) to capture the distribution function of much of the Alaskan interior. Constant improvements in access facilities and in types of carriers have been of marked assistance in the attainment of this role--entrepreneur for the habitable Northland.

In the early stages of settlement, when river boats provided the bulk of cargo movement, only the richer mining claims could be worked economically: with the addition of the Alaska Railroad, large scale operations on lower value claims were possible, thus raising the level of employment and augmenting the economy. Improved roads, an increase in road mileage, better trucks and cars, additional air fields, and better planes all appeared about the same time. Defense activities which expanded sharply during the war have continued to the present; in addition to military construction now under way in the area. fifty-one Air Force and five Army projects were scheduled for 1960. The functional significance of Fairbanks as an Alaska center, as always, continues to exceed its status when measured by population alone.

Rural Settlements

Small dependent communities have developed around the cities. Most of them have arisen through the development of local natural resources. In Prince William Sound are the cannery towns of Ellamar, Tatitlek, and Latouche, and the Indian villages Chenega and San Juan. These small settlements, all with less than fifty inhabitants, grew

¹Robert L. Monahan, "The Role of Transportation in the Fairbanks Area," <u>Yearbook of the Association of</u> <u>Pacific Coast Geographers, XXI (1959), pp. 20-21.</u>

up around fish canneries at the mouths of streams. Here pools could be entered at high tide, thus offering some degree of storm protection.

Away from the coast, small communities developed along the roads and railroads. They furnish meals and lodging, fuel, and supplies to tourists, miners, construction workers, and military personnel. Settlements of this type are Glenallen, Gulkana, and Tok Junction. Other communities, such as Copper Center and Chitina, which were old trading posts, outfitting centers, or mining towns, have assumed renewed activity by catering to local needs. Nenana, with a population of 206 in 1960, is a typical break-of-bulk point at the confluence of the Tanana and Nenana Rivers. It was first settled as a construction camp for the northern division of the Alaska Railroad.

Highways did not bring the development their advocates predicted. The effect on people living in the country has not been great because only a small number of people lived there. There are towns at both ends of major roads and small centers at intersections, but few settlements along the highways. Some are wholly outgrowths of the highways. They usually develop from early maintenance camps and repeater stations for telephone lines. They usually stretch for about a mile on both sides of the highway. Residents cater mostly to the tourist trade. In addition to the dwellings of the local residents there

are gas stations, cafes, hotels, motor courts, and small stores.

Most highways were built for military purposes or for specific mining localities. In planning routes, little thought was given to the resources that lay between the outlets of the region and the highway objective. The future need is for branches from the main routes to resources and their population concentrations. Unless traffic is large and development permanent, cost of construction will remain a limitation. As the mapped pattern shows (Fig. 14), few branches were built, primarily because of the small size of the presently active mining areas.

Only a possibility exists that rich mineral discoveries will be made along this region's highways. Also, any future development of lumbering and agriculture seems unlikely because of the inferior quality of the forests and the subsistence character of farming. The tourist traffic, however, will increase, and with it tourist business along routeways.

CHAPTER VI

INTERNAL AND EXTERNAL TRADE AND THE SOUTH CENTRAL AND INTERIOR ALASKA TRANSPORT SYSTEM

The Role of Transport in the Movement of Goods and People

The first objective of this section is to present the pattern and character of the freight transporting facilities of the region; a second to analyze the freight traffic associated with these media of transportation. For a clear understanding of the regional movement of freight an examination is first made of the general character of the Area's external trade and the volume and composition of movement through the region's ports.

A Comparison of Internal and External Trade

The economy of all Alaska is more dependent on transportation than that of most other American regions appears to be. In the southern states, for example, the pioneers developed an agricultural system that became selfsustaining, while Alaska imports foodstuffs. Other imports are construction materials and manufactured goods; they must be brought great distances from the developed

sources. Although major improvements are being made in transportation routes, the area considered is still remote from supply centers.

The canning of fishery products was the extent of manufacturing and processing activities in the early history of Alaska. The organization of the transportation services was based on the principle of outward and inward flow of overseas freight. Raw materials were moved by feeder roads and trails to the nearest railhead or river navigation terminal. They proceeded by rail or water-andrail to the ocean terminal for shipment to overseas destinations. A reverse process functioned for imports.

Intraterritorial exchanges remained on a small scale. In parts of the territory in which transportation facilities were available, services operated with natural handicaps and frequent breaks of bulk.

External trade, in particular, export, was the strongest feature of regional commerce until the opening of the Second World War.¹ Then the economy of the region

¹Alaska's external trade during the 1931-1940 decade, for example, had average annual out-shipments totaling \$58,758,000 of which the three leading items were canned salmon (\$32,582,000), gold and silver (\$15,904,000) and furs and skins (\$2,607,000), all other outshipments accounting for only 13% of the total. The average annual value of in-shipments was less than half the value of out-shipments (\$28,410,000). Again the northward trade was specialized and revealing as to the nature of Alaska during this period. The three leading commodities were tin cans (\$5,219,000), petroleum products (\$2,679,000) and alcoholic beverages (\$1,968,000). Weintraub, pp. 11-22.

changed. From reliance on mining and fishing, it was supported strongly by government construction. Construction materials and supplies for naval and other military installations became heavy imports. By 1942, imports exceeded exports for the first time.

Although gold mining was resumed after the war, its effect on regional economy was dwarfed by federal expenditures for continued construction of military facilities, bringing an influx of population and materials. Imports continue to exceed exports.

In 1958, statehood stimulated interregional and intraregional commerce to greater activity. Increased manufacturing of goods became especially evident in Southeast Alaska. In South Central and Interior Alaska, manufacturing was less important than agriculture, coal mining, and forest industries. An attempt was made by the two regions to be self-sufficient. Domestic consumption increased as immigrants arrived. These were military contingents stationed in the State, with the civilian population associated with their activities. However, because of various factors operating against the growth of industry and agriculture, commodity movement still remains predominantly external.

> Magnitude of Regional Trade The magnitude of the traffic carried by the regional

transportation system will be presented here in terms of total tonnage or the value of trade flowing over the network.¹ Regional commerce consists of external trade--imports and exports, internal trade--intraregional and interregional, and transit trade.²

¹Data used in this section have as their source the following:

Sources for rail statistics: U. S. Department of Interior, Alaska Railroad Reports; U. S. Department of Commerce, <u>Alaska, Its Economy and Market Potential</u>, pp. 23-24.

Sources for highway statistics: U. S. Department of Commerce, <u>Report on Extension of National System of</u> <u>Interstate and Defense Highways within Alaska and Hawaii</u> (Washington: Government Printing Office, 1960); State of Alaska, Department of Public Safety Releases; Alaska Resource Development Board, <u>Biennial Report of the Alaska</u> <u>Territorial Highway Engineer and the Superintendent of</u> <u>Public Works</u> (Juneau). Alaska Road Commission, <u>Annual</u> <u>Report of the Alaska Road Commission</u> (Juneau).

Sources for water-borne statistics: U. S. Corps of Engineers, <u>Waterborne Commerce of the U. S</u>., Part IV, Waterways and Harbors: Pacific Coast, Alaska and Pacific Islands (San Francisco, California). U. S. Department of Commerce, U. S. Bureau of the Census, <u>Monthly Summary of</u> <u>Foreign Commerce of the U. S</u>. (Washington: Government Printing Office). Alan Weintraub, "Water Transportation in Alaska's External Trade," Unpublished Master's thesis, University of Chicago, June, 1957.

Other statistical sources: Alaska Resource Development Board, <u>Alaska Passenger Traffic Survey</u> (Juneau, Annual); U. S. Department of Commerce, Maritime Administration, <u>Docket No. 881</u>, <u>General Increases in Alaskan Rates</u> and <u>Charges</u> (Unpublished Data), prepared by Statistics and Special Studies Office, Cargo Data Branch, June, 1960.

Any attempt at a complete analysis of the overall weight or monetary significance of the regional transport system is, however, defeated by the absence of official figures as to the value or tonnage of intraregional transfers. Hence one must resign oneself to assessing the traffic of the transport services chiefly from the point of view of foreign trade.

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The annual inward and outward flow of goods totals almost 1.3 million tons.¹ Only a small part of this represents commercial exchange with Canada. The great proportion of external trade is with the southern states, reached by ship, plane, or the Alaska Highway. The regional transport system also aids the interregional transfer of produce between South Central and Interior Alaska, Southeastern Alaska, and North and West Alaska.

It was noted earlier that total freight movement in and out of the area is about 1.3 million tons, with two-thirds imports and one-third exports. Most of this traffic moves to and from the coastal sections.² Freight tonnage, excluding coal, brought into Fairbanks from the coast by the Alaska Railroad and Richardson Highway, is limited. Freight movements to the coast from this region are also limited. Major freight movements of land resources are handled by shipping over the shortest land

¹Passenger movements are mainly by air, with a fair portion by highway, and a small portion by water. During the year 1959 the Alaska transport network carried 195,128 people into and 193,962 out of the State.

²The most recent study by the U. S. Army Corps of Engineers shows that approximately 70 per cent of the Seward freight handled by the Alaska Railroad is consigned to the Anchorage area. U. S. Congress, Senate, <u>Alaska and West Coast Transportation Problems</u>, Hearings before the Committee on Interstate and Foreign Commerce on Senate Resolution 13 and Senate Resolution 163, 84th Cong., 2d Sess. (Washington: Government Printing Office, 1956), p. 47.

route, and thence to markets by water transport, rather than over the Alaska Highway route to Interior Canada and the southern states.¹ The Fairbanks area generates a total of 55,000 tons of dry cargo per year, exclusive of movement of coal from Healy. About 15,000 tons are sent north by railroad; 15,000 tons by truck from Valdez; 15,000 tons are sent south by rail and highway; and 10,000 tons over the Alaska Highway in both directions.

The effort of the various prime movers in the Area can also be appraised by determining total tonnage of produce moved by various transport services.

Area freight movements are mostly by water and

A number of studies indicate that, because of the limited traffic generated in the interior, tourism is the only major economic development potential in the Area that would benefit substantially from new or improved landtransport linkages between Alaska and the southern states. Various mimeographed reports of the Alaska International Rail and Highway Commission discuss this problem in considerable detail. See also: U. S. Congress, House, <u>Transport Requirements for the Growth of Northwest North America</u>, Vols. 1-3, Letter from the Chairman, Alaska International Rail and Highway Commission, transmitting the final report of the Alaska International Rail and Highway Commission, pursuant to Public Law 181, 84th Cong., 87th Cong., 1st Sess. (Washington: Government Printing Office, 1961).

¹Plans exist for the construction of a railroad or road from Interior Alaska to the White Pass and Yukon Railroad and southern States in the near future. Construction of these routes would change the present pattern of trade in the Area to a considerable degree. To split or take all of the freight moving to and from the South Central coast by the proposed "short-cut" would provide only a small part of the costs of the new lines and would result in comparable reductions of the decidedly limited revenues of the trucking lines, Alaska Railroad, and steamship or barge lines now jointly serving the region.

rail. Only minor tonnage goes by air or by longhaul trucks. Freight movements have been undergoing changes over the past decade. Cargo is being carried more and more by bulk cargo barges and van-barges at the expense of large drycargo ships, and increasingly by highway at the expense of rail carriers.

