SB

207

Alaska State Legislature

Senate

Committee on Transportation

Senator Bill Ray
Chairman

Official Business
Pouch V
State Capitol
Juneau, Alaska 99811

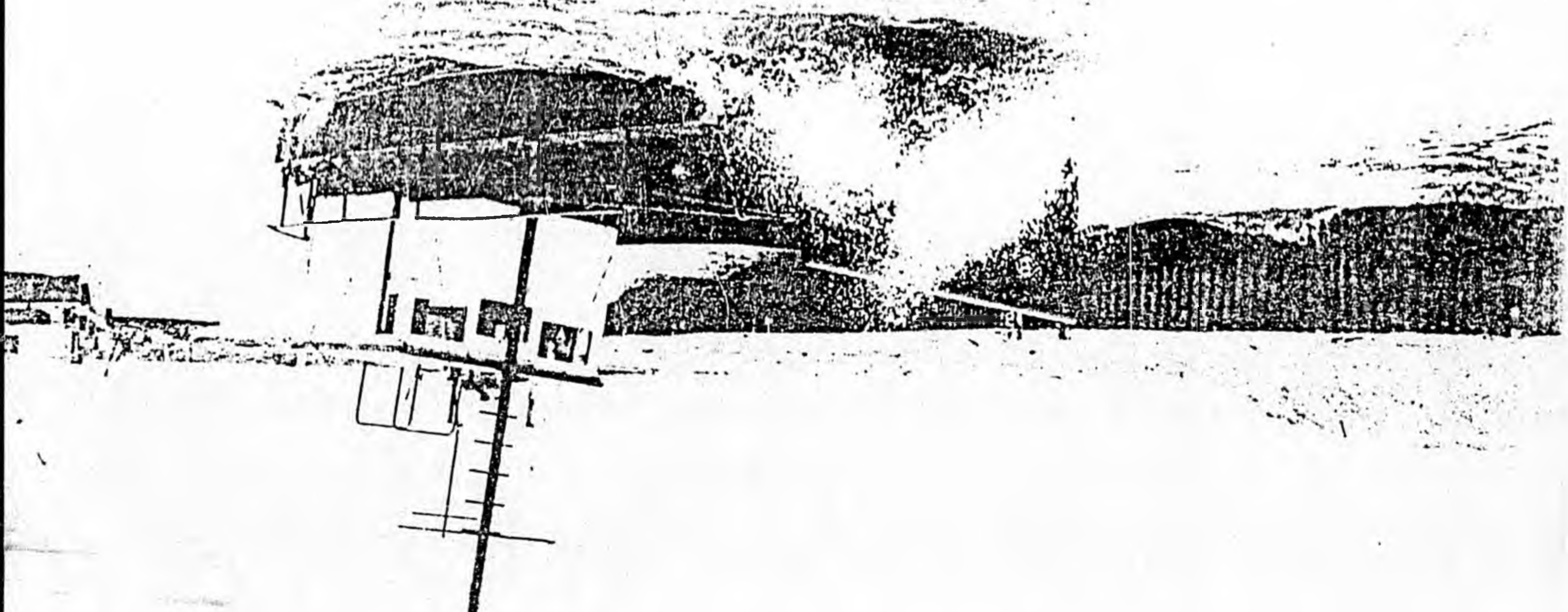
TO: Senator Don Bennett, Co-Chairman
Senator Ed Dankworth, Co-Chairman
Committee on Finance

FROM: Senator Bill Ray, Chairman
Committee on Transportation BR

DATE: April 27, 1982

RE: Senate Bill 207, Making a special appropriation for construction of a Nome port facility.

The Transportation Committee considers the Nome port facility feasible but questions the method of financing. We believe it should be better considered in a bond issue.



EXECUTIVE SUMMARY

Based on the planning, engineering, and economic feasibility analyses conducted for the City of Nome for the development of a deep draft general purpose port facility, the following conclusions have been drawn:

1. It is functionally, environmentally and operationally feasible to develop a general purpose, deep draft/causeway port at the City of Nome, provided that the initial costs of land acquisition, engineering design and construction of the navigational works are assumed by the State of Alaska. This feasibility assessment is based on the present rate of growth of the city and the region. If additional growth-inducing factors such as energy resource development, mineral extraction or fisheries development accelerate the regional growth, a significant portion of the development costs can be absorbed by the port and the related industrial concerns.

2. The port facilities have been designed to accommodate general cargo, utility and fishing vessels, and ocean-going barges with a draft not to exceed 22 feet.

   Cargo handling at the pier is accommodated by ship/barge fixed cranes and a mobile crane onshore. Fuel transfer is accomplished using a fixed line/pump system to existing shore storage facilities.

   Shoreside facilities for vessel service will include fuel supply, water, power, and telephone communications.

3. The site location that has been selected for the port/causeway facility is at the west city limits, on an elevated plateau that is bordered on the north and east by the Snake River. This site is in close proximity to the city, the

city utilities, fuel storage tanks, the Nome Airport, and lies well above the level of expected coastal flooding. The selected shore facilities location also allows for expansion of material handling/storage areas for future growth, and does not compete with the city for contiguous commercial/residential land. Site location at Cape Nome was found to be unacceptable because of adverse operational and engineering reasons.

4. The port will consist of a 3600-foot long causeway with berthing/loading facilities at its seaward end and with container, general cargo and bulk handling facilities located on shore.

   The immediate need at Nome is to develop containerized and general cargo handling capabilities. To provide for this task, approximately 35 acres of onshore land are required in Phase A of the onshore development. If bulk cargo handling is required in the future (for tin ore, coal, fluorite, quarrystone), Phase B of onshore development must be implemented, requiring an additional 65 acres of onshore land adjacent to the Phase A parcel.

   The top elevation of the causeway and loading dock is +20 feet above the mean lower low water level.

5. Acquisition, design and construction costs of the port are estimated in three phases, each representing a successive level of expansion.

	Initial Construction
Phase I	$20.4 Million
Phase II	$23.8 Million
Phase III	$26.2 Million

Construction estimates are in 1980 dollars and are based on a $25/cubic yard unit cost for armor rock (in place) assumed to be a realistic negotiated present day value. Final construction cost can be established only after a firm quarrystone price has been negotiated.

Direct revenues for the operation at the port will accrue from berthing fees, land/facility leases and sales of fuel, power and water to the harbor users.

6. Each of the above expansion increments may be constructed without major disruptions in the on-going port activities. The causeway cross-section has been designed to accommodate additional utilities and a future bulk material handling system.

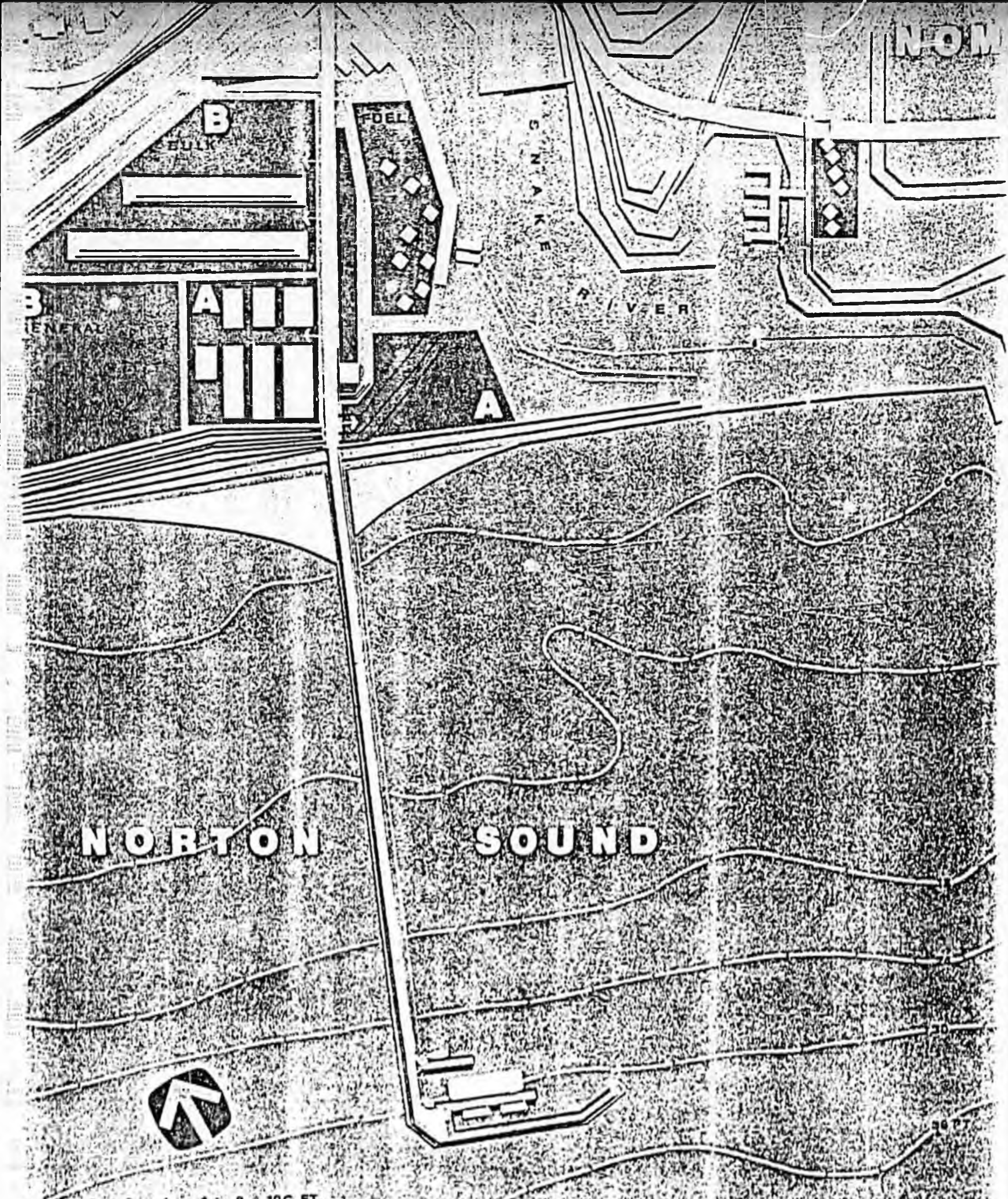
7. Environmental considerations for the proposed plan include longshore transport of sand, ice movement and forces, salmon spawning, crab fishing, induced economic growth of the region and prehistoric native dwelling sites. None of the above concerns represent irreconcilable constraints to the implementation of the port project.

8. Permitting requirements for the proposed port facility have been reviewed and include U.S. Corps of Engineers, Alaska Department of Transportation, Department of Fish and Wildlife, and a number of other specific state and federal regulatory agencies. Meeting their currently existing permit requirements and the Environmental Impact Report process will require approximately 12-18 months. Without public opposition to the project, this time period may be decreased significantly.

9. The existing harbor area has been identified as a potential location for a small boat harbor facility with a capacity

for 80-100 craft. The present harbor entrance at the mouth of the Snake River will serve the small boat traffic of the inner harbor only.

These conclusions summarize the general findings of this Phase A engineering feasibility study and define the major deep draft port development options for the City of Nome within the limits of the study. More definitive and quantitative answers to some of the questions raised will be answered in Phase B - Port Master Plan Development.



