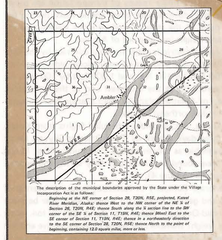
Note: For additional subdivision information see U.S. Survey No. 4392

1700' x 100' Gravel Airstrip

State Division of Aviation Lease

1 Water storage tank (30,000 gallons)
2 Pump house
3 City well
4 School
5 Store
6 Store
7 Church
8 Community hall/clinic
9 Post office
10 Jade shop
11 Warehouse
12 Pool hall
13 National Guard Armory

Extent of U.S. Army Corps of Engineers floodplain study.



COMMUNITY MAP

AMBLER

67°05'N 157°52'W Elevation 135'

Scale
100 0 200 400 Feet
50 0 50 100 150 Meters

Prepared by the Arctic Environmental Information and Data Center, University of Alaska, for the Alaska Department of Community and Regional Affairs

The preparation of this document was financed in part through a comprehensive planning grant from the Department of Housing and Urban Development under provisions of Section 701 of the Housing Act of 1954, as amended, and the Division of Community Planning, Department of Community and Regional Affairs of the State of Alaska. December, 1976.

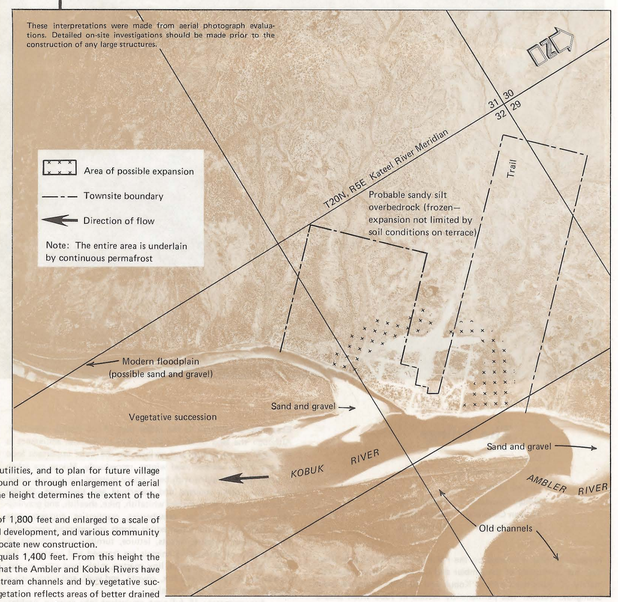
Flood Data
U.S. Army Corps of Engineers. Preliminary draft 1975. Compiled from aerial photos dated 6-27-65 by the Bureau of Land Management. Date 8-10-65. Assumed grid. Assumed elevation.

Area that would be inundated by a flood with a frequency of approximately 100 years.

- Flood hazard work was performed by the Alaska District Corps of Engineers at the request of and funded by the Federal Insurance Administration.
- The flood hazard area shown hereon is based on meager data, plus a minimum of historical flooding information and should be considered as preliminary.
- The major flooding that occurs at this location is the result of spring ice jams.
- Any levees or dikes were considered in delineating the approximate 100 year flood.

Land Use
- Residential
- Public
- Commercial
- Water line under construction (PHS)
- Sewer System under construction (PHS)
- Main
- Seepage Pits
- Manhole
- Earth station
- Phone (RCA)
- Townsite boundary (BLM)
- Survey line (BLM)
- Direction of flow
- GEN Generator
- Active erosion

Note: Electrical system under construction, no map available. (AVEC)



Community Base Map—Maps are needed to show land use, ownership, location of utilities, and to plan for future village improvements. These maps can be prepared by either surveying the land on the ground or through enlargement of aerial photos or by a combination of both. Air photos can be taken at various heights. The height determines the extent of the area covered by the photograph.

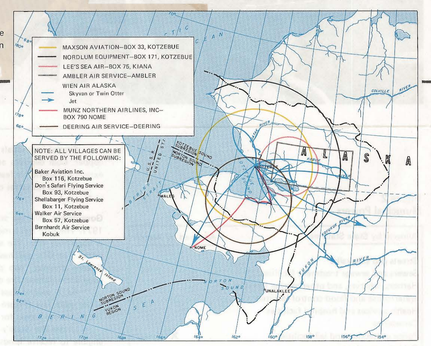
The Community Base Map was prepared from a photograph taken at a height of 1,800 feet and enlarged to a scale of 1:2,400 (1 in. = 200 ft.). This map was used to locate the present utilities, residential development, and various community services and can be used in the future to evaluate the area for village expansion and to locate new construction.