The Alaska Steamship Company and other barge lines haul 1,125,000 tons; the Alaska Railroad hauls 500,000 tons. They are the outstanding freight transportation media serving the Area.¹ Transportation is mainly on an inbound haulage basis (725,000 tons annually). Freight of the Alaska Steamship Company and other barge lines is landed at Seward; it is moved by the Alaska Railroad (400,000 tons annually) and truck (50,000 tons annually) to Anchorage and Fairbanks. The remainder goes by way of Valdez (90,000 tons annually) to Fairbanks and other interior points and directly to Anchorage (85,000 tons annually).

Some additional tonnage is also moved by truck over the Alaska Highway and by air freight to the two principal consuming centers--Anchorage and Fairbanks. Truck tonnage has averaged 13,000 tons annually since 1950; air freight has reached 9,000 tons of cargo and 3,000 tons of mail

¹The Military Sea Transport Service handles a substantial portion of the military tonnage to Alaska and discharges it at Whittier. It is warehoused and later shipped to military establishments along the rail belt. Military waterborne cargo during 1958 totalled 170,000 tons.

annually between 1950 and 1959.

Freight and passenger boats operate on the Yukon and Tanana Rivers during the short ice-free period moving from 30,000 to 50,000 tons of freight annually. Snow vehicles carry a limited tonnage primarily for military installations.¹

Function of Various Transport Services

The most important inbound transportation media, on a tonnage basis, are the water carriers--notably the Alaska Steamship Company and a number of tow-barge opera-Linked to these carriers are the rail and trucktors. ing lines. They move the waterborne commodities to interior points and bring much smaller quantities of export commodities back to the ports. The most important land transportation operators handling this port traffic are the Alaska Railroad and numerous privately-owned motor carriers. Overland freight haulage via the Alaska Highway and connecting highways in British Columbia and Yukon Territory is carried on by a number of individual truckers and trucking companies. Several airlines connect Alaskan cities with major centers in Canada and in the states. Additional lines and non-scheduled charter planes serve

¹Official statistics on the volume of produce carried by snow vehicles are not available. Security reasons partially account for this lack of data.

the Area internally.¹ Finally, boats on the Yukon and Tanana Rivers, and tractors carry passengers and freight where no other mode of travel is available or where winter conditions restrict movements.

The Alaska Railroad.--Although large sections of the Area are remote from the Alaska Railroad, the majority of the people profit by its service. Approximately ninety per cent of the population live within ten miles, by road, of railway stations. All of the region's major trade centers and principal ports have good rail connections; indeed, the Area's principal rail centers are also its primary ports and commercial foci.

The major economic activities, including intensive types of agriculture and large scale extractive industries, are also well served by the railnet. The railroad has a branch line into the Matanuska Valley; Fairbanks, the northern terminus, is in the center of the Tanana agricultural district. Although small by comparison with similar areas in other states, these two regions provide important traffic for the railroad. Until recently, the

¹Cargoes flown within, into, and out of the region by air will not be considered in this study. This omission, however, is not relevant because air carriage is not greatly patronized for movement of freight due to heavy charges (Tables 7 and 9). Passenger competition to surface transport facilities is, however, considerable. Passenger movements to and from Alaska are predominantly by air (about 60%) followed by highway (33%), and by water (7%) (Fig. 22).

TABLE 7

CARGO AND MAIL FLOWN TO, FROM AND WITHIN ALASKA BY U. S. COMMERCIAL AND MILITARY TRANSPORT^a

Traffic movement Commercial						
Year	Total to Alaska	Total from Alaska	Total within Alaska	Grand Total		
1950 1951 1952 1953 1954 1955 1956 1957 1958 1959	5,711 7,370 9,180 10,096 9,014 9,897 10,461 8,767 8,733 9,166	1,089 1,255 1,456 1,782 1,459 4,037 2,671 2,333 2,573 2,547	6,295 10,336 11,375 10,771 14,930 25,039 47,944 17,087 14,519 16,020	13,095 18,961 22,011 22,649 25,403 38,973 61,076 28,187 25,825 27,733		

Traffic movement Military

Year	Total	Total	Total
	to	from	to and from
	Alaska	Alaska	Alaska
1956	5,779	4,729	10,508
1957	6,198	5,219	11,418
1958	5,954	4,799	10,753
1959	5,475	4,025	9,500

^aTons units.

Source:

Civil Aeronautics Board from 41 quarterly reports of individual airlines: Schedule B-5 for the years 1950-1956 and Schedule T-4 for the years 1957-1959. U. S. Department of Commerce, Maritime Administration, <u>Docket No. 881, General Increases in Alaskan Rates and Charges (Unpublished data).</u> Prepared by Statistics and Special Studies Office, Cargo Data Branch, June, 1960. . .

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. . railroad depended almost entirely on the mining industry and its attendant activities.¹

Mining is not, however, as important in value as the commodity group "Manufactures and Miscellaneous." A large part of this traffic is interstate in character, that is traffic which has originated in or is destined for another state. The value and character of traffic in this commodity group reveals the significance of urban and military markets in areas of large-scale construction. They are the terminal points for shipments from major industrial areas of the other 48 states.

Tonnage and revenue data for the Alaska Railroad are summarized for the years 1957-1958 in Table 8. These figures indicate that a substantial proportion of the total service consists of cartage for the United States Government. More than half of the total traffic carried is U. S. Army freight. It is noted that military carload traffic in 1958 represented 56.7 per cent of total tonnage, and 41.8 per cent of total revenues. In both tonnage and revenue, the important commodities moved for the military by railroad are "Products of Mines," mainly coal. In 1957

¹In point of value gold is the chief metal produced, but in 1958 approximately 726,801 tons of coal were mined in the Healy River and Matanuska fields, nearly all of which was moved by the Alaska Railroad. In 1959, production dropped to 602,000. U. S. Bureau of Mines, Mineral Yearbook, Vol. III, Annual; State of Alaska, <u>1959 Report of the Division</u> of Mines and Minerals, Preliminary.

TABLE 8

THE ALASKA RAILROAD, REVENUE FREIGHT TRAFFIC, 1957-1958

Category	Tons	Revenue				
1957						
Commercial Freight Products of Agriculture Animals and Products Products of Mines Products of Forests Manufactures and Misc. Other Traffic Total	4,180 809 183,822 25,460 400,034 <u>39,664</u> 653,969	\$ 69,752 13,776 597,690 329,130 5,145,765 <u>704,658</u> 6,860,771				
Military Freight Products of Agriculture Animals and Products Products of Mines Products of Forests Manufactures and Misc. U. S. Army Class "A" Freight Total	957 46 565,157 4,314 162,842 <u>15,378</u> 748,694	<pre>\$ 14,221 870 1,836,261 57,020 1,821,453 409,479 4,139,304</pre>				
1958						
Commercial Freight Products of Agriculture Animals and Products Products of Mines Products of Forests Manufactures and Misc. Other Traffic Total	3,493 242 179,632 18,212 350,784 40,597 592,960	\$ 58,056 6,943 594,184 217,722 4,310,059 <u>661,394</u> 5,838,358				
Military Freight Products of Agriculture Animals and Products Products of Mines Products of Forests Manufactures and Misc. U. S. Army Class "A" Freight Total	489 675,636 2,713 131,935 <u>9,312</u> 820,085	\$ 8,292 2,241,708 39,199 1,620,075 <u>290,947</u> 4,200,221				

Source:

U. S. Department of Interior, <u>Alaska Railroad</u> <u>Reports</u>; U. S. Department of Commerce, <u>Alaska, Its</u> <u>Economy and Market Potential</u>, pp. 23-24.

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the railroad carried 564,608 tons of coal with a revenue of \$1,827,633; in 1958 it carried 671,332 tons with a revenue of \$2,208,824. This constitutes almost the total military requirement for coal, which has averaged between 600,000 and 800,000 tons annually for the past several years. The transports are significant in the light of total coal production. In 1958, 70 per cent of coal produced was sold for heat and power to Ladd and Eielson Air Force Bases near Fairbanks and to Fort Richardson and Elmendorf Air Force Bases near Anchorage.¹ Continued rise in coal production reflects the Railbelt's strategic position.

It is doubtful whether the Alaska Railroad's haulage for the military will continue to increase with further expansion of military bases. It is noted that traffic volume in terms of tons and revenues declined between 1954 and 1957 (Fig. 33) with only a slight rise in 1958. The railroad suffered tonnage losses in 1957 when \$3.5 million in revenue was diverted by the construction of a military oil pipeline from Haines to Fairbanks.² Cutbacks

¹U. S. Department of Mines, Bureau of Mines, <u>Mineral Yearbook, Vol. III, 1959</u>, p. 87.

²Colonel George Warren, "The Alaskan Pipeline," <u>The Military Engineer</u> (Nov.-Dec., 1955), pp. 460-463; Janes W. Dalton, "Survey of the Future Growth of the Petroleum Industry in Alaska and Its Impact on Anchorage," (Greater Anchorage Chamber of Commerce, Anchorage, Aug., 1958).



in hauling material for military construction resulted from completion of the DEW line in 1957. Resumption of large military traffic movements came with construction of two new detection systems in 1958: the BMEWS, or Ballistic Missile Early Warning System and the "White Alice" network with 33 stations (Fig. 20).¹ Although construction may not continue at its present level, the maintenance of existing facilities will remain a strong influence on transportation requirements.

Table 8 shows by commodity groups the relative importance of commercial traffic handled by the Alaska Railroad in terms of volume and revenue. The "Manufactures and Misc." group accounts for 60 per cent of the tonnage for each of the years shown. Revenue from this group ranged from 82.8 per cent of total revenue from commercial traffic in 1955 to 73.8 per cent in 1958. The consistent decline in volume of tonnage in this group during past years may be partly attributed to the recent recession and increased competition and partly to the lessening of military activities, especially in the area of construction.

Since its completion in 1923 the Alaska Railroad

¹That the volume of military traffic is decreasing is also indicated by the fact that from the level of 1954 the waterborne traffic carried by military transport had declined 23 per cent by 1957 and 43 per cent by 1958.
has become the "backbone" of the surface transportation in the Area. It is a ready and dependable means of transport for supplies; it has made possible the rapid expansion of domestic and military establishments. It integrates the inland waterways, roads and ocean ports. Over its 470 miles of track is transported most of the food, supplies, and equipment necessary for the military and civilian population within the area extending from the Canadian border west to the mouth of the Yukon and north to the Arctic Ocean.

