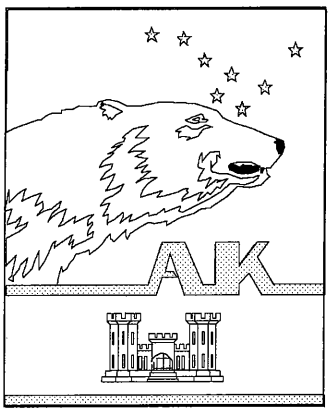


VIII. MILITARY CONSTRUCTION

CREATING A PERMANENT MILITARY ESTABLISHMENT IN ALASKA

In December of 1949, Jiang Jieshi (Chiang Kai-Shek) and the Chinese Nationalist forces fled from mainland China to Taiwan. Two months later, Mao Zedong and Joseph Stalin signed a treaty pledging mutual assistance between China and the U.S.S.R. The "loss" of China and the expansion of the Communist bloc to Asia, coupled with the Soviet Union's first successful atomic bomb test in September, 1949, ensured that the United States would intensify its defense posture of solid preparedness. As early as 1947, President Truman had determined that there was little that America could do militarily to influence the civil war in China. But, on June 25, 1950, when the North Korean Army crossed the 38th parallel into South Korea, Truman and his military advisors, under the auspices of the United Nations, quickly responded by sending U.S. troops to Korea. This "police action" — Congress never actually declared war on North Korea — resulted in the growth of the defense budget by 1952 to $50 billion. It inaugurated in American foreign policy an almost seamless response to Asian affairs from 1950 through the end of the Vietnam War.

Historian Charles M. Dobbs has explained how Korea exemplified this pattern, in which American leaders "submerged left-wing Asian nationalism within the superpower confrontation." Dobbs further argued that, throughout the 1950s and 1960s, "attitudes, rhetoric, and policies would reappear as the government in Washington sought to impose a free world/communist world model in Asian lands wrestling with the last vestiges of colonialism."[1] American officials interpreted events in Korea during the summer of 1950 as evidence of Soviet-led communist aggression that could not go unchallenged. Throughout the

1950s and 1960s, fearing that if one more struggling nation fell to communism, then they would all — like dominoes — fall, American policy makers sought to contain the spread of the rival philosophy and economic system, almost as if it were a disease.

For Alaska, these developments meant a reassertion of the strategic significance of the region and an increase in defense dollars. During the 1950s, the Alaska District planned and supervised a military construction program that exceeded $1 billion in costs. During the first four years of the decade, as one senior engineer suggested, the Alaska District simply could not "spend money fast enough."[2] Construction of housing, utilities, warehouses, roads, hangars, runway extensions, hospitals, water supply and sewage treatment plants, ordnance storage and other support facilities comprised the bulk of this program. By 1958, as reported by then District Engineer Colonel Pierre V. Kieffer, Jr., the Alaska District had become the fourth largest in the Corps, in terms of the dollar value of the construction under its jurisdiction. Ahead of the Alaska District by only slight amounts were the New England, Omaha, and Mobile districts.[3]

A full $98 million of this military construction program represented expenditures for housing. One of the chief obstacles to full troop deployment in Alaska was the lack of barracks and family quarters. In its March 1, 1951, "Report of the Alaskan Task Force," the Preparedness Subcommittee of the Senate Committee on Armed Services noted that, until the onset of military action in Korea, the pace of permanent construction had delayed "the military build-up of operational and logistical forces" to the extent that the majority of allotted troops had not yet arrived in the Territory. The report observed further that, because of the worsening "international situation," a significant change had since occurred, "both in the realism of approach and the implementation of planning."[4] Congressional funding for the military construction program in Alaska began to pour into the Territory. The job of organizing the planning and supervision of this program fell to the Alaska District, almost with the urgency of construction during World War II, but designed this time to create a permanent military establishment rather than to meet temporary wartime necessities.

In a November 26, 1951 memorandum, Alaska District Executive Officer Lieutenant Colonel J. J. Jewett, referring with pride to the District's workload as "one of the greatest construction programs in history," invited all District employees on a tour of Corps projects in the Anchorage area.[5] The following table, listing the projects under the District's supervision in 1951, provides some impression of the magnitude of this program.[6]

Alaska District Military Construction, FY 1951.

ITEM	CONTRACT AMOUNT	CONTRACTOR
AACS [Airways and Air Communications Service] Facilities	$1,192,669	Morrison-Knudsen and Peter Kiewit Sons, Seattle WA
Roads, Streets and Drainage - AACS Facilities	$178,000	Sealand Construction Co., and Olav Boen Construction Co., Seattle WA
Outside Utilities, AACS	$521,712	City Electric, Anchorage AK
Roads, Streets, Sidewalks	$717,391	Birch & Boespflug, Seattle WA
Sanitary Sewers	$189,779	Urban Plumbing & Heating Co., Tacoma WA
51 8-family Quarters	$4,812,503	Patti-MacDonald Co., Kansas City MO
33 8-family Quarters	$3,175,500	Birch & Boespflug, Seattle WA
3 500-man Barracks	$2,830,961	Haddock Engineers, Ltd. & Assoc. III, Santa Fe NM
14 200-man Barracks	$5,727,000	J. H. Pomeroy & Co., Inc., San Francisco CA
Outside Utilities	$2,387,933	Patti-MacDonald Co., Kansas City MO
Enlisted Men Service Club	$489,000	Morrison-Knudsen Co., Inc. & Peter Kiewit Sons Co., Seattle WA
2 Bachelor Officers Quarters	$321,000	J. H. Pomeroy & Co., Inc., San Francisco CA
4 Warehouses	$270,000	Morrison-Knudsen Co., Inc. & Peter Kiewit Sons Co., Seattle WA
6 Shop Buildings	$207,980	Chris Berg, Inc., Seattle WA
20" Supply Main	$376,918	S. Macri Construction Co., Seattle WA
Ship Creek Dam & Intake Water Treatment Plant	$966,000	Haddock Engineers, Ltd. & Assoc. III, Santa Fe NM
2 200'x1000' Warehouses	$3,582,782	Morrison-Knudsen Co., Inc. & Peter Kiewit Sons Co., Seattle WA
4 Civilian Bachelor Quarters & 2 Bachelor Officers Quarters	$959,800	Patti-MacDonald Co., Kansas City MO
38 8-family Quarters	$4,042,329	Patti-MacDonald Co., Kansan City MO
Power & Heating Plant	$3,213,417	Morrison-Knudsen Co., Inc. & Peter Kiewit Sons Co., Seattle WA
1 500-man Barracks; 15 200-man Barracks	$9,540,765	Anderson Construction Co., Inc. & Montin-Benson Inc., Seattle WA
14 8-family Quarters	$2,138,416	Sealand Construction Co., Inc., & Olav Boen Construction Co., Seattle WA
750-man Barracks	$1,656,771	Chris Berg, Inc., Seattle WA
3000 KW Diesel Electric Plant	$314,928	E. V. Lane Co., Palo Alto CA
4 Shop Buildings	$172,650	Morrison-Knudsen Co., Inc. & Peter Kiewit Sons Co., Seattle WA
Outside Utilities	$547,011	Southern Constructors, Fairbanks AK
Ketchikan Alaska Communications System Transmitter Building	$111,658	Shupp, Chase & Tolbert, Kodiak AK
Central Power & Heating Plant	$7,913,652	Morrison-Knudsen Co., Inc. & Peter Kiewit Sons Co., Seattle WA

Source: "Current Military Construction in Alaska," ca. Feb. 1951, Folder: Corps of Engineers in Alaska, 1951-1952, File: 228-10 Installation Historical Files, Accession no. 77-85-0042, Box 6, Records of the Army Corps of Engineers, RG 77, National Archives — Alaska Region.