PORT OF NOME

TETRA TECH

1.0 INTRODUCTION

1.1 BACKGROUND

The need for a port development plan for the City of Nome is based on the recognition of the strategic location of Nome as a major center of trade and transportation for the Norton Sound - Northern Bering Sea area. Nome not only has the most developed infrastructure for the area, but also serves as the principal center for distribution of goods and services in the Bering Sea region (see area map, Figure 1.1).

The major deterrent to growth and economic well-being of Nome and the population/industry served by this center of distribution is the lack of modern port facilities.

The shallow entrance to the limited port facilities (designed and built in the 1920's) precludes the use of the harbor for all but extremely shallow draft vessels. In fact, the present harbor represents only a marginal improvement over the lighterage techniques used at the turn of the century.

Previous studies for the improvement of the Port of Nome have contained a single economic element for their justification--the transfer of freight. This picture has changed significantly in the last few years. Nome now has a real and growing demand for services to two additional industries - fishing and oil development. The two-year old herring and red King Crab fisheries have already resulted in a multifold increase in fishing vessel visits for purposes of obtaining fuel, water and supplies.

In light of the above concerns, the City of Nome has authorized this port feasibility/expansion study to synthesize planning work done to date, to consider the latest economic pressures and to establish a set of specific development recommendations for a viable port facility in the area.

1.2 SPECIFIC PURPOSE OF STUDY

In order to establish the overall feasibility for the Nome Port development, the study plan has been organized consisting of two major work phases, with the following specific purpose:

Phase A - Port Feasibility Determination. (1) A review of planning and study work done to date. (2) Schematic development of port improvements protective structures, site identification. (3) Selection of specific facility features and infrastructure. (4) Preliminary cost estimates, benefit/cost analysis. (5) Identification of major permit, environmental and financing constraints.

Phase B - Port/Facility Planning. Development of a detailed specific plan for both facilities; definition of facility element mix and supporting infrastructure, economic analysis of plan including implementation, operation, maintenance; identification of specific financing sources, development of an implementation plan and schedule.

Figure 1.2 shows the schematic relationship of the above Phases A and B to the overall development of the port, including such other specific tasks as field studies for bathymetry, geologic and soils investigations, environmental impact report development, model studies and finally, the development of detailed engineering design drawings and specifications.

This report represents work accomplished for port feasibility determination as outlined in the Phase A task.

In general, this phase of the study incorporates the following features:

1. The study uses existing data and available local inputs to the maximum extent possible to minimize time requirements for the task.

2. It addresses critical engineering, regulatory, environmental, socioeconomic, and political issues at the outset to minimize potential delays for implementation.

3. It incorporates selected energy industry, transportation industry, and mining industry needs to consolidate the financing and political interest base for the project. It also incorporates requirements for the expanding fishing industry operations and processing.

4. Engineering analysis work has been done to the level necessary to establish project feasibility; further refinement is necessary in Phase B to establish a detailed port plan.

5. Economic feasibility assessment is based on a number of growth scenarios and general assumptions which need to be refined and verified in the subsequent work element.

1.3 HARBOR FACILITIES

Following the Gold Rush that precipitated the growth of Nome in 1898-1900, it became obvious that a harbor was needed to support the city's growth. Not until 1915, however, did the Federal government initiate action to create the present harbor. Following government surveying efforts and further authorization, construction of the harbor jetties and dredging activities was begun in 1919. Various dredging activities and further reconstruction and rehabilitation have continued to the present day. Table 1 documents the construction history of Nome Harbor dating back to 1915. Figure 1.3 shows Nome Harbor as it exists today.

The present port facilities are operated by Arctic Lighterage (a division of Crowley Maritime). The majority of the harbor maintenance is performed by the Federal government.

2.4.3 Dredging History

Since its completion in 1923, Nome Harbor has undergone major periodic dredging operations to maintain adequate navigational depths. On the average, dredge volumes of from 12,000 to 20,000 cubic yards have been removed on a yearly basis. Major storm periods, however, have required the emergency removal of as much as 60,000 cubic yards of sediments to allow safe passage into the harbor. The majority of the dredging activity takes place at the harbor mouth where the prevailing southwest waves and the unlimited coastal sand supply yield a net west to east sediment flow. Within the inner harbor, settling of the sediments carried by the Snake River requires periodic dredging.

Maintenance dredging at Nome has been directed by the U.S. Army Corps of Engineers using government-owned equipment. Since 1964, the GILPIN, a 0.75-cubic yard clamshell dredge, has performed the majority of the dredge work. The GILPIN normally loads two side-dumping barges which transport the spoil to offshore areas prior to dumping. This equipment is only marginally adequate for the dredging task at Nome. This fact is exemplified by the inability of the equipment to achieve and maintain the harbor's authorized depth of eight feet.

Dredging is severely limited by the existing environmental conditions. Ice cover limits these activities to the June through October period. The limiting wave height for efficient dredge operations is three feet, a condition that is exceeded 50% of the time in July (Dames & Moore, 1977).

The importance of maintaining navigable depths within Nome Harbor is paramount to the economic well-being of the city and region. A large volume of goods are transported to Nome during the summer months aboard ocean-going barges that transfer their cargos to shallow-draft barges that can safely navigate within the harbor. As harbor shoaling occurs, the lighterage craft must limit their loads in order to maintain adequate draft for passage into the harbor. This requires these vessels at times to make trips from the ocean-going barge to the city dock with loads that are less than their full capacity. Thus, additional roundtrips must be made leading to additional costs that must eventually be absorbed by the consumer. If shoaling proceeds without dredging, Nome Harbor would eventually be closed to all vessel traffic.

The dredging costs expended at Nome by the federal government have been substantial. This history of these expenditures are presented in Table 3. To date, the total value of these activities is approximately $2.6 million. Projected costs for fiscal year 1981 are $490,000. Figure 2.5 shows the alarming rate at which annual costs have increased since 1971.

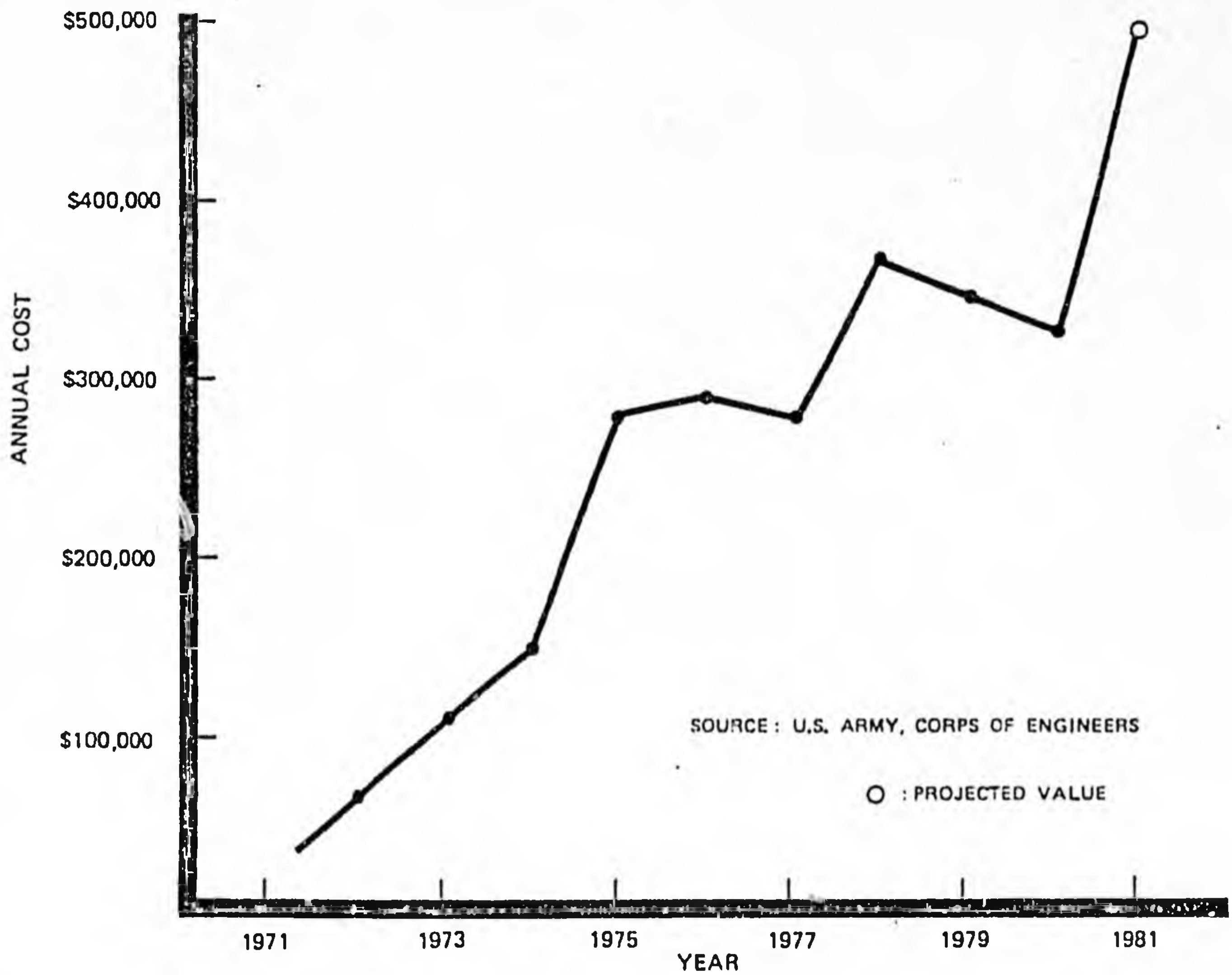


FIGURE 2.5: RECENT FEDERAL DREDGING COSTS, NOME

DATE OF DREDGING	LOCATION	VOLUME & TYPE OF DREDGED MATERIALS	TYPE, SIZE & CONDITION OF DREDGE	DISPOSAL METHOD AND LOCATION	CONTRACTOR	COSTS
1919-1920	Turning basin and ent. channel	20,625 cy of silts and sands	Not available	Not available	W.J. Lowe, Nome	$ 20,212
1921-1933	Annual maint. dredging turning basin and ent. channel	65,690 cy of silts and sands	Not available	Offshore disposal areas south of harbor	Not available	$113,[illegible]
1933-1964	Turning basin/ ent. channel maintenance	Est. average 17,250 cy for 7 yrs. of silts and sands	Small clamshell (ARCTIC) and 2 scows	Offshore disposal areas south of harbor	Govt. owned equipment	Est. average $40,271 for 7 years
1949-1951	Turning basin expansion	Unknown volume (silts and sands?)	Small clamshell (ARCTIC) and 2 scows	Offshore disposal areas (?)	Govt. owned equipment	Unknown
1964 through October 1971	Turning basin and entrance channel maint. dredging	Est. average 15,030 8 years (silts and sands)	3/4 cy clamshell (GILPIN) and 2 scows (65 cy)	Offshore disposal areas	Govt. owned equipment	$61,322 average for 1974 through FY 1970
FY 1973 (7/1/72-6/30/73)	Turning basin and entrance channel maint. dredging	14,350 cy (silts and sands)	3/4 cy clamshell (GILPIN) and 2 scows (65 cy)	Offshore disposal areas	Govt. owned equipment	$100,[illegible]
FY 1974 (7/1/73-	Turning basin and entrance channel maint. dredging	13,510 cy (silts and sands)	3/4 cy clamshell (GILPIN) and 2 scows (65 cy)	Offshore disposal areas	Govt. owned equipment	$148,104
FY 1974 11/74-4/75	Emergency ent. channel dredging	60,000 cy (sands)	2900 monitoring drag-line dozer, loader, scraper dumptruck (condition?)	Onshore location	[illegible] Barge	$[illegible]
FY 1975 7/1/74-6/30/75	Turning basin and ent. channel maint. dredging	12,000 cy ? (silts and sands)	3/4 clamshell (GILPIN)	Offshore disposal areas	Govt. owned equipment	$120,000