<u>Competitors of the railroad</u>.--Competition for the railroad is of recent date. Water carriers have presented limited competition by hauling small amounts of freight to Anchorage during summer months. In addition, as new transport techniques developed, the railroad has become more vulnerable to truck competition. In recent years, trucks and vans, unloaded from barges at Valdez, use the Richardson Highway to Fairbanks, hauling large amounts of freight formerly handled by the railroad.¹

¹"Piggy-back" service is the term most often applied to this type of transport. Increasing numbers of trailers, vans, and containers are being hauled on a "piggy-back" basis in the interest of improving service and reducing costs. Use of containers, including re-frigerated units, is expediting the movement to and from interior points. It has been successful in reducing loss and damage to cargo as well as eliminating the expense and delays of checking and handling. The Alaska Railroad was a pioneer in "piggy-back" service, due in part to the demand for carrying trailer vans during the spring thaws

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Construction of dock facilities at Anchorage will reduce tonnages carried by railroad between Seward and Anchorage, as well as those between Anchorage and Fairbanks because of truck competition at Anchorage.

Another form of competition to the railroad is the military pipeline for petroleum products from Haines to Fairbanks.¹ It has drastically reduced the volume of liquid fuel railroad shipments in the last two years.

Several factors operate to keep freight rates for many items high. Some of these are limited backhaul, small tonnage from north to south, seasonal fluctuations in tonnages, severe weather conditions, high wage rates,

when highways cannot bear heavy traffic. Piggyback vans are regularly received by the railroad at shipside in Seward and transported on flatcars to Anchorage and Fairbanks, where unloading ramps have been built. At these terminals tractors are attached to the vans. The railroad carries van boxes as well as wheeled vans and offers this service to shippers and carriers. While the railroad owns equipment of its own, it also moves the boxes or trailers of competitive carriers. Many motor carriers have invested in their own equipment and some have combined a water-rail-truck freight system using a water carrier and the Alaska Railroad facilities. Other motor carriers ship in containers via their own tug and barge lines. For a detailed discussion of "piggy-back" service in relation to ocean shipping see Weintraub, Chapter VII, "Specialized Operations, Devices, and Equipment," pp. 94-107.

Haines-Fairbanks pipeline tonnage: 1956--191,660; 1957--198,100; 1958--169,700; 1959--201,400. This information is taken from release issued by the Department of Defense, Office of the Assistant Secretary of Defense, Supply and Logistics.

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and relatively low total freight tonnage.¹ The Haines-Fairbanks military oil pipeline diverted \$3.5 million in revenue from the Alaska Railroad, and other diversions contemplated at present will further reduce the freight income of the railroad. Freight costs can only be reduced through handling of more tonnage, rather than less. Pipelines and gas lines, carrying locally produced fuel as substitutes for coal, with improved highways, threaten the railroad. Consumers will pay less for products carried by new means, but rail-borne commodities will cost more because they will carry a larger share of the total freight bill. The railroad has served the needs of local hauling firms, warehouses, water carriers, construction

¹An attempt was made by a schedule of raised rates (effective April, 1937) to make the Alaska Railroad self-supporting. This brought strenuous opposition from people affected. They claimed that the original purpose of the railroad was to develop Alaska; that business must revise its rates of operation with each rate change, and that this discouraged business enterprise. When rates were increased, great quantities of freight were unloaded at Valdez and traveled to Fairbanks over the Richardson Highway. U. S. Department of Interior, <u>Annual Report of</u> the Governor of Alaska (Washington: Government Printing Office, 1937), p. 6.

Railroad rates are not now under a federal or state regulation. However, pending legislation will place freight rate structures under the Interstate Commerce Commission. Interstate truck rates have been subject to ICC regulation since statehood. U. S. Congress, House, <u>Regulation of Alaska Railroad</u>, Report No. 1913, 86th Cong., 2d Sess. (Washington: Government Printing Office, 1960); U. S. Congress, Senate, <u>Applying the Provisions of the</u> <u>Interstate Commerce Act</u>, <u>As Amended to the Alaska Railroad</u>, 86th Cong., 1st Sess. (Washington: Government Printing Office, 1959).

TABLE 9

FREIGHT RATES--SEATTLE TO FAIRBANKS FOR SELECTED COMMODITIES, FEBRUARY 4, 1958

Commodity ^a	Alaska Steamship & Alaska R. R. combined rates	Alaska Freight Lines barge-truck	Lynden Transfer Line operated direct truck	Air Freight
Mining machinery	\$59.12	\$70.40	\$170-200	\$310-380 ^b
Groceries	62.20-89.90	67.70-81.60	170 - 200	380
Vegetables	135.96	145.00-155.00	170-200	340 [°]
Milk & cream				300 ^d
Petroleum products, lube oil, asphalt mix, etc.	60•77 - 79•93	64 . 00 - 69.00	170 - 200	380
Gasoline, benzine, etc.	62.21-80.34	65.60-70.60	170-200	380
Agricultural implements including wheeled vehicles	48.82 - 63.45	70.40	170-200	380

^aTon units.

^b30,000 lb. minimum, will not handle less.

°2,000 lb. minimum.

d100 lb. minimum.

Source:

Interstate Commerce Commission Tariffs, February 4, 1958; R. L. Monahan, "The Role of Transportation in the Fairbanks Area," <u>Yearbook of the Association of the Pacific Coast Geogra-</u> <u>phers</u>, Vol. XXI (1959), pp. 7-21. companies, and other businesses and individuals for years. Increased rail rates or discontinuance of service will cause certain establishments to relocate, change the pattern of their activities, or perhaps cease operation. Whether publicly or privately owned, the railroad is destined to feel the effect of impending transportation developments.

<u>Highways</u>.--Highways in the Area are used mostly for local freight. Major highways serve primarily to move commodities landed at Seward, Anchorage, and Valdez, to Fairbanks and other points in the interior. They allow movement of freight into and out of the region on a longhaul basis, or via rail-highway junctions. They facilitate local trucking to Anchorage and Fairbanks. Further, they enable residents of this area to travel great distances, an experience not available to people outside the area. Residents of the remaining Alaskan regions also do not enjoy other low-cost, individual means of visiting contiguous areas.

Traffic figures for motor services are not representative enough to be discussed in detail in this study. Altogether, a vehicle-mileage of 650,000,000 was recorded in 1958 for automobiles, buses, and trucks in collecting and distributing an undetermined amount of external and

local produce.¹ In addition, 121,751 passengers were transported in both directions over the Alaska and Haines Highways in 1959.²

Unfortunately, information is scanty concerning traffic on Alaskan highways. Since 1950, an increase in motor vehicles registered in the State indicates traffic expansion. In that year, 30,281 vehicles were registered-passenger cars, buses, and commercial vehicles. In 1958 there were 64,726 units. Annual consumption of motorfuel doubled: 22,586 gallons were reported for 1950, and 45,828 gallons in 1958 (Table 11).

Low traffic volumes and great distances are typical of highway travel (Fig. 34). Average daily traffic

¹The estimate of highway travel for 1958 is based on fuel consumption statistics published in U. S. Department of Commerce, Bureau of Public Roads, "Report of Extension of National System of Interstate and Defense Highways within Alaska and Hawaii," (Washington: Government Printing Office, 1960), pp. 11-13. These figures are not published on a regional basis and therefore cover all of Alaska. This lack of regional differentiation, however, is not relevant because both North and West and Southeast Alaska have negligible highway traffic.

²Intrastate passenger figures are not available. This figure was compiled from data supplied in a study by the Alaska Resource Development Board: <u>Alaska Passenger</u> <u>Traffic Survey</u> (Juneau, annual). It represents the volume of passenger travel by bus, truck, and auto in interstate or foreign commerce and is limited to the Alaska Highway, the only land outlet of the Area. Compared to auto and truck, the volume of passenger travel by bus in interstate and foreign commerce is small, being limited to a line operating between Fairbanks and points in Canada over the Alaska Highway. Other bus operations are local or intrastate.

TABLE 10

TRUCK	TRAFFIC	то	AND	FROM	ALASKA,	
1954-1959						

Traffi c movement	1954	1955	1956	1957	1958	1959
Total	4,517 ^a	10,119	13 , 854	18,976	6 , 168	10,239
Total to Alaska	4,517	6,242	8,805	12,284	4,307	7 , 635
Total from Alaska	n.a.	3,877	5 , 049	6,692	1,861	2,604

^aTon units.

n.a. Not available.

Note:

These figures do not include the very much larger tonnage transported to and from Alaska by water in trailers. Source:

State of Alaska, Department of Public Safety.

TABLE 11

MOTOR VEHICLE REGISTRATIONS AND FUEL CONSUMPTION IN ALASKA

	Motor Vehicle Registrations					
Year	Automobil	.es & Buses	Tru	cks	To	tal
	Number	Percent	Number	Percent	Number	Percent
1950	20,468	67.6	9,813	32.4	30,281	100.0
1955	42,319	71.9	16,528	28.1	58,847	100.0
1958	47,966	74.1	16,760	25.9	64,726	100.0
	Hig	hway Motor (1,000	Fuel Con gallons)	sumption		
1950	22,586					
1955	1955 37,236					
1958	1958 45,828					
Sourc	e:					

Source: U. S. Department of Commerce, <u>Report on Extension of</u> <u>National System of Interstate and Defense Highways within</u> <u>Alaska and Hawaii</u>, p. 12.

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` . in 1958 between Fairbanks and the Canadian border--a distance of 296 miles--was estimated at 250 vehicles. Density ranged from a high of 3,000 vehicles a day near Fairbanks to a low of 150 a day near the Canadian border. Between Anchorage and Fairbanks, the 1958 daily traffic was about 100 vehicles per day, a figure suggesting stronger ties by road with outside areas rather than between the two cities.

Traffic volumes are higher near Anchorage, with a decrease in traffic as distances increase from it. The city exceeds Fairbanks in number of average daily vehicles entering and leaving its borders. The latter is nearly equaled by the Palmer area among regional centers. Between Anchorage and Fairbanks and the two major ports of Seward and Valdez, traffic averages 120 vehicles per day. The small increase in volume around these ports indicates their transshipment function and small population.¹

The routes given above are the longest within the region. However, vehicles using them cover only a small portion of their total length. Travel centers around the two largest cities. About 350 miles of highway serve the major portion of the population. This accounts in part for the heavy traffic within the zones around Anchorage and

¹The data upon which these statements are made include all types of traffic and do not differentiate between tractor-semitrailer traffic and the less important passenger autos and single-unit farm and delivery trucks.

Fairbanks--both small by comparison with the total size of the region but of large proportions considering the size of both cities. William S. Siddall elaborates on the influence of these two cities as follows:¹

The larger towns in Alaska exist almost wholly to serve their hinterlands as central places. . . Anchorage clearly holds the top urban position for southern coastal Alaska, and within a short distance there is a substantial number of smaller towns and settlements . . . Fairbanks is, without contest, the ranking central place for interior Alaska and has the largest hinterland area of any town in the Territory.

