SECTION 3.0

BARGE DOCK
(Area 107)

3.1 DESIGN BASIS

3.1.1 The docking facility will be located near Granite Point on the west shore of Cook Inlet, approximately 1000 feet from the west boundary of the Moquawkie Indian Reservation and about 3 miles from the Methanol Plant.

3.1.2 The selected dock site is in the high bluff area, but the mud build-up along the beach is minimal on comparison with adjacent areas. This will reduce the amount of dredging needed to keep the docking area navigable.

3.1.3 The water at this point flows south at an estimated maximum velocity of 6 knots, which causes considerable shifting of silt.

3.1.4 Tide condition at mean higher high is approximately 12 feet above mean tide level and approximately 18 feet below at extreme low water. Thus the maximum tide deviation is approximately 30 feet. Prevailing winds are out of the north with occasional strong gusts.

3.1.5 The dock will be sized to accommodate 400 ft. x 100 ft. barges. Its working surface will be approximately 13 feet above mean higher high water. To avoid undue disruption of fish migration, the dock will extend a minimum distance out into the water.

3.1.6 The dock proper will be constructed of steel caissons (at sufficient distances apart to avoid buckling from ice) and sheet piling, backfilled with cut material from the bluff, and topped off with well-graded, compacted crushed stone. A fendering system will be provided for the protection of barges. Concrete paving will be used in areas where mobile cranes will operate, and in areas of dense truck traffic.

3.1.7 The slip base will be a prepared bed of well-graded crushed stone to an elevation that will be approximately 2 feet below the bottom of a loaded barge at high tide. Barges will be beached as the tide recedes. All barge traffic in and out will be at high tide.

The slip bed will require periodic replenishing and reshaping by adding more crushed stone. This will be done with a dozer at low tide.

3.1.8 Loaded barges will be positioned into the slip by tug and a land-based winching system.

3.1.9 A ramp and staging areas will be located adjacent to the slip to facilitate the unloading and handling of large modular structures.

3.1.10 A single-line track extension of the railroad system to the dock will provide rail access to the plant and, through the main rail corridor, on to the Capps and Chuitna mines. The single track from the dock to the plant will be set on cut benches in the bluff area, climbing from the dock to the bluff level at a maximum grade of 2%. The difference in elevation from the dock to the level of the bluff is approximately 120 feet.

3.1.11 A 40 foot wide roadway with about 100 foot clear right of way, roughly parallel to the railroad, will provide means for all truck and module transporter traffic from dock to plant site. This roadway will run along the beach to the vicinity of the pumping station and then, with improvements to existing logging roads, on to the methanol plant. Road access will continue north to the construction camp, town, air strip and on to the mines. Approximately 100 feet of clearance is required for the transport of modules.

3.1.12 The dock and its associated facilities will be used for receiving incoming and shipping outgoing barge cargos of equipment, materials and fuel for the mines, methanol plant, railroad, construction camp, townsite and air strip.

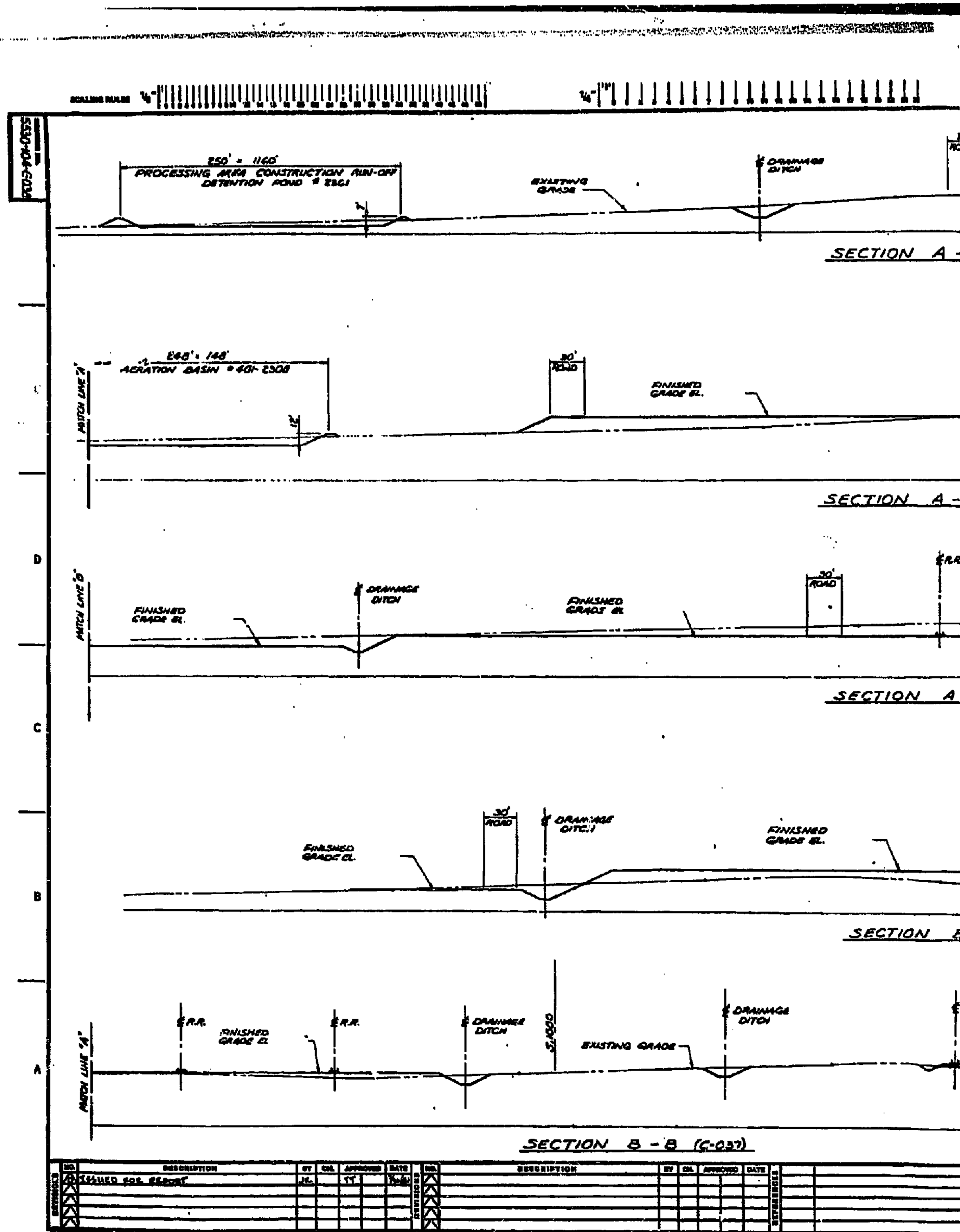
3.2 ENGINEERING DESIGN DATA

Design data pertinent to the dock is detailed in the Equipment List on Page 3/4 and in the drawings listed below.

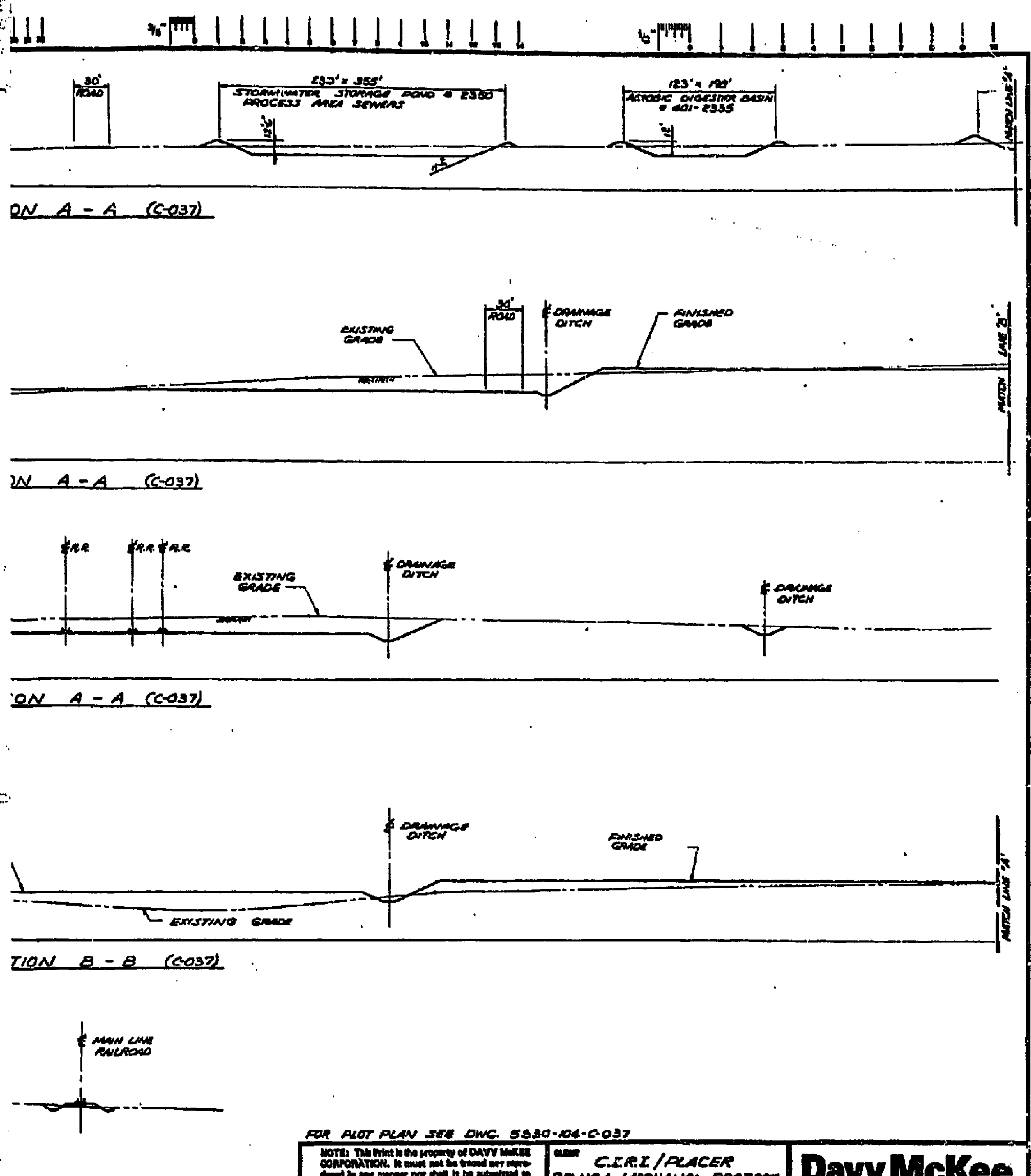
DRAWING NO.	TITLE
5530-C-001	Project Plant Plan
5530-104-C-037	Methanol Plant Plot Plan Grading, Roads and Drainage
5530-104-C-038	Methanol Plant Grading, Roads and Drainage - Sections
5530-104-C-039	Proposed Transporter Road and Dock Facility - Plan
5530-104-C-040	Proposed Transporter Road and Dock Facility - Cross Sections
5530-104-C-041	Proposed Transporter Road and Dock Facility - Sections
5530-104-C-042	Methanol Plant Grading, Roads and Drainage - Sections