By December of 1951, *Newsweek* had reported that military construction in Alaska was "in full swing." At Fort Richardson near Anchorage, the "24 sets of family-type quarters" in existence only a year earlier now numbered almost 1,200. Allocations for fiscal year 1951 alone reached $176 million, as, in addition to housing, all manner of support facilities — from bowling alleys to streets to sewage treatment plants — needed to accompany housing construction. *Newsweek* expected that within two years housing shortages at the Alaskan posts would be alleviated, anticipating further that, given the likelihood of increased numbers of troops continuing to arrive in the Territory, the housing construction program would proceed for another five years.[7]

To facilitate the increased workload the Alaska District created a Technical Information Branch. The function of this office was to reach prospective bidders by disseminating proposed project information through Alaskan newspapers and radio stations, as well as Seattle newspapers, United Press, Associated Press, and contractor and engineer trade journals throughout the U.S.[8] In order to provide a liaison with Outside construction firms, the Alaska District also established a branch office in Seattle, which remained operative throughout the 1950s.[9]

In his annual report for 1952, Territorial Governor Ernest Gruening observed that for the present fiscal year the Defense Department had allocated another $156 million for military construction in Alaska. One year later, however, Gruening's successor, Frank Heintzleman, feared reductions in these funds, possibly because of the cessation of fighting in Korea.[10]

Heintzleman's fears proved groundless. The Soviet Union's detonation of a hydrogen bomb in August of 1953 ensured that the pressure to maintain U.S. military preparedness would stay taut. In late August, shortly after this detonation, members of a Senate Joint Subcommittee on Public Works and Armed Services, visited Juneau and Anchorage. South Dakota Senator Francis Case, acting chairman of the group, explained that "Russia's acquisition of the hydrogen bomb" more than offset "any disposition on the part of Congress to relax defenses because of the Korean truce." Moreover, Senator Case predicted that defense spending would even continue to increase in response to the enlarged Soviet nuclear threat.[11]

All had not transpired smoothly in the first few years of the fast-paced, large-ticket-price military construction program in Alaska. In addition to the problems that the District encountered because of Alaska's harsh climate, a shortened construction season, supply complications, and labor shortages, the sheer

enormity of the program perhaps stretched the Alaska District too thin to oversee and inspect all projects as completely and thoroughly as possible. A special subcommittee of the House Committee on Government Operations, investigating the Corps' efforts in Alaska, concluded as much and criticized the District for its "lax supervision" of the program.[12]

On December 30, 1952, California Representative Chet Holifield submitted the subcommittee's report, entitled "Military Housing Construction in Alaska." This report identified problems with choices of building materials, excessive excavation in areas of permafrost, and too heavy a reliance on "contractors' formal responsibility." Some of the specific problems included accepting a contractor's choice of "welchboard" as a poor substitute for striated plywood; use of substandard bathtubs; and failure to install cut-off valves on 4,500 convector heating units. The report also noted that utility construction had lagged behind housing construction, thereby postponing occupancy. The report further observed a need for stiffer inspection methods and tighter controls on approving contract modifications.[13]

Answering criticisms that pertained to the choice of building materials and features in housing design, the Alaska District emphasized that the military construction program under its supervision reflected a speedy response to urgent needs. Also influential was the District's 60 to 72 per cent employee turnover rate. The subcommittee itself recognized that Alaska's acute housing shortages, high living costs, as well as the lack of schools and other community organizations, had fostered the severe turnover rate, and that to compensate, the District had needed to devote considerable amounts of time and energy simply to training new employees.[14]

Early in response to this investigation, which also involved the General Accounting Office, Chief of Engineers General Lewis A. Pick acknowledged "errors and deficiencies" in some aspects of the Alaska District's military construction program. Writing to Representative Holifield on September 7, 1951, General Pick assured the congressman that either the contractors at fault would correct their mistakes or the Corps would withhold final payment until they had done so. Almost one year later, in a letter dated July 28, 1952, Assistant Chief of Engineers for Military Construction, Brigadier General John R. Hardin, advised Holifield that the Corps had pursued one of two solutions: either the contractors in question had corrected the problems or the government had taken offsetting credits in compensation.[15] As a result of this inquiry, members of the subcommit-

tee concluded that both the Corps and contractors would in the future minimize any further practices that were "detrimental to the public interest."[16]

The congressional investigation may have had this salutary effect, but equally instrumental must have been the Alaska District's coming of age and acquisition of the organizational structure and methodologies required to handle such a large-scale construction program. The Alaska District had grown substantially since its establishment in 1946. According to the subcommittee's report, by 1952, the District had numbered 19 military officers and 1,200 civilian employees.[17] By 1958, this number had decreased to 13 military officers and 600 civilian employees. In the six-year interim, the District continued to supervise projects that averaged $100 million in costs every year.[18]

Indicative of the Alaska District's increasing organizational maturity was a meeting of all its resident engineers, held in Anchorage, in late November, 1952, with District Engineer Colonel Louis H. Foote. The Corps then announced that by April of the following year, the Alaska District would have awarded contracts for 187 new construction items. The resident engineers recognized that this workload meant that the District's inspectors would have to intensify their review of specifications, in order to catch problems before work actually began on a given project. Colonel Foote also instructed the resident engineers to disallow any unnecessary changes to original plans and specifications: "There simply will not be time to consider changes not utterly essential."[19]

One of the contracts awarded by April, 1953, was for the construction of a heating and power plant for Elmendorf Air Force Base. The Alaska District let the contract to Patti-MacDonald and Associates of Kansas City, Missouri, the low bidder at just over $11.5 million. This construction company had also just completed building a similar power plant at Fort Richardson. The decision to construct the plant at Elmendorf reflected greatly increased energy needs there, as well as the goal of modernizing the utility system used on the base. Designed to produce steam from Alaskan coal, the plant incorporated unique features not typically utilized in the Lower 48. These included a large thawing shed needed to de-ice the coal that arrived at Elmendorf in "solid blocks of black ice." Also, plans included an indoor storage facility for stockpiling the coal after this thawing process had occurred.[20]

The amount of building materials required to construct the Elmendorf power plant provides some measure of the scope of the project: 807 tons of reinforcing

In honor of Brigadier General Louis H. Foote.

steel; 11,530 cubic yards of concrete; 1,807 tons of structural steel; 402 tons of "boiler tubing"; 56,360 square feet of steel roof decking; 88,160 square feet of insulated metal siding; 62,000 linear feet of electrical conduit and duct; 290,000 feet of electrical wire; and 23,500 square feet of duct installation. Additionally, the project required the excavation of 48,000 cubic yards of material. Finally, the job also necessitated constructing almost a mile of railroad tracks for coal delivery, as well as outside steam distribution lines and power lines to connect to existing systems on the base.[21]

The Elmendorf power plant project demonstrates how the Alaska District's military construction program benefitted the economies of surrounding communities, in this case, Anchorage. Construction of the Elmendorf power plant involved nine subcontractors, many of whom were located in the Anchorage

area. By August of 1954, "all of the trades were on the payrolls," with an average of 225 workers on the job. By January, 1957, Anchorage had received the title, "All American City." The *Anchorage Times* reported that the economic boost provided by the Alaska District's military construction program had played a significant role in the city's "amazing postwar growth." This influence appeared most directly in the development of Anchorage's own construction industry, and more indirectly stemmed from the $32 million paid to District employees over the course of the ten years since 1946.[22]

Also, by 1957, arguments for Alaskan statehood had begun to resurface in Congress. The relationship of statehood to Alaska's strategic importance frequently appeared in arguments favoring the Territory's admission to the union. The 1956 Republican Party platform recognized that "adequate provision for defense requirements must be made," and advocated immediate statehood for Alaska.[23] On more than one occasion, General Nathan Twining reaffirmed his belief that statehood for Alaska would benefit the military.[24]

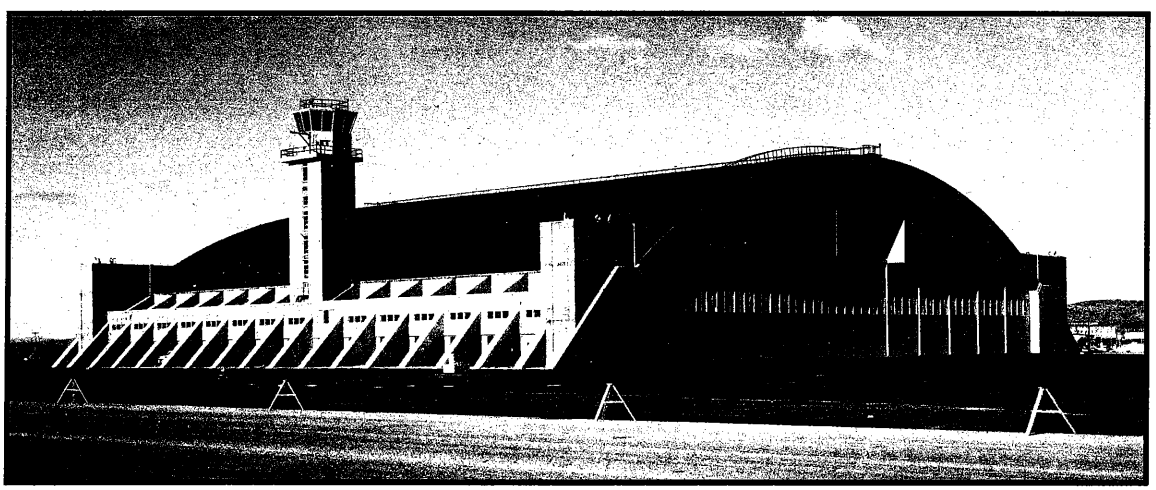
Statehood advocates in 1958 also evidenced the influence of the Cold War. Representative Chet Holifield, for example, urged Alaska's admission because doing so would validate the American principle of government by the consent of the governed. Furthermore, Holifield stressed that statehood for Alaska would provide a sharp contrast to "Russia's enslavement of her satellites." Conferring "equality" to Alaska, Holifield contended, especially because the region had once belonged to Russia and lay within "naked-eye view of the Soviet police state," would show "all mankind that America practices what it preaches."[25] Holifield's colleague from Louisiana, Representative Otto Passman similarly equated granting Alaskan statehood with practicing American ideals. In House debates on May 22, 1958, Passman asserted that by denying Alaska's entry into the union, Congress demonstrated "a poor example of our own democracy at work to the remainder of the free world."[26]