The role of the surface transport network in the development of large hinterlands of both cities is apparent from a consideration of Southeast Alaska:²

In the Panhandle two towns vie for the dominant position, Juneau and Ketchikan, and nearby are numerous smaller settlements. These settlements are not joined to one another by an overland means, air and water being the only connections. Apparently this lack of easy communication has been one factor permitting the second and fourth largest towns in the Territory, so closely alike in size, to grow up so closely together in space.

Inland waterways .-- Inland waterway transportation is

limited to the Yukon River and its tributaries during the ice-free period. Service includes local transportation, as well as that to localities otherwise accessible only by air. Movement of freight on the inland waterways is essential to

¹William R. Siddall, "Seattle: Regional Capital of Alaska," <u>Annals of the Association of American Geographers</u>, XLVII (September, 1957), pp. 278-279. ²<u>Ibid</u>., p. 279.

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regional interchanges, since river shipping services collect and distribute local produce and imported goods in districts not served by rail and road. River shipping is an internal transportation network not unlike the networks of rail and highway routes. Its growth has been less significant than that of rail or road transport, fluctuating more than the other two, possibly because travel by waterway is more seasonal. Further, the direct rail line from Seward to Fairbanks absorbs most of the increased traffic offering. Development of services on the Yukon and Tanana Rivers has, on the other hand, been checked by natural handicaps, such as shallow depths and shifting navigation channels.

The Yukon River system has been replaced by the railroad and road systems as the principal means of freight transportation. Since 1923--the year the Alaska Railroad was completed--mining camps and small settlements along the Yukon and Tanana Rivers have been served through the railto-river transfer point at Nenana.

Before 1955, Alaska Railroad - owned steamers handled the major part of the tonnage carried on the river. In that year, the railroad leased its river boats and facilities to a privately owned transportation company operating downstream to Marshall and upstream to Whitehorse. The latter is of limited value and seldom used. River boats formerly

made scheduled trips between Whitehorse and Nenana. When aviation and highway connections developed, traffic along the route declined. This trend is likely to continue with the completion of a road parallel to the Yukon River from Circle to Whitehorse, Yukon Territory (Fig. 38). A few boats still operate. They are mostly cargo steamers bringing supplies to isolated settlements along the river.

Between 1950 and 1955, tonnage of railroad vessels was more than 5,000 tons annually. The highest tonnage was carried during World War II, the peak year having been 1944, with 17,000 tons. Private operators now provide summer service on the rivers. Data on individual movements are not available. However, unofficial sources indicate movement of freight on the rivers is assuming increased importance. Average annual tonnage in recent years is estimated at 30,000 to 60,000 tons, predominantly for the military.

Petroleum products accounted for two-thirds of the cargo carried by Alaska Railroad - owned vessels between 1950 and 1955, and appear to be still the major portion of the traffic for private carriers. The rivers offer cheap water transportation for mining equipment and supplies, and for limited export of minerals and furs from interior points.

Deliveries before the construction of the Alaska Railroad were seasonal and extremely slow. The ice-pack

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. . did not recede from the mouths of the rivers until nearly mid-summer. The railroad made possible the earlier delivery of goods. To minimize the difficulties of winter freighting, alternative methods have been developed: combinations of river movement to staging points and tractortrain or truck haulage into the interior proved effective. When rivers are frozen, they can be used for dog-sled, foot, tractor train, and truck traffic. A hazard is the danger of delays due to poor trafficability in muddy spots if movements occur too early in the spring or too late in the fall.

Ocean transportation.--The Area depends upon water transportation for over 90 per cent of its food and other supplies. Major ports are served by two steamship lines operating on a schedule from the West Coast of the United States. Competitive carriers also serve some of the ports as traffic dictates. Anchorage is not yet a major port, but is used by tankers, barges, and motor vessels for small tonnage hauls.

The principal steamship line serving the Area is based in Seattle; the other line operates from ports in California and Oregon. Barge lines, tankers, and Army transports are additional carriers. Since direct land routes between coastal settlements except between Whittier and Seward, are not practical, many fishing boats and other small craft operate in the local trade. Annual tonnages shipped by commercial transport to and from South Central and Interior Alaska amount to 1,125,000 tons.

Although Alaska is interested in the rapid improvement of land transportation, water traffic will continue to offer the best means for conducting trade with the outside world.

Commodity Movement over the Regional Transport Network

Most of the commodities of the Area are produced for distant markets. Food, raw materials, and manufactured goods come from distant sources of supply. At the same time, efforts are made to reduce imports by the development of local resources. One result of such efforts is the increase in intraregional movement of goods, particularly coal.

About 1,300,000 tons of cargo pass through the ports of the region annually.¹ Some of this traffic moves by

Over 120,000 people entered and left the area via the Alaska and Haines Highway in 1959. This is the most important means of access and egress by surface transport

¹Another 13,000 tons or less per year moves over the Alaska Highway, which provides direct motorcarrier transportation between the southern states and Alaska (Table 10). A number of motor carriers operate over the highway. The exact number is not ascertainable. The quantity of freight trucked is small. About 50 per cent is traffic of the U. S. Government, much of it military. Trucking rates of 7 to 11 cents per ton limit movement to perishables and a restricted number of high value items (Table 9). Over short sections of this highway, in British Columbia and Yukon Territory especially, higher tonnages of petroleum, zinc and lead concentrates, and asbestos are trucked. Over 120,000 people entered and left the area via

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truck, but most of it is handled by the Alaska Railroad. Of the 1,500,000 tons of cargo moved annually by the railroad, one-third is external and two-thirds intraregional. Of the annual average, 80 per cent or 800,000 tons of intraregional traffic consists of products of mines--mostly coal, sand, and gravel. Coal is the most important product moved over the Alaska Railroad.

External commerce.--Dry cargo traffic is mostly a one-way northbound movement from the Pacific Northwest. It consists of staples for domestic consumption, industrial and military construction materials, and commercial supplies of all kinds. Tanker traffic is almost exclusively north-bound, originating from California ports.

"Products of Manufactures" and "Products of Mines" dominate regional imports and figure prominently in the inward haulage of freight, either by rail or road. Manufactured goods constitute a high-rated, profitable traffic with strong competition between rail and road carriers. The cargo consists of iron and steel products, construction and mining equipment, and vehicles needed to implement local development programs. It exceeds mineral products in value, but not in tonnage. Petroleum products are the most im-

since the Alaska Steamship Company discontinued passenger service in 1954. Were it not for the highway's gravel and dusty surface this figure would be larger. However, these surface conditions have little effect on truckers who prefer unpaved over paved roads because of all-weather and heavy load-bearing characteristics.

portant in the mineral group. In the last decade, movement of liquid fuels has increased to satisfy the demands of the growing motor traffic and to supply the Alaska Railroad diesel locomotives. Military forces have also increased fuel shipments. In 1958, the Alaska Railroad carried nearly 97,000 tons of petroleum products valued at \$761,580 for the military. In addition, tank farms at major ports store oil for visiting ships and fishing boats, and for redistribution by small tankers to fish canneries along the South Central Alaskan Coast. Imports of coal have decreased because of expanding production within the region. The movement of coal, the major commodity shipped by the Alaska Railroad, is intraregional in character. It exceeds in tonnage the total external traffic of the Alaska Railroad.

Land transport plays its part in moving agricultural products from the coast to inland centers of population. Only 8 per cent of local needs for products of agriculture can be provided within the region.

The principal commodities of coast-bound traffic have not changed much since Alaska became a Territory. South-bound cargoes are canned fish, minerals, furs, lumber, and processed goods, the two most important items being minerals and processed goods. Land transportation has played a small role in the movement of forest products. Dense forest growth is limited to coastal areas, with

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• • forest products moved by water freight and short logging roads. Land transport facilities do not serve the fisheries, since their location makes water transport convenient.

Internal commerce.--It is difficult to determine to what extent commodities are moved by the various means of surface transportation. Urban centers, such as Anchorage and Fairbanks, depend upon motor deliveries from rural areas within a 40-mile radius for daily supplies of meat and milk. By the same routes, urban centers supply rural areas with bakery goods, processed wood, newspapers, and other locally produced items. Intraregional circulation of minerals, particularly coal, is facilitated by rail transportation service.

Most of the coal comes from the Matanuska and Nanana fields. The former is 45 miles northeast of Anchorage, the latter 75 miles southwest of Fairbanks. Anchorage and the local military forces provide the major market for the Matanuska coal. A limited market also exists throughout the southern coastal sections, especially in canneries and fishing villages. The chief market for Nenana coal is the Fairbanks area. Coal supplies power and fuel for both cities and various military installations, as well as for mining and smelting operations. Shipments from the Nenana field to Anchorage are limited, but the market there is important, providing the Alaska Railroad with a back haul. ,

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Convenient access to coal fields was required to meet the fuel needs of the Alaska Railroad. For many years the railroad was the chief customer of the fields. With the introduction of the diesel engine, the railroad transports coal only to meet actual market demands within the territory served by the railway.

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CHAPTER VII

THE ROLE OF SURFACE TRANSPORT IN THE REGIONAL ECONOMY OF NORTH AND WEST ALASKA AND SOUTHEAST ALASKA

Alaska is served by various forms of transport. The extent and adequacy of the transport facilities vary because of physical limitations and limited population. A connected network exists only for sea and air transport. The highway and rail transport systems of the individual regional units of the state are not joined, except for a link from Haines in Southeast Alaska to the Eastern border of South Central and Interior Alaska. For all practical surface transport considerations, the three areas demarcated on Fig. 1 are separate units.

The transport network will be examined here in two areas that differ from South Central and Interior Alaska in their transport facilities and stage of road and rail penetration. One area is North and West Alaska, experiencing at present complete isolation with respect to rail and road transport, but served by a well-developed air network. The other area, Southeast Alaska, is semiisolated, with only a short rail and road penetration

along its northern and southern edges. It is completely dependent on water transport.

The North and West Alaska Surface Transport Region

A fundamental problem in the utilization of natural and cultural resources of underdeveloped regions is the creation of efficient transport links between these areas and major existing centers of economic activity. This problem affects North and West Alaska, which occupies onehalf of the land area of Alaska and is far from the reaches of surface transport. This wast isolated region is characterized by small settlements separated from one another by immense distances. A primary network of transport is nonexistent in an area of 345,400 square miles. There are only a few scattered, low-standard roads serving local industrial development. Access to this vast Area is limited to air transportation and overland freighting by snow train and dog sled during the winter season. Access by sea is limited to a short season between two and four months. Air transportation is, in consequence, of great importance. In recent years, the air network has been extended and improved (Fig. 36). Most settlements are connected with the outside by plane.

¹North and West Alaska embraces the Colville, Noatak, Kobuk, Kuskokwim and lower Yukon River basins, the Arctic slope of the Brooks Mountain Range, the Seward Peninsula, the Alaska Peninsula, the Bristol Bay drainage shed, and offshore islands (Fig. 1).