The photograph to the right was taken at a height of 8,400 feet or one inch equals 1,400 feet. From this height the village as well as the land around it can be clearly evaluated. This photograph shows that the Ambler and Kobuk Rivers have changed their beds many times in the recent past, as reflected by the remnants of stream channels and by vegetative succession. Well-defined trails can be seen crossing the gently rolling topography. The vegetation reflects areas of better drained soils and established drainage patterns. This kind of data is very important in the development of community growth and expansion as well as in understanding some of the environmental conditions that are presently affecting the community—flood, erosion, source of water supply, and location for disposition of waste.

KOBUK ← RIVER

U.S.G.S. estimated average annual flow—9,481 cubic feet per second.

Note: This community base map has been prepared from low altitude aerial photographs which contain unavoidable distortions in scale. Property and utility information have been generalized from many sources and may contain minor inconsistencies. This map should not be construed as a survey.



Environmental Considerations for Community Development

Community development must consider all environmental factors that affect the engineering design and location of structures, including climate, topography, soils, permafrost, erosion, and flooding.

Climate

Climatic data on winds, precipitation, temperature, and snowfall (Figure 5) allow engineers to design buildings strong enough to withstand heavy winds and deep snow, select type and thickness of insulation to reduce heat loss, and estimate fuel requirements. Climatic data are also needed to determine the type of clothing needed to protect the human body against extreme temperatures. No climate records have been kept for Ambler; data collected in nearby Shungnak are the most representative of conditions at Ambler and are used for the following descriptions.

Chill Factor—If the air temperature is below body temperature, a person loses heat to the atmosphere. When the wind blows, the rate of heat loss increases; therefore, air temperature and wind velocity are the two environmental factors which affect body heat loss. Wind chill data (Figure 6) were developed by combining wind and temperature measurements into numbers which express equivalent chill temperatures.

Figure 6
Wind Chill Temperatures

WIND SPEED IN MILES PER HOUR	COOLING POWER OF WIND EXPRESSED AS "EQUIVALENT CHILL TEMPERATURE"																				
	TEMPERATURE (°F)																				
CALM	40	30	20	10	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100	-110	-120	-130	-140	-150	-160
	EQUIVALENT CHILL TEMPERATURE																				
5	35	30	20	10	0	-10	-15	-25	-35	-45	-60	-70	-80	-90	-100	-110	-120	-130	-140	-150	-165
10	30	20	10	0	-5	-15	-25	-35	-45	-60	-70	-80	-90	-100	-110	-120	-130	-140	-150	-165	-175
15	25	15	0	-10	-15	-25	-35	-45	-60	-70	-80	-90	-100	-110	-120	-130	-140	-150	-165	-175	-185
20	20	10	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100	-110	-120	-130	-140	-150	-165	-175	-185
25	15	10	0	-15	-20	-30	-40	-50	-65	-75	-85	-95	-105	-115	-125	-135	-145	-155	-165	-175	-185
30	10	5	0	-15	-25	-35	-45	-55	-65	-75	-85	-95	-105	-115	-125	-135	-145	-155	-165	-175	-185
35	10	0	-5	-15	-25	-35	-45	-60	-65	-75	-85	-95	-105	-115	-125	-135	-145	-155	-165	-175	-185
40	10	0	-5	-15	-25	-35	-45	-55	-65	-75	-85	-95	-105	-115	-125	-135	-145	-155	-165	-175	-185
WINDS ABOVE 40 HAVE LITTLE ADDITIONAL EFFECT.	LITTLE DANGER			INCREASING DANGER (Flesh may freeze within 1 min.)				GREAT DANGER (Flesh may freeze within 30 seconds)													
	DANGER OF FREEZING EXPOSED FLESH FOR PROPERLY CLOTHED PERSONS																				

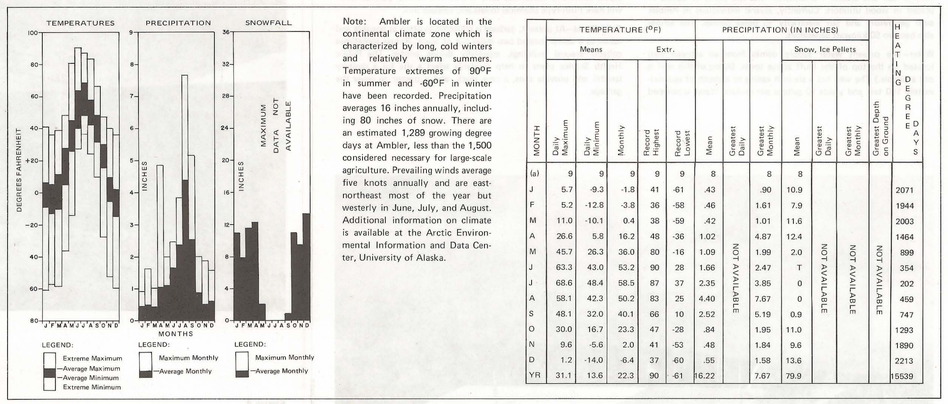


Figure 5
Climatic Data Recorded at Shungnak and Considered Representative of Ambler