By the time Congress finally admitted Alaska as the 49th state, the Alaska District had been active for over 10 years. While looking back at the economic consequences of statehood during the early 1960s, economist George Rogers commented on how the presence of the large military installations near Anchorage and Fairbanks had contributed to population growth and stimulated local markets.[27] Through its construction program, the Alaska District had been instrumental in amplifying the military's influence on regional development. Accordingly, the District's tenth-year anniversary spawned a number of retrospective reports and speeches that reviewed the District's accomplishments

since its establishment. These reports and speeches also anticipated what the future would bring to the District's workload. During a March 4, 1957 speech before the Anchorage Chamber of Commerce, for instance, District Engineer Colonel Kieffer alleviated possible worries that defense construction would lessen in the years to come. Acknowledging that much of the permanent construction at Alaska's major military bases had been completed, Colonel Kieffer suggested that, just as construction work was never actually finished in a city like Anchorage, projects would continue to emerge for the bases at Elmendorf, Ladd, and Eielson, as well as at Forts Richardson and Greely. Colonel Kieffer mentioned specifically the Alaska District's upcoming work on the Army's Nike guided missile defense system and the beginning of Operation Stretchout extending the Distant Early Warning [DEWline] stations to the Aleutians.[28]

Another tenth-year retrospective reviewed problems that had affected the implementation of the Alaska District's military construction program. Chief among these was the "struggle to maintain supervision over projects scattered through the isolation of 586,400 miles of territory." Also influential was the "constant turnover of personnel that has measured as high as 80 per cent per year."[29]

According to a January 28, 1957 District report, several administrative changes accounted for this difficulty in retaining employees. These included a modification of the original policy of a 48-hour week with "unlimited overtime," to a 40-hour work week with "restricted overtime." Also influential had been the availability of inexpensive housing for District employees. In 1946, rooms, or more accurately, "camp type and quonset hut quarters," had been provided for



Largest hangar in Alaska in 1954, Eielson Air Force Base.

employees at a rent of $6 per month. By 1957, only a few such rooms were available for $20 per month, and most averaged closer to $70 in rent.[30]

Another reason for the rapid turnover rate, as explained in this report, was the curtailment of certain privileges. In 1946, for example, all Alaska District employees enjoyed commissary privileges. By 1957, these had been discontinued. Similarly, during the first few years after the District's establishment, employees could buy goods at the post exchange. By 1957, only those employees who resided on base could enjoy "limited privileges" at the exchange. This limitation also applied to Army post office privileges. Moreover, during the early years, all District employees had received medical supplies at the base dispensary — and this service, too, had been discontinued. In 1946, federal employees did not have to pay any territorial tax. By 1957, this tax had been imposed, resulting in a loss to District employees of 10 to 15 per cent of their territorial cost of living allowance. Essentially, the greater organizational complexity of the Alaska District and the maturation of the Territory had combined to cut into employees' take-home pay. A disgruntled edge characterized the report's conclusion that "the privilege of working for the Government in Alaska is not sufficient inducement by itself for the man to leave family and friends, live in isolated areas in sub-standard living conditions and work under harsh conditions with less real pay than he can get for [the] same and more pleasant work in the states or other parts of the world."[31]

Presumably, not all 600 of the District's employees shared these views, or few would have chosen to renew their contracts and continue to work in Alaska. The administrative changes delineated in the report, however, do indicate the growth of the District during its first ten years.

DEVELOPMENT OF AIR DEFENSE SYSTEMS

By the time of the Alaska District's tenth-year anniversary, military strategists had begun to emphasize the threat of nuclear attack over the risk of a Russian or Chinese invasion. This shift reflected the Soviet Union's perfection of intercontinental ballistic missile [ICBM] technology by the mid-1950s. In the United States, the change in strategy also issued from President Eisenhower's NSC [National Security Council] Memorandum 162/2, released in October of 1953. This directive, part of Eisenhower's "new look" for the American military, intended to reduce the defense budget by more heavily relying on U.S. nuclear striking capabilities. In response, as military historian Jonathan Nielson has

explained, the Defense Department accelerated the "rearming of the American armed forces with strategic and nuclear weapons."[32]

In Alaska, the strategic change and stronger emphasis on ICBM warfare resulted in a transition away from focusing on the large military bases toward strengthening the air defense system. Specifically, these changes led to the extension of the DEWline; improvements to the Air Control and Warning [AC&W] stations; construction of a BMEWS [Ballistic Missile Early Warning System] station at Clear Air Force Base; the building of Nike Hercules missile sites; and the conversion of abandoned facilities at Shemya into an experimental radar station.

DEWline

The Distant Early Warning Line air defense system, or DEWline, resulted from studies at the Massachusetts Institute of Technology conducted in the early 1950s. The basic premise of the system was that a string of radar detection stations erected in the Arctic could alert the United States to a surprise attack from Soviet bombers. Americans would then have three or four hours to prepare for the coming assault. Construction of the first phase of the DEWline, built for the Air Force primarily by Western Electric, began in 1953 and was completed by 1957. The joint American-Canadian defense project consisted of 50 radar and communications stations strung over 3,000 miles from Point Barrow, Alaska, to Baffin Island, Canada. Total costs of DEWline's initial phase eventually reached $600 million. Few analysts would dispute that, at the time of its construction, the DEWline represented one of the most sophisticated, ambitious, and expensive projects ever initiated by the military during peacetime.[33]

In February, 1957, the Corps became involved in the extension of the DEWline to the Aleutians. Termed "Operation Stretchout" and managed by the Alaska District, this $27 million project resulted in the construction of six additional radar stations: Cold Bay, Port Heiden, Port Moller, Cape Sarichef, Driftwood Bay, and Nikolski. Plans for each facility, varying little from one another, included a composite building, which contained living quarters, warehousing, and work areas. To this building was attached a high condenser tower crowned by a radar "bubble." Other features included: four towers with "feed horns"; "waveguide" supports; two VHF and two UHF antennae; power, water, and sewer systems; POL [petroleum, oil, and lubricants] storage; and pumphouse and related piping. Runways and runway lighting also needed to be constructed at four of the six sites.[34]

The Alaska District awarded the largest of five separate contracts to a Seattle firm, Manson-Osberg. This company built the stations at Cold Bay and Cape Sarichef for just under $8 million. Project manager Clyde Hovik, who had worked on several other Alaskan construction jobs, described building the DEWline station at Cape Sarichef on Unimak Island as the "toughest" he had ever experienced. Rough weather and isolation were the typical fare, especially at Aleutian sites. But the Cape Sarichef radar station was located on the top of a red volcanic hill, with both extinct and active volcanoes in the vicinity. Hovik had never before encountered constantly blowing wind that pelted workers with the surrounding "volcanic ash and cinders like sand-blasting." Everyone, Hovik observed, including the "government inspectors," had to wear goggles and suffer the stinging sand when on the job at Cape Sarichef.[35]

Another feature of the Cape Sarichef Project was the federal government's designation of Unimak Island as a sanctuary, where the Alaskan brown bear was protected from unregulated hunting. At first, Alaska District Project Engineer Bill Phillips worried that the bears would pose a hazard to workers. The worst damage to the work site, however, resulted from a bear attacking a bulldozer seat cushion. Safety Engineer Howard Edison depicted the bears as "friendly and curious," since the only previous contact they had with humans was with a few coast guardsmen stationed on the island. Edison quipped that these men had not developed any animosity towards the bears since they were much more interested in counting the days "until they rotated back to the States where blondes were as thick as their bear neighbors."[36]

Severe weather handicapped the delivery of supplies and building materials to the Cape Sarichef and Cold Bay sites. Aircraft often could not land at either place because of excessive fog. Frequently, high swells postponed unloading operations as barges carrying materials, shipped from the Lower 48, had to head for the leeward side of the islands until calmer conditions had returned. Despite these supply delays, the DEWline extension was completed by October of 1958. By December 1 of that year, the Alaska District had deactivated the DEWline field project office.[37]

Aircraft Control and Warning System

In addition to the DEWline's eye on the polar routes, another chief component of the warning system were two "rings" of radar stations — one along the coast of Alaska, and the other in the interior. Between 1950 and 1960, the Alaska District supervised $82.5 million in construction contracts to build and then

improve these AC&W stations. Installations at Northeast Cape on St. Lawrence Island, Cape Newenham, Cape Lisburne, Cape Romanzof, and Tin City comprised the outer ring. In 1950 and 1951, the Alaska District awarded contracts for these facilities.