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The Regional Setting

The natural environment. -- The physical environment has discouraged large-scale settlement in North and West Alaska (Fig. 2). The topography varies from low, marshy plains to high, rugged mountains. In Southwest Alaska the land is rugged and high. The Alaska Peninsula and Aleutian Chain have several active volcanoes. The coast of the Alaskan Peninsula and the shores of the Aleutian Islands are irregular. The islands have steep shores and little flat land. Wide valleys and coastal plains are found only on the mainland. Western Alaska is drained by the Yukon and Kuskokwim Rivers, the lower reaches of these being flat and swampy. Shallow lakes cover much of the flatlands, making summer travel over land areas almost impossible. Shallow waters and numerous extensive deltas are found along the Bering Sea coast. The Brooks Range, with peaks from 4,000 to 10,000 feet, dominates Northern Alaska. It separates Interior Alaska from the Arctic slope. Permafrost of varying depths exists over most of the Area (Fig. 6).^{\perp}

Nearly half of North and West Alaska lie north of the Arctic Circle and is of continental proportions. The weather is therefore rigorous and the climate poses problems of considerable magnitude (Fig. 5). The remaining

¹Williams, pp. 61-128.

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• • • • • • land comprising the Seward Peninsula, the lower drainage basins of the major rivers, and offshore islands benefits from the influence of the maritime air masses. North and West Alaska have long, cold winters, short cool summers, with light precipitation in the form of snow. The climate of the Alaska Peninsula and the Aleutian Islands is thermally more acceptable, although it is wet. The skies there are often overcast and the winds high, with violent storms prevailing throughout much of the year.

The climate of North and West Alaska limits forestry and agriculture and shortens the annual working season for placer gold mining.¹ It also limits shipping to summer periods and hampers surface transport.

<u>Population</u>.--North and West Alaska occupy 345,400 square miles. There are only 33,290 people: 20,000 indigenous and 13,290 nonindigenous (Table 12 and Fig. 8). The preponderance of natives reflects the frontier character of the area and importance of native life in the regional economy. Eighty per cent of the white residents live in Nome, and most of them are employed in service industries. They are only indirectly engaged in such basic pursuits as mining and fishing.

The census of 1900 showed 29,000 persons in North and West Alaska, an increase of 11,925 over that of 1890.

^LU. S. Department of Agriculture, <u>Land, the 1958</u> <u>Yearbook of Agriculture</u>, p. 428.

The gold rush of 1900 accounted for the change. Gold mining declined after 1900. In 1910 and 1920, census figures indicate a decrease of over 8,000 in total population of the Area for the years between 1900 and 1920 (Table 12).

TABLE 12

GROWTH OF POPULATION IN NORTH AND WEST ALASKA AND SOUTHEAST ALASKA

Census Year	North and West Alaska Population	Southeast Alaska Population
1880 .	20,098 17,075 29,000 24,416 20,650 21,702 23,856 29,005 33,290	7,748 8,038 14,350 15,216 17,402 19,304 25,241 28,203 34,600

Sources:

U. S. Bureau of Census, <u>Tenth to Seventeenth Census</u> of the United States, 1880-1950, <u>Population</u>; Alaska Resource Development Board, "Population Estimates of Towns in Alaska, 1957," <u>Financial Data Regarding the Incorporated</u> <u>Towns and Cities of Alaska, 1957</u>.

As a result of the rise in the price of gold, population increased between 1920 and 1940. The wartime activity of the years 1940-1945 brought little population rise in North and West Alaska. Gold mining, the chief source of income was suspended without sufficient compensating expenditure for military installations. After the close of the war in 1945, increased material and labor costs and the fixed price • •

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for gold remained obstacles to the recovery of the mining industry to prewar levels of employment and production.

Adversely affected by severe climate, lack of transportation and small population, the region has seen very little economic development. Remoteness and isolation, however, remain the major handicaps. Resources cannot be exploited fully, nor population increase, until land transportation links North and West Alaska with the South Central and Interior Alaska railroad and highway system.

The Regional Economy and Surface Transport Network

The Seward Peninsula road pattern.--The only welldeveloped road system in North and West Alaska is found on the Seward Peninsula. The development of mineral resources on the peninsula depends upon access to mineralized areas. Fig. 35 shows present distribution of minerals and roads. The road pattern indicates four mining districts: the Nome district, with a well-developed system of roads; the Solomon-Council district, east of Nome; the Bunker Hill - Taylor district, once connected with a railroad leading north from Nome; and the Candle-Deering district, with roads in the Candle Creek and Immachuk River valleys.¹

¹Many of the present roads have developed from earlier railroads. Narrow gauge railroads were constructed in the Seward Peninsula at the turn of the century. Operation continued to about 1938. At that time there were approximately 124 miles of railroad in the Seward Peninsula. A road between Nome and the Taylor-Bunker Hill gold mining district replaced 80 miles of this track.



A stretch of road services the Port Clarence district about Teller, and another the York district at the western tip of the peninsula (these poor secondary roads are not shown on Fig. 35). Mining implements and supplies can be moved over these roads, although with the decline of gold mining many roads have deteriorated. Some are passable only by specially made vehicles and their traffic-carrying capacity has declined. It is now preferred to move heavy equipment over frozen tundra during the winter months. Major reconstruction and extension of these roads await revival of interest in gold, development of other mineral deposits, or connection with the northern termini of the existing state highway system in South Central and Interior Alaska.¹

Dog sled trails.--Surface transportation in North and West Alaska is not entirely lacking in spite of the poorly developed road and rail pattern. An estimated thousand miles of trails connect inhabited areas. They follow beach lines, traverse the low tundra, and parallel the courses of streams, utilizing the low divides. In summer, many of the trails are impassable where lakes and swamps abound, but others serve as pack trails. In winter, dog sleds are used in nearly all of the Area, following established trails or frozen streams and lakes. They

¹These projects are discussed in Chapter VIII and outlined in Fig. 38.

serve trap lines and carry furs and necessities between trading posts or native villages. Airplanes can take the place of dog teams on long trips, but are not economical for short or irregular journeys.

<u>Rivers</u>.--Since the beginning of settlement, rivers have furnished means of transportation for North and West Alaska. Early explorers, followed by missionaries and gold seekers, used the rivers of North and West Alaska. Exploration was first carried out by ship along the Pacific Coast. Later, it was extended into the Bering Sea and the Yukon River. Inland penetration from the South Central coast came many years later. In the gold rush period, "stern wheelers" navigated parts of the Yukon River upstream to Whitehorse. Today, native-manned skiffs provide transportation to service fish wheels, government construction projects, and tourists. However, as a whole, the river systems are not effectively used as avenues of communication.

North and West Alaska contain about five thousand miles of navigable waterways, usable during four or five months on the lower Yukon and Kuskokwim Rivers, and for a shorter period on the smaller northern rivers. Although both of the rivers named have bars at their mouths, many miles of navigable waters stretch beyond, after the bars are passed. During the summer the large rivers in this Area thus provide the counterpart of the South Central and

Interior Alaska road and rail system.

<u>Ocean transport</u>.--Water continues to be the principal medium of freight transportation in North and West Alaska. Nevertheless, in contrast to South Central and Interior Alaska and Southeast Alaska, the Area is shut off from steamship service for seven or eight months of the year. The short navigation season, isolation, severe climate, poor anchorage, and low volume of commerce combine to limit shipping activity. Moving equipment, materials, supplies, and products is expensive--a major hindrance to economic development in North and West Alaska.¹

The navigation period covers two or three weeks in the north, and four and a half months in the south. Even special vessels find navigation to Point Barrow hazardous; except for military movements, navigation does not exist east of the point. Among the offshore islands, the dangers lie in fog, high winds, and strong currents. Shoals and lack of harbors interfere with the discharge of cargo. Shallow water and adverse weather increase time and costs of operations.² Distance from the Pacific

¹While mail and passengers are, for the most part, carried by airplane, movement of general cargo continues to depend upon water transportation. Practically all foodstuffs, building material, clothing, petroleum products, cannery supplies and fishing gear are imported on water. Exports consist principally of fish and ore. U. S. Corps of Engineers, <u>Waterborne Commerce of the U. S., Part 4, 1958</u>.

²U. S. Department of Commerce, <u>U. S. Coast Pilot:</u> <u>Alaska, Cape Spencer to Arctic Ocean</u> (Washington: Government Printing Office, 1956).

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Northwest supply base and major trade routes offer additional handicaps to navigation.

<u>Air transport</u>.--The airplane plays an important role in the movement of people, mail, and goods in North and West Alaska. Numerous airlines within the area act as feeders to the scheduled flights (Fig. 36) and provide service to almost any location. The fishing industry utilizes air transport for moving personnel. The United States Fish and Wildlife Service has a fleet of planes used in enforcement of fishing regulations and control of propagation.

Small wheel planes make use of federal, state, and private runways and crude improvised airstrips and landing areas. They also utilize firm beaches and gently sloping river banks. Lakes abound and are often the only means of access to remote areas. Amphibious or ski-equipped planes use the lakes, without which much of the region would remain inaccessible.¹

The Southeast Alaska Surface Transport Region

Land transportation does not pose as grave a problem in Southeast Alaska as it does in other regions of the

¹Alaska Resource Development Board, <u>Northwest</u> <u>Alaska: A Report on the Economic Opportunities of the</u> <u>Second Judicial Division</u> (Juneau, 1949).



F1g. 36

State.¹ In common with other areas, its needs are served well by the airplane. In contrast to the former, however, there is an extensive system of waterways, with most of the region accessible to water-borne traffic, offering safe and easy movement of bulk products. Short stretches of road lead out from some of the cities, but the Haines cutoff is the only highway connecting the Area with the Canadian road system and the Alaska Highway (Fig. 37). Dense forest cover and rugged topography make the development of connecting roads difficult. If built, numerous ferries would be required, greatly increasing costs.

Although the topography has prevented the growth of a land transportation network, the enclosed waterway links the towns, providing access to areas within and outside the region. The economic life of Southeast Alaska has always been directed toward this "Inside Passage."

The Regional Setting

<u>The natural environment</u>.--The southeastern area is mountainous and intricately cut by waterways. Peaks on the mainland rise 6,000 to 8,000 feet or higher. Except

¹Southeast Alaska is that portion of Alaska lying east of the 141st meridian and includes the western slopes of the coastal mountains of the mainland and the islands of the Alexander Archipelago. The Area extends about 550 miles southeasterly from Mount St. Elias to Portland Canal. It has a land area of about 35,700 square miles, of which 40 per cent are islands (Fig. 1).



for the valleys of the Taku, Stikine, and Unuk Rivers, this mountain area is virtually impassable from the landward side. The barrier nature of this mountain region is brought out by the following:

Southeast Alaska roads cannot be constructed over the coastal mountains because all passes are filled with The only routes available for future highways ice. are in three or four valleys which rivers have cut through the mountains. The two which seem destined to be followed by roads in the near future are the Stikine and Taku. A road through the Taku Valley would connect a large isolated section of British Columbia to the sea at Juneau. The lower part of this valley, however, is flooded annually by the breaking out of the Tulsequah Lake, impounded behind Tulsequah Glacier, which lies just inside the British Columbia boundary but drains ice from the Juneau Ice Field in Alaska. The valley of the Stikine is also periodically flooded by the bursting of an icedammed lake.1

From the sea, however, there are many entrants formed by long, deep fjords. Islands fringe the coast: Prince of Wales, the largest, covers 2,770 square miles. The Chichagof, Admiralty, Baranof, Revillagigedo, and Kupreanof Islands all exceed 1,000 square miles in area. These, with the mainland fjords, give miles of protected waterways, with shelter from the Pacific storms and strong winds. However, complex topographical features make the construction of traffic routes difficult and costly.