TABLE 3: DREDGE HISTORY, NOME, ALASKA

FY 1976 7/1/75-6/30/76	Turning basin and ent. channel maint. dredging	12,100 cy (clam-shell) 21,550 (suction)	3/4 cy clamshell (GILPIN) 12-inch pipeline dredge (Bethel)	Offshore disposal areas	Govt. owned equipment	$183,381
July-Oct. 1976	Turning basin and ent. channel maint. dredging	6,650 cy (silts and sands)	3/4 cy clamshell (GILPIN)	Offshore disposal areas	Govt. owned equipment	$105,588
1977	Turning basin and ent. channel maint. dredging	12,120 cy	3/4 cy clamshell (GILPIN)	Offshore disposal areas	Govt. owned equipment	$278,880
1978	Turning basin and ent. channel maint. dredging	9,130 cy	3/4 cy clamshell (GILPIN)	Offshore disposal areas	Govt. owned equipment	$363,248
1979	Turning basin and ent. channel maint. dredging	13,000 cy	3/4 cy clamshell (GILPIN)	Offshore disposal areas	Govt. owned equipment	$346,250
1980	Turning basin and ent. channel maint. dredging	13,000 cy	3/4 cy clamshell (GILPIN)	Offshore disposal areas	Govt. owned equipment	$322,250
1981*	Turning basin and ent. channel maint. dredging	13,000 cy	3/4 cy clamshell (GILPIN)	Offshore disposal areas	Govt. owned equipment	$490,000

* Projected

Source: U.S. Army Corps of Engineers

TABLE 3 (CONTINUED)

With the escalating cost of diesel fuel, replacement parts, and skilled labor, these expenditures will continue to rise in the future. A principal goal of the proposed port design is to minimize the dredging requirements at Nome. Placement of any new coastal structure will have an effect on the sand transport along the shore. With proper consideration of this effect, it is hoped that a reduction in the dredge requirements at Nome can be achieved.

2.9 ECONOMIC BASE

2.9.1 Fishing Industry

The fishing industry of the Norton Sound area is limited and the commercial harvesting of fisheries resources must compete heavily with subsistence fishing interests. High operating costs have discouraged investment of private capital in seafood processing in the Norton Sound area and, consequently, transportation is a major cost factor. Typically, the fishermen of the area do not have large capital investments in their boats and equipment, and most use 18-foot skiffs with outboard motors.

Salmon

Salmon gillnetting is the principal commercial fishery in the Norton Sound area. Five species are harvested in Norton Sound waters with the vast majority of catches being pink and chum salmon (NOAA,1977).

Until recently, the Norton Sound commercial fishery was sporadic because of the lack of processors and buyers or inadequate tendering service. However, the recent development of cooperatives and improved tendering facilities have helped to stabilize the fishery (Gusey,1979).

The commercial salmon fishing season extends from June 15 to September 30, a basic season that has been in effect since 1963. The Norton Sound fisheries began in 1961. The period of high fishing effort from 1962 to 1964 was followed by several years of low effort. Beginning in 1969, levels recovered and have been consistently exceeding 140,000 fish annually (Gusey,1979).

Annual commercial salmon harvests in the Norton Sound region ranged from 40,000 to 316,000 fish during the 1961 to 1976 period, averaging about 170,000 annually. During that time, chum salmon comprised nearly 65 percent of the total catch, followed by pink salmon with 29 percent (NOAA 1977).

In 1979, commercial fishermen harvested 10,706 king, 21,438 coho, 167,411 pink, and 140,789 chum salmon, totaling 350,344 fish in Norton Sound. This was the second largest catch on record and was 110% of the recent 5-year average annual harvest of 310,005 salmon. A total of 204 commercial fisheries entry permits were issued for the Norton Sound district in 1979. Approximately $875,000 was paid to fishermen for their 1979 salmon catches. Eleven processors operating in the Sound in 1979 purchased approximately 2.1 million pounds of salmon (Schwarz,1980A).

Commercial catches of salmon during the 1961 to 1976 period are shown in Table 4.

TABLE 4

COMMERCIAL SALMON CATCH, 1961-1976

Year	Norton Sound Commercial Catch of Salmon (No. of Fish)
1961	101,711
1962	232,431
1963	233,863
1964	164,671
1965	40,524
1966	100,345
1967	74,818
1968	124,499
1969	178,972
1970	178,218
1971	141,977
1972	149,713
1973	176,797
1974	315,829
1975	257,802
1976	192,917

Source: NOAA, 1977; Gusey, 1979

In the subsistence category, nearly all of the native peoples are dependent to some degree on the fish and game resources for their sustenance. In 1979, all subsistence fishermen interviewed by the Alaska Department of Fish and Game reported catching a total of 46,446 salmon, about 35 percent above the recent 5-year annual average harvest (Schwarz,1980A).

Herring

The earliest American commercial effort on Bering Sea herring apparently took place in the early part of this century at Golovin Bay in Norton Sound. It declined because of foreign competition and then resumed in 1964 near Unalakleet and has continued on a limited and sporadic basis. The harvest is not taken in the Nome area, but rather in the Cape Denbigh, Unalakleet, and Stuart Island to Klikiktarik areas.

Commercial fishing for herring is carried out by local inhabitants and foreign gillnet fleets. Fishing is performed primarily with gillnets and occasionally by beach seines. Herring roe is the main product of commercial operations. Most harvest occur after winter ice break-up in May-June, while herring are in spawning concentrations (NOAA,1977).

Considered a developing fishery, interest in northwestern Alaska herring stocks appears to be increasing. Market conditions, however, have a large influence on the catch. For example, when 1172 metric tons of herring were harvested in Norton Sound in 1979, the market price was about $800 per metric ton. This year, however, the price has fallen to $200 per metric ton and will likely significantly influence the volume of harvest (Schwarz, 1980A).

Historical herring catch figures for the 1964 to 1976 period are shown in Table 5.

TABLE 5

COMMERCIAL HERRING CATCH, 1964-1976

Year	Norton Sound Commercial Harvest of Herring (Metric Tons) Local Inhabitants	Japanese Fleets	Total
1964	18.1	0	18.1
1965	0	0	0
1966	0	0	0
1967	0	0	0
1968	0	125	125.0
1969	0	1270	1270.0
1970	7.3	54	61.3
1971	17.7	621	638.7
1972	15.3	11	26.3
1973	32.3	25	57.3
1974	3.1	720	723.1
1975	2.0	5	7.0
1976	7.7	N.A.	N.A.

Source: NOAA, NMFS, 1977; Gusey, 1979
N.A. = Not Available

King Crab

Another developing fishery is that of King Crab. A winter and summer commercial king crab fishery has recently developed in Norton Sound. The summer fishery is a large vessel fishery consisting mainly of Dutch Harbor vessels. The winter fishery is composed mostly of local fishermen who fish through the ice with pots for the crab. In 1979, 3 million pounds of king crab were harvested; this year, the harvest will be held to only 1 million pounds, however. A subsistence king crab fishery also exists.

The fishing industry harvests in Norton Sound are not expected to experience significant change, other than that resulting from normal market economics. New fisheries development is not expected for the area due primarily to the far north location, proximity to markets, and the competition offered by more attractive, plentiful fisheries in other parts of the state (Schwarz, 1980B).

2.9.2 Mining Industry

Next to federal and state spending, mining and tourism were the major components of the cash economy of northwest Alaska prior to the discovery of oil at Prudhoe Bay. The Seward Peninsula has historic ties with the gold mining industry which date back to the gold rush of 1898 and the resultant settling of Nome. Beginning with this gold boom in 1898, the following minerals have been located and produced in significant quantities in the Seward Peninsula: gold, tin, tungsten, and beryllium. Small amounts of antimony, bismuth, copper, silver, lead, and quicksilver have also been found but no large deposits of these metals are known to exist on the Peninsula. A residual iron deposit occurs near Nome, while zinc, arsenic, uranium, and molybdenum occur in or near the tin and base metal lodes. Platinum, manganese, mica, fluorite and graphite have also been reported (Corps of Engineers, 1974A). Although gold is being produced at this time, other minerals are not now under active operation.

Gold

As discussed earlier, gold mining in the area dates from 1898. Although large dredges continued to mine placer gold in the Nome area until 1962, production was not steady and suffered severe fluctuations over the years. In 1962, the United States Smelting, Refining, and Mining Company (USSR&M) discontinued their operations, having previously employed as many as 400 persons in the area. With an increase in the price of gold, the Alaska Gold Company (successor to the USSR&M) resumed their dredging operations in 1975 and have operated in the area since that time during the summers. The company is one of the major employers in Nome, and their operations have contributed to the overall economy. In 1978, the Alaska Gold Company produced 11,925 troy ounces of gold from the Nome area using two large dredges.

Tin-Beryllium-Fluorite

At the present time, the Lost River and Tin City deposits constitute the most important tin reserve in the United States. Although the deposits are not large, they are the only known deposits of significance in the United States. The heavy minerals belt passes through the Seward Peninsula and tin production from this belt has been in the form of both lode deposits and placer tin. Production is now relatively inactive (City of Nome, 1968).

If fluorite and beryllium deposits in the Lost River area are developed, the tin ore reserves at that location may be confirmed and expanded. In addition, tin claims on Humbolt Creek, 125 miles due north of Nome at Serpentine Hot Springs, were explored during 1970 and 1971. These are believed to be an extension of the lode tin deposits at Lost River which would make them the fourth largest known tin lode in the world (Corps of Engineers, 1974A).

Almost all of Alaska's known beryllium deposits occur in the Lost River area. These are reported to be a substantial portion of the total national resource. Although these deposits occur in commercial quantities, the feasibility of mining them is not proven due to minerology and economic factors. A proposed fluorite, tin and beryllium mining venture at Lost River is not presently active (City of Nome, 1968; 1979).

Similarly, fluorite is known to occur in commercially significant quantities at the Lost River tin mine. No active production operations are underway (City of Nome, 1968; 1979).

Tungsten

By itself, tungsten production does not appear to be feasible on the Seward Peninsula. In connection with the tin mining activity at Lost River, however, tungsten may be a minable by-product of tin lodes in this region (City of Nome, 1968).