Because of the technological limitations of electronic equipment at the time, the AC&W stations had to be constructed at high elevations in order to ensure the radar's capacity to detect enemy aircraft. This technical problem complicated the process of site selection. Phil Morrow, a long-time Alaska District employee, remembered that AC&W sites were always located on the tops of mountains. Morrow also could not forget "trying to dig holes in frozen ground with hand tools" at an AC&W site, with temperatures "well below zero." Morrow added that he "surveyed the same way. You have to dig the snow down to find out where the ground level is to take your level shots."[38]

Once chosen and surveyed, none of the outer ring locations had harbor facilities. Consequently, all building materials needed to be lightered to shore across shallow waters. Workers then struggled with transporting building materials up to the construction sites from sea level. Access roads, built during good weather, often proved useless when deep snow, black ice, or heavy rains rendered them impassable.[39]

As a solution, aerial tramways were constructed and used to carry equipment and materials to the installation sites. Although they were an improvement over impassable roads, the tramways nonetheless created problems when high winds or ice destabilized them. On one occasion, a tram car fell to the ground at Cape Newenham, luckily without harming anyone.[40]

Semi-monthly progress reports on the Tin City station provide an indication of both the scope and some of the engineering problems of this project. Tin City is located on the coast of the Bering Sea, on the Seward Peninsula, approximately 200 miles northwest of Nome. On September 9, 1950, Gaasland Company, the contractor for the Tin City station, initiated the work of clearing the job site, locating a water source, and building an access road. Within the first two months, however, the onset of winter intervened and work had stopped. In March of the following year, with the return of better, or at least less impossible, conditions, construction restarted.[41]

By late October, 1951, according to Zone Engineer Hammond Ashley's progress report, an early freeze had again slowed the pace of outside work. Steel workers assigned to the arctic tower and tramway had quit even earlier in the

month, because of the cold weather. Progress on the airstrip, by then 1,700 feet in length, also had ceased.[42] Ashley reported further that the contractor's camp, home to the 185 employees working at the site, was finally receiving electricity since one of four generators had become operative. With the exception of the Bachelor Officers' Quarters, all completed structures were connected to steam heat and thus interior work was proceeding on them. These structures included the power building, two warehouses, a recreation center, mess hall, and two barracks.[43]

By October, workers had also completed a water storage facility. Ashley commented that there was sufficient steam heat to prevent the water tanks from freezing. Within two weeks, Ashley further expected the contractor to complete the following tasks: finish the construction of the "rhombic and beverage antennae," as well as the interior work on the receiver and transmitter buildings; begin the foundation for the garage; and sheetrock, shingle, roof, and insulate the vehicle storage building.[44]

Within a year of Ashley's report, in September, 1952, Gaasland Company, under the Alaska District's supervision, finished work at Tin City, Cape Lisburne, and Cape Romanzof. By 1954, the entire outer ring of AC&W stations had become operative. Inner ring sites in this air defense system included Bethel, Campion, Fort Yukon, Galena, King Salmon, Indian Mountain, Kotzebue, Sparrevohn, Tatalina, and Unalakleet. The Alaska District also managed subsequent improvement of many of these AC&W stations. Problems at these sites stemmed from the necessity of supplying them almost solely by air.

Sparrevohn, located nearly 200 miles west of Anchorage, provides an example of a station that was accessible only by air. The Air Force initially directed construction at this site. Early efforts concentrated on building an access road, two aerial tramways, and a runway. The Alaska District became involved at Sparrevohn in the late 1950s, when it awarded a $1.6 million contract to Raber-Kief. Features of this project included a composite building to house personnel; a 25,000-gallon POL tank; a septic tank; a 1,080,000-gallon water tank; and water and fuel lines. In addition to complicating supply procedures, needing to supply all materials by air also measurably increased construction costs. Alaska District Project Engineer Leo Smith, for example, estimated that because aggregate for concrete was flown in from Anchorage in 55-gallon drums, one cubic yard of concrete used at Sparrevohn cost more than $500.[45]

Added to the inner ring of AC&W stations were six reserve sites: Middleton Island, Chiniak, Sitkinak, Ohlson Mountain, Fire Island near Anchorage, and Murphy Dome near Fairbanks. Throughout the 1960s, the Alaska District continued to provide planning and supervision on projects to repair and improve sites in the AC&W system of radar stations.

BMEWS at Clear Air Force Base

As Soviet ICBM capabilities intensified in the mid-to-late 1950s, the resulting shift in U.S. military strategy led to the development of another air defense system, the Ballistic Missile Early Warning System, or BMEWS. Consisting of three sites located in Greenland, England and at Clear Air Force Base in Alaska, this system reflected increasing sophistication in radar technology. Warning time of an ICBM-missile attack, detected at one of these stations, was now reduced to 15 minutes.[46]

In September, 1958, the Alaska District established a project office at Clear in order to supervise its contract with Patti-MacDonald and Morrison-Knudsen who were building the construction camp for the BMEWS site. This $2.8 million project called for 13 dormitories, three mess halls, a resident engineer office, soils lab, warehouses, POL storage tank, access roads, and utilities. In order to gain access to lands needed by the site, another company, William A. Smith Contracting, relocated a 40,000-foot length of the railroad. The Alaska District awarded a nearly $1.7 million contract for this job, completed in 1959.[47]

Yet a third firm, Baker and Ford of Bellingham, Washington, received the project's primary construction contract. For $15 million, after a series of project modifications, Baker and Ford built a transmitter and computer building; a heat dissipation system; a radar transmitter building; wells and pumphouses; a fire station; and utilities. Despite labor and supply problems caused by a carpenters and plumbers strike as well as the national steel strike, Baker and Ford met all construction schedules. In late December, 1960, the Army awarded this company a "Certificate of Appreciation for Patriotic Civilian Service." Earlier in the year, the Army also commended the Resident Engineer at Clear, Lieutenant Colonel Joseph A. Bacci, for demonstrating an "exceptional degree of professional competency" in his supervision of the BMEWS Project.[48]

Providing power to the construction site also involved the Corps. Prior to the completion of a coal-fired generating plant with a 22,500-kilowatt capacity, the Alaska District oversaw the assembly of a power-train generator with a 5,000-kilowatt capacity. Notable in this phase of construction was the delivery of a gas

turbine generator weighing over 269 tons — at that time, the heaviest single item ever offloaded at a dock in Alaska. Alaska District electrical engineer, Hubert Gay, accompanied the generator as it traveled by rail to the work site, and then supervised its operation once it arrived at Clear.[49]

Other job statistics illustrate the magnitude of the District's involvement with the BMEWS Project: total costs reached $62 million; 185,000 cubic yards of dirt and gravel were excavated; workers poured 65,000 cubic yards of concrete; and at one time more than 1,100 workers were employed at the site. Materials totalled 4,000 tons of structural steel; 2,600 tons of reinforcing steel; and 900,000 square feet of fabricated panels.[50] RCA handled the installation of the huge football-field-sized antennae and other equipment related to the missile warning system at Clear. Completed in 1966, its final construction price exceeded $300 million.[51]

Nike Hercules Missile Sites

Defending the air corridors over Alaska did not depend solely on radar detection of incoming strikes, but also relied upon the ability to launch U.S. missiles. In 1955, local newspapers announced that the military would develop missile sites as part of its defense profile in Alaska. This guided missile program replaced the 120-mm anti-aircraft artillery batteries that had previously protected the major military installations near Fairbanks and Anchorage. The initial construction of eight Nike Hercules missile sites under the supervision of the Alaska District, during 1958 and 1959, cost $29 million. Preliminary work, also involving the District, had included land surveys and site acquisitions in 1955 and 1956. Upgrades in the early 1960s added another $4.3 million to the project's final price.[52]

Each of the Nike sites consisted of similar features. The battery control area included an operations building that housed the target tracking and missile tracking radars; barracks and support facilities for the enlisted men; and a High Power Acquisition Radar, or HIPAR, building with a radar tower and motor repair shop. Erected nearby was a sentry station. The launch area, located from one to three kilometers away from battery control, consisted of two missile launch and storage structures, a launch control and guidance building, a missile maintenance shop, a fuse and detonator magazine, a warhead building, and a guard dog kennel.[53]