The winters are mild and the summers cool in Southeast Alaska (Fig. 5). The Pacific air masses modify the climate, so that there is little difference between

¹Dyson, p. 79.

summer and winter temperatures. The average range between January and July temperatures is 25° F, compared with 70° to 80° in Interior Alaska. Precipitation is high with a maximum of 270 inches. Snowfall varies from 21 to 448 inches. Winds are strong in the fjord section. Mild temperatures and frequent precipitation provide an ideal environment for one of the greatest coniferous forests of the world.

The physical features of the Area inhibit the construction of rail and road communications between communities. Although road construction is proceeding at a rapid rate, and air transportation is used throughout the State, the coastal communities will continue to depend on water transportation.

<u>Population</u>.--The census of 1880 showed 7,700 persons in Southeast Alaska (Table 12). As a result of the Klondike gold rush the figure doubled in the next two decades: the 1880 count in Skagway, which was most affected by the rush, was 3,100, reaching a peak of 30,000 as newcomers arrived. Most of these were transients who came to cross into Yukon Territory by trail and by rail. Thus, Southeast Alaska experienced its greatest rise in population because of its location astride the major routes to the interior.

Since the gold rush days, population growth in the Area has been slower than in other sections of the State

because development has been based upon fisheries, lumbering, and manufacturing rather than upon mining and military activities. Military construction programs in Alaska since World War II bypassed Southeast Alaska. Population increased only slightly between 1940 and 1956.

Southeast Alaska is more thickly settled outside the main centers of population than other areas of the State. Coastlines are dotted with small communities. The channels separating the islands early attracted people to the coast because of the fish and the fur-bearing sea animals, and the convenience of water transportation. Later, coastal settlements grew through the development of forestry, mining and other industries dependent on service from the sea. Thus, in all periods of this region's history the people clustered along the coasts of the mainland and the islands.¹

The Regional Economy and Surface Transport Network

Water transport.--Fishing is the major source of income in Southeast Alaska (Fig. 15). The annual average values of the fisheries have declined since 1949-1953, but the industry still furnishes the livelihood for much of

¹U. S. Bureau of Census, <u>Tenth to Seventeenth</u> <u>Census of the United States, 1880-1950, Population;</u> Alaska Resource Development Board, "Population Estimates of Towns in Alaska, 1957," <u>Financial Data Regarding the Incorporated</u> Towns and Cities of Alaska, 1957.

the population.¹ The fishing industry utilizes sea transportation to markets. Thus it has had little effect on the land transport pattern.

The dominating influence of the forest industries in the employment pattern is demonstrated by the employment figures (Fig. 23). Forest industries employed an average of 1,255 between 1954 and 1957.²

The Tongass National Forest contains 25,000 square miles or 73 per cent of the land area of Southeast Alaska. The forest extends from tidewater to 2,000 feet altitude, the lower three-fourths being of commercial quality. Logs can be moved by water transportation from forests to mill. The finished product can be sent to market in the same way. Access to cheap water transport reduced the number of miles of logging roads and railroads. Equipment can be floated from one camp to another and, since 75 per cent of the timber is within two and one-half miles of tidewater, part of it can be logged directly to tidewater.³ The rest, coming from the longer valleys, requires log flumes, truck roads, or short railroads.

¹U. S. Fish and Wildlife Service, <u>Alaska Fishery</u> and Fur Seal Industries: <u>1949-1957</u> (Washington: U. S. Government Printing Office, <u>1951-1959</u>).

²Alaska Employment Security Commission, <u>Financing</u> <u>Alaska's Employment Security Program, Vol. II and III.</u>

³John A. Sandor and John E. Weisgerber, <u>Timber</u> <u>Management Plan Tongass National Forest, Alaska Region</u>, <u>1958-1967</u> (Juneau: U. S. Forest Service, 1958), pp. 10-11. The Ketchikan Pulp Company, the largest manufacturing concern, has operated a 50-million-dollar plant at tidewater north of Ketchikan since 1950.¹ Supplies are shipped by rail-barge from Prince Rupert. The finished product is loaded into boxcars for the return to the Canadian rail system.

Opportunities for large-scale farming are limited. The United States Department of Agriculture states:² "... agriculture is this region is limited to a few intensive poultry, dairy, and vegetable farms." A major handicap is lack of good highways. Air and water transportation are costly and time-consuming.

Mining has little importance in the region. Operators cannot compete with outside production. Because of existing transport costs only higher grade ores and concentrates can be moved to markets.

Resources are distributed over a wide, extremely rugged area accessible mainly from the sea. In addition, this Area is dependent on Juneau and Ketchikan in the extreme north and south to furnish supplies. With navigation

²U. S. Department of Agriculture, <u>Land</u>, p. 426.

¹A second pulp mill of approximately the same size has been constructed at Sitka by an American company owned by Japanese interests. Shipments from this mill are destined to Japan. A site near Juneau is under consideration by the Alaska Pacific Company for a third mill. It is estimated that there is sufficient timber of suitable quality along the "Inside Passage" to support four or five pulp mills.

so important to Southeast Alaska boats are used almost universally.¹ The transport of logs is accomplished by log-raft and towboat. Fishing boats, coastal steamers, and petroleum carriers are important in coastal shipping. They are also found in similar forms in other parts of Alaska. However, barges, tugs, and log-rafts are unique to Southeast Alaska because of their construction, uses, and large numbers.

The road and rail pattern.--The economy of Southeast Alaska depends upon water transportation. Land transportation routes are not practical, except for short local roads. These include the Tongass Highway near Ketchikan, Glacier Highway near Juneau, and Mitkof Highway near Petersburg.²

Other roads are found near Sitka, Wrangell, Craig, and Gustavus. Although short, these roads make business centers available to canneries, sawmills, and power plants. They also make possible the development of mineral areas, homesites, and localities suitable for dairying, or truck-

¹A conservative estimate of the number of boats operating in the region during summer would be 4,000 including non-resident fishermen. Interview with an official of the Fish and Wildlife Service, July, 1962.

²Juneau's 32 miles of roads lead mostly to summer homes. During three to four months of summer, the stateoperated ferry takes passengers and autos north to Haines and Skagway. Thus, from June to approximately mid-September Juneau residents have connections with the rest of Alaska by auto, via Haines and the Haines Cutoff. It is the only town in Southeast Alaska having access by auto to the other regions of the State.

or fur-farming.

A land connection to the outside is the highway from Haines to the Alaska Highway. Another is by the White Pass and Yukon Railroad, furnishing the only rail connection to any town in Southeast Alaska.¹ This railroad, only 20 miles of which are in Alaska, runs from Skagway to Whitehorse in Yukon Territory, a distance of 111 miles, and connects steamer service from the United States and Canada with Yukon River Transportation. It also connects with the Mayo road and the Alaska Highway.

In 1900, the first train to operate on this line arrived in Whitehorse from Skagway, carrying supplies to the Klondike gold fields. The line enjoyed its greatest prosperity during World War II. It was taken over by United States military authorities in 1942. Its facilities were utilized in transporting supplies required for Joint Defense projects, including the Alaska Highway and Canol Road and Pipeline. In the year ending in October, 1943, the White Pass and Yukon Railway handled 300,000 tons of freight between Skagway and Whitehorse, roughly ten times the annual figure in normal years.² During the

¹Now abandoned the Yakutat Southern Railroad once ran a distance of nineteen miles from Yakutat, on the Gulf of Alaska, to Setuk River, with a branch line to the Lost River. It was one of the few fish railroads in the world.

²Canada, Northern Administrations Department of Resources and Development, <u>Yukon Territory</u> (Ottawa, annual).

period of the United States Army lease, the roadbed and the equipment were much improved. At the termination of the lease in 1946, the railroad, previously under British control, was bought by Canadian interests.

At present, minerals account for major movements of freight. Silver, lead, zinc, and asbestos were delivered to the railroad by truck.¹ The ore goes to Skagway by rail, then to Prince Rupert or Vancouver. In 1958, outbound concentrates and asbestos amounted to 63,000 tons. Inbound shipments (groceries, equipment, appliances, mine supplies and minerals) totaled 85,000 tons in the same year. Petroleum products constituted over half of the inbound movement.² Much of the inward cargo is destined for Yukon Territory, with the outbound concentrates and asbestos going to Vancouver, the former moved by rail to the smelter at Trail, British Columbia. The transit trade from Yukon Territory and much of Northwest British Columbia is an important factor in the economy

¹Mineral exploitation in Northern British Columbia has always been hampered by lack of Canadian "corridors" to the sea through Southeast Alaska. To alleviate this situation a road was built from Stewart to the Alaska Highway at Mile 648. High-grade asbestos is transported via the Alaska Highway to Whitehorse. Lower grades are stockpiled until port facilities can be built at Stewart. British Columbia, <u>Transactions of the Twelfth British</u> <u>Columbia Natural Resources Conference, Resources of the</u> <u>Northern Cordilleran</u> (Victoria, British Columbia, 1959), pp. 122-126.

²U. S. Corps of Engineers, <u>Waterborne Commerce of</u> the United States, Part 4, 1958.

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of Skagway, giving employment to much of the local population.

The Haines Highway, also called Haines Cut-off, runs from Haines on Chikoot Inlet near the north end of the Area, to the Alaska Highway in Yukon Territory, 100 miles west of Whitehorse. The highway is 160 miles long; it is paved in Alaska, graveled in Canada. The cut-off is passable in summer only. It was built by the military at the same time as the Alaska Highway, and according to the same standards.

Traffic possibilities for this connecting highway merit attention. It provides access to promising mineral territory and a land bridge from Alaska proper to the "panhandle" section. The St. Elias Mountain range prevents any other land communication between these two areas. Two alternate routes are available: one is by sea around the St. Elias range; the other is through Skagway, then via the White Pass and Yukon Railroad to the Alaska Highway.

The Haines Cut-Off has an advantage in speed of delivery and in freighting costs. It is a likely competitor for freight traffic now moved over the White Pass and Yukon Railway. The port of Haines is near Skagway; both ports enjoy equal water rates. Current trucking rates permit carriage over the 260 miles from Haines into Whitehorse at half the railway charge for its lll-mile haul. Canadian truckers are handling loads from Haines to Whitehorse, circumventing the entire White Pass and Yukon Railroad, to the obvious disadvantage of the latter. The railroad has, however, made some effort to reduce operating costs and tariff rates.¹

Freighting by way of the cut-off effects substantial savings for Whitehorse consumers. Use of the road may also lead to the opening of Yukon mining properties hitherto not operated because of the prohibitive costs of shipping out lower grade concentrates.