EQUIPMENT LIST

NO. REQUIRED	DESCRIPTION
3	Land Based Winches for Positioning of Barges
1	Dozer for Dock Maintenance and Reshaping Barge Slip Bed
1	Mobile Crane - 150 Ton Capacity Minimum
1	Mobile Crane - 50 Ton Capacity
2	Fork Lifts
1	Front End Loader
1	Pick-up Truck
1	12 Foot Powered Utility Boat
2	Car Puller for Railroad Car Unloading
1	Building 60' x 50' (Offices/Equipment Shelter)
1	Communication Center (Dock/Tug/Central Communication Center)



SCALING RULES
5530-104-C-036
250' x 1160'
PROCESSING AREA CONSTRUCTION RUN-OFF DETENTION POND # 2161
EXISTING GRADE
℄ DRAINAGE DITCH
SECTION A -
248' x 148'
AERATION BASIN # 401-2508
MATCH LINE "A"
30' ROAD
FINISHED GRADE EL.
SECTION A -
MATCH LINE "B"
FINISHED GRADE EL.
℄ DRAINAGE DITCH
FINISHED GRADE EL.
30' ROAD
℄ R.R.
SECTION A
30' ROAD
℄ DRAINAGE DITCH
FINISHED GRADE EL.
FINISHED GRADE EL.
SECTION B
℄ R.R.
FINISHED GRADE EL.
℄ R.R.
℄ DRAINAGE DITCH
S.1000
EXISTING GRADE
℄ DRAINAGE DITCH
MATCH LINE "A"
SECTION B - B (C-037)
DESCRIPTION
BY
CH.
APPROVED
DATE
ISSUED FOR REPORT
DESCRIPTION
BY
CH.
APPROVED
DATE
D
C
B
A



FOR PLOT PLAN SEE DWG. 5530-104-C-037

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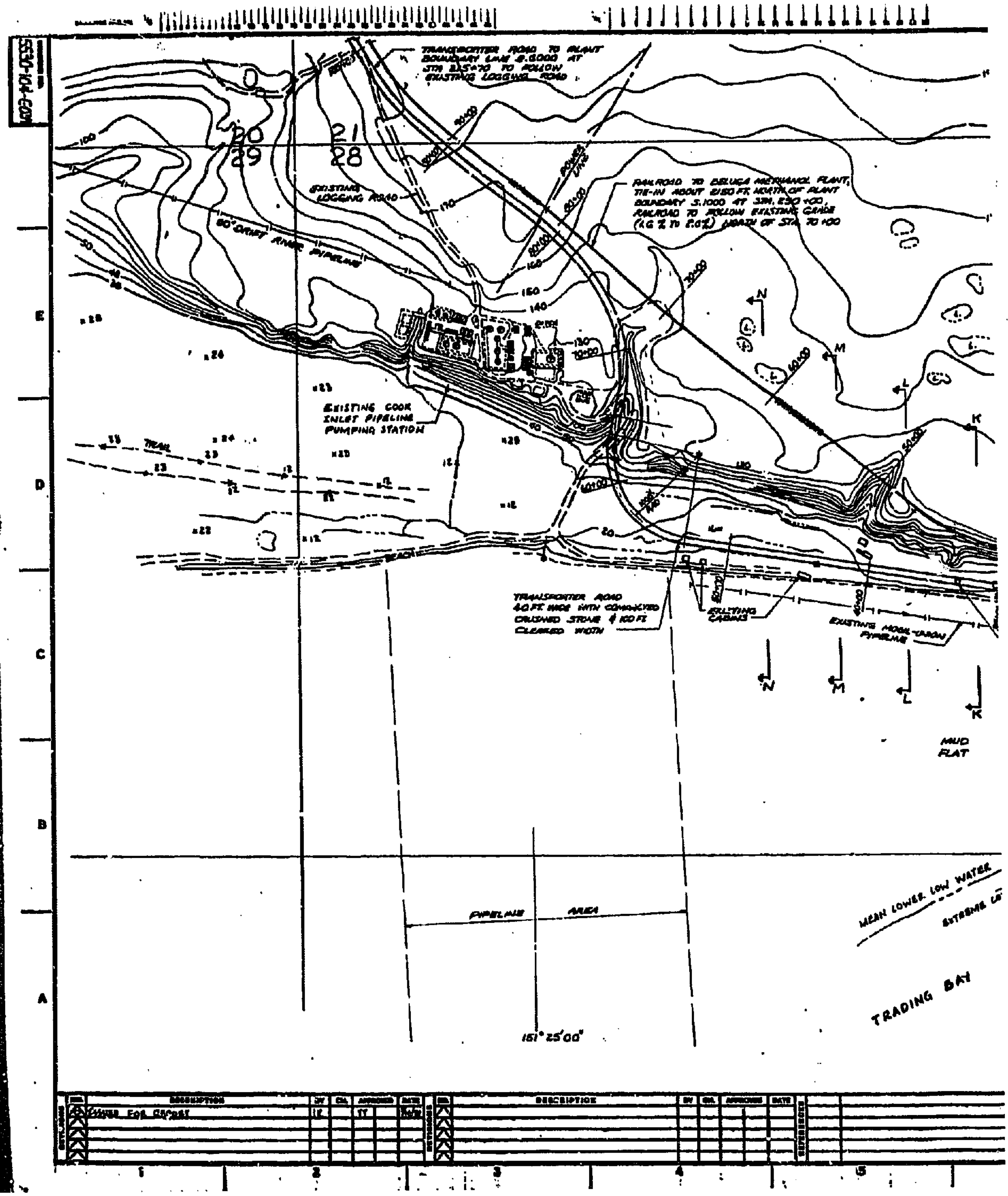
BELUGA METHANOL PROJECT
COOK INLET, ALASKA