Of the eight facilities, Site Summit, built at 3,900 feet in the Chugach Mountains near Anchorage, presented some of the most difficult engineering

challenges. Project Engineer Gordon M. Lyon reported that even before construction could begin, the site posed unique problems. Because there were "no known points from which to start," he explained, the entire survey of the site had to be "completed using monuments at a much lower elevation as a base." Thus, the field crew worked for several weeks just to give the engineers a "starting point." Lyon also recalled having to wait while snow melted in order to be able to determine how much excavation was necessary for the site. When work began on April 22, 1957, snowdrifts of up to 40-feet deep needed to be cleared prior to building an access road.[54]

Lyon delineated other features of the Site Summit construction project. He reported that building the access road entailed blasting more than 20,000 cubic yards of solid rock. Also, backfill material from the excavations did not compact properly. In response, engineers devised a system of sorting and grading the material to obtain the required 95 per cent density. Another distinctive problem, according to Lyon, resulted from the porous nature of the rock strata near the site. Large quantities of water, trapped inside the rock, remained frozen until exposed by excavation. This water, combined with locally heavy rains, thus collected in excavation areas. A series of Jaeger centrifugal pumps were used to get rid of the water, helping the project to stay on schedule. By May, 1959, Site Summit had become operational.[55]

The other Anchorage missile sites were known as Sites Bay and Point. Near the Fairbanks military bases were located Sites Tare, Peter, Mike, Jig, and Love. By the late 1970s, all of these facilities, having become obsolete, had been deactivated.[56]

Shemya

Located on the far western tip of the Aleutian chain, wind-blown and completely isolated, Shemya Island served as another eye on the Soviet Union during the 1950s and 1960s. By 1957, Air Force strategists had decided to convert the small island into an "experimental radar station." Situated less than 300 miles from Russia, Shemya had already proven its military value during World War II and the conflict in Korea, but since 1954 had been held in standby status.[57]

In June, 1958, the Alaska District negotiated the first of several contracts with B-E-C-K and Associates to begin rehabilitating military facilities on the island. Finished by 1959, this work entailed improving the dock; installing new power and sewer systems; operating a rock quarry and crushing plant; renovating dormitories, the dispensary, and recreation center; and refurbishing mess halls,

shops, hangars, and warehouses. Features of the project also included an operations building, storage tank farm, antenna bases and electronic equipment. The Alaska District subsequently awarded B-E-C-K and Associates two additional contracts to work on the communications system at Shemya. This work was completed in 1961.[58]

Alaska District employees found working on Shemya to be a memorable experience. Morrow, whose job involved soils engineering and survey work, recalled staying on the island in pre-fabricated housing that was not quite yet finished. Morrow remembered going to bed while workers were still pouring tar on the roof. "There were drips of tar right down the middle of your sheets," he noted. Even so, this was an improvement over needing to shovel the snow out of Quonset huts in order to have room enough to sleep in them. Describing the windy conditions on the island, Morrow explained that "the wind blows so hard at Shemya that everything, any little crack in the place, gets full of snow."[59] Phil Morrow also recalled the seriousness of the military mission at Shemya:

> We had snooper planes going all around the outside of Siberia listening to their communications and actually probing and seeing what their response was. I can remember being out at Shemya and seeing one of those planes come back in; he had lost two engines on the same side. It was a B-50. And those guys — they were losing altitude the whole way back — and when they finally got back to Shemya they just barely made it onto the runway. Those guys got out and kissed the ground. They thought they were gone. And, of course, some of them did get shot down. ... I think there were 20 or 30 planes shot down during that period. It never hit the news, you know.[60]

Throughout the 1960s, the Alaska District continued to oversee improvements at Shemya. These various projects primarily addressed the need to rebuild the dock, and to renovate the runway and associated facilities. In 1967, work began on an addition to the composite building and repair of warehouses and the power line. By the end of the decade, the Alaska District had also negotiated contracts to install a fire protection system, and to build a weather facility, chapel and non-commissioned officers' club.[61] If one were to tally all the federal defense dollars spent on this tiny island, dating from the World War II period through 1974, the total would exceed $113 million, easily making Shemya one of the most expensive pieces of real estate imaginable.[62]

DEVELOPMENT OF COMMUNICATION SYSTEMS

Essential to an effective early warning defense system was a quick and reliable communications network. Development of a communications system in Alaska necessarily coincided with the evolution of the DEWline, BMEWS, and AC&W stations. Known as White Alice, this network initially consisted of over 3,000 route miles, 31 stations, and 170,000 telephone circuit miles. As military and civilian needs of the system increased, more stations and circuitry were added to the network.[63]

Prior to the technological advances and construction efforts that resulted in the development of White Alice, only one telephone call could be made between Fairbanks and Nome at a time. This limitation reflected the type of technology then in use: telecommunications operated solely via "line-of-sight," making long distance "hops" for rapid transmission of data impossible. The development of the technical ability to beam radio signals from a transmitting antenna, then bounce them off the troposphere back down to a receiving antenna, revolutionized telecommunications. This technological breakthrough, also known as the forward propagation tropospheric scatter system, had important implications for Alaska, given its strategic importance, mountainous terrain, and vast distances in need of linkage.[64]

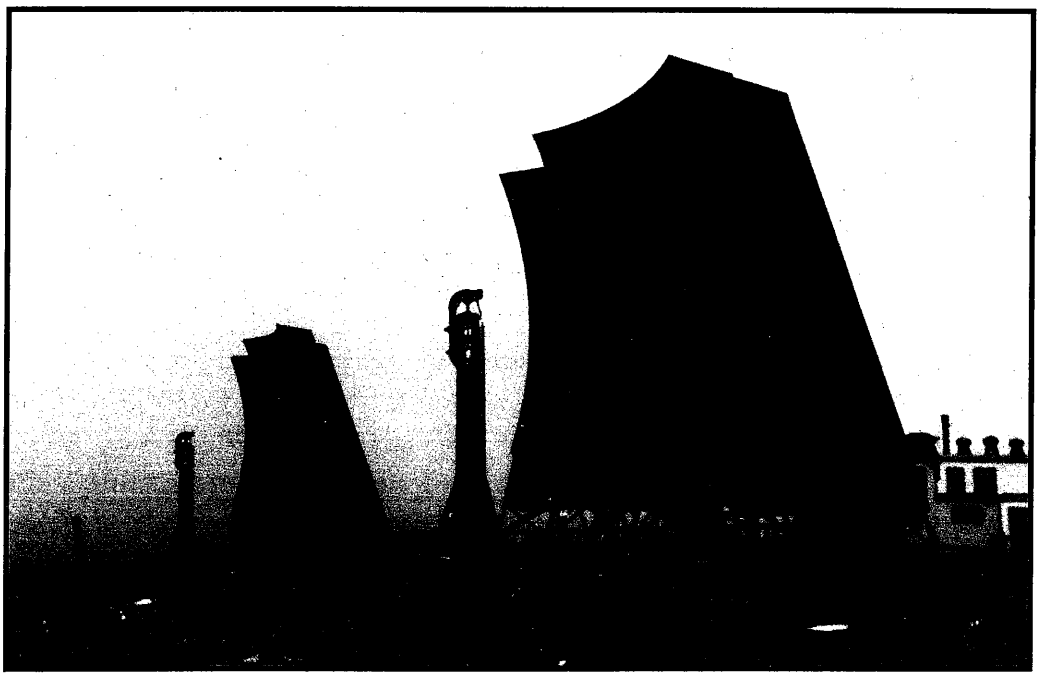
Western Electric, under direction of the Air Force, built 20 of the original White Alice stations; the Alaska District constructed the other 11 sites, usually in conjunction with AC&W projects. Total costs associated with development of the communications network reached $140 million. Of this total, the Alaska District supervised White Alice Projects worth just over $15 million. Construction on the first phase began in 1955 and was completed by 1958.[65]

Prior to construction, Alaska District survey crews and geology technicians gathered all the on-site information for the original 31 White Alice stations. This part of the project entailed excavating soil samples for evaluation at the District's soils laboratories at Elmendorf. Often crews worked out of remote and sparsely populated villages located as close as possible to station sites. Assisting District employees were Alaska Natives who worked as dog sled mushers and laborers. Conditions were often less than ideal. At Kotzebue, for example, Eskimo workers, who contracted with the Corps to dig two 30-foot-deep test pits, were delayed for a week by a severe storm. The Eskimos waited until 75 mile-per-hour winds had died down to 40 miles-per-hour, and thermometers had climbed to 35 degrees below zero, to dig the pits as agreed.[66]