Shorter barge-hauls from Pacific coast ports give the Haines Cut-Off an advantage over the circuitous carriage of commodities to the interior via distant railbelt ports in South Central Alaska. Instead of crossing the Gulf of Alaska, which takes from three to five days, freight can reach Haines in considerably less time than it takes to reach the railroad ports of Whittier or Seward. A truck from Haines and a train from Seward can reach Fairbanks in one or two days, but the truck will accomplish this at less cost than the train.²

¹Handling costs have been reduced by a "containorization" program similar to that used by the Alaska Railroad and described in Chapter V under the section "Competitive transport systems." The White Pass and Yukon Railroad has also considered rerouting to lower grades and conversion from narrow to standard gage. Letter from General Manager, White Pass and Yukon Railroad, Whitehorse, Yukon Territory.

²Data submitted to Battelle Memorial Institute, May 6, 1961.

The Haines Cut-Off provides a land bridge between two semi-isolated sections of United States territory. With development of this new artery Haines could become a gateway to South Central and Interior Alaska. This alternate route will be superior to other routes for many commodities, especially those which can be carried by truck.

<u>Rivers</u>.--Rivers of the mainland originate mostly in the glaciers and snowfields of the Coast Range and St. Elias Mountains. Their gradient is steep, the valleys are rocky and deeply incised, preventing navigation. The Unuk, Taku, and Stikine Rivers, however, rise in the plateaus of Canada, reaching the sea through valleys that traverse the barrier. The Taku and the Stikine are navigable by shallow-draft boats: they receive the discharge of glaciers and carry a heavy silt load often deposited as sandbars at their mouths. The resultant shoals with shifting channels endanger navigation.

The Stikine has long been one of the routes into the interior. Used by the Hudson Bay Company as early as 1835, it became prominent during the Klondike rush of 1898. It is the only river traversing the Pacific Mountain System with regular transport service. A river transport service on the Stikine is operated out of Wrangell as far as Telegraph Creek in British Columbia.¹ Connections with

¹A shallow-draft boat tows barges and carries passengers, making weekly trips. The traffic consists princi-

Interior Alaska can be made via the highway leading from Telegraph Creek to the Alaska Highway.

North of the Stikine is the Taku River, which has its source in British Columbia beyond the Coast Range. Boats with barges navigate the Taku River as far as Tulsequah, British Columbia, where ore is received. The period of navigation on both rivers covers late spring to early fall, depending upon their condition.

<u>Air transport</u>.--Transportation of passengers and freight by air in Southeast Alaska is vital. Several airlines operate scheduled routes from other states and Canada with regular landings in the region. Others operate scheduled local feeder-line routes to various points within the Area, and furnish non-scheduled and charter plane services for all purposes.

The physical landscape has fostered the rapid growth of air transportation into an enterprise of benefit to the local economy by furnishing important service to the many widely dispersed and isolated communities and operations.¹

pally of oil products, machinery, and food upstream and empty oil drums, furs, and some ore downstream.

^LRugged terrain makes the construction and maintenance of airfields expensive. Coastal communities must depend on amphibious or pontoon-equipped planes. Some airfields have been constructed on flat and gently rolling areas near sea level. Juneau airport was built on the outwash plain of the Mendenhall Glacier.

CHAPTER VIII

SUMMARY AND CONCLUSION

It is the purpose of this chapter to appraise current transport plans and analyze certain developments. Some indication is given as to type of transport needed to enhance the effectiveness of the regional transport system. Finally, it is intended to review briefly the present situation of Alaska's industries and to comment on prospects for economic development as related to the present and future surface transport network.

State Transport Requirements

When Alaska was given statehood, many of her citizens believed the new status would provide a final solution of existing economic ills. Since statehood is a political phenomenon, it may stimulate economic development, but it cannot by itself provide direct solutions for economic problems.¹

¹Statehood has been the catalyst for reactions which are essentially economic. It has reduced absentee control and distance between the governing and governed. Under terms of statehood the state has the option to select more than 100 million acres of public lands, during the next 25 years. Much of this area will be opened for prospecting, with the state deriving the principal advantage in all gains resulting from discovery of minerals. In

Basic to the solution of such matters is a broader development of the natural-resource base.¹ Definite programs and projects are required. One specific--and most urgent--need is that for low-cost transportation.²

Alaskans have hoped for better travel and transport facilities since the territory became a state. The Alaska International Rail and Highway Commission, a Congressional group under the chairmanship of Senator Warren C. Magnuson, has studied the transport need between Alaska and the other states for years. The Commission has held a series of hearings in Alaska. It utilized the services of the noted Battelle Research Institute to study the

addition, certain lands reserved for conservation of fisheries and wildlife are to be transferred to the state. Federal aid to transportational institutions has also been increased. The benefits associated with this aid are discussed under the section, "Organization of the Components of the Land Transport System," Chapter III.

¹Intensive exploitation of the State's natural resources was under way some years before Statehood. In 1954, the first major year-round industry started operations at Ketchikan and in 1959, a second mill went into operation at Sitka. Two additional mills, at Juneau and Wrangell, are in the planning stage. For years, South Central Alaska has been explored for oil. It is too early to determine whether the Area will become a major oil-producing one, but the new State is receiving substantial revenues from leases.

²U. S. Congress, Senate, <u>Highways in Alaska</u>, Hearing before a Subcommittee of the Committee on Public Works on S. 2976, 86th Cong., 2d Sess. (Washington: Government Printing Office, 1960), p. 10; U. S. Congress, Senate, <u>Highways in Alaska</u>, Memorandum of the Chairman to Members of the Committee on Public Works, 86th Cong., 1st Sess. (Washington: Government Printing Office, 1959), pp. 1-29. -

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need for additional highway and rail transportation facilities between the continental United States and Alaska. The Institute presented a report to the Commission in March, 1961.¹ It is to be expected that on the basis of the report findings there will certainly be an increase in federal assistance to transport plans for Alaska.

The Commission may recommend to Congress a direct rail link between the continental United States and Alaska, even though such a link is not supported in the Battelle report. Some federal participation would be required, either through subsidies to a private railroad or by expansion of the government-owned Alaska Railroad. Another approach to the problem involves the improvement and expansion of the Alaska Highway through the joint cooperation of the governments of the United States and Canada, and construction of a second and shorter highway connecting the other states and Alaska. This road could have feeder roads to Southeast Alaska's major cities. The work of the Commission, however, does not concern the far greater problem of the need for highways inside Alaska.

Many new Alaskan highways are in the planning and

¹U. S. Congress, House, <u>Transport Requirements for</u> <u>the Growth of Northwest North America, Vols. I-III</u>, Letter from the Chairman, Alaska International Rail and Highway Commission, transmitting the final report of the Alaska International Rail and Highway Commission, pursuant to Public Law 181, 84th Congress, 87th Cong., 1st Sess. (Washington: Government Printing Office, 1961).

the building stages. Small markets limit tonnage to be shipped into the Area. Production provides small backhaul tonnage for all forms of transportation. Nevertheless, improvements in the transport system are under consideration. The Alaska Department of Public Works is drawing up an intrastate road program. Extensions of existing roads and planned new roads are shown in Fig. 38. The proposed highway facilities are expected to increase travel and the volume of imports, to improve competitive conditions for local producers in world markets, and stimulate local economic growth.

The network of roads in South Central and Interior Alaska serves present needs. Major highways are paved, but subject to drequent damage caused by annual freezing and thawing. Funds for improving transportation facilities have been scarce. Individuals in charge have tried to extend improvements over as much mileage as possible. (The exception of roads in the National Forests is mentioned in Chapter IV .) As a result, maintenance problems are constantly present. A portion of federal funds available for the next five years is earmarked for maintenance work.¹

<u>Road transport</u>.--Only one road now leads to Alaska. Inside the State, about 2,000 miles of road are available

LU. S. Congress, Senate, <u>Federal-Aid Highway Act of</u> <u>1960</u>, Hearings before a Subcommittee of the Committee on Public Works on H. R. 10495, 86th Cong., 2d Sess. (Washington: Government Printing Office, 1960), pp. 45-76.

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for driving, in an area of 586,000 square miles. The only major cities connected by road are Anchorage and Fairbanks. Of the seaports, only Seward, Valdez, and Haines have road connections with the interior.

The Alaska Department of Public Works has proposed construction of a basic throughway system. This would include: 1) a road running parallel to the Alaska Railroad from Nenana to Willow, providing a second -and shorter--through route from Anchorage to Fairbanks; 2) completion of a road from Fairbanks to Nome and Teller on the Seward Peninsula, really an extension of the Elliott Highway;¹ 3) a branch from Talkeetna via McGrath to a junction with the Fairbanks-Nome Highway at Ruby, and another branch south to Dillingham on Bristol Bay; 4) connection of the Taylor and Steese Highways by way of Eagle and Circle; 5) completion of the Copper River Highway, from Cordova via Chitina to McCarthy, and east to the Alaska Highway; 6) extension of the Nabesna road to a junction with the Alaska Highway.

Fjords create special problems for road construction

¹Senator Magnuson, Chairman of the Alaska International Rail and Highway Commission, suggested the extension of this road by way of Bering Strait into Asia in the future. An effort in this direction was made in 1865, when the Western Union Expedition began construction of a telegraph line across Alaska to be connected by undersea cable with a Siberian line. Work was suspended after the Atlantic cable was successfully laid. Brooks, pp. 242-245.

in Southeast Alaska. Most of the major settlements are on islands separated by water from the mainland and from each other. No established water transportation system serves these communities. The Area can only be approached by air and water, except for the Haines-Skagway rail and road outlet. Surface transportation needs could be met by a proposed automobile ferry system, since construction of causeways or bridges would be extremely costly, even if practical from an engineering viewpoint. A ferry system with frequent and regularly scheduled runs seems feasible from Prince Rupert to Haines. With Canadian cooperation, certain towns--Skagway, Juneau, Petersburg, Wrangell, and Ketchikan--would be linked by road to the proposed "A" route. This route, lying just east of the Coast Range, runs from Hazelton, British Columbia, to the Alaska Highway (Fig. 38).

The proposed routes would have the following benefits for South Central and Interior Alaska:

- 1. Give the region an alternate port by connecting Cordova with the interior of Alaska.
- 2. Further implement movement of supplies by shortening the route from tidewater to Alaska's interior.
- 3. Have a definite military significance, since the routes would reduce highway mileage between defense installations by 100 to 200 miles.
- 4. Open a market for large stands of birch.
- 5. Permit more direct access to land transport for mining and other activities in the Fairbanks-Circle-Eagle triangle.