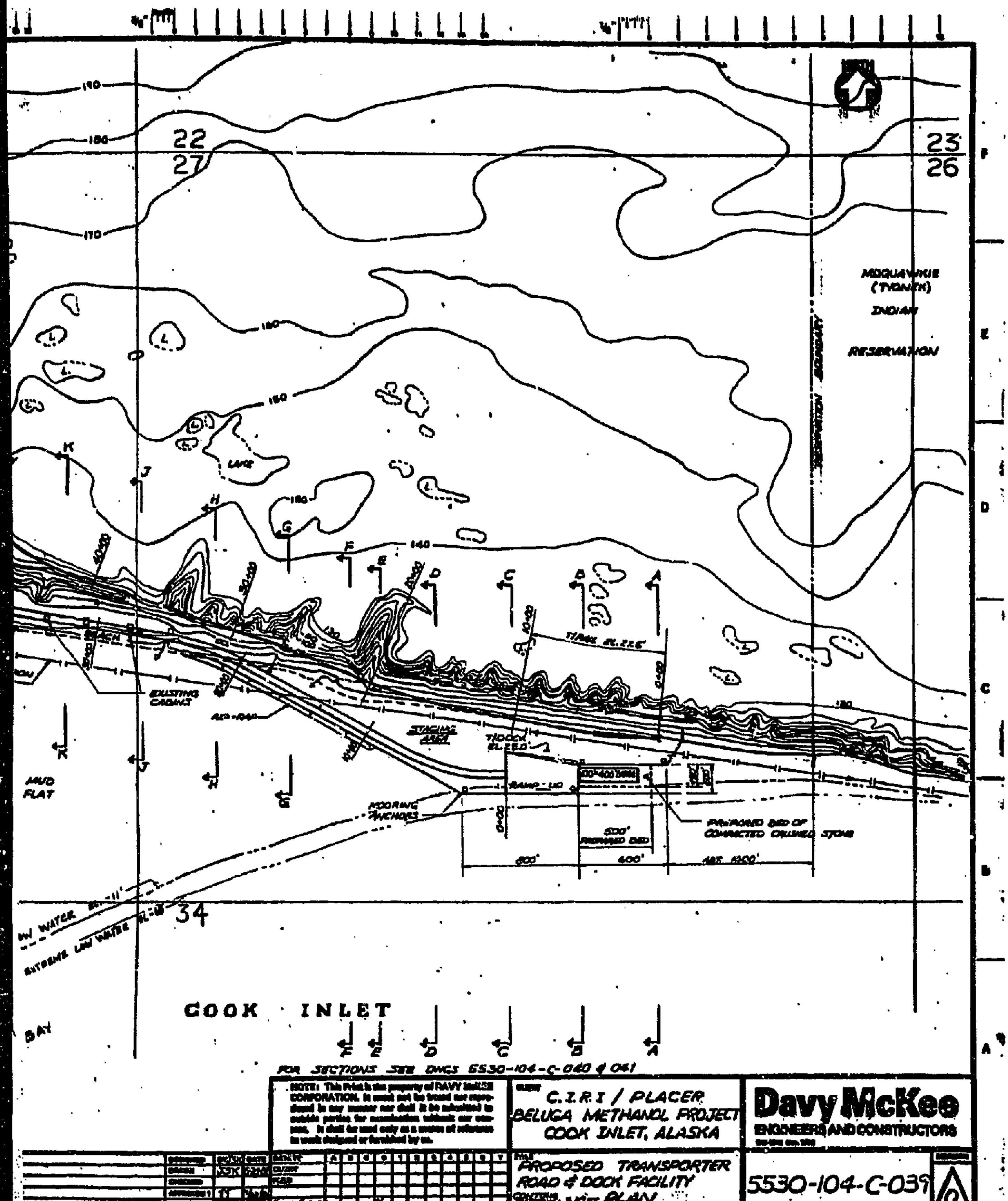
Davy McKee
ENGINEERS AND CONSTRUCTORS

TITLE: METHANOL PLANT
GRADING, ROADS, DRAINAGE
SECTIONS

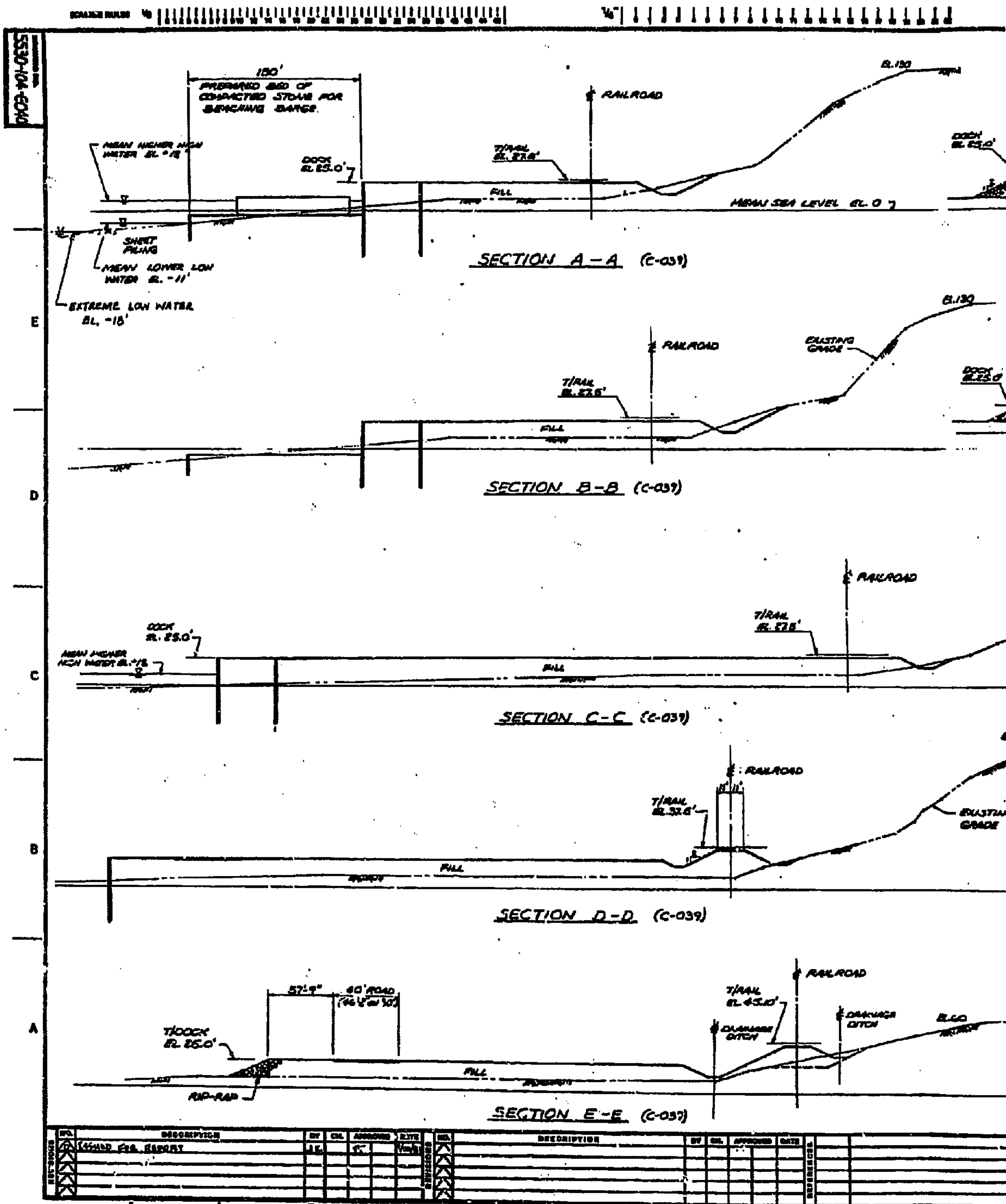
SCALE 1" = 50 FT.

5530-104-C-038

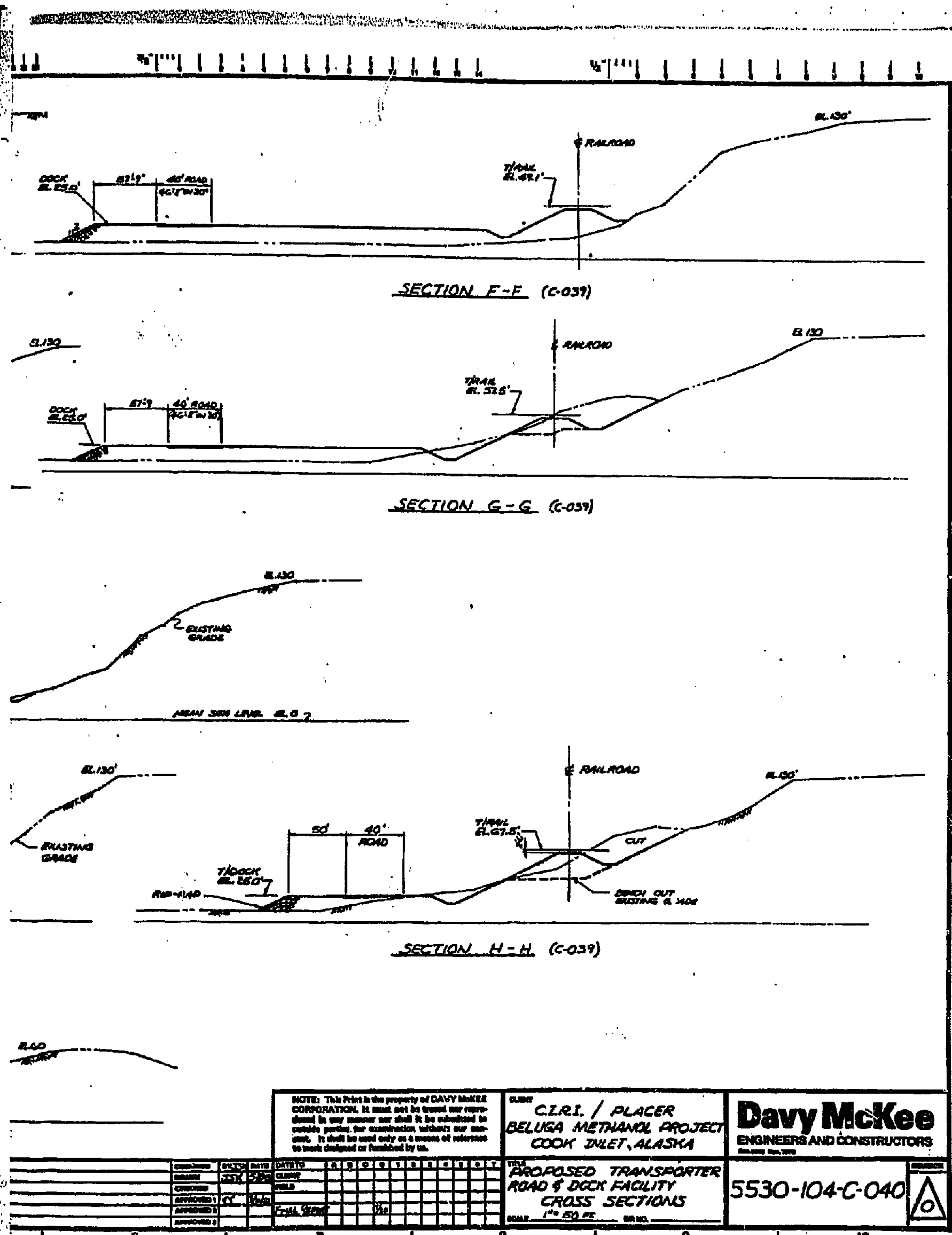

TRANSPORTER ROAD TO PLANT BOUNDARY LINE S.6000 AT STA 215+70 TO FOLLOW EXISTING LOGGING ROAD
20
29
21
28
POWER LINE
EXISTING LOGGING ROAD
RAILROAD TO BELUGA METHANOL PLANT, TIE-IN ABOUT 2150 FT. NORTH OF PLANT BOUNDARY S.1000 AT STA. 230+00, RAILROAD TO FOLLOW EXISTING GRADE (1.6% TO 2.0%) NORTH OF STA. 70+00
50" DRIFT RIVER PIPELINE
EXISTING COOK INLET PIPELINE PUMPING STATION
TRAIL
BEACH
TRANSPORTER ROAD 40 FT. WIDE WITH COMPACTED CRUSHED STONE & 100 FT. CLEARED WIDTH
EXISTING CABINS
EXISTING MOBIL-UNION PIPELINE
MUD FLAT
PIPELINE AREA
MEAN LOWER LOW WATER
TRADING BAY
151° 25' 00"
DESCRIPTION
ISSUED FOR REPORT
A
B
C
D
E
1
2
3
4
5



22
27
23
26
MOQUAWKIE
(TYONEK)
INDIAN
RESERVATION
LAKE
140
150
160
170
180
190
EXISTING CABINS
STAGING AREA
TIDOCK EL.25.0
RAMP
MOORING ANCHORS
PREPARED BED OF COMPACTED CRUSHED STONE
500' PREPARED BED
MUD FLAT
34
COOK INLET
BAY
FOR SECTIONS SEE DWGS 5530-104-C-040 & 041
C.I.R.I / PLACER
BELUGA METHANOL PROJECT
COOK INLET, ALASKA
Davy McKee
ENGINEERS AND CONSTRUCTORS
PROPOSED TRANSPORTER
ROAD & DOCK FACILITY
PLAN
5530-104-C-039
0



5530-104-E040
150'
PREPARED BED OF COMPACTED STONE FOR BEACHING BARGE
MEAN HIGHER HIGH WATER EL. +12'
DOCK EL 25.0'
T/RAIL EL. 27.6'
℄ RAILROAD
EL.130
FILL
MEAN SEA LEVEL EL. 0
SHEET PILING
MEAN LOWER LOW WATER EL. -11'
EXTREME LOW WATER EL. -15'
SECTION A-A (C-039)
EXISTING GRADE
SECTION B-B (C-039)
SECTION C-C (C-039)
T/RAIL EL. 32.6'
SECTION D-D (C-039)
60' ROAD
T/DOCK EL. 25.0'
RIP-RAP
T/RAIL EL. 45.0'
℄ DRAINAGE DITCH
SECTION E-E (C-039)
DESCRIPTION
ISSUED FOR REPORT