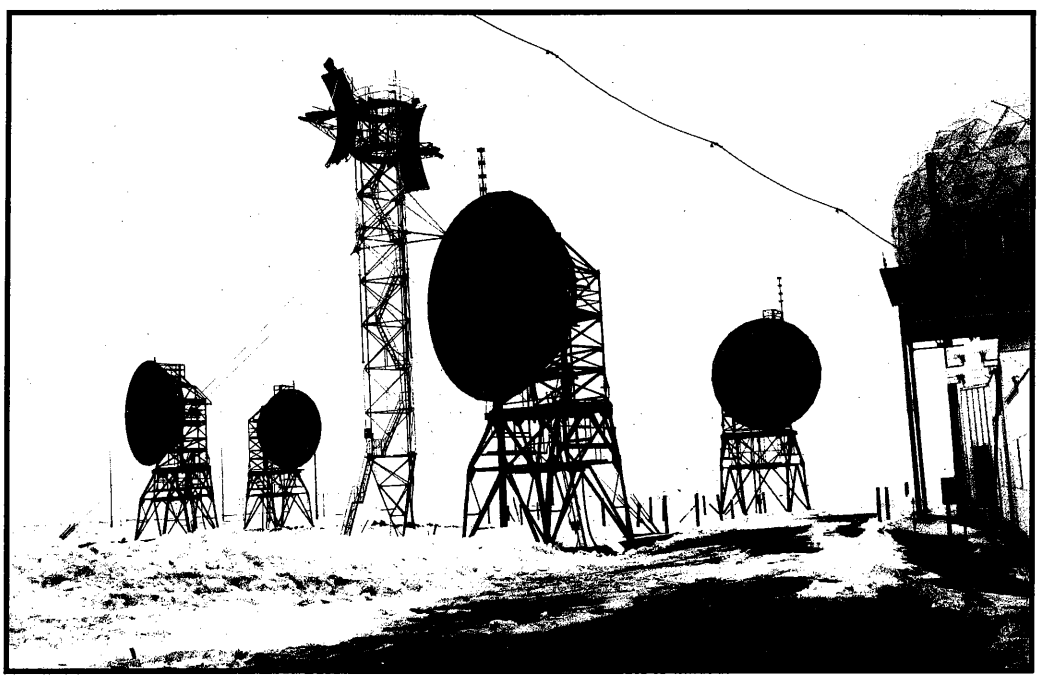
Successfully linking DEWline sites and AC&W stations into a "cohesive network," White Alice served to relay communications to Elmendorf and Eielson Air Force bases.[67] Additionally, two routes needed to be developed to send information from these stations and from the BMEWS facility at Clear to NORAD [North American Air Defense Command] headquarters in Colorado. Termed "Rearward Communications," this part of the communications network added 32 more stations to the complex chain. One route roughly paralleled the Alaska Highway; the other ran south along the Gulf of Alaska to Annette Island, and relayed data from there to Seattle by submarine cable. The Alaska District awarded 28 contracts totaling over $18 million for the 32 stations. By 1961, all site work had been completed.[68]

By the early 1960s, the development of satellite technology had eclipsed the usefulness of the White Alice network. In 1967, Congress passed the "Alaska Communications Disposal Act," providing for the transfer of all federally owned long-haul communications facilities in Alaska to private industry. In 1969, RCA established RCA Alaska Communications, Inc., now ALASCOM, and successfully bid to take control of the network. One year later, when the Public Utilities Commission granted authority to ALASCOM to begin the process of this takeover, the Alaska District became responsible for handling the enormous real estate transfer.[69]

This job entailed "thousands of details," including researching, photographing, and mapping each station to prepare legal descriptions prior to the formal transfer. Additionally, the Alaska District oversaw the legal transfer of all documentation of rights-of-way, easements, and other forms of property associated with the network's 84 stations. This process required negotiating stipulations with several other agencies, including the Bureau of Land Management, Federal Aviation Administration, Alaska Railroad, and U.S. Forest Service, as well as with the state departments of highways, lands, and aviation. The entire transfer occupied the Real Estate Branch of the Alaska District for 13 years.[70]



Part of the White Alice Network.



MILITARY CONSTRUCTION IN ALASKA DURING THE 1960S

Despite differences in personal style and political party, Presidents Dwight D. Eisenhower and John F. Kennedy both devised foreign policies premised on their staunch cold warrior outlooks. In his second inaugural speech, Eisenhower depicted international communism as a "divisive force," which was "dark in purpose." According to Eisenhower, all free nations, linked together by their interdependence, looked to the United States for leadership, thus "making isolation an impossibility."[71] Similarly, Kennedy, in his inaugural address, warned:

> Let every nation know, whether it wishes us well or ill, that we shall pay any price, bear any burden, meet any hardship, support any friend, oppose any foe, in order to assure the survival and success of liberty.[72]

Although Kennedy also referred to the need for nuclear arms control in this speech, his administration oversaw the expansion of the number of American ICBMs from 60 to more than 420. Also, in order to contain the spread of communism in Southeast Asia, Kennedy enlarged American military involvement in Vietnam.[73] More significantly, as one analyst has argued, by equating military victory in Vietnam with a show of "American credibility in the Cold War," Kennedy's policies in Southeast Asia "raised the costs of withdrawal for his successor" — ultimately, to an unpayable price.[74]

In Alaska, the ongoing fight against the Cold War ensured that military construction during the 1960s, although markedly reduced in pace and size from the program of the previous ten years, would continue to lure large defense contracts to the state. Additional housing at the major posts, the Whittier-Anchorage pipeline, and nuclear testing at Amchitka, comprised the largest features of the Alaska District's workload after it had completed the bulk of the massive military construction program of the 1950s. The Alaska District also responded to the emergencies created by the 1964 earthquake and the 1967 Chena River floods by subsequently repairing damages to the military installations near Anchorage and Fairbanks.

In a February, 1961 speech before the Anchorage Chamber of Commerce, District Engineer Christian Hanburger explained that approximately $27 million had been allocated to fund Alaska's military construction program for that year. This amounted to less than one third of the total appropriated in 1960, just one year earlier.[75] At the height of the Vietnam War, defense expenditures in the state shrank even more as the war itself required ever increasing chunks of the

budget.[76] With efforts at detente in the late 1960s, however, military construction in Alaska declined even more precipitously, a trend which continued until Reagan's policies again strengthened the U.S. defense profile.

Continued Construction of Housing and Support Facilities at Whittier, and at Alaska's Major and Remote Military Installations

Improvements to the Port of Whittier, part of the Alaska District's intensive military construction program, date from 1951. Located on an arm of Prince William Sound, less than 70 miles from Anchorage, the Port of Whittier challenged engineers because of space and weather limitations. High mountains frame the port, annual rainfall measures 160 inches, snow can accumulate to depths of 70 feet, and winds have been clocked at gusts of 135 miles per hour. The first phase of work at Whittier — the construction of the Buckner building — was completed by 1952. This seven-story composite structure provided residences for 1,700 people and housed a host of other amenities: restaurants, a 17-bed hospital, a bowling alley, a library, classrooms, a theater, barber shops, a post office, a commissary, an exchange, and two rifle ranges. Like a city under one roof, the building even contained a jail.[77]

By the mid-1950s, the Alaska District was also supervising construction at Whittier of new docks and cargo-receiving facilities, in addition to a 14-story apartment house known as the Hodge building. This structure, completed in 1956, was connected to the docks and to the Buckner building through a maze of tunnels. Expensive multi-storied structures, like the Buckner building, were necessary given that the Whittier location consisted of so few suitable construction sites. Total costs of developing all these facilities since Whittier's establishment as an emergency defense port in 1943 reached $55 million.[78]