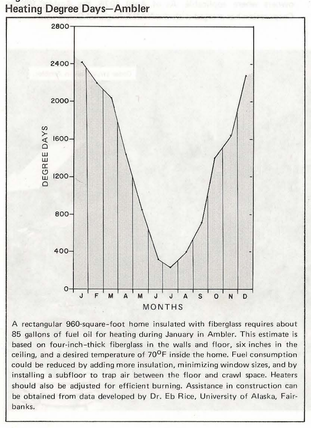
Note: Ambler is located in the continental climate zone which is characterized by long, cold winters and relatively warm summers. Temperature extremes of 90°F in summer and -60°F in winter have been recorded. Precipitation averages 16 inches annually, including 80 inches of snow. There are an estimated 1,289 growing degree days at Ambler, less than the 1,500 considered necessary for large-scale agriculture. Prevailing winds average five knots annually and are east-northeast most of the year but westerly in June, July, and August. Additional information on climate is available at the Arctic Environmental Information and Data Center, University of Alaska.

MONTH	TEMPERATURE (°F) Means: Daily Maximum	Means: Daily Minimum	Means: Monthly	Extr.: Record Highest	Extr.: Record Lowest	PRECIPITATION (IN INCHES): Mean	Greatest Daily	Greatest Monthly	Snow, Ice Pellets: Mean	Snow, Ice Pellets: Greatest Daily	Snow, Ice Pellets: Greatest Monthly	Greatest Depth on Ground	HEATING DEGREE DAYS
(a)	9	9	9	9	9	8		8	8				
J	5.7	-9.3	-1.8	41	-61	.43		.90	10.9				2071
F	5.2	-12.8	-3.8	36	-58	.46		1.61	7.9				1944
M	11.0	-10.1	0.4	38	-59	.42		1.01	11.6				2003
A	26.6	5.8	16.2	48	-36	1.02		4.87	12.4				1464
M	45.7	26.3	36.0	80	-16	1.09		1.99	2.0				899
J	63.3	43.0	53.2	90	28	1.66		2.47	T				354
J	68.6	48.4	58.5	87	37	2.35		3.85	0				202
A	58.1	42.3	50.2	83	25	4.40		7.67	0				459
S	48.1	32.0	40.1	66	10	2.52		5.19	0.9				747
O	30.0	16.7	23.3	47	-28	.84		1.95	11.0				1293
N	9.6	-5.6	2.0	41	-53	.48		1.84	9.6				1890
D	1.2	-14.0	-6.4	37	-60	.55		1.58	13.6				2213
YR	31.1	13.6	22.3	90	-61	16.22		7.67	79.9				15539

(a) NOT AVAILABLE

Heating Degree Days—Annual fuel requirements for a heated building can be calculated from heating degree days information. Structural heating usually begins when the air temperature is near 65 degrees F, the index temperature. If a particular day has a mean temperature of 50 degrees F, 15 heating degree days accumulate (65 minus 50). For the entire year the heating load is the sum of the daily degree days. The degree days for each month of the year for Ambler are shown in Figure 8. This information, combined with an inventory of types, sizes, and insulative qualities of buildings, can determine the amount of fuel required for a specific time period in the village.

Figure 8
Heating Degree Days—Ambler



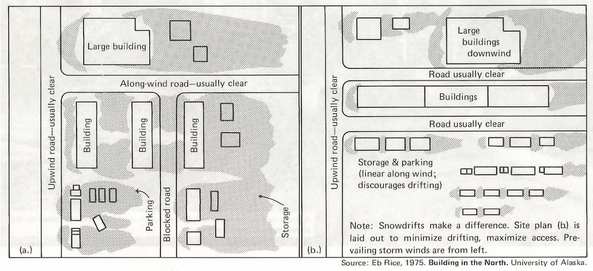
A rectangular 960-square-foot home insulated with fiberglass requires about 85 gallons of fuel oil for heating during January in Ambler. This estimate is based on four-inch-thick fiberglass in the walls and floor, six inches in the ceiling, and a desired temperature of 70°F inside the home. Fuel consumption could be reduced by adding more insulation, minimizing window sizes, and by installing a subfloor to trap air between the floor and crawl space. Heaters should also be adjusted for efficient burning. Assistance in construction can be obtained from data developed by Dr. Eb Rice, University of Alaska, Fairbanks.