RAILROAD
DOCK EL 25.0'
87'-9"
40' ROAD
T/RAIL EL. 47.1'
EL. 130'
SECTION F-F (C-039)
EL 130
RAILROAD
DOCK EL 25.0'
87'-9
40' ROAD
T/RAIL EL. 52.5'
EL 130
SECTION G-G (C-039)
EL 130
EXISTING GRADE
MEAN SEA LEVEL EL 0
EL 130'
EXISTING GRADE
RAILROAD
EL 130'
50'
40' ROAD
T/RAIL EL. 67.5'
CUT
T/DOCK EL. 25.0'
RIP-RAP
BENCH CUT EXISTING GRADE
SECTION H-H (C-039)
EL 40
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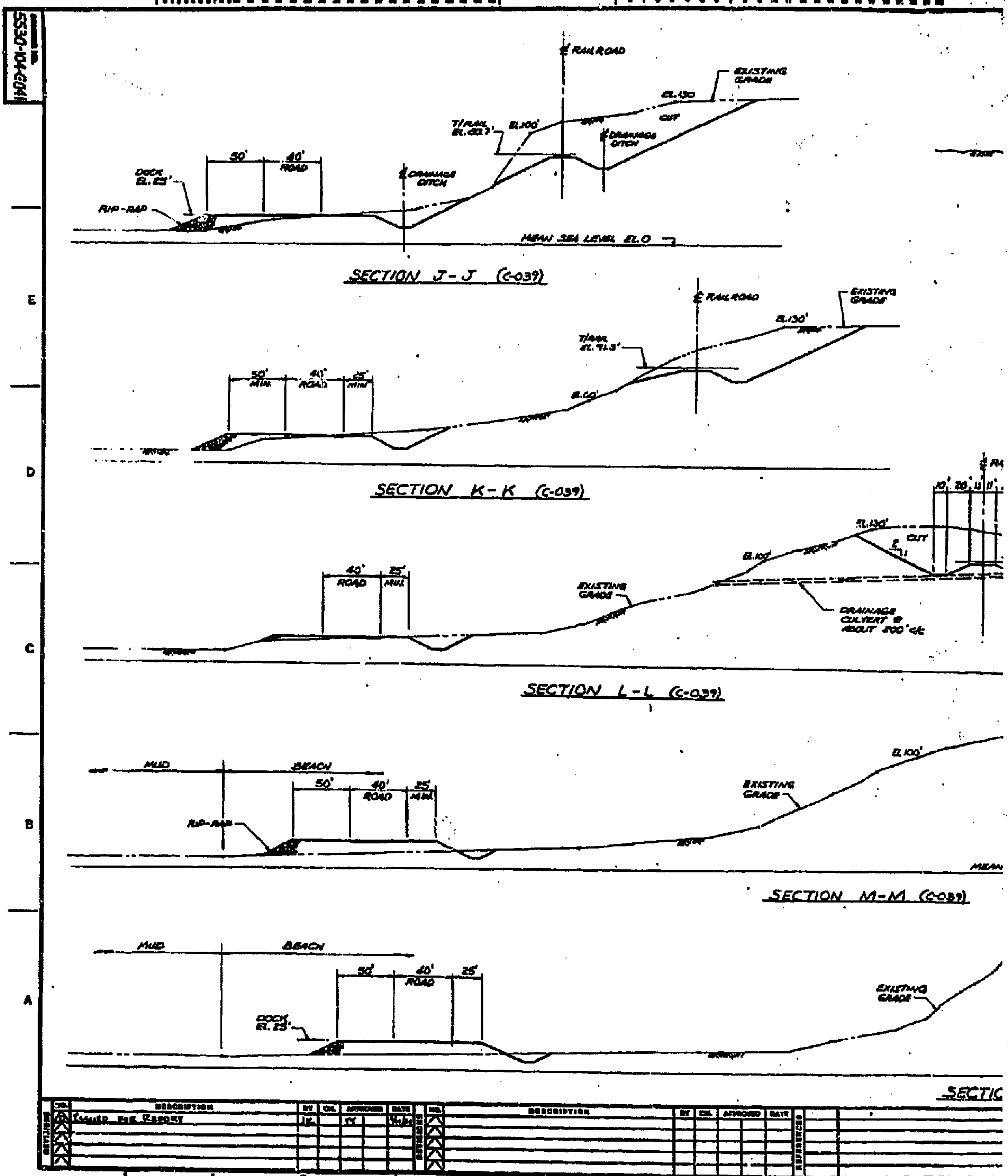
BELUGA METHANOL PROJECT
COOK INLET, ALASKA
Davy McKee
ENGINEERS AND CONSTRUCTORS
TITLE
PROPOSED TRANSPORTER ROAD & DOCK FACILITY CROSS SECTIONS
SCALE 1" = 50 FT.
5530-104-C-040
0



5530-104-C041
℄ RAILROAD
EXISTING GRADE
EL.130
CUT
EL.100'
℄ DRAINAGE DITCH
50'
40' ROAD
DOCK EL. 25'
RIP-RAP
MEAN SEA LEVEL EL.0
SECTION J-J (C-039)
EL.130'
50' MIN
40' ROAD
25' MIN
EL.60'
SECTION K-K (C-039)
EL.130'
EL.100'
EXISTING GRADE
DRAINAGE CULVERT @ ABOUT 200' c/c
SECTION L-L (C-039)
MUD
BEACH
RIP-RAP
EL.100'
SECTION M-M (C-039)
DOCK EL. 25'
SECTIC
DESCRIPTION
BY
CH.
APPROVED
DATE
ISSUED FOR REPORT
E
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A
1
2
3
4
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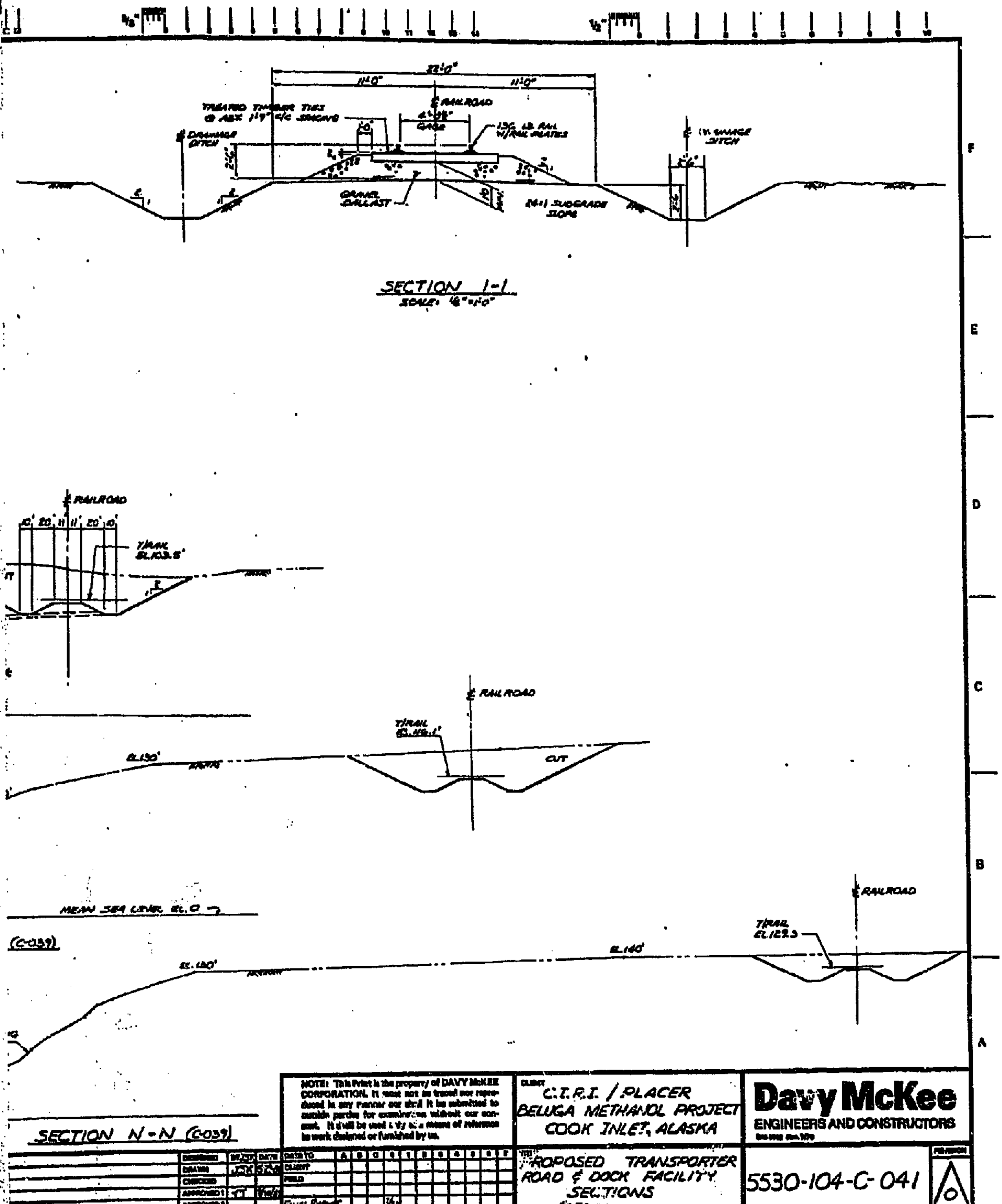