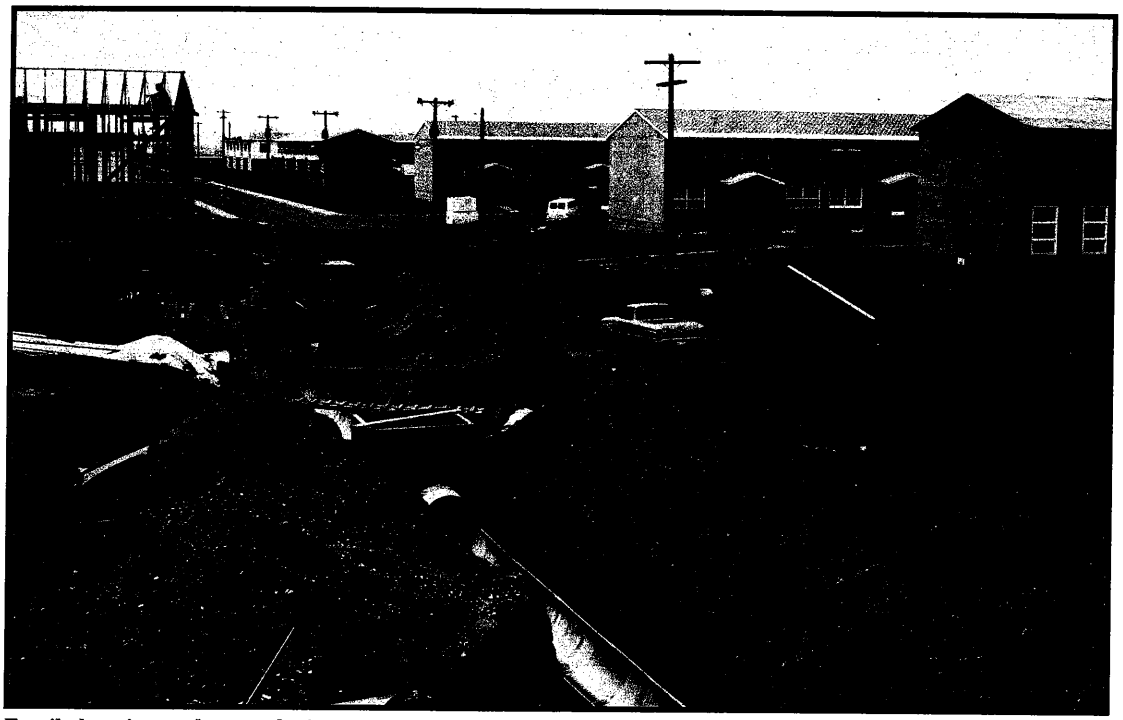
But by 1964, only 32 caretakers were living in the apartments at Whittier, the property had been declared "surplus," and the government hoped to unload it for as little as $800,000. Except for continuing to use the port for handling petroleum shipments, the Army had discontinued operations there in September of 1960. By 1974, the property was still considered surplus. Eventually, the city of Whittier assumed responsibility for the Hodge building and used it as a condominium complex. A private developer purchased the Buckner building but never found a suitable use for it. As of 1994, the building still stood empty.[79] Perhaps illustrative of a tendency to build facilities primarily because the funds were available and less because of a pressing need, the Army's development of Whittier remained controversial and has been pegged Alaska's "white elephant."

Throughout the 1960s, the Alaska District supervised housing projects and construction of support facilities at all the major posts. In 1961, a contract with M-B Construction, totalling nearly $6 million, resulted in improvements to housing at Fort Richardson. During the period 1960-1965, the bulk of the housing and support structures at Fort Greely was completed. In 1963, a 150-unit housing project at Eielson Air Force Base employed as many as 175 construction workers. Two years later, contractors finished building 290 additional housing units at Elmendorf. Also during 1965, projects included constructing a new officers' club at Fort Wainwright.[80]

At remote sites, including most of the AC&W stations, the Alaska District oversaw several projects during the course of the decade that resulted in improvements to airmen's living quarters. Some of the changes in interior design anticipated even greater efforts at modernization that would characterize improvement projects during the 1980s. At Cape Lisburne, for example, an Anchorage architect developed the interior of a composite building by incorporating a two-story "airy" foyer, colorful walls, and bright lighting into his design. The purpose of these alterations was to lend the building an open quality in order to counteract some of the difficult aspects of arctic living.[81]

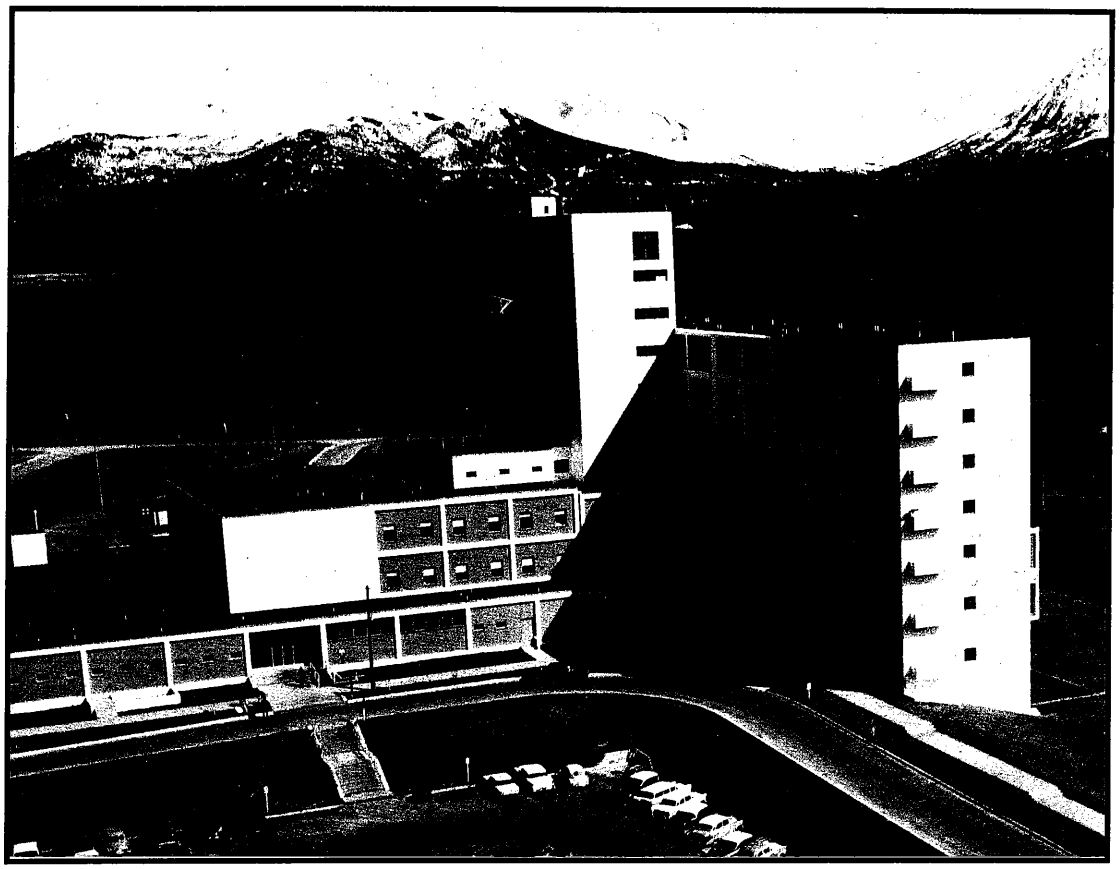
A barracks-improvement project at Fort Richardson, completed in 1974, also foreshadowed the more intense efforts of the 1980s to create comfortable living quarters for military personnel. Reflective of the change to a post-Vietnam War, all-volunteer military, the improvements at Fort Richardson, eliminated the "old open-bay, multi-occupancy style" characteristic of basic training assignments, and replaced them with either single- or double-occupancy rooms. Interior walls were no longer painted either "graveyard-gray" or "seasick-green." While the barracks' exteriors remained the same concrete blocks, this project was designed to provide greater privacy and more pleasing interiors to residents. Describing the affect of the improvements, Platoon Sergeant William Kerley noted that there was "no doubt that [the changes] brought morale way up," adding that he wished "we could have all one-man rooms."[82]

Other construction projects that filled the Alaska District's workload during the 1960s included runway and hangar improvements, new docks at Shemya, aircraft fuel storage facilities, and the Whittier-to-Anchorage pipeline. While Colonel Hanburger had announced $27 million in construction jobs in 1961, only $12 million was slated for 1972.[83] The Alaska District's total workload, however, remained heavy, as attention increasingly turned toward civil projects during the 1960s and 1970s.



Family housing and storm drainage projects, Eielson AFB, early 1970s.

Alaska District headquarters (foreground) and 8-plex housing at Elmendorf, 1965.



Air Force hospital, Elmendorf AFB, early 1960s.

Nuclear Testing at Amchitka

One of the exceptions to the decreased focus on military construction during the 1960s was the Alaska District's role in nuclear testing at Amchitka. Located in the Aleutian Chain approximately 1,400 miles southwest of Anchorage, Amchitka had originally been developed during World War II as a forward air base. In 1950, the military abandoned the island, leaving behind Quonset huts, roads and runways, and three struggling spruce trees planted outside of the World War II officers' club, affectionately known as "the Amchitka Forest." By the mid-1960s, the Defense Department's Defense Atomic Support Agency [DASA] had selected the island for project "Long Shot," the primary objective of which was to determine whether remote seismic instruments could detect and locate an underground nuclear blast. An ancillary purpose of the project was to discover if seismic instruments could distinguish between the blast from the 80-kiloton bomb and an earthquake.[84]

The decision to detonate this bomb — four times the power of those dropped on Hiroshima and Nagasaki — reflected the federal government's growing concern over enforcing the Limited Nuclear Test Ban Treaty of 1963, which prohibited atmospheric tests while still permitting underground nuclear tests. As one historian observed, a test such as Long Shot proved "critical at a time when instrument detection of surface and subsurface atomic explosions is the only check we have to guarantee the test-ban agreement."[85] From a later perspective, it seems ironic that testing adherence to the ban itself required testing a nuclear device. In October of 1964, however, "Red" China had detonated its first nuclear bomb, and fears of proliferation were increasing both among U.S. policy makers and the public at large. Officials consequently argued that the capacity to detect a nuclear underground explosion justified the possible risks attending the Long Shot experiment.