Other Minerals

The mining of lead, zinc, and copper does not appear to be commercially feasible at this time. Small smounts of these ores have been recovered in the past as a by-product of gold mining. In addition, there has been a minimal amount of silver production as a by-product of gold mining. Future production, however, probably rests upon the development of some of the lead and silver bearing galena lodes scattered about the Seward Peninsula (Corps of Engineers, 1974A).

Future

The future of large-scale mineral development on the Seward Peninsula is affected by the remoteness of the deposits from market outlets, available transportation, the absence of an industrial and institutional infrastructure, and the associated high production costs. The key to successful mineral production is the development of a market demand sufficient to pay the high costs of Alaska production and transport (City of Nome, 1979; Corps of Engineers, 1974A).

Transport costs alone cannot be isolated as the major impediment to development. Oil, for example, with 50 percent of its market price absorbed by transportation costs, can support its own highly sophisticated transport system. Under present economic circumstances, however, most other Alaska resources cannot do this because they are not valued high enough in the market place.

With the exception of gold, mineral development in the Seward Peninsula must, therefore, be considered to be far in the future. The extent and timing of development is dependent partly upon unpredictable market forces. A long-term potential for development of the Lost River deposits does exist, but probably for a small, seasonally-operated mine only (Sanders, 1980).

On the other hand, the potential for developing gold in offshore beaches is very high. Forecasts of future production are not available, however.

2.9.3 Coal

Alaska possesses extensive coal resources, distributed widely throughout the state. Of the total 130 billion tons speculatively estimated to exist in the state, more than 90 percent is believed to be located in the northwestern Arctic. This includes an estimated total of 19.3 billion tons of bituminous and 100.9 billion tons of subbituminous and lignite coals (Corps of Engineers, 1974A). This area encompasses about 30,000 square miles bounded by the Brooks Range in the south, the lower Colville and Itkillite Rivers to the east, and the Beaufort and Chukchi Seas to the north and west. Roughly 24,000 square miles of this coal-rich area is included in the National Petroleum Reserve No. 4. The U.S. Bureau of Mines has identified the parts of the area along the Chukchi Sea coast as being "very important" in its potential for economic viability and national or local economic or strategic need for development (DMJM, 1979).

Alaska's identified resources (130 billion tons) are approximately 7.5 percent of the total United States identified coal resources of 1,730 billion tons.

Alaskan coal, including that in the Arctic, is low in sulfur content. The subbituminous coal is generally high in water and ash content, but bituminous coal of some areas possesses good coking characteristics. Some of the beds are known to be of good quality and are capable of being mined in large blocks with large mechanized equipment. Coking coal is generally in high demand on the world market at the present time (City of Nome, 1968; DMJM, 1979).

The major markets for Alaskan coal, given the limited domestic market, are the west coast of the United States and Japan. The United States market is limited to coal for electric power production, while the Japan market is limited primarily to metallurgical coal. Key to the marketability of this coal is the technology and cost of moving it from the northwestern Arctic area to a coastal loading point (Federal-State Land Use Planning Commission, 1978). Substantial investments would be required in mining equipment and transportation systems before coal can be moved from these northwestern fields. Such problems as moving the coal from mine to a port in a roadless area, plus the development of suitable port facilities and loading techniques, have caused some to hold a pessimistic outlook on near-term coal development. Rather, they suggest that production of northwestern Arctic coal under present technology and costs is far in the future (Corps of Engineers, 1974A). A more recent report (Massachusetts Institute of Technology, 1980), stresses the importance of coal as a source of energy in the United States' future. The study, which reflects the recent instability of Mid-East oil supplies, states that coal will become the primary domestic energy source for the United States within twenty years.

Although coal production activities in the northwest Arctic area would be remote from Nome, Nome may play a future role as a base of operation and supply as well as a loading terminal point for coal exports to both Japan and the west coast of the continental United States.

2.9.4 Petroleum Industry

The potential for development of petroleum resources in the Norton Sound area is uncertain at this time, although inferential data indicates that reserves may be sufficient for feasible development. Because detailed geophysical data is unavailable and because there is no drilling history in the Norton Basin, reserves estimates have been based upon known characteristics of similar geologic areas. Present estimates of undiscovered recoverable oil and gas reserves in North Basin are:

	Low Find	Medium Find	High Find
Oil (billions of barrels)	0.38	1.4	2.6
Gas (trillions of cu. ft.)	1.2	2.3	3.2

Source: Dames & Moore, 1980.

If exploration, development, and production of the Norton Basin petroleum resources does occur, Nome will serve as a support base for supplies and services, including aerial support for offshore operations. The extent to which this occurs will depend upon the magnitude of the development and production phases (Dames & Moore, 1978). In addition, the future development of petroleum resources to the north in the Chukchi Sea area, Kotzebue Sound, and the National Petroleum reserve could also have a significant effect upon the Community of Nome, first as a staging and transshipment point for supplies, materials, and personnel destined for these northern areas and, second, as the pipeline terminus and transshipment point for product oil from these areas.

The lease sale No. 57 for the Norton Basin is scheduled to take place in September, 1982, and is to be preceded by a number of intermediate formal steps leading to this sale. In addition, a continental offshore stratigraphic test well will be drilled by ARCO in 1980 to better identify the geologic strata in the Norton Sound (Scott, 1980; Fisher, 1980).

Exploitation of a petroleum reserve involves three distinct phases of activity, i.e., exploration, development, and production. The development phase involves drilling the optimum number of production wells for the field and construction of the equipment and pipelines necessary to process the crude oil and transport it to its destination. Whereas the exploration and production phases are not particularly labor intensive, the development phase creates the highest levels of employment locally and the import of the greatest amount of materials, supplies, and services for development activities (Dames & Moore, 1980).

The development of petroleum resources included in lease sale No. 57 is expected to result in the production and employment levels shown in Table 6.

TABLE 6

PETROLEUM DEVELOPMENT SCENARIOS

	Low Find	Medium Find	High Find
OIL			
Years of Production	1990-2009	1990-2011	1989-2016
Peak Years	1993	1994	1995
Peak Production	153,000 b/d	463,000 b/d	764,000 b/d
GAS			
Years of Production	1990-2009	1989-2009	1989-2011
Peak Years	1993-2001	1994-2000	1995-1998
Peak Production	230.4 mmcfd	460.8 mmcfd	691.2 mmcfd
EMPLOYMENT			
Onshore & Offshore			
Peak Years	1990	1990	1991
Peak Employment	1376	3555	5276
Onshore Only*			
Peak Years	1989	1990	1987
Peak Employment	387	374	1544

* A portion of this work force may establish residence at or near Nome.

Source: Dames & Moore, 1980

2.9.5 Port Operations

Freight service to Nome is generally via ocean-going cargo barges direct from Seattle, although some freight is transported to Nome by air. In 1979, 18 general cargo barge trips were made by the three firms serving the city as follows:

Pacific-Alaska Lines	4 Trips
Alaska Cargo Lines, Inc.	4 Trips
Foss Barge Company	10 Trips

Barges from Seattle normally do not arrive fully loaded, having previously stopped in Bethel and Dillingham.

The barge season generally runs from May 1 to September 25, a period of slightly less than 5 months. Incoming general cargo averages between 6,000 and 8,000 tons per year. Nearly all general cargo is containerized; an ocean-going barge can haul about 150 containers.

Because of extensively shoaled beaches, ocean-going barges calling at Nome presently anchor about one mile offshore for unloading and reloading of cargo and freight. The harbor is too shallow to allow ocean ships and barges to enter. Therefore, cranes onboard the ocean-going barges are used to offload containers and other cargo to lighters. The average time required to offload the typical ocean-going barge is 18 hours. The shallow-draft lighters are towed through the surf and the shallow entrance channel for unloading at the transfer facilities of the lighterage company, Arctic Lighterage (Crowley Maritime). Consequently, freight is, of necessity, double-handled in lightering from ship to shore and, furthermore, freight destined for interior locations is handled a third time. Winds in excess of 15 knots make the transfer to lighters extremely difficult, the resulting delays adding a demurrage charge of $12,000 per day.

On shore, the lighters are unloaded over the entrance channel revetment by portable cranes. Empty containers and outgoing shipments are reloaded to lighters inside the harbor area for return to the ocean-going barges anchored offshore.

Lighterage costs represent approximately 22 percent of the typical freight bill between Seattle and Nome.

Bulk petroleum products are presently delivered to Nome by Chevron Shipping Corporation in tankers loaded at Richmond, California. In 1979, three direct shipments were made. The average annual imports of petroleum amount to about 7 million gallons. As with the general cargo barges, tankers are anchored offshore at Nome and the products are offloaded to lighters for transfer to onshore storage facilities.

Waterborne commerce through the Nome Harbor for the period 1969 to 1979 is presented in Table 7.

TABLE 7

CARGO TRANSPORT, NOME HARBOR, 1969-1979

	TONNAGE		
	General Cargo	Liquid Petroleum	Total
1969	5,945	20,327	26,272
1970	8,108	12,843	20,951
1971	6,145	15,786	21,931
1972	10,643	32,506	43,149
1973	5,620	23,162	28,782
1974	10,158	22,156	32,314
1975*	N.A.	29,000	N.A.
1976*	N.A.	25,000	N.A.
1977*	N.A.	29,000	N.A.
1978*	6,800	24,000	30,800
1979*	8,100	25,000	33,100

* Estimates by Arctic Lighterage

Projections of future commerce through Nome Harbor depend upon expected population growth within the service area, the extent to which the natural resources of the Seward Peninsula are developed (mining, petroleum, fishing), the potential of the Nome Harbor as a cargo transshipment point for developing areas and communities in such categories as tourism and recreation. The future of some of these factors depends upon outside economic, marketing, and physical determinants. The future of the harbor as a transshipment point may depend largely upon the physical development of the port facility itself.

In the event that the population of the service area was to increase by the projected 65 percent between 1970 and 1985, then the increase in the throughput of staples would likely increase proportionately. Other dry cargo, such as equipment and construction materials, would not necessarily experience such a proportionate increase. Rather, the import volume of these items would relate more to the economic activity and new development in the region. The consumption of oil products is expected to continue its steady long-term increase.