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BELUGA METHANOL PROJECT
COOK INLET, ALASKA

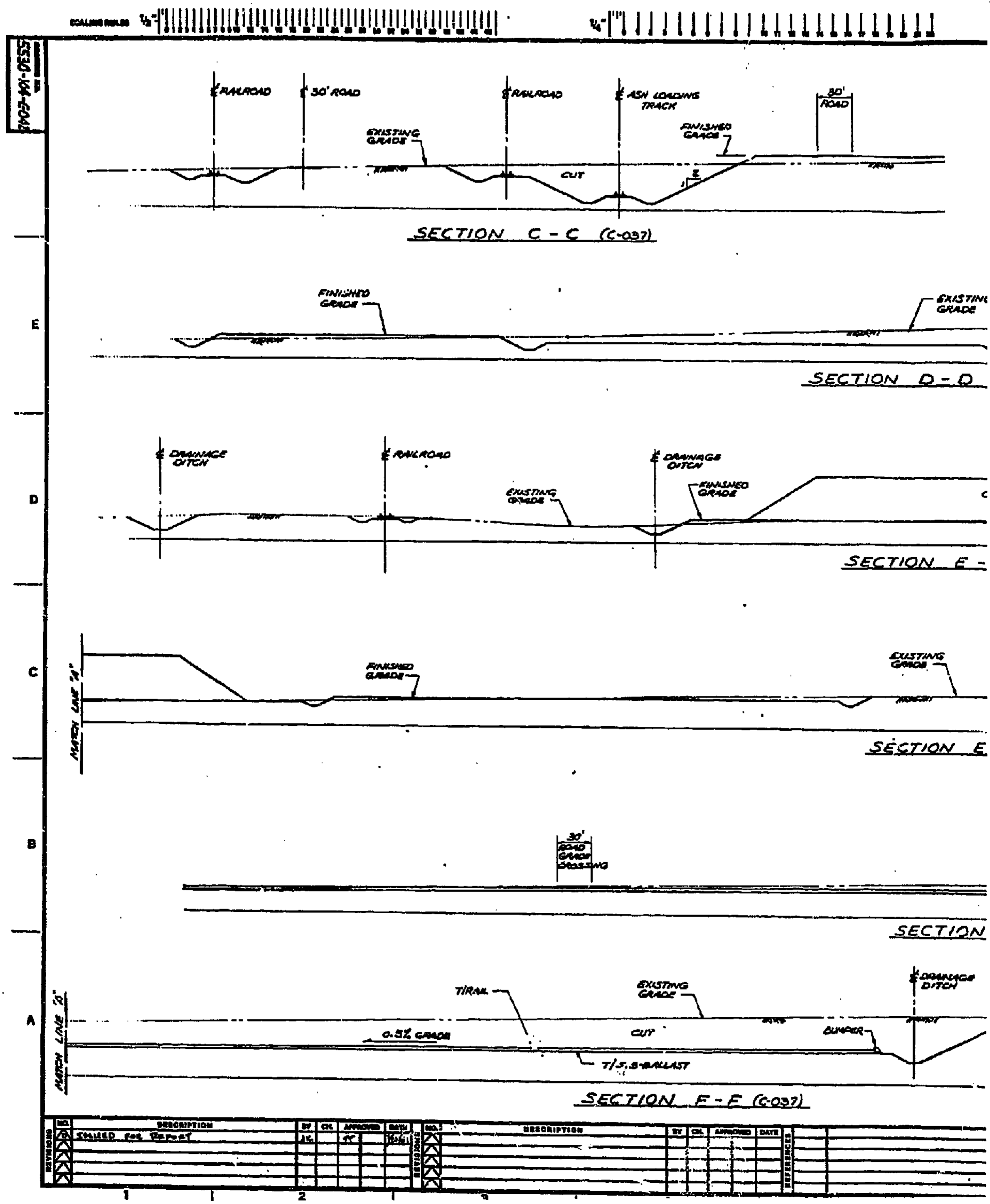
TITLE: PROPOSED TRANSPORTER ROAD & DOCK FACILITY SECTIONS

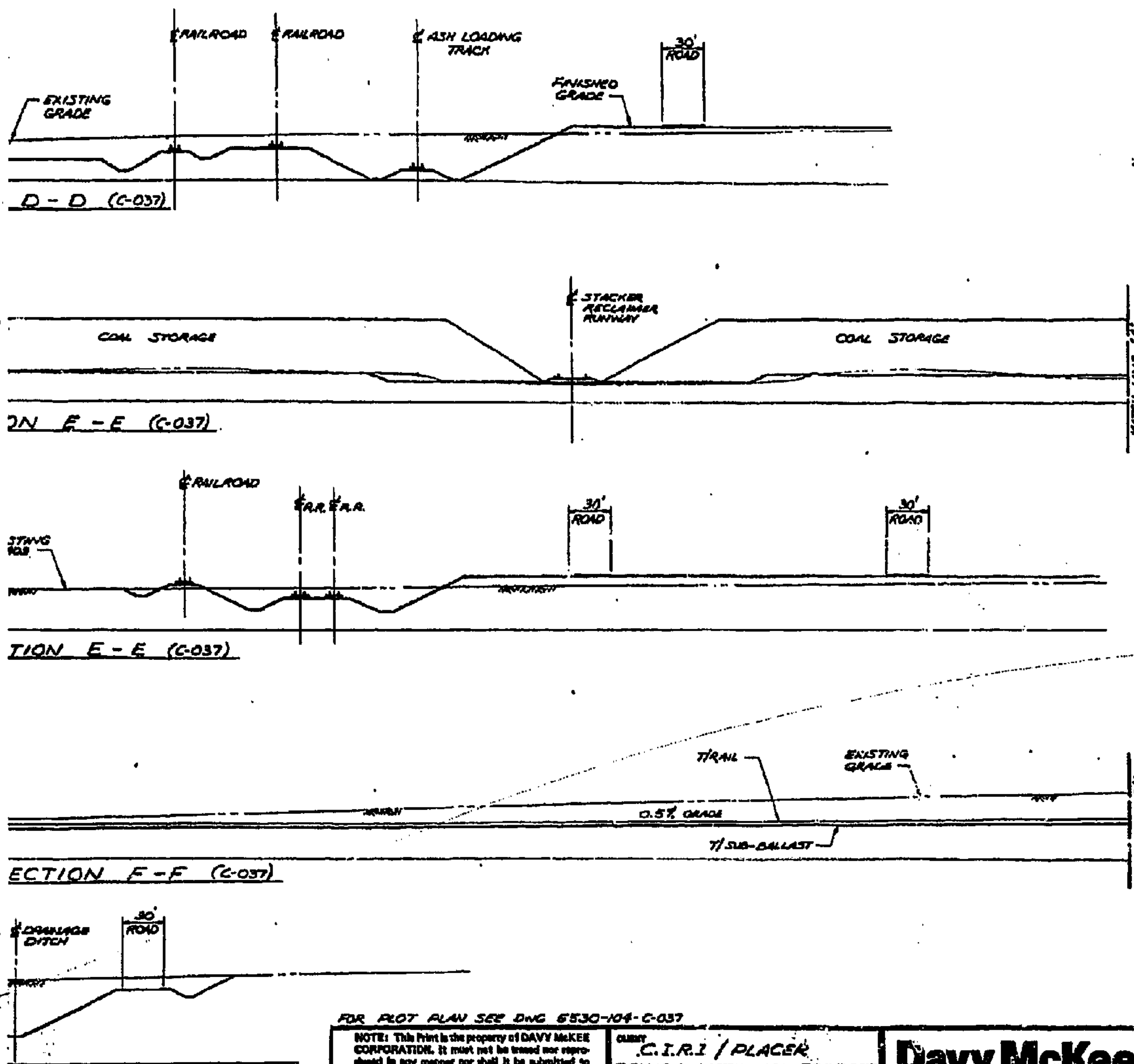
SCALE: 1"=50 FT

Davy McKee
ENGINEERS AND CONSTRUCTORS

5530-104-C-041

REVISION: 0


5530-104-E042
SCALING RULES
℄ RAILROAD
℄ 30' ROAD
℄ RAILROAD
℄ ASH LOADING TRACK
30' ROAD
EXISTING GRADE
FINISHED GRADE
CUT
SECTION C - C (C-037)
FINISHED GRADE
EXISTING GRADE
SECTION D - D
℄ DRAINAGE DITCH
℄ RAILROAD
℄ DRAINAGE DITCH
EXISTING GRADE
FINISHED GRADE
SECTION E -
MATCH LINE "A"
FINISHED GRADE
EXISTING GRADE
SECTION E
30' ROAD GRADE CROSSING
SECTION
MATCH LINE "A"
T/RAIL
EXISTING GRADE
℄ DRAINAGE DITCH
0.5% GRADE
CUT
BUMPER
T/S.S-BALLAST
SECTION F - F (C-037)
E
D
C
B
A
REVISIONS
NO.
DESCRIPTION
ISSUED FOR REPORT
BY
CK.
APPROVED
DATE
REFERENCES
1
2



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CLIENT: C.I.R.I / PLACER
BELUGA METHANOL PROJECT
COOK INLET, ALASKA

Davy McKee
ENGINEERS AND CONSTRUCTORS

	BY	DATE
DESIGNED	JSK	
DRAWN	JSK	6-5-81
CHECKED		
APPROVED 1	JT	1/26/82
APPROVED 2		
APPROVED 3		

DATE TO: CLIENT / FIELD / Final Report

TITLE: METHANOL PLANT
GRADING, ROADS, DRAINAGE
SECTIONS

SCALE: 1" = 50 FT.

5530-104-C-042

REVISION: 0

SECTION 4.0
BUS SYSTEM

4.1 General

The purpose of the bus system is to transport mine workers between the town and the mines. The distance from the town to the Chuitna Mine is approximately 9 miles; and from the town to the Capps Mine, approximately 19 miles.

The system comprises a fleet of 13 buses, 10 operating and 3 spares; and 3 terminals, one at each mine and one at the townsite.

The buses are diesel powered 47 passenger units, designed for heavy duty over harsh terrain under severe weather conditions.

4.2 Operations

The manning schedule for the mines (Table 4-1 on page 4/3) shows a requirement for 430 workers during the first shift, 275 on the second shift, and 355 on the third. Thus, ten buses are required for each shift change - six buses for the Chuitna crews and four for the Capps crews.

Each group of buses travels as a convoy, drops off arriving workers, picks up those from the previous shift, and returns to the town. There will be times when buses will leave or return with light passenger loads, or empty, because of the varying number of workers on each shift.

The buses will use the 40 foot wide access road which parallels the railroad to the mines. This is a graded gravel road with bridges and culverts for stream crossings, used by maintenance trucks, pickup trucks, and on occasion by coal trucks. It is kept open in winter with snow removal equipment mounted on maintenance trucks.

Dispatchers maintain radio contact with each other and with bus drivers, to handle schedule changes or resolve any situations arising with buses en route.

4.3 Bus Terminals and Garage

The terminals at the mines are small, insulated steel buildings with heating and ventilation, washroom facilities, benches for waiting passengers, and dispatcher's offices.

The bus terminal at the townsite includes a garage used for storage, cleaning and minor maintenance of buses. This building includes washroom, locker and lunchroom facilities for drivers and an office for the dispatcher. One bay in the garage is reserved for routine maintenance.

Bus interiors are cleaned by the drivers during storage. Exteriors are cleaned at washing facilities located at the mines.

4.4 Maintenance and Repair

All major repairs, component exchanges and scheduled maintenance procedures will be done by the general maintenance shop at the methanol plant.

4.5 Bus System Personnel Requirements

Operation of the bus system will require a personnel complement of approximately 20 men. This will include 3 dispatchers, 2 bus mechanics capable of handling road emergencies, and 15 drivers. In addition to their primary responsibilities, these employees will be assigned such other duties as may be required for operation of the system.

TABLE 4-1
COAL MINES MANPOWER SCHEDULE

	Shift			
	1	2	3	Swing
CAPPS MINE				
Plant Office	65	5	15	5
Maintenance Operations	-	-	105	5
Coal Operations	95	95	-	10
Overburden Operations	30	30	30	35
Total	190	130	150	55
CHUITNA MINE				
Central Office	40	5	5	5
Plant Office	65	5	15	5
Central Repair	-	-	40	-
Maintenance Operations	-	-	105	5
Coal Operations	95	95	-	10
Overburden Operations	30	30	30	35
Ash Handling	10	10	10	10
Total	240	145	205	70
Grand Total	430	275	355	125

SECTION 5

CIRI - H&N
ANCHORAGE, ALASKA

PREPARED FOR
COOK INLET REGION, INC.
AND
PLACER AMEX, INC.
SEPTEMBER 1981

BELUGA METHANOL PROJECT

CONCEPTUAL CAMP, AIRPORT, AND TOWNSITE DEVELOPMENT PLAN

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

INTRODUCTION

This conceptual plan provides preliminary guidance for the initial consideration and eventual development of 1) a construction camp for 3,000 persons; 2) an airport capable of serving Lockheed Hercules aircraft; and 3) a permanent townsite for 2,600 to 4,200 persons (including project workers and their families). Based on a review of selected available information regarding the physical and land use characteristics of the project area and relevant socioeconomic trends of the surrounding Cook Inlet region, the following more significant conclusions have been determined. Each of these conclusions are discussed more fully within subsequent sections of this report.

CAMP DEVELOPMENT

The most appropriate method of camp development for the support of the Beluga Methanol Project is believed to be the use of prefabricated and preinstalled modules which are readily available from local contractors and manufacturers in Alaska, as well as larger camp manufacturers in the Gulf Region of the United States.

The development of a 3,000-person camp in the project area will cost approximately $25,120,700 (midpoint, 1981 dollars). This preliminary estimate includes costs associated with construction mobilization, facility erection and assembly, and utility development and installation.

Camp operation and maintenance (O/M) costs will vary as the size of the camp fluctuates. For example, a 50-person camp in the project area can be operated for approximately $70 per person per day while O/M costs for a 3,000-person camp will be approximately $32 per person per day.