Snow Load—Snow load data are used in the design of structures to determine the strength needed to withstand the weight of packed snow. The U.S. Army Cold Regions Research and Engineering Laboratory has estimated local ground snow loads in pounds per square foot (psf) for many areas of Alaska. The design load selected depends on the expected use, life span, and geographic location of the building. For example, a five-year life span could be selected for a temporary facility. A structure that can withstand 87 pounds of snow per square foot is considered safe for five years in Ambler. A building with a life expectancy of 25 years must be able to withstand a snow load of 132 psf; 152 psf for 50 years; and buildings with an anticipated life of 100 years or more, such as hospitals and other long-lasting, permanent facilities, should be able to withstand 172 psf.

Wind Speed—Information on wind speed and direction is necessary to design and orient airports and other structures. It has been estimated that for a structure with an expected life span of two years a structural design that could withstand extreme wind speeds of at least 59 miles per hour should be chosen; 62 miles per hour for a structure with an expected life of 10 years; 70 miles per hour for a 25-year life; 75 miles per hour for a 50-year life; and 82 miles per hour for a structure with a life expectancy of 100 years or more.

In locating buildings, consideration must be given to the direction of wind to minimize snowdrifts (Figure 7).

Figure 7
Snowdrifts and Wind Direction



Note: Snowdrifts make a difference. Site plan (b) is laid out to minimize drifting, maximize access. Prevailing storm winds are from left.

Source: Eb Rice, 1975. **Building in the North.** University of Alaska.

Topography and Soils

Ambler is built on a gently sloping terrace of dry, frozen silty sand adjacent to a steep river bluff. The terrain inland from the bluff consists of rolling hills mantled with old eroded glacial moraines (see air photo). The highland area is locally well drained as shown by the presence of trees and other vegetation. Because site selection and design of permanent structures must consider the bearing capacity of soil, slope, drainage, erosion, flooding, and depth to permafrost, evaluation of these factors is essential.

Permafrost—Permafrost (permanently frozen ground) is continuous under most of the area. Major engineering problems arise when permafrost occurs in fine-grained, poorly drained silt and clay. These sediments can contain large amounts of ice. If the ice melts, the soil will become unstable and may move.

Permafrost should be protected from thawing whenever new structures and utilities are built in the village. The most common methods of protecting permafrost are to place a thick gravel pad between the structure and the frozen ground to limit heat transfer or to raise buildings on pilings to allow air circulation under the structure. Utility pipes should be properly insulated or placed in utilidors so that a minimum of heat transfers from the pipes to the adjacent ground.

Erosion and Flooding—Topography minimizes flooding problems at Ambler. The village is located on high ground on a slope and back far enough from the active floodplain of the Kobuk River to be safe from severe erosion and flooding. The Kobuk overflowed its banks in 1968 due to heavy spring rains but did little damage at Ambler. All new homes are located above any dangerous flood areas, but riverfront developments such as boat moorings and storage areas may be vulnerable to high water.

River erosion is minimal due to the straight course of the river through this section. Spring flooding near shoreline areas occurs every year when the ice begins to move. Erosion is limited to the bluff areas as a result of spring runoff. Running water erodes and removes soils free of vegetation. Locally, this type of erosion is severe enough to demand stabilization as shown in the adjacent photograph.

The most important thing to remember when building in the Arctic is that successful design requires site investigation and the advice of competent engineers because of the special conditions in the North. Neglecting these considerations can lead to complete failure of structures.

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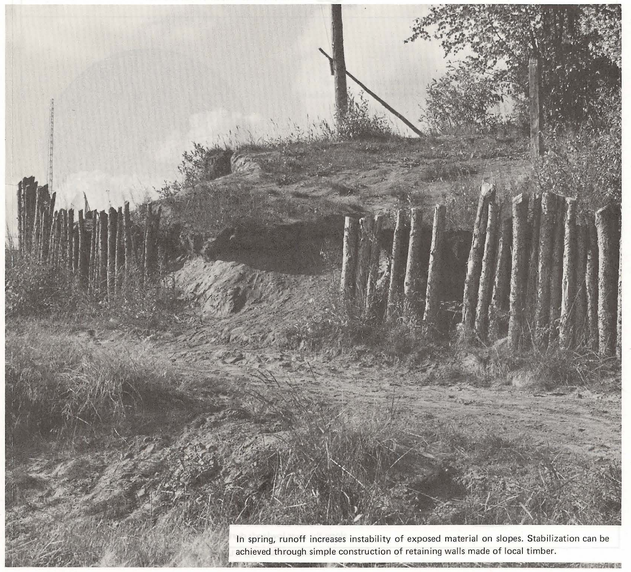

In spring, runoff increases instability of exposed material on slopes. Stabilization can be achieved through simple construction of retaining walls made of local timber.