The proposed routes would have the following effects in North and West Alaska:

- 1. Open access to South Central and Interior Alaska.
- 2. Open the potentially mineral-rich Seward Peninsula.
- Provide military forces with a land connection of communications to DEW line and "White Alice" sites.
- 4. Make stands of birch and spruce accessible.
- 5. Lessen the dependence of North and West Alaska on air transportation.¹
- 6. Encourage settlement and agricultural activity.
- 7. Open the Kuskokwim basin to oil exploration.
- 8. Make the fishing products of Bristol Bay available to city markets.

In Southeast Alaska, the proposed routes would have

the following effects:

- 1. Stimulate further development of the mineral and timber resources, and aid population growth.
- 2. Connect communities of Southeast Alaska with one another, and to the rest of the State.

¹Highways, railroads, and ships are best adapted to handle the bulk freight produced by Alaska's industries. However flexibility of air routes is a distinct advantage in rapid movement of personnel during the short working season. Initial production may not justify large expenditures in permanent roadways. The airplane often enables developmental work to proceed to a point justifying roadways. However, beyond this point the airplane is often a negative factor. To overcome the high cost of air transport only high quality ore is moved out in mining developments. Where medium quality ore might justify the extension of surface transport, low quality ore, remaining after this initial development period, has little attraction for investors.

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3. Provide an alternate route for tourists to South Central and Interior Alaska.

Fig. 38 shows, however, that even this road construction program would leave one-third of the state--the Alaska Peninsula, Kodiak Island, the Aleutians and all land north of the Arctic Circle--inaccessible by automobile.

Land Transport and the Regional Economy

Furs, with fishery and mineral resources, provided the base for the economy of Alaska before 1940. Fisheries continued to be the mainstay of the economy which, however, was at the same time heavily dependent upon federal expenditures. Two causes are operative against present formation of a sound economy: decline in the salmon pack, and inconsistency of federal expenditures for military construction. On the other hand, three resources offer possibilities for industrial growth: timber, minerals, and the scenery.

Some concluding statements are in order concerning the outlook of Alaska's industries to determine their prospects for economic development as related to the present and future surface transport pattern.

<u>Regional economic development</u>.--Mining activity in Alaska at present is different from that of prewar days. Until World War II, mineral resources of the state were a major incentive for settlement, and for development of a
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surface transport network. Since the war, the industry is not concerned entirely with gold and copper, but also with nonmetals--coal, sand, and gravel. The Alaska Railroad has facilitated the intraregional circulation of these minerals. Construction projects have furnished the major market for sand and gravel; military installations have been the main buyers of coal.

It is not economical to transport coal, sand, and gravel over great distances. Consequently, local sources must be developed. The following causes have operated against the exploitation of these and other minerals: (1) high labor costs, (2) rugged topography, (3) a climate preventing year-round operations, (4) distance of markets, and (5) expensive and inadequate transportation facilities. Distance is the most serious problem of these. Much of the Area is far removed from the chief markets outside the state. Alaska is also characterized by vast extents of territory within its boundaries. Consequently, expensive transportation is the major reason for high mine production costs in Alaska. Although the road extension from South Central and Interior Alaska to the Seward Peninsula will improve the mining industry of North and West Alaska, it will not remove the distance draw-back. This disadvantage will exist as long as similar resources are available in more accessible areas. Size of reserves, richness of

ore, and ease of exploitation will have to be balanced against distance involved.

Mineral resources promise more for Alaska than either the tourist potential or military installations. The economy of the state will improve rapidly if minerals can compete in world markets after all transportation costs are allowed for. Thus, improvement of the external and internal transport network may be the determining factor in mineral resource development. The future of Alaskan minerals will also depend on additional exploration, reduced costs of development, lower labor costs, and greater demand from domestic and foreign sources.

Three principal areas in Alaska have proved to be commercially feasible for agriculture: the Matanuska Valley, the Tanana Valley, and the Kenai Peninsula. There is also some farming in Southeast Alaska near Juneau, Sitka, and Ketchikan.

The suitability of any area in Alaska for agricultural settlement depends not only on physical resources, but also on economic factors. Large-scale agricultural settlement is not feasible at present in all areas suitable for farming and grazing. Isolation, climate, and lack of markets deter development. It may be that poorer lands near existing roads and settlements may be utilized first.

Thus, land is not the main limiting factor in

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Alaska. The three major criteria for agricultural growth, according to their importance, are: accessibility to markets, climate, and character of the land.

The location of the future center of farming activity depends upon the location of centers of future population. In a new country with a dearth of transportation, agriculture develops near the markets. As industrial development and population grow, agriculture is apt to follow to supply local demand. Demand will be for products which can be grown in a given locality with greater economy than they can be imported. If, in South Central and Interior Alaska--the most densely populated region--there are millions of acres of unimproved farming land and there is not likely to be any major change in the amount of new land settled or number of farmers in the Matanuska or the Tenana in the near future, then no change will occur in agricultural production in North and West Alaska or Southeast Alaska. Isolation of the regions and intervening distances also set limitations on the integration of various areas, owing to high transportation costs. Unless intraregional transportation is improved, crops must be consumed near the place of origin. If such sustenance farming is practiced, agricultural progress will be slow. It is evident that Alaska cannot hope to compete with more favored regions in the markets of the world.

The relative unimportance of manufacturing in Alaska can be traced to several factors. Some of these are inadequate markets and marketing facilities, poor lines of distribution, and high labor costs. Venture capital is lacking. Manufacturing is needed to provide diversification and economic balance. In view of the difficulties mentioned above, however, it is not expected that manufacturing in the state will expand rapidly.¹

The vast forests of coastal Alaska are the most promising of the resources for growth of manufacturing. Two large pulp mills now exist in Southeast Alaska. The successful operation of the Ketchikan Pulp Mill is a healthy development, the first real commercial exploitation of forest resources on a permanent basis.

Where water routes are available on which logs can float to processing plants or markets, transport costs are lowest, and the major commercial logging areas of Alaska are near water. The forests of Interior and North and West Alaska are, in contrast, far from cheap water transport. Much of this area also lies far from land transport lines and its forests are much less or not at all used for commercial timber.

¹An oil refinery on the Kenai Peninsula will be completed in 1963. It will be South Central and Interior Alaska's first major manufacturing industry and may make possible a reduction in the high cost of transportation by auto and truck.

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Many more pulp and paper industries can be developed in the accessible forest zone of South Central and Southeast Alaska. Timber, water power, and cheap water transportation are available. Future development will have little effect on the overall surface transport pattern. The operations of the industry will, however, require an increased network of local roads and other improvements in transportation facilities.

Concentration of military installations along a line extending from Seward to Fairbanks stems from the central position of the area, as well as from environmental factors. Civilian and military workers were brought into this area to build and maintain military facilities and supply routes. The transportation network has been enlarged and improved. All major towns are now connected with one another by road or railroad.

Federal government activities will probably continue for the immediate future to be the most important impetus to the economy of Alaska. Attempts of the military to purchase local food and mineral products have influenced the pattern of traffic flow. The military has also played a role in the development of the employment pattern. In spite of these benefits, the State's economy will have to adjust to fluctuations in defense spending. If military establishments continue to be a permanent and

stable market, some Alaskan industries will be aided and encouraged.

Recreational resources in the three major regions Tourist facilities are increasing, with a are numerous. potential for expansion dependent upon access. In the past the majority of visitors have come by steamship and air rather than by automobile. In the future highway travellers will constitute an increasing portion of the To encourage tourists, attractions must be readily total. accessible at reasonable prices. A significant project for the development of tourist trade is embodied in the trunk road system for Alaska outlined in the preceding section on future transportation development. A completed trunk road system would be a strong incentive to automobile travel. It will help make recreation activities assume the proportions of a major industry.

The Federal government has given substantial financial assistance to transportation in Alaska. The chief justification for this aid is the urgent necessity for overcoming the basic difficulty in Alaska, namely, the separation of the various physiographic and economic regions of the state. The provision of adequate transportation facilities is essential in order to develop the large but scattered resources of the state and to lend unity to the area as a whole. The division of Alaska into regions is not a

device arbitrarily adopted by the geographer to suit his own convenience. It is a basic fact in Alaska's economic and political life. Cheap, rapid transportation is a means of offsetting the harmful effects of geographic regionalism.

To estimate the possibilities for increased production in Alaska it is necessary to consider matters other than physical or economic conditions, including transport, within the state. The Pacific Northwest has an abundance of varied resources. The latter area has resources similar to those found in Alaska. This being the case, earlier development is expected, since it is closer to the traditional markets and transport costs are lower. Competition from the Pacific Northwest, distance from major markets, and inadequacy of external transportation facilities make individual development difficult if not impracticable in Alaska. Thus, external forces will continue to have great influence on the pattern of economic development within the state.

Alaska's resources can be profitably used only if advances continue to be made in solving the problems of living and working in remote areas under relatively severe climatic conditions, and of maintaining cheap transport connections with markets and sources of supplies.

APPENDIX

NOTES ON THE FIGURES

Figure 7. Population of Alaska, 1880-1957.--U. S. Department of Commerce, Bureau of Census, Tenth to Seventeenth Census of the United States, 1880-1950, Population (Washington: Government Printing Office).

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Figure 12. Land travel time from Fairbanks-<u>Circle.--Statements of individuals and statistical records</u> in historical documents used in computing travel time at various periods.

Figure 13. Rank order of major land routes according to volume of traffic: 1896-1960.--Figure 13 represents the compilation of data from numerous sources including statements of individuals and statistical records in historical documents.

Figure 15. Percentage distribution of annual average values produced from Alaskan natural resources, <u>1954-1957</u>.--U. S. Department of Interior, Bureau of Mines, <u>Mineral Production in Alaska</u>, Preliminary Annual Figures, Mineral Industry Surveys, Area Report A-16 (Washington: Government Printing Office, annual).

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Figure 27. Alaska Railroad and Highway Traffic Flow.--Data on internal traffic flow compiled from numerous sources.

Figure 33. Alaska Railroad Traffic, Total, Commercial, and Military, 1938-1959.--U. S. Department of Interior, Alaska Railroad Reports.

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Figure 34. Alaska, Traffic Flow on Principal Highways, Average Daily Traffic, 1958.--U. S. Department of Commerce, Bureau of Public Roads, <u>Report on Extension</u> of National System of Interstate and Defense Highways within Alaska and Hawaii (Washington: Government Printing Office, 1960), pp. 11-16.

Figure 36. Scheduled Airline Routes in Alaska.--Federal Aviation Agency, Fifth Region, Central Information on Flying to and in Alaska (Anchorage, annual), pp. 1-6.

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Figure 38. Highways to and within Alaska--Existing and Proposed.--U. S. Congress, House. Transport Requirements for the Growth of Northwest North America; Vol. 1-3. Letter from the Chairman, Alaska International Rail and Highway Commission, pursuant to Public Law 181, 84th Congress. 87th Cong., 1st Sess. (Washington: Government Printing Office, 1961).

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