The water source for the campsite would ideally be obtained from the existing aquifer in the vicinity of the townsite utility complex in order that the same supply could eventually be used in conjunction with the permanent townsite. However, this approach will only be cost-effective if the campsite is located within 1.5 miles of the permanent townsite.

A significant salmon fishery is present within Nikolai Creek along Cook Inlet (Arminsky, 1981). Consequently, careful planning and coordination with the State Department of Fish and Game and the State Department of Environmental Conservation will be required during the design phase of the camp sewage system to ensure that fishery resources in this area will not be significantly affected by the upstream discharge of tertiary-treated effluent.

The minimum power requirement anticipated for the campsite is approximately 7.0 megawatts (MW). However, should more detailed engineering studies during Phase IIA of the project indicate that sufficient quantities of natural gas are readily available, approximately 4.1 MW could possibly be deleted from the total electrical power requirements.

AIRPORT DEVELOPMENT

One general transport aircraft which has proven successful in the transport of construction materials and equipment, general cargo, and passengers to remote camps and communities in Alaska is the Lockheed Hercules.

An airport capable of serving Lockheed Hercules aircraft under normal and crosswind conditions can be developed in the project area for approximately $6,078,003. This preliminary estimate assumes the use of construction equipment already mobilized for camp development, as well as the local availability of gravel.

Even though no substantive field investigations or resource analyses were made in conjunction with this planning effort, a cursory field reconnaissance of the project area and gross review of general soils data suggest that the project area is probably characterized by a significant amount of saturated soils and swampy muskeg areas. Consequently, design of the airport runway and support facilities must recognize the potentially damaging mechanisms of frost heave and progressive frost jacking of objects within the freezing zone, as well as the settlement or softening (loss of bearing capacity) of the soil upon thawing (Smith, Reed, et al, 1979).

The minimum total power requirement estimated for the airport facility is approximately 251 kilowatts (kW). However, should more detailed engineering studies during Phase IIA of the project indicate that sufficient quantities of natural gas are available for project use, approximately 206 kW could possibly be deleted from the total electrical power requirements.

Given the limited quantity of potable water required, potable water and fire department supply at the airport can be trucked on a weekly basis from the townsite water treatment and storage facility to the airport.

Camp and airport O/M activities can be effectively combined. However, union rules may somewhat restrict the use of O/M workers on a combination basis. Assuming that some degree of combined use can occur, the costly duplication of labor and heavy equipment requirements can be significantly reduced.

TOWNSITE DEVELOPMENT

The townsite is highly significant to the overall project in terms of its potential impact on employee morale and efficiency, work force continuity, and the general perception of the project by adjacent Cook Inlet Basin communities.

Given the preliminary assumptions regarding the potential financial participation by the project and other investors (Tables 12 and 13), it is estimated that the level of financial responsibility anticipated for townsite development will be as generally follows.

Agency	Amount
Project	$ 18 million
Other Investors	85 million
Total	$103 million

The permanent townsite will centralize basic commercial, educational, and community services facilities in order to enhance provisions for these service in terms of reduced construction and O/M costs, and personal convenience to future town residents. These facilities, as well as some limited multiunit housing, will comprise the central core of the townsite which will be financed and constructed incrementally by the project and other investors. Surrounding the central core of the townsite will be the development of single family, townhouse, and multiunit residential neighborhoods. These neighborhoods will be developed and financed by a private residential builder. Individual housing units will be marketed by a local real estate sales organization.

Circulation within the townsite will initially be accomplished primarily through the use of small 20- and 45-passenger buses, as well as pedestrian and combination bicycle/cross-country ski trails throughout the town. However, the use of private automobiles may eventually be permitted.

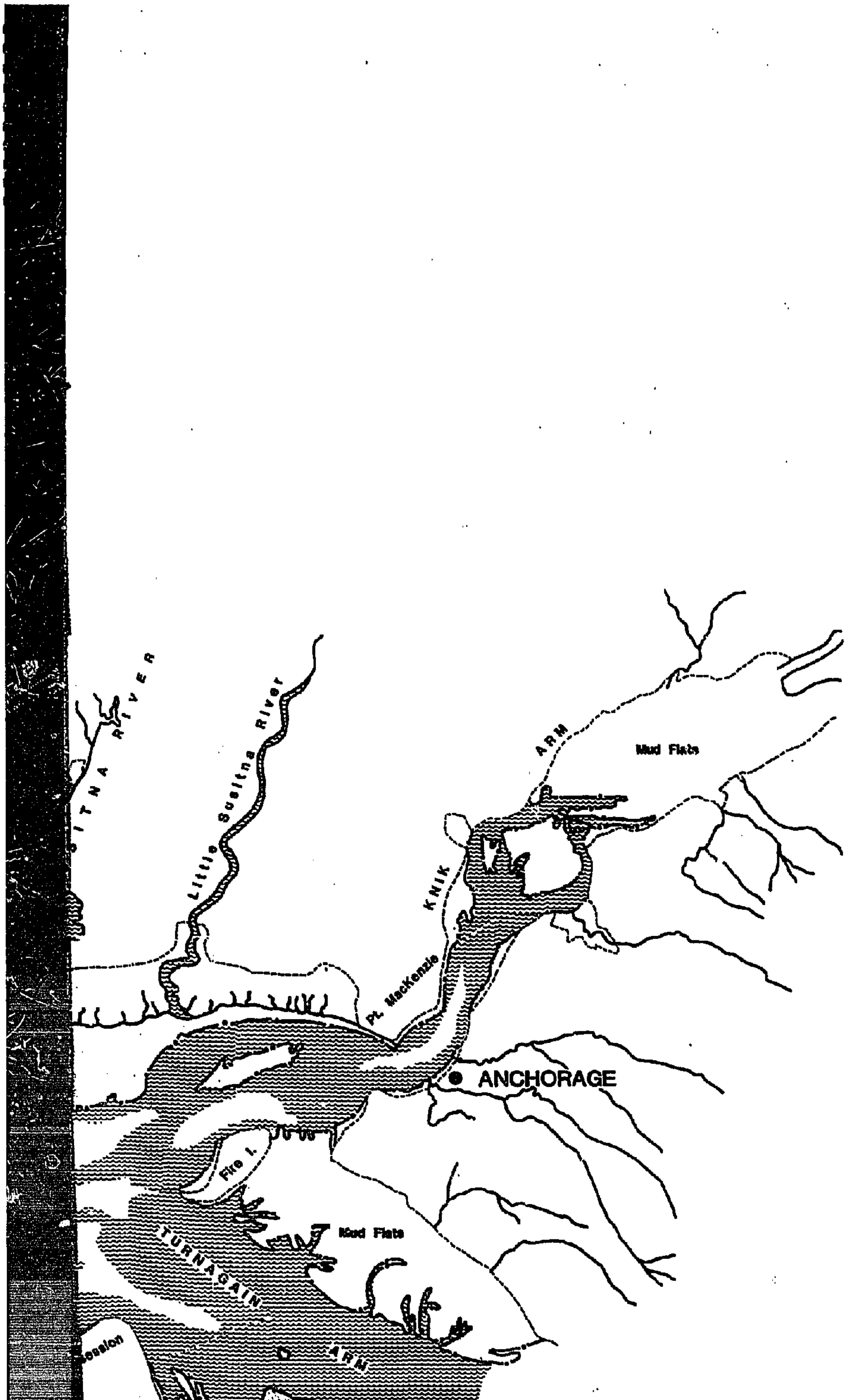
Similar to other rural Alaskan communities, school facilities will serve as a community center for both community education, as well as indoor and outdoor recreation. Access to other nearby recreational opportunities such as fishing, hiking, hunting, and camping will also be provided.

The sewage treatment process will consist of the four 50,000-gallon package plants previously utilized for the construction camp, as well as three additional 50,000-gallon package plants necessary to accommodate the increased sewage quantities.

The minimum power requirement anticipated for the townsite is approximately 25.9 megawatts (MW). However, should more detailed engineering studies during Phase IIA of the project indicate that sufficient quantities of natural gas are readily available, approximately 21.0 MW could possibly be deleted from the total electrical power requirements.

The operation and maintenance of the new town will be accomplished most ideally through the use of single O/M organization for all facility complexes, residential neighborhoods, and utility systems. However, due to the variety of tasks required, the availability of a single contractor capable of providing such a broad range of O/M services may be limited.