~~of the local labor force.~~

4.1.1 The Selected Causeway Design

Based on the evaluation of the various causeway designs presented previously, the cross-section shown in Figure 4.3 has been selected for the port of Nome causeway. The major positive attributes of this design are as follows:

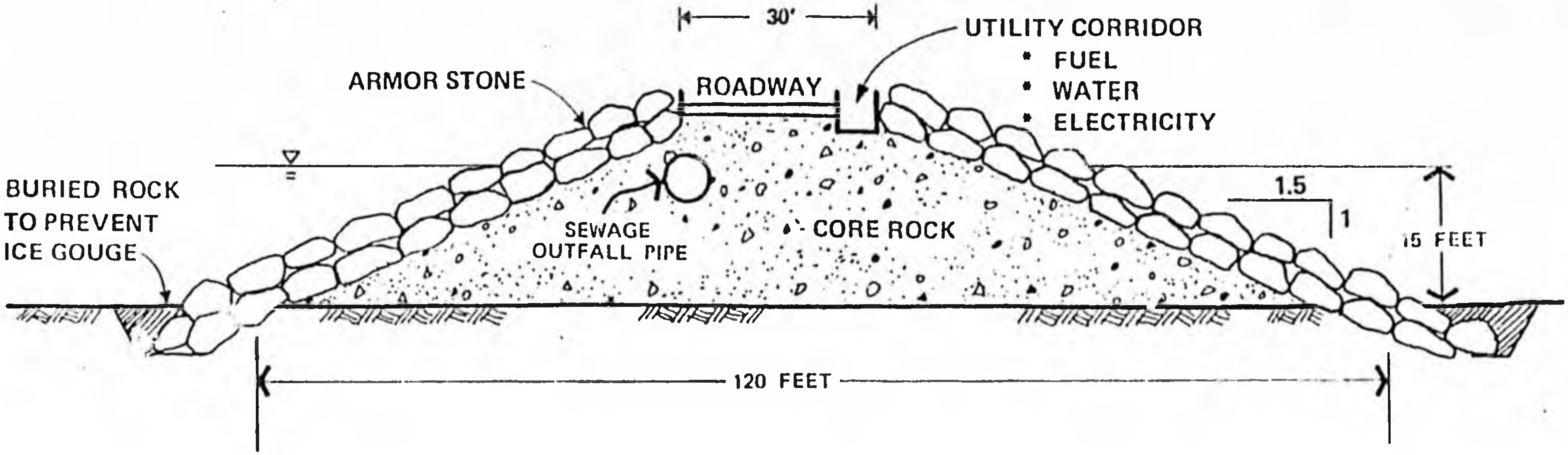


FIGURE 4.3: CAUSEWAY DESIGN CROSS-SECTION

1) Local availability of all construction materials
2) Simple construction methods
3) Durability
4) Ease of expansion
5) Maximum use of local labor force
6) Moderate cost

The use of this design assumes that wintertime port operations will not be undertaken since ice can be expected to over-ride the structure. For this reason, no structural elements will be placed on the causeway surface. Similarly, the quarrystone armor must be placed carefully to minimize its displacement by the moving ice. All utilities (fuel, water, electricity) must be placed in a covered containment channel thereby allowing easy accessibility for future expansion or maintenance of these items. Nome has an immediate need to develop an effective sewage disposal system in order to avoid the necessity of constructing a secondary sewage treatment plant. By burying an outfall pipe in the causeway, primary-treated sewage can be discharged to the relatively deep waters at the end of the causeway. The feasibility and cost-effectiveness of this plan must await future analysis. The armor rock will be buried to a depth of five feet to reduce the possibility of displacement due to wave or ice scour. The side slopes (1:1.5) have been designed to minimize construction cost while maximizing the protection afforded from wave and ice impact.

The data needed to fully refine this design is not yet available. Such critical design considerations as side slope alignment, causeway elevation, height and thickness of armor layer, and filter layer thickness are best designed in detail following close examination of the performance of these components in scale-model testing experiments. In this way, the total design can be optimized to deal with all the serious threats posed by waves, ice, and high water levels at the minimum construction cost. For example, the results of analytical studies on ice impact at the causeway shows that ice along the Nome coast will ride-up and over the causeway if a 1:2 side slope is used. The choice of a 1:1.5 side slope will cause the formation of ice piling at the slope. It becomes important from an economics standpoint when one realizes that the choice of a 1:1.5 slope will decrease the total causeway volume by 25% relative to a 1:2 side slope. Steepening the side slopes will require an increase in the size of the largest individual armor stones, however, from 7.25 tons to 8.3 tons. The economic impact of the need for larger armor rock is not presently known. In addition, the steeper side slope will have an effect on wave overtopping during severe wave events. The final design decisions for the causeway will rely on adequate wave and water level data as well as the results of small-scale hydrodynamic testing that will seek to minimize project costs while properly dealing with expected wave and ice forces.

4.2 OFFSHORE TERMINAL DESIGN

4.2.1 Vessel Traffic

At the present time, the City of Nome is visited by a number of vessel types that are serviced by the existing harbor facility. Those vessels with drafts in excess of five feet are normally unable to enter the port and must be serviced by "lightering" barges operated by Arctic Lighterage, a Division of Crowley Maritime, Inc. The expected vessel traffic that is anticipated at the Port of Nome is briefly discussed below.

Ocean-going Barge

The largest vessel type that currently visits Nome is the major cargo-carrying barge that arrives throughout the summer period. These vessels are normally towed by ocean-going tugs and the containerized cargos that they carry are off-loaded to shallow-draft lighterage barges for the transfer to the Nome city dock. The dimensions of the ocean-going barges are approximately as follows:

Length:	400 Feet
Beam:	100 Feet
Draft: (Loaded)	22 Feet

Because many of these barges make stops at Bethel and/or Dillingham prior to arrival at Nome, a fully loaded barge having a 22-foot draft is relatively rare at Nome. However, for the sake of conservatism and acknowledging the future status of the Port of Nome as the major maritime transport center of northwestern Alaska, the 22-foot draft value has been chosen for design purposes.

These large barges would be berthed at an offshore facility using a small fleet of tugs working in conjunction with the barge's towing vessel.

Ocean-going Tugboats

These tugs are large capacity towing vessels that supply the means of propulsion for the ocean-going barges. The dimensions of these vessels are as follows:

Length:	160 Feet
Beam:	30 Feet
Draft: (Loaded)	18-20 Feet

These vessels are very powerful and can be used to maneuver the large barges into and out of berthing spaces.

Utility Tugboats

Smaller tugboats owned, maintained, and operated by private interests would be used for many tasks at the Port of Nome. They would be required to assist in the berthing of all barge traffic. Also, certain large vessels having their own propulsion systems may require berthing assistance occasionally. Disabled craft will also require the use of these smaller tugs. The dimensions of this vessel type are as follows:

Length:	50-90 Feet
Beam:	10-15 Feet
Draft: (Loaded)	8-12 Feet

Oil Industry Workboats

In 1979, Arco Petroleum initiated field work that sought to determine the extent of the petroleum wealth of Norton Sound.

The first phase of exploratory drilling will begin in 1980. If oil is discovered in exploitable quantities in the Norton Basin/Chukchi Sea Region, workboats employed by the oil industry will call at the Port of Nome to transfer personnel, equipment, and to provide general logistics services. The dimensions of these vessels are as follows:

Length:	150 Feet
Beam:	30 Feet
Draft: (Loaded)	10-15 Feet

Fishing Craft

Various fishing vessels are expected to call at the Port of Nome to transfer their catch ashore, replenish food, water, fuel, and equipment supplies, and to undertake vessel or equipment repairs. These vessels vary in size from large inter-ocean craft to small boats used principally by the local residents to fish the waters of Norton Sound. Maximum draft of the fishing fleet that will utilize Nome as a port of call is assumed to be 20 feet.

4.2.2 The Design Vessel

At the present time, the largest vessel that calls at Nome is the ocean-going cargo barge having a loaded draft of 22 feet. In order to allow for adequate water depths at all times alongside the proposed pier facility, it is recommended that the offshore docking terminal be located at the 30-foot bottom contour. Figure 4.4 illustrates the position of the design vessel when docked at this location for both the high-water and low-water extremes. The extreme low water level will occur when offshore winds drive the surface water to the south. During these periods, the still water level can fall as much as five feet (NOAA, 1977). For design purposes,

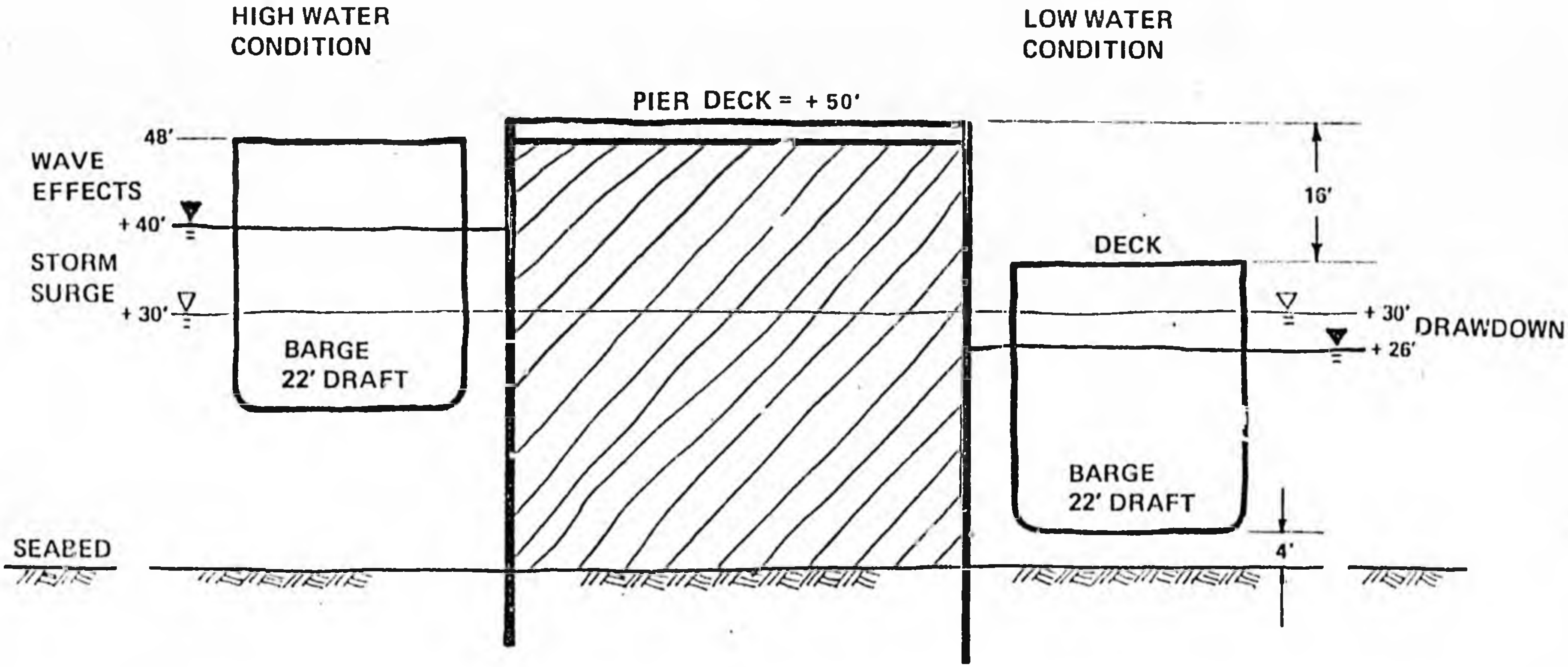


FIGURE 4.4: DETERMINATION OF DESIGN DEPTH ALONG PIER

a four foot water level fall has been chosen. At this level, the hull of the fully-laden barge will be 4 feet above the seabed. This additional depth below the keel is considered adequate to ensure vessel safety.

Conversely, during intense onshore wind episodes, the nearshore still water levels can experience increases of as much as 14 feet (NOAA, 1977). An increase of 10 feet has been chosen for the design of the terminal deck shown in Figure 4.4. During this high water period, the barge keel lies 18 feet above the sea bottom. In both cases of the high and low water extremes, the deck height as shown in Figure 4.4 is considered adequate for safe cargo transfer operations. Each ocean-going barge carries a crane for transferring its cargo. The height differential that exists between the barge and terminal decks is considered to be well within operational limits of the transfer equipment.