DASA chose Amchitka largely for its geological and hydrological characteristics as well as its remoteness. Also influential was the degree of regular seismic activity in Amchitka's general vicinity. A more tenuous connection lay in the Atomic Energy Commission's ongoing interest in conducting nuclear experiments in Alaska after the cancellation of Project Chariot. Upon hearing of this decision to shelve Chariot, Senator Ernest Gruening had remarked, "If they wanted to blow a hole in the ground they should have picked an uninhabited island where there would be no possible danger to anyone" — in other words, Amchitka.[86]

Amchitka was chosen despite its status as a national wildlife refuge. Executive Order 1733, establishing the Aleutian Islands National Wildlife Refuge in 1913, contained a provision that disallowed this status from interfering with military use of the islands. Refuge status, however, did sensitize scientists and other officials to the need to take extra precautions to protect wildlife and to monitor animals' reactions to the blast. When Long Shot was detonated on October 29, 1965, reporters observed little harm to wildlife.[87]

The Corps' involvement in the Long Shot Project included exploratory drilling and contracting for building the construction camp and other support facilities. Between May and December of 1964, the Alaska District drilled six holes of varying depths. Working in conjunction with the U.S. Geological Survey, the District also made geophysical and directional surveys as the holes were drilled. Additionally, the Alaska District sent core samples to the Corps' laboratories at Troutdale, Oregon, and Vicksburg, Mississippi, for petrographic analysis. In May, 1965, the District and the USGS jointly reported their findings regarding Amchitka's geology, hydrology, and access. The Alaska District's exploratory

drilling and subsequent analysis then helped DASA select a test site for drilling a 2,300-foot hole near the southeastern tip of the island.[88]

In addition to this preliminary work, the Alaska District sought bids for building a 200-man construction camp and other project-related support facilities, including docks, roads, runway improvements, and office quarters. In March, 1965, the District awarded the $4.2 million contract to Norcoast Constructors of Seattle, and Morrison-Knudsen of Boise. Operating under an extremely tight schedule, the District oversaw this construction that at peak periods employed up to 300 workers. Amchitka's rain, mud, and strong winds affected the work. As Long Shot Resident Engineer Lieutenant Colonel W. R. Barwick complained, "The mud was our first problem. We excavated 51,000 cubic yards of it at ground zero. It was too thick and dirty for a bird bath but it was sure wet." Despite the muddy conditions, Barwick successfully kept contractors on schedule and by December, within six weeks of the blast, had returned to District headquarters in Anchorage.[89]

Within eight minutes of the blast, according to a DASA report released shortly after Long Shot's detonation, seismic waves were registered at a recording station in Montana. Preliminary indications suggested that remote points throughout the world recorded signs of the blast in less time than DASA officials had expected. By December, over 2,000 of these stations — located as far away as Quetta, Pakistan — had reported their measurements of the event. By so clearly demonstrating detectability, Long Shot had fulfilled its purpose.[90]

One year later, the *Anchorage Times* reported that the Atomic Energy Commission [AEC] had budgeted nearly $27 million for further nuclear testing at Amchitka. In the meantime, the AEC had used the experience of Long Shot, and conducted additional exploratory drilling, to determine that the island satisfied the agency's criteria for underground testing of megaton-range nuclear weapons.[91] This decision grew out of the AEC's recognition that locations in Nevada were not adequate for conducting what were termed "high-yield" tests because of possible damage to structures in nearby communities, including Las Vegas, caused by ground motion. The AEC had also considered conducting tests in the Brooks Range, but stiff opposition from Natives led the agency to limit its choice of Alaskan test sites to Amchitka.[92]

With the AEC's decision to transfer its high-yield testing to Amchitka came additional responsibilities for the Alaska District. In January of 1968, the District began supervising several projects, including one to build 20 miles of gravel

roads, and another to construct a satellite camp on the northwest end of the island. The District also awarded a relatively small contract to Walsh and Co., Inc., located in Spenard, Alaska, to rehabilitate docks and handle unloading and storage operations at Amchitka.[93]

The AEC regarded the first of these subsequent detonations on Amchitka as a calibration test to determine if the site could indeed safely tolerate the explosion of a megaton nuclear device. Named "Milrow," the AEC detonated this bomb on October 2, 1969, at a depth of 4,000 feet. Milrow registered 6.5 on the Richter scale. Observers noted a few rock slides and earth slumps along the coast, in addition to minor cracking in roads, and shifting of temporary buildings. Although fish mortality was high in the Clam Lake area, most analysts concluded that Milrow had caused only minimal damage to wildlife.[94]

Satisfied with these results, the AEC subsequently planned to detonate an even larger bomb in 1971. This five-megaton bomb, known as "Cannikin," produced 250 times the force of the Hiroshima and Nagasaki explosions. The Alaska District again supervised a program of improving and maintaining test facilities. Detonated on November 6, 1971, from a depth of over 6,000 feet, Cannikin measured 7.0 on the Richter scale. This time, the blast was severe enough to uplift land surfaces and harm wildlife. An estimated 10,700 fish were killed, after either having been "literally tossed out" of Amchitka's lakes and streams, or stranded in drained ponds. Cannikin further resulted in the deaths of birds and sea otters. Peregrine falcon and eagle nests were also destroyed by the blast.[95] Although the AEC later justified Cannikin as "a vital part of the United States' weapons development program," growing opposition to the agency's activities contributed to creating a political climate in which additional testing in Alaska became untenable. In 1973, the AEC decided to "demobilize" the Amchitka Island site.[96]

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Despite the continuation of the U.S. nuclear weapons development program, which led to the detonation of Cannikin, President Richard Nixon and Henry Kissinger initiated a move toward detente in American foreign policy. Both Nixon's successful visit to mainland China in February, 1972, and the first agreements reached between the U.S. and the U.S.S.R. in Strategic Arms Limitation Talks shortly thereafter, stemmed from this change in policy. By 1972, as further sign of alterations in U.S. defense strategies, troop deployment in Vietnam had dropped to 39,000 from 543,000 in 1968.

In Alaska, detente also resulted in military reductions. By 1973, officials had decided to inactivate the 171st Infantry Brigade at Fort Wainwright as well as other smaller units. Two years earlier, the military had discontinued use of most of the Haines-Fairbanks fuel pipeline. Moreover, many AC&W stations had closed and Nike Hercules batteries had become obsolete. By 1974, total military personnel in Alaska numbered just under 23,000, down from over 38,000 in 1962. Civilian employees of the military in 1974 had declined to 4,600, a drop from almost 6,300 in 1968.[97] Until Reagan's policies of the 1980s resulted in increases in defense budgets, the military in Alaska maintained this lower profile.

But the work of creating a permanent military establishment in Alaska had already been completed. As District Engineer Colonel Hanburger had explained to the Anchorage Chamber of Commerce in 1961, the Alaska District had accomplished the "hard, costly pioneer work."[98] Economist George Rogers, also writing in the early 1960s, suggested that Alaska would not have become a state when it did without the "influx of new population and prosperity" brought in by what Rogers termed "Military Alaska."[99]

Indeed, numbers abound in the history of the Alaska District's military construction program. In dollars allocated, projects designed, contracts awarded, workers employed, soil excavated, and materials supplied, the program's statistics are staggering. In directing this program, the Alaska District had learned to accommodate the Far North's shortened construction season, labor and supply shortages, harsh weather conditions, and logistical complications. During the period 1946 to 1974, the Alaska District evolved from a small nucleus of engineers and staff to an organization employing over 600 engineers, surveyors, draftsmen, and technicians, as well as administrative and support staff. While the District grew in size and complexity, the state of Alaska followed suit. The role of the Corps in this process of maturation stemmed in large part from the Alaska District's orchestration of its military construction program. Looking back in 1966, the District could celebrate 20 years of contributing to Alaska's frontier economy by developing "a far-flung system of facilities for military defense" throughout the state.[100] This contribution had stimulated increases in population, fostered the growth of a local construction industry, and strengthened developments in Alaskan communications and transportation.