INTRODUCTION

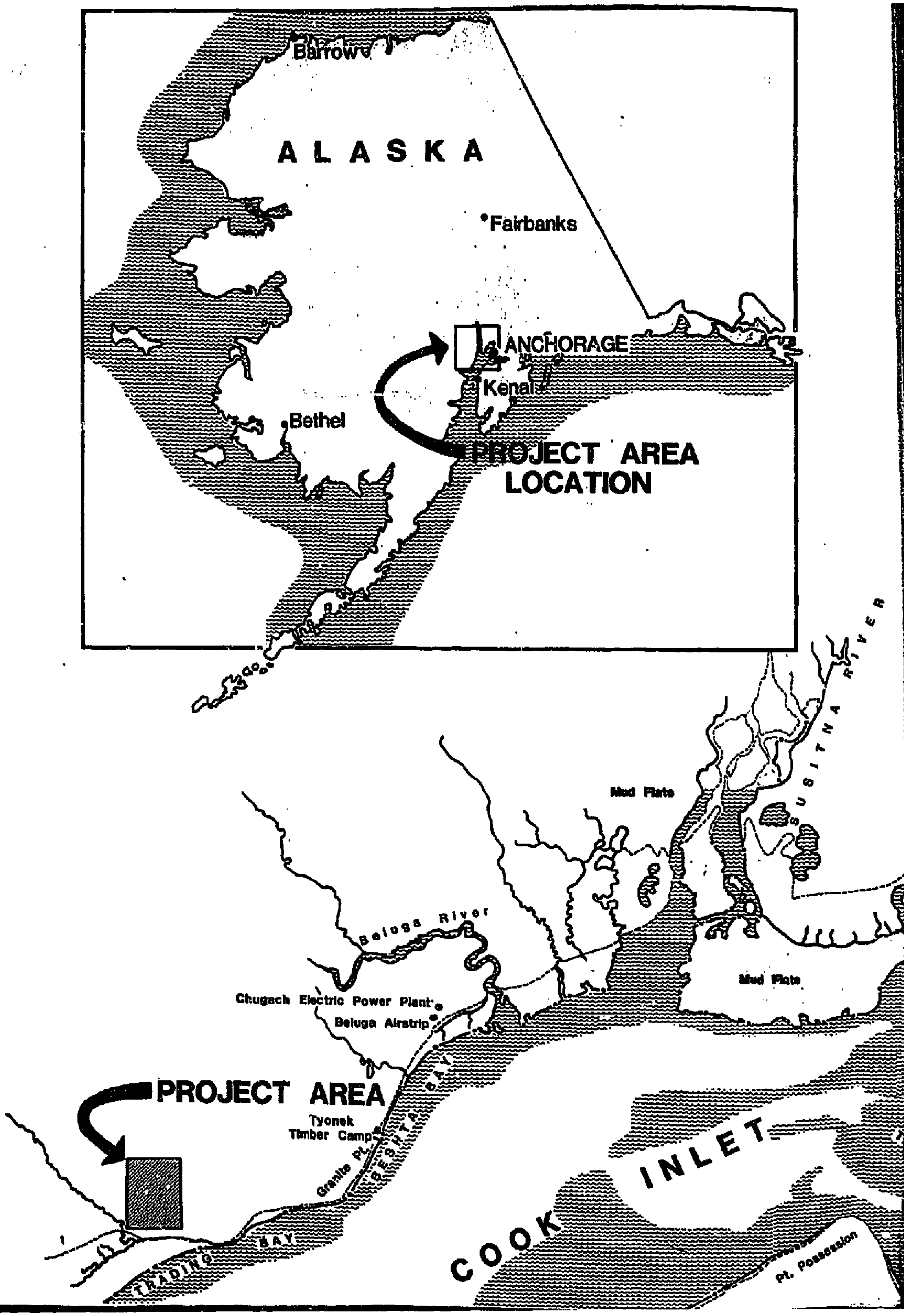


CIRI / H & N
ANCHORAGE, ALASKA

CONCEPTUAL CAMP, AIRPORT, and TOWNSITE DEVELOPMENT PLAN

BELUGA METHANOL PROJECT

REGIONAL LOCATION OF PROJECT AREA
FIGURE 1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Mud Flats
Beluga River
Mud Flats
Chugach Electric Power Plant
Beluga Airstrip
PROJECT AREA
Tyonek Timber Camp
Granite Pt.
BESHTA BAY
TRADING BAY
COOK INLET
Pt. Possession

INTRODUCTION

PURPOSE OF THE PLAN

This plan is intended to assist Cook Inlet Region, Inc., and Placer Amex, Inc. (CIRI/PLACER) in its evaluation of community facilities and services which will be required to support construction and O/M personnel associated with the Beluga Methanol Project. The concepts and related cost estimates presented in this document will also provide the basis for consideration of various alternative approaches to providing community facilities and services even though more specific attention is given to the potential development of these facilities and services within the project area (Figure 1).

SCOPE OF THE PLAN

Plan Objectives

The approach used in developing this Conceptual Camp, Airport, and Townsite Development Plan generally included the analysis and determination of the following:

- Conceptual facility, service, and equipment requirements necessary to develop a 3,000-person construction camp within the project area.

- Conceptual runway and facility design criteria, O/M services and heavy equipment required to develop and operate an airport capable of serving Lockheed Hercules and commuter air traffic within the project area.

- Conceptual housing, related community services and facilities, and general design criteria necessary to develop a small town within the project area for approximately 2,600 to 4,200 permanent residents.

- Gross estimates of mobilization, construction, and O/M costs associated with the development of the proposed construction camp, airport, and townsite.

Study Limitations

Site selection is not incorporated with the scope of these conceptual planning considerations. Consequently, the conceptual plans presented do not reflect a detailed review and assessment of various regional and site characteristics. Rather, only a cursory review was made of selected available information regarding the physical and land use characteristics of the project area and relevant socioeconomic trends of the surrounding Cook Inlet region. In addition, limited coordination was made with appropriate governmental agencies concerning general design criteria for the proposed airport, utility systems, and educational facilities.

Planning Assumptions

In order to pursue the preparation of conceptual plans and related analysis for this effort, several overall project assumptions were established. The following assumptions were primarily determined by CIRI/PLACER with some limited assistance by CIRI/H&N:

- Development of the construction camp, mine, methanol plant, airport and permanent townsite will commence during the first quarter of 1984 and continue through the fourth quarter of 1987.

- The construction and operational work forces anticipated for the project are summarized in Table 1. However, the size of the construction work force will vary from approximately 20 construction workers in the first quarter of 1984, to a peak of approximately 3,000 workers during the third and fourth quarters of 1986, and the first quarter of 1987. Consequently, camp construction activity will be undertaken on an incremental basis.

- Upon completion of construction activities in 1987, it is anticipated that operation and maintenance of the mine, methanol plant, campsite, and townsite will sustain a work force of approximately 850 to 1,600 persons for an indefinite period. Of this amount, approximately 200 workers will be single individuals choosing living in apartments or multifamily housing units. The remaining work force will be married and will reside in single family residential housing.

- One option to the permanent townsite is the continued use of construction camp facilities beyond the construction phase of the project. Should this option be exercised, rotating crews (without families) working seven days on/seven days off during the O/M phase of the project, will be transported to and from the campsite by air service to Anchorage and/or Kenai.

TABLE 1

ANTICIPATED CONSTRUCTION AND OPERATION WORKFORCE

BELUGA METHANOL PROJECT

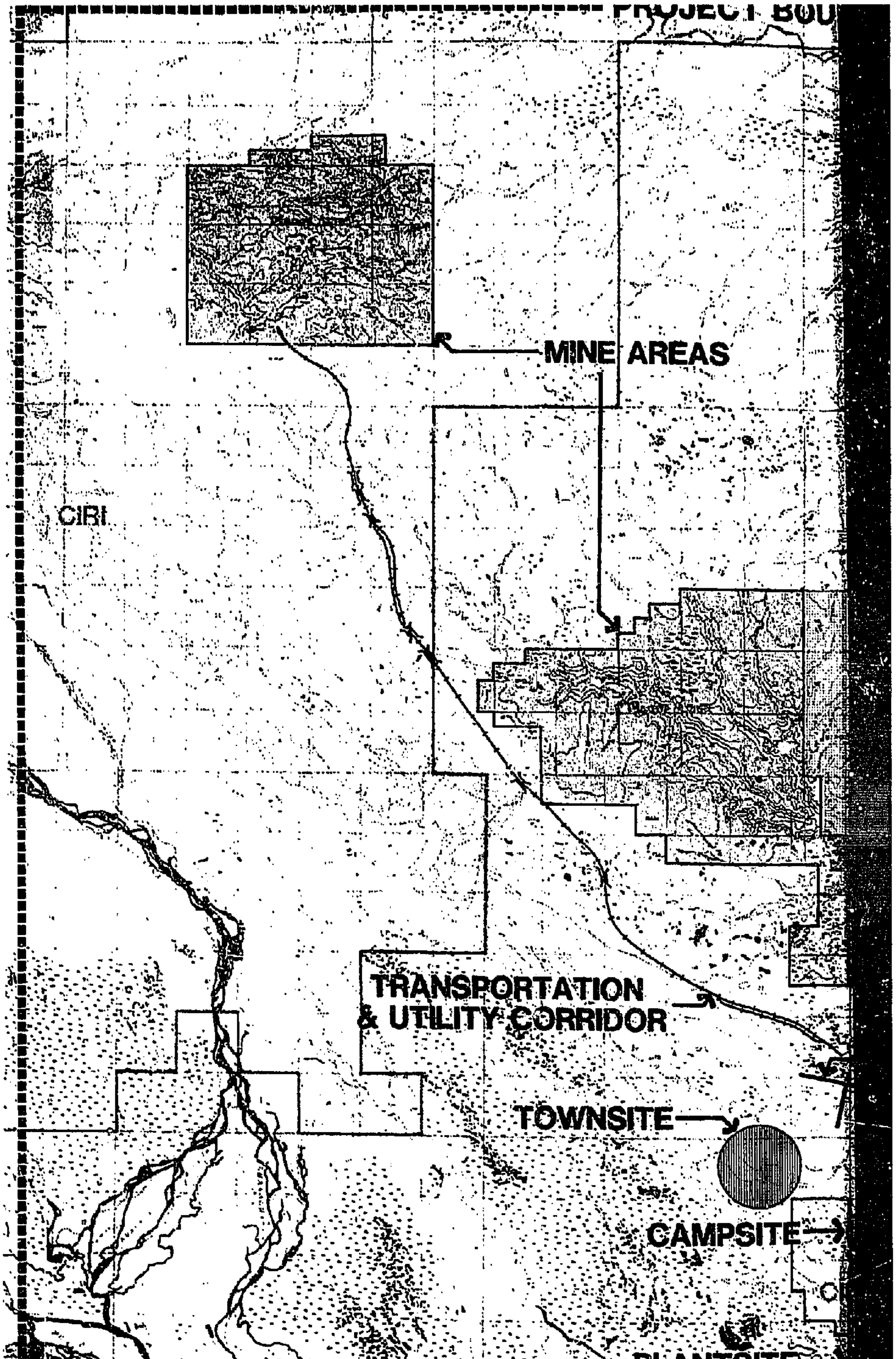
Number of Anticipated Personnel

General Project Activity	1984 1Q	1984 2Q	1984 3Q	1984 4Q	1985 1Q	1985 2Q	1985 3Q	1985 4Q	1986 1Q	1986 2Q	1986 3Q	1986 4Q	1987 1Q	1987 2Q	1987 3Q	1987 4Q
Field Management	10	15	25	30	35	55	85	120	145	175	190	190	190	145	95	90
Camp Support	5	30	55	60	65	95	115	145	180	185	185	185	185	175	130	125
Infrastructure Development*		200	330	350	350	350	320	300	240	170	110	80	60	40		
Methanol Plant Construction*					50	310	620	920	1230	1545	1735	1715	1545	720		
Coal Mine Construction						30	140	250	350	350	350	350	350	350	350	220
Miscellaneous	5	20	35	40	45	75	115	155	195	230	250	250	250	195	130	125
Mine Operation										120	180	230	300	350	410	470
Plant Operation													120	350	450	450
TOTAL	20	265	445	480	545	915	1395	1890	2340	2775	3000	3000	3000	2325	1565	1480

*Based on current Davy McKee direct construction manhour estimate and 750 MH's/Quarter.

Project Area Location

The project area is located approximately 60 miles southwest of Anchorage on the west side of upper Cook Inlet (Figures 1 and 2). Upslope of Trading Bay, the project area encompasses approximately 575 square miles which are situated within the Kenai Peninsula Borough.