4.2.3 Offshore Terminal

The offshore berthing terminal will be connected to the onshore port facility by a 3400-foot long causeway. Five offshore terminal alternatives were developed for consideration in Section 4.0 of this report. A refined version of Alternative III was chosen to best serve the proposed Port of Nome. Figure 4.5 presents a plan view of the anticipated terminal layout. Protection from incoming wave energy will be provided by the southern armorstone slope. Berthing facilities for various vessel types are provided. The large (100' x 400') ocean-going barge is the largest vessel that can be accommodated at the port. A freight transfer area exists on the terminal's southwest corner where trucks from the city will load/unload their cargos. This area is designed such that the trucks can make a single sweeping turn to pick up the cargo and return to the onshore facility. The berthing docks will have vertical walls

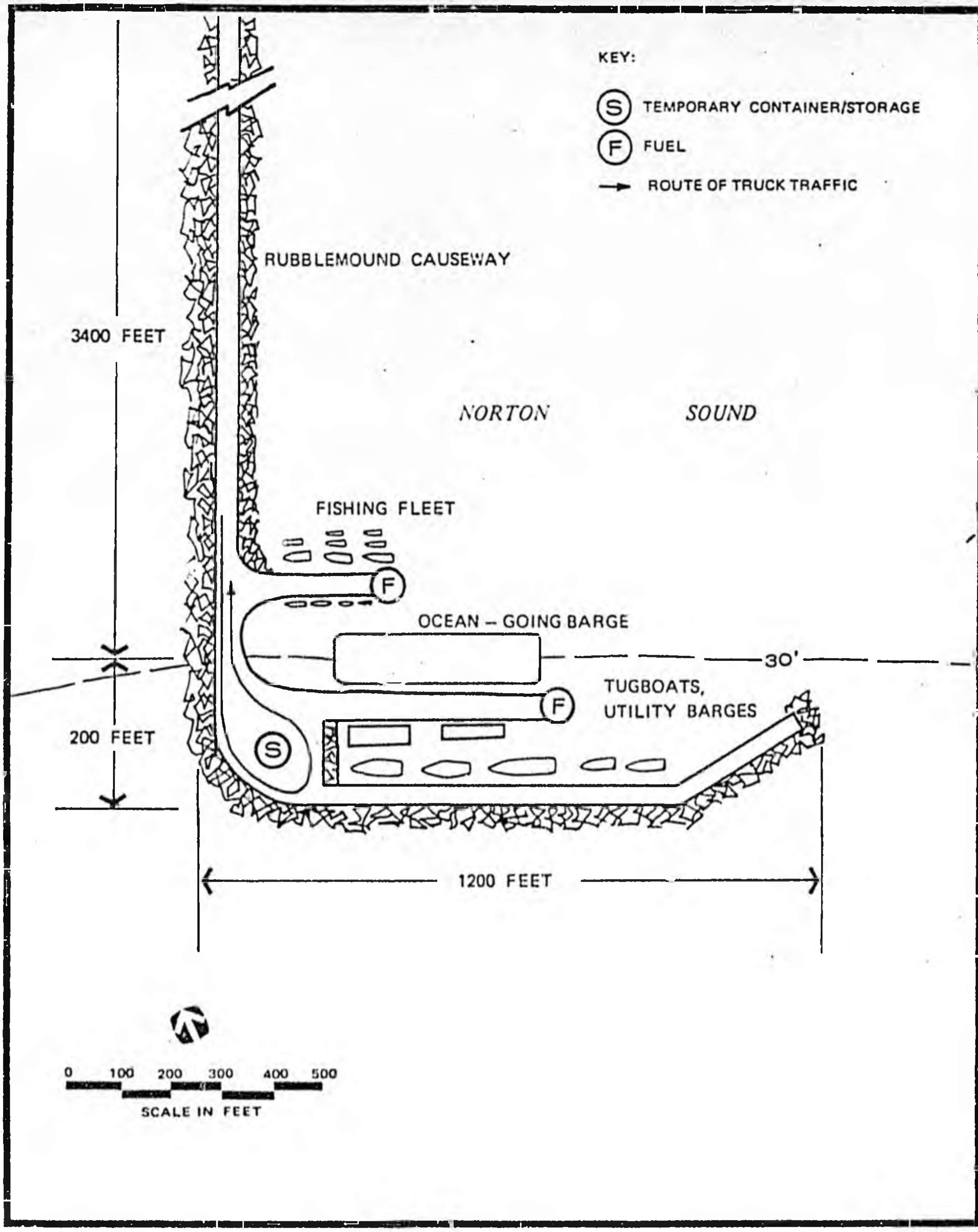


FIGURE 4.5 OFFSHORE TERMINAL LAYOUT

using either parallel sheet pile walls or circular steel sheet pile cells.

The offshore terminal has been separated into three general zones: 1) The ocean-going barge facility (accommodating one barge at a time, 22 foot design draft); 2) A utility barge, tugboat, and deep-draft vessel facility (designed to accommodate a wide range of vessels with maximum drafts of 22 feet); and 3) A small craft berthing area, to be utilized by fishing craft and other lighter-draft vessels (maximum draft = 20 feet).

Only mobile equipment will be utilized at the berthing terminal since the expected winter ice over-ride may damage any permanent facilities. Likewise, the utilities delivered to the piers (water, fuel, electricity, telephone) will be contained within a buried utility corridor.

4.2.4 Phased Development

It may be necessary based on financial or logistical considerations to construct the offshore facility in a number of distinct phases. An example of this means of development is presented in Figure 4.6, where three distinct stages of completion are shown. In Stage I, the south breakwater and cargo transfer area is complete to accommodate ocean-going barge traffic and the related tug fleet.

In Stage II, the primary ocean-going barge berthing facility is contained on the inshore pier structure. This allows a higher level of usage for a medium-draft tug and barge fleet between the breakwater and the newly constructed pier. As the third stage of development, a small pier is constructed further inshore for the berthing of a small-craft/fishing fleet. If additional berthing space is required in the future, small piers similar to that added in Stage III can be constructed from the causeway further inshore.

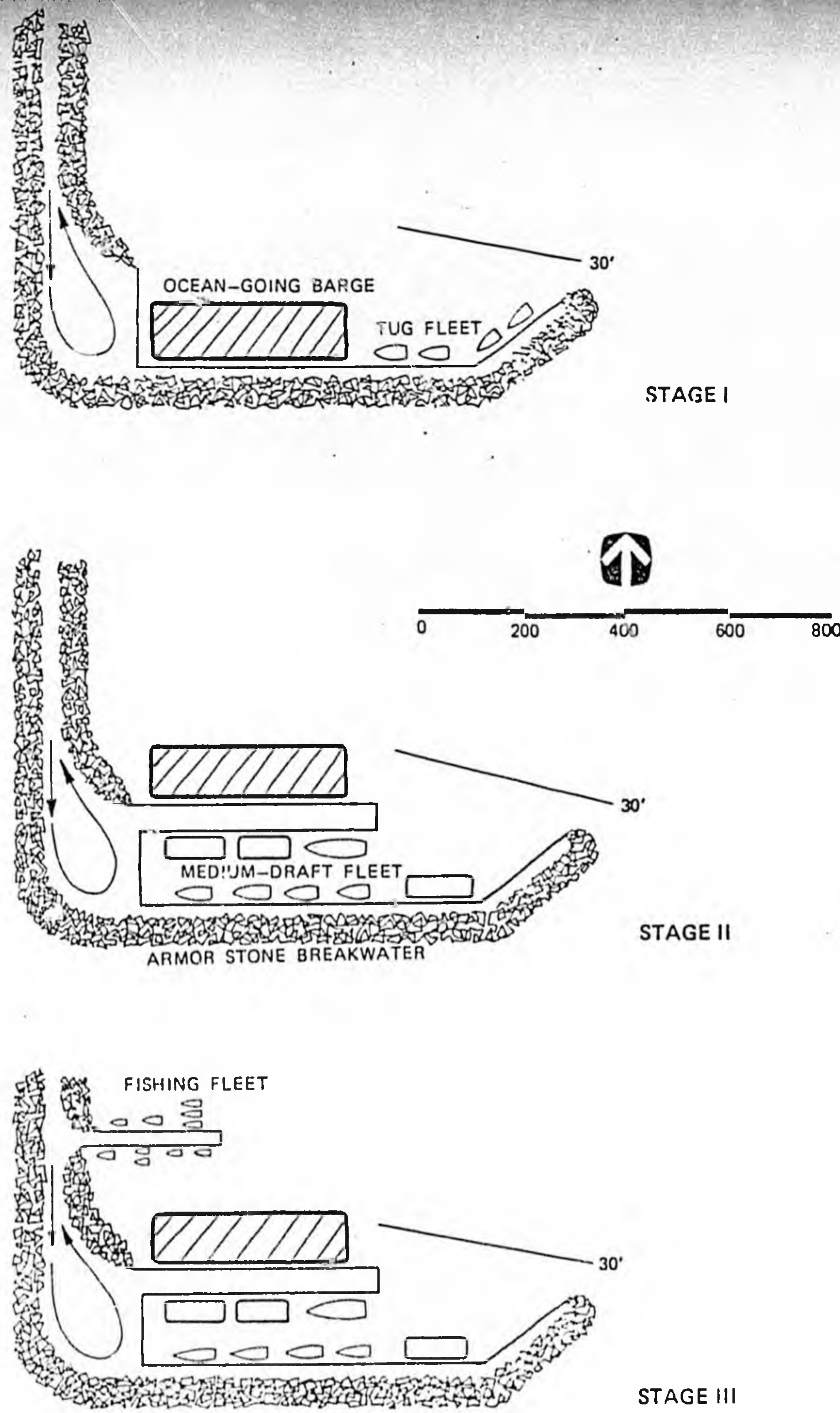


FIGURE 4.6: OFFSHORE FACILITY DESIGN

This phased development concept can be undertaken without disrupting existing port services since the Stage II and III construction sites do not directly imp[illegible] on the causeway traffic. Further, the causeway can be expanded in length if, in the future, the need for a deeper draft facility becomes apparent. During such expansion activities, the existing port should experience uninterrupted service as it is physically separated from the area of future expansion.

7.0 ECONOMICS

7.1 COST PROJECTIONS

The costs associated with the construction of the proposed port facility at Nome have been estimated using a variety of data sources. The large scale of this construction project and the remote location of Nome make a precise engineering cost estimate extremely difficult to achieve. All estimates presented in this report are in 1980 dollars.

Due to the limited nature of Nome's historic growth and development, cost estimates based on comparable construction projects are not possible. This makes it necessary to develop cost estimates from limited past construction experiences with proper adjustment for both cost escalation and the economy associated with large scale acquisition of construction materials. The major raw material required for the proposed port construction is quarrystone in various sizes ranging from large armor rock to small cobbles and rock fragments that comprise the "quarry run" causeway core. Approximately 800,000 cubic yards of quarry rock are needed for the construction of the offshore facilities.

It is obvious that the unit cost of quarry rock will have a major influence on the economic feasibility of the port development. For the purpose of determining the total project cost, unit costs for the various categories of quarry rock have been selected using prices quoted in the past escalated to 1980 price levels. It is understood in this analysis process that there is a practical limit to the funding capacity of the state government beyond which a port development is not possible. In a sense, the quarry rock unit costs are the controlling factor in the port construction feasibility and should be negotiated with this fact in mind.

The source of the quarry rock needed for the project is yet to be determined, however, potential quarry sites have been identified in close proximity to Nome. The assumed unit costs of quarry rock used in the cost determination are as follows:

Armor Rock	$25/cubic yard
Filter Rock	$ 8/cubic yard
Core (Quarry Run)	$ 5/cubic yard

While more detailed design work may lead to a lowering of the total estimated costs, it seems reasonable to assume that the negotiated unit costs for quarrystone cannot increase significantly above the stated levels without severely impacting ultimate project feasibility.

The general philosophy used for the port design is to construct a simple, efficient, and cost-effective facility that will require a minimum of maintenance. For this reason, basic operating needs are filled without detailed and costly amenities. It is assumed, for example, that no road paving will be undertaken. Also, while the additional Phase B parcel of land should be purchased initially, no improvements shall be placed on that land until bulk cargo facilities are required. The cost of land acquisition is estimated to be $2000/acre. At the present time, there is very little historic cost data upon which to base this figure. No comparable real estate sales have been undertaken in recent years to use as a basis for cost estimation. Negotiations between the City of Nome and the present owner of the land will establish the final cost of the parcel required for the onshore facilities.

An attempt has been made to minimize the need for imported construction materials due to the high cost of transportation to Nome. The major construction element that is not presently available at Nome is the steel sheetpile needed for the construction of the docking facility. The cost of supplying and driving the sheetpile has been estimated based on prices presented in earlier reports (Gute and Nottingham, 1974; CH2M-Hill, 1976) and our own cost index for remote area construction.

A tabulation of all costs associated with the Port of Nome construction are presented in Table 9.

The total cost of construction of the Port complex is shown in Figure 7.1. The three stages of port development are compared in this figure with costs associated with each option.

The different costs associated with Stage II and Stage II only refer to the additional berthing facilities for auxillary barges and other medium draft vessels and for the small pier that is associated with fishing vessels and other comparably sized smaller craft.

A summary of the primary cost items of the three phases of construction are as follows:

PORT DESIGN	TOTAL COST
Stage I	
Barge Facility	$20,409,300
Stage II	
Barge Facility	$20,409,300
Medium-Draft Dock	3,383,100
	$23,792,400
Stage III	
Barge Facility	$20,409,300
Medium-Draft Dock	3,383,100
Fishing Vessel Dock	2,449,900
	$26,242,300

CONSTRUCTION COST ESTIMATE

TABLE 9.A

REFERENCE/PLAN NO. ______

LOCATION Port of Nome
Offshore Facilities - Phase I

JOB NAME Nome Port
JOB NUMBER TC 3373
PRELIMINARY ☒ FINAL ☐
BY P. Gadd DATE 6-1-80
CHECK ______ DATE ______

LINE	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
*	3400-FOOT CAUSEWAY				
1	Armor Rock	101,800	CY	$ 25	$2,545,000
2	Filter Rock	54,600	CY	$ 8	436,800
3	Core Rock	130,300	CY	$ 5	651,500
*	OFFSHORE TERMINAL				
4	Armor Rock	211,200	CY	$ 25	5,280,000
5	Filter Rock	75,700	CY	$ 8	605,600
6	Core Rock	264,000	CY	$ 5	1,320,000
*	ROADWAY SUBGRADE AND SURFACE				
7	Gravel	14,300	CY	$ 4	57,200
*	STEEL SHEETPILE (DOCK FACE)				
8	Sheetpiles	64,000	LF	$ 24	1,536,000
9	Pile Driving	533	EA	$620	330,500
10	Tiebacks/Hardware	800	LF	$100	80,000
11	Backfill Compaction	88,180	CY	$ 8	705,400
12	Dock Fenders	LS			32,000
13	Docking Hardware	LS			55,000
14	Navigational Aids	LS			15,000
	SUBTOTAL				13,650,000
15	Contingency (20%)				2,730,000
16	Engineering/Design (6%)				819,000
17	Supervision/Administration (6%)				819,000
18	PHASE I OFFSHORE FACILITIES TOTAL:				$18,018,000

CONSTRUCTION COST ESTIMATE

TABLE 9.B

REFERENCE/PLAN NO.

LOCATION Port of Nome
Onshore Facilities - Phase A + B

JOB NAME Nome Port
JOB NUMBER TC 3373
PRELIMINARY [X] FINAL [ ]
BY P. Gadd DATE 6-1-80
CHECK DATE

LINE	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
*	LAND ACQUISITION				
19	Phase A	17	Acre	$2,000	$ 34,000
20	Phase B	53	Acre	$2,000	106,000
21	Land Preparation	70	Acre	$4,000	280,000
22	Road Construction	4,500	LF	$ 40	180,000
*	UTILITIES				
23	Water		LS		524,000
24	Fuel		LS		329,000
25	Electricity/Telephone		LS		105,100
26	Lighting	20	EA	$1,500	30,000
27	Administration Building	1,000	SF	80	80,000
28	Restrooms	5	EA	$10,000	50,000
29	Fencing (Phase A only)	2,500	LF	35	87,500
30	Signage		LS		6,000
31	SUBTOTAL				1,811,600
32	Contingency (20%)				362,300
33	Engineering/Design (6%)				108,700
34	Supervision/Administration (6%)				108,700
35	ONSHORE FACILITIES TOTAL:				$2,391,300

CONSTRUCTION COST ESTIMATE

TABLE 9.C

REFERENCE/PLAN NO. ______

LOCATION Port of Nome
Offshore Facilities - Phases II Dock

JOB NAME Nome Port
JOB NUMBER TC 3373
PRELIMINARY [X] FINAL [ ]
BY D. Gadd DATE 6-1-80
CHECK ______ DATE ______

LINE	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
*	DOCKING PIER AT 30 -FOOT CONTOUR				
36	Core Rock	24,580	CY	$ 5	$ 122,900
37	Sheetpile	76,800	LF	$ 24	1,843,200
38	Pile Driving	640	EA	$ 620	396,800
39	Sheetpile Tiebacks	960	LF	$ 100	96,000
40	Backfill Compaction	8,000	CY	$ 8	64,000
41	SUBTOTAL				2,522,900
42	Fenders		LS		10,000
43	Docking Hardware		LS		30,000
44	PHASE II DOCK: SUBTOTAL				2,562,900
45	Contingency (20%)				512,600
46	Engineering/Design (6%)				153,800
47	Supervision/Administration (6%)				153,800
48	PHASE II DOCK: TOTAL				$3,383,100

CONSTRUCTION COST ESTIMATE

TABLE 9.D

REFERENCE/PLAN NO.

LOCATION Port of Nome
Offshore Facilities - Phase III Dock

JOB NAME Nome Port
JOB NUMBER TC 3373
PRELIMINARY [X] FINAL [ ]
BY P. Gadd DATE 6-1-80
CHECK DATE

LINE	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
*	DOCKING PIER AT 26 -FOOT CONTOUR				
49	Core Rock	16,870	CY	$ 5	$ 84,350
50	Sheetpile	56,000	LF	$ 24	1,344,000
51	Pile Driving	467	EA	$ 620	289,550
52	Sheetpile Tiebacks	700	LF	$ 100	70,000
53	Backfill Compaction	5,620	CY	$ 8	45,000
54	SUBTOTAL				1,832,900
55	Fenders		LS		8,000
56	Docking Hardware		LS		15,000
57	PHASE III DOCK: SUBTOTAL				1,855,900
58	Contingency (20%)				371,200
59	Engineering/Design (6%)				111,400
60	Supervision/Administration (6%)				111,400
61	PHASE III DOCK TOTAL:				$2,449,900

CONSTRUCTION COST ESTIMATE

TABLE 9.E

REFERENCE/PLAN NO. ______

LOCATION Port of Nome
Facilities Cost Summary

JOB NAME Nome Port
JOB NUMBER TC 3373
PRELIMINARY [X] FINAL [ ]
BY P. Gadd DATE 6-1-80
CHECK ______ DATE ______

LINE	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
*	PHASE I DEVELOPMENT				
18	Offshore Facilities				$18,018,000
35	Onshore Facilities				2,391,300
*	PHASE I TOTAL:				20,409,300
48	PHASE II DOCK TOTAL:				3,383,100
*	PHASE I + PHASE II TOTAL:				23,792,400
61	PHASE III DOCK TOTAL:				2,449,900
*	PHASE I + II + III TOTAL:				$26,242,300

CONSTRUCTION COST ESTIMATE - SHEET NO. ___ OF ___

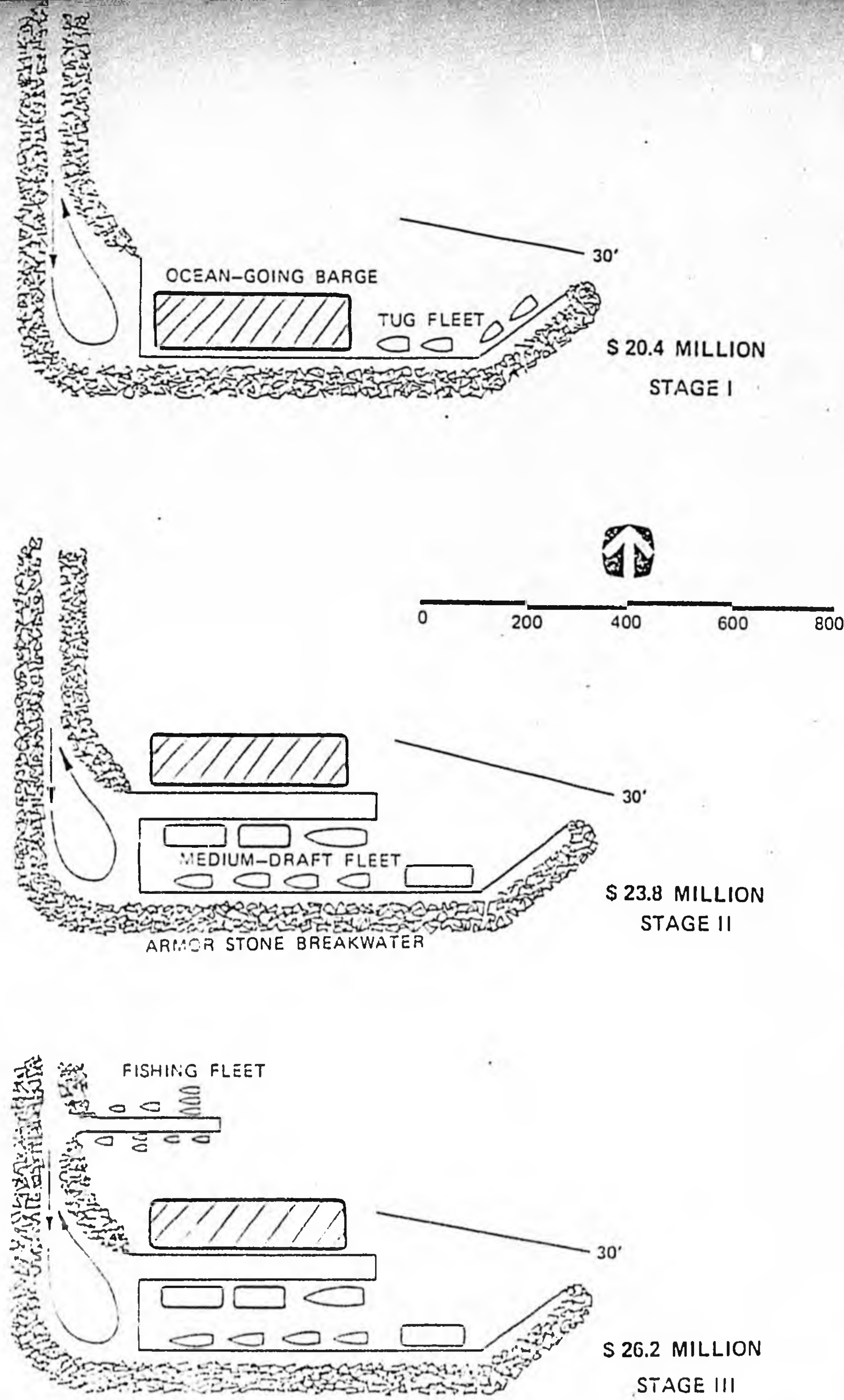


FIGURE 7.1: TOTAL PORT CONSTRUCTION COSTS

Regardless of the specific offshore terminal design, the onshore facility configuration remains the same. Basic cost items included for development of the onshore facilities are as follows:

- o Land Acquisition
- o Land Preparation
- o Road Construction
- o Utilities
    - * Water
    - * Fuel
    - * Electricity/Telephone
    - * Lighting
- o Buildings
    - * Administration
    - * Restrooms
- o Fencing
- o Signage

The cost estimate presented herein assumes development of only the 35 acre onshore facility shown in Figure 5.1.

In order for the port facility to be totally self-supporting, annual port income would have to exceed the yearly costs of operations, maintenance, the initial construction costs, and the costs associated with the debt service on the initial costs. Port costs can be annualized as follows:

A.	Capital Recovery (50 Years @ 8%)	$2,145,000
B.	Operations/Maintenance	
	Maintenance	$ 260,000
	Staff Salaries	35,000
	Equipment Maintenance	10,000
	Administrative Costs	10,000
		$ 315,000

TOTAL: $2,460,000

The level of economic activity in the Nome region is not currently sufficient to generate the income needed to offset the projected $2,460,000 annual costs.

An analysis has been undertaken, however, to determine the extent to which the port projected revenues can offset the city's costs in operating and maintaining the facility.

7.2 REVENUE PROJECTIONS

In order to develop anticipated revenues which might be derived from the usage of port facilities in Nome, the rate structures of several other ports in Alaska were examined. In addition, the actual cargo transported through the Nome Harbor in 1979, amounting to a total of 33,100 tons (refer to Table 6), was applied against these rate structures. Nome cargo, if transported through the harbors at Anchorage, Homer, and Dillingham, would be as follows:

	General Cargo	Petroleum	Total
Total tonnage through Nome in 1979 (refer to Table 6)	8,100	25,000	33,100
Charges by the port if processed through the port at:			
($ in thousands)			
Anchorage	$ 20	$ 2	$ 22
Homer	$ 35	$ 35	$ 70
Dillingham	$111	$305	$416

Establishing Anchorage rates as the base for comparison, the ports would rank as follows:

Port	Port Charges as a Multiple of Anchorage
Anchorage	1.0
Homer	3.2
Dillingham	18.9

The present service area of the Nome Port is generally that area encompassed by the Nome Census Division. Although villages outside the Division may receive goods transshipped through Nome, it is likely that over 90 percent of incoming general cargo and petroleum products is destined for residents or users within the Division. A study of growth in the Division by the Corps of Engineers (1974A) projects a population of about 9,500 persons by 1985 and 15,800 persons by the year 2000, compared to a population in 1978 estimated at between 6,700 and 7,200 (refer to Section 2.8.1).

In the period from 1969 to 1979, the average cargo tonnage through the Nome Port amounted to between 4.6 and 4.9 tons per person per year, with no meaningful trends of increase or decrease in evidence. Therefore, using a figure of 4.75 tons per person per year, the following cargo projections resulted:

Year	Projected Service Area Population (Nome Census Div.)	Total Incoming General Cargo and Petroleum Products through Nome
Base Year (1979)	7,000	33,250*
1985	9,500	45,125
2000	15,800	75,050

* Compares with actual of 33,100 tons (refer to Table 6)

Utilizing a rate structure equivalent to 15.0 times the Anchorage rates results in annual revenues for the Nome Port as follows:

Year	Total Incoming General Cargo & Petroleum Products	Annual Revenues Rec'd from Port Charges & Fees
Base Year (1979)	33,250	$331,250
1985	45,125	$450,000
2000	75,050	$750,000

This amounts to an average rate of $10.00 per ton or about $0.50 per 100 pounds of cargo.

In addition, other port revenues will accrue from sources which cannot, at this time, be adequately quantified. These include:

1. Docking of workboats related to petroleum exploration, development, and production, primarily for the purpose of securing provisions and supplies, and transporting work crews and equipment.

2. Docking of fishing vessels operating in Norton Sound and nearby fisheries, primarily for the purpose of securing provisions and supplies.

3. Docking of vessels for the purpose of receiving minerals mined in northwest Alaska for transport to Japan or the "lower 48".

4. Docking of vessels and transshipment of cargo related to petroleum development activities on the Beaufort and Chukchi Seas. This may include export of quarrystone for oil drilling island construction in these areas.

5. Leasing of land within the port complex to private firms for the purpose of constructing and utilizing operations and storage buildings, fuel facilities, repair facilities, and similar structures, as well as for open land for container storage and other types of storage.

The above revenue items could add significantly to the revenue projections derived from incoming general cargo and petroleum products. The complex and speculative nature of this income requires that an accurate determination of this element of potential income must await further study in Phase B of the planning effort.

7.3 ECONOMIC CONCLUSIONS

It is anticipated that the annual cost of debt service, operation and maintenance activities of the port of Nome will exceed the income generated by the Port. This conclusion is somewhat speculative in part due to the inability of accurate forecasting of the extent and magnitude of developments in the petroleum, mining, coal and fishing industries. It does seem clear, however, that the income generated from port operations will exceed the cost of port operations and maintenance. Given the rather conservative port income scenario that anticipates income from the projected population growth only, the income roughly equals the yearly cost of port operations and maintenance. If other more optimistic scenarios develop that would increase port traffic, income levels would rise accordingly. The highly speculative nature of economic forecasting for Nome dictates that it be limited to those elements that seem most plausible. This has been our objective and it is upon this premise that our preliminary economic evaluation is based.

9.0 CONCLUSIONS

The planning, engineering and economic analyses undertaken in this report conclude that construction and operation of a deep-draft port facility in Nome, Alaska, is feasible from a functional, operational, and environmental standpoint. This conclusion is based solely on the expected growth rate of the city and region although additional growth-inducing factors are considered (petroleum, mineral, fisheries development), these rather speculating elements are not judged to be necessary for the port to succeed. It has been determined that port income will roughly equal the expected port operation and maintenance costs. A primary requirement for the economic viability of the port project is the ability of the State of Alaska to finance the initial costs of land acquisition, engineering design, and construction of the port facilities. The level of income generated by the port is not anticipated to absorb the total construction costs assuming even the most optimistic regional growth scenarios.

The port complex will be composed of onshore cargo storage/handling facilities connected to the offshore terminal by a 3600-foot long rubblemound causeway, as shown in Figure 9.1. The port facility will accomodate vessels with maximum drafts of 22 feet. At the offshore terminal, general and containerized cargo will be handled by vessel-fixed cranes as well as a dock-based mobile crane. Fuel, water, electricity and telephone services will be provided at dockside.

The site selected for the location of the onshore terminal is on an elevated plateau just west of the Snake River. This site is convenient to the city and city services and will lead to reduced dredging requirements at the present harbor due to the sand blocking effect of the causeway.

Onshore area requirements for the cargo storage/handling activities are contained within a 35-acre parcel designated "Phase A". The "Phase B" parcel is 65 acres and will be utilized as a bulk cargo storage/handling area if the need should arise in the future. It is recommended that the city acquire the entire parcel (Phase A + Phase B) at the present time to preserve these lands for future use. Presently, only about 30 acres of the 100 acre parcel encompassing both Phase A and Phase B development is owned by the city.

The cost of the port project is estimated for three configurations:

Phase I:	Onshore Facilities 3600-foot long causeway Barge Terminal	$20.4 Million
Phase II:	Phase I plus Additional 450-foot long barge/ Ship Pier	$23.8 Million
Phase III:	Phase II plus Additional 300-foot long Docking Pier	$26.[illegible] Million

Construction cost estimates are given in 1980 dollars. Quarry rock costs will have a major impact on project cost. A unit cost of $25/cubic yard for armor rock is assumed for these cost estimates. The structural design of the major port elements have been designed to minimize maintenance costs. This philosophy of design is reflected in the port cost estimates.

Port income will be generated from berthing fees, land/facilties lease income derived from port-related businesses located within the port complex, sales of fuel, water, and power to the port users.

The offshore terminal can be expanded in the future to accomodate deeper draft vessels as well as to provide docking space for a larger number of small, shallow draft vessels. The causeway has been designed to support additional utilities and a bulk material transfer system in the future.

The existing harbor at Nome (in the Snake River) is envisioned as a small craft harbor with an anticipated vessel capacity of 80-100 boats. It is believed that the presently authorized depth of eight feet will not be required for the Snake River and that small craft traffic within the present harbor will be limited to vessels drawing four feet or less.

Environmental concerns that have been identified appear not to be of the nature or degree that would prevent port construction or operation. These concerns include:

- o Longshore Sediment Transport;
- o Ice Movement and Forces;
- o Salmon Spawning;
- o Crab Fisheries;
- o Expected Regional Growth;
- o Structural Foundation Support;
- o Cultural, Archeological Concerns.

Permitting requirements for the Port of Nome have been identified and include the U.S. Army Corps of Engineers, Alaska Department of Transportation, Alaska Department of Fish and Wildlife, as well as other state and federal agencies. The total time to process all permit applications is 12-18 months, however, if opposition to the project is slight it is conceivable that this time requirement would be reduced.

9.1 RECOMMENDATIONS

Based on the findings of this report, it is recommended that the City of Nome initiate the following tasks in order to expedite the construction of the Port of Nome:

1) Obtain specific data at the proposed port site to properly describe site geology, offshore bathymetry and onshore topography.

2) Undertake negotiations to procure onshore land from present owner.

3) Conduct tidelands survey to allow State to grant ownership to the City of Nome for the offshore lands existing between the city limits and a line located two miles offshore.

4) Conduct refined economic assessment to better quantify the expected port income given various development scenarios.

5) Organize a citizens committee and assign specific responsibilities to establish the means to obtain financial support from the State for the port facility.

6) Provide site and contract specific guidance to Tetra Tech in order to proceed with development of Port of Nome Master Plan (Phase B of ongoing study).