PROJECT BOU
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TRANSPORTATION
& UTILITY CORRIDOR
TOWNSITE
CAMPSITE
PLANTSITE
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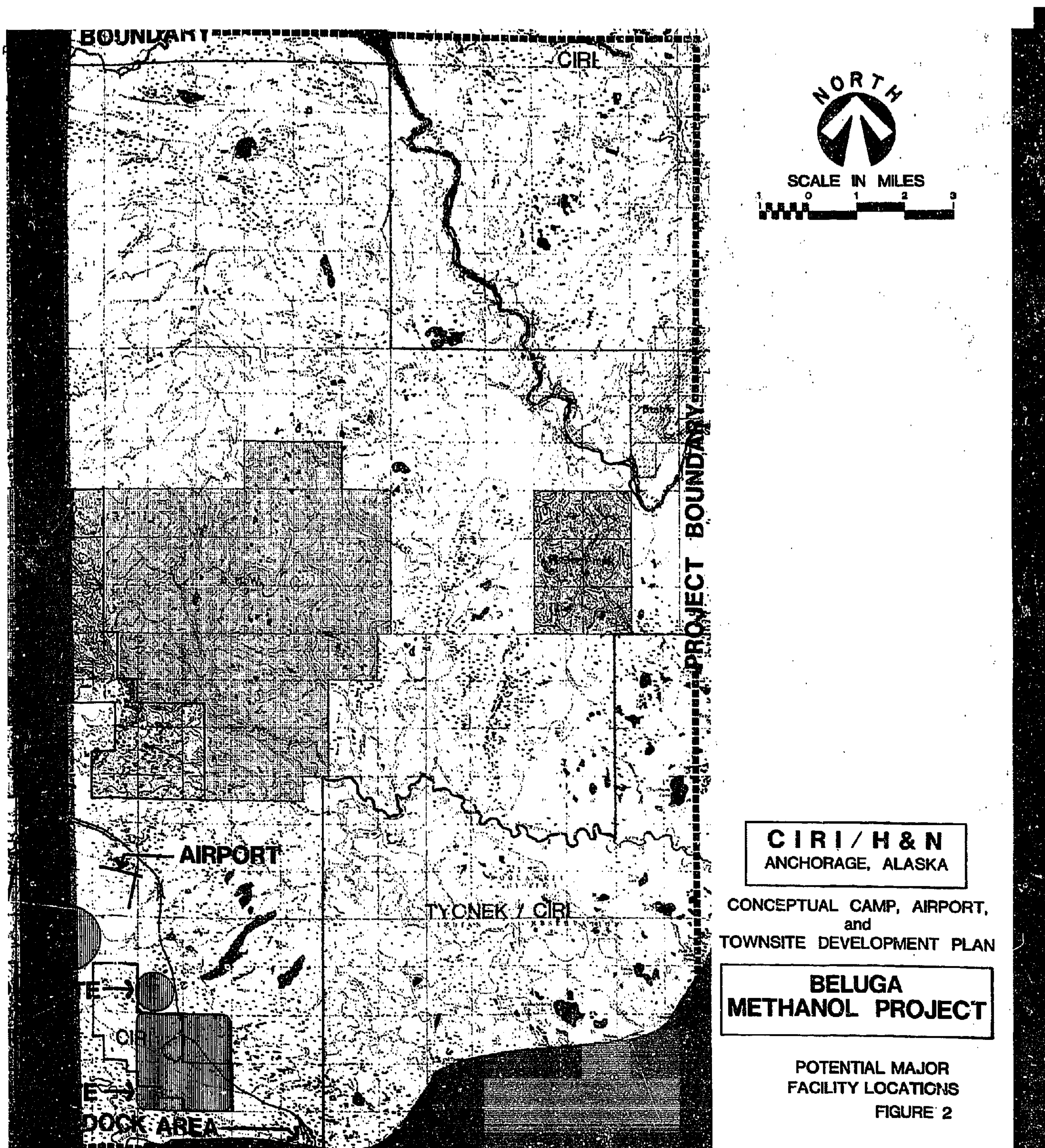

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ANCHORAGE, ALASKA

CONCEPTUAL CAMP, AIRPORT, and TOWNSITE DEVELOPMENT PLAN

BELUGA METHANOL PROJECT

POTENTIAL MAJOR FACILITY LOCATIONS

FIGURE 2

CAMP DEVELOPMENT

CONSTRUCTION CAMP DEVELOPMENT

INTRODUCTION

Camps throughout Alaska are generally quite similar in basic design and configuration. Mobile or short-term camps are generally characterized by prebuilt trailer modules, on skids or tracks, which each serve a specific purpose such as water supply or dining (Smith, Reed, et al, 1979). Dependent on the physical conditions of the regional environment and the anticipated camp population, semipermanent camps are either constructed on-site, or consist of prefabricated modules which are assembled together on-site to serve a variety of camp uses. In some semipermanent camps, prebuilt trailer modules containing a specific support function will supplement a camp otherwise consisting of prefabricated modules.

Due to the remote nature of most camps in Alaska, the mobilization of construction materials, prebuilt trailer modules, or prefabricated modules is a primary consideration in camp development. The method and timing of construction mobilization is dependent upon numerous factors such as the location of the site, land ownership, the applicability of federal, state, and borough regulations, the availability of fuel, and weather conditions. However, the mobilization of construction materials and prefabricated modules is normally accomplished through the single or combined use of barges, trucks, Lockheed Hercules aircraft, helicopters, cat-trains, CATCO Rolligons, or the Alaska Railroad.

Concepts for the development of a 3,000-person construction camp in the project area are described and analyzed in the following paragraphs in terms of a recommended design approach and general concept; required facilities and general design criteria; O/M labor and heavy equipment requirements; and estimated mobilization, construction, and O/M costs.

RECOMMENDED DESIGN APPROACH AND GENERAL CONCEPT

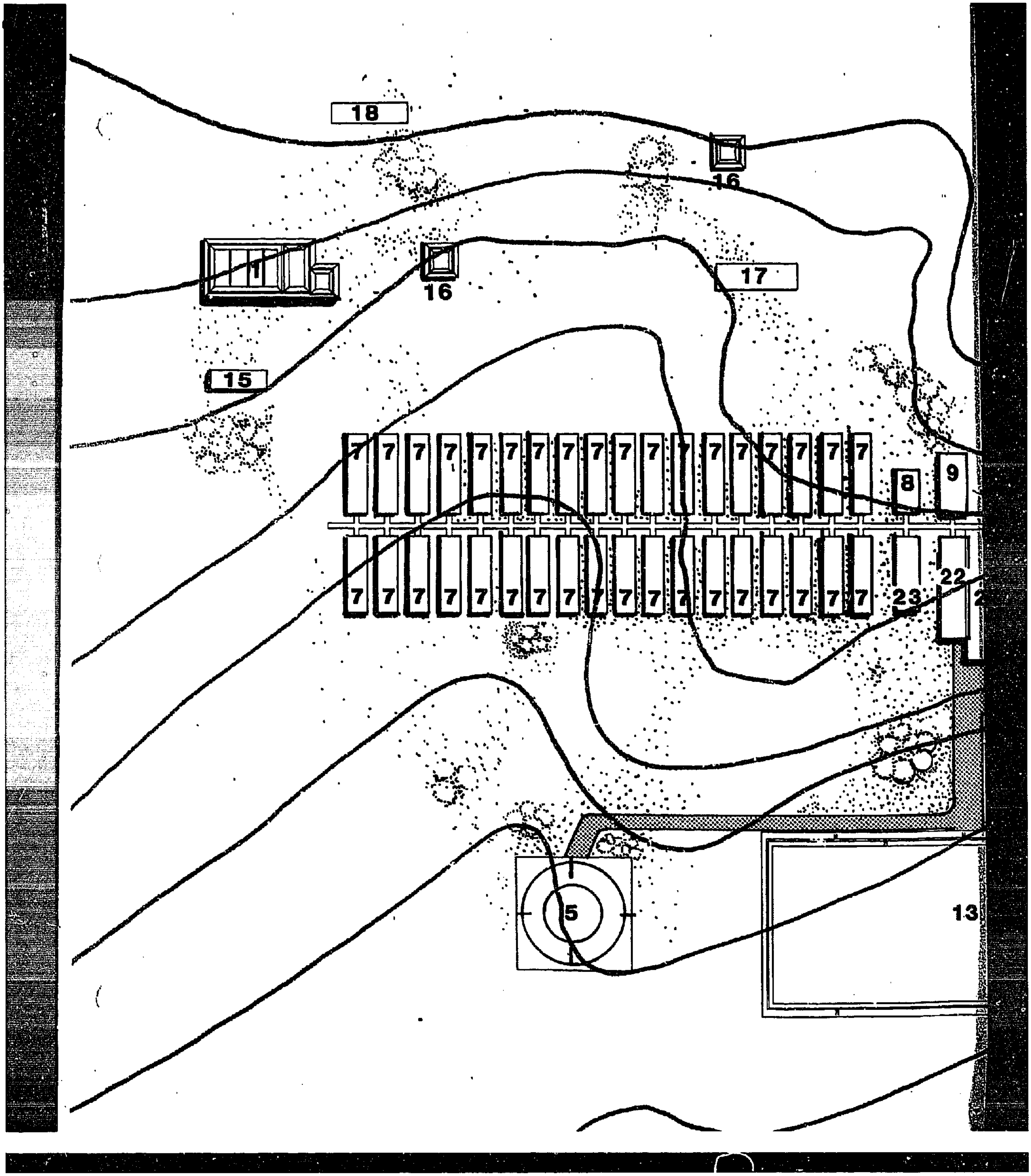
Since remote camp development is already an integral part of the resource development process in Alaska, it is economical and prudent to generally follow the existing camp technology of the area which continually undergoes change as new system improvements are tried and proven by local contractors and entrepreneurs. However, each proposed camp situation usually has some unique site characteristics or special operational requirements which will require some variation from standard camp construction and O/M practice.

Even though the project area is situated only 60 miles from Anchorage, camp facilities must be designed and constructed as a remote community as all construction materials and installed equipment will be transported to the project area by aircraft or barge. Due to the anticipated fluctuations in the size of the construction work force, another significant consideration is the requirement for incremental or phased development. Both of these factors can generate significant front-end development costs for the project unless the proper method of camp contruction is utilized.

The most appropriate method of camp development for the support of the Beluga Methanol Project is believed to be the use of prefabricated and preinstalled modules which are readily available from local contractors and manufacturers in Alaska, as well as larger camp manufacturers located in the Gulf region of the United States. These modules are amenable to air or barge transportation in the Cook Inlet area. More importantly, the modules are adaptable to phased camp development since prefabrication and preinstallation ultimately results in a minimum of field construction activity. Consequently, overall camp development costs are enhanced through more reliable construction mobilization, minimal field construction, and the ability to readily increase or decrease camp facilities without significant additional cost to the project.

The configuration of the camp is important. The relationship of various camp facilities and services has a direct effect on the morale of camp resident and O/M personnel, general safety and security of the facilities, and the daily management of the camp. Figure 3 depicts a typical camp layout for a 3,000-person camp in Alaska which consists of four quadrants of prefabricated preinstalled modules. Each quadrant houses approximately 850 to 900 workers and O/M personnel, and contains its own kitchen/diner and recreation hall. The laundry, first-aid station, warehouse, shops, and administrative offices will all be constructed during the first phase of camp construction and will not be affected by incremental camp development.

The typical camp layout (Figure 3) is adaptable to siting within the project area. However, the camp configuration should be modified prior to final design of the camp layout and module interiors as work force requirements become more definitive and camp O/M services are subcontracted. Otherwise, the project will assume the responsibility and cost for camp modifications which could have been accomodated, at a lesser cost, before initial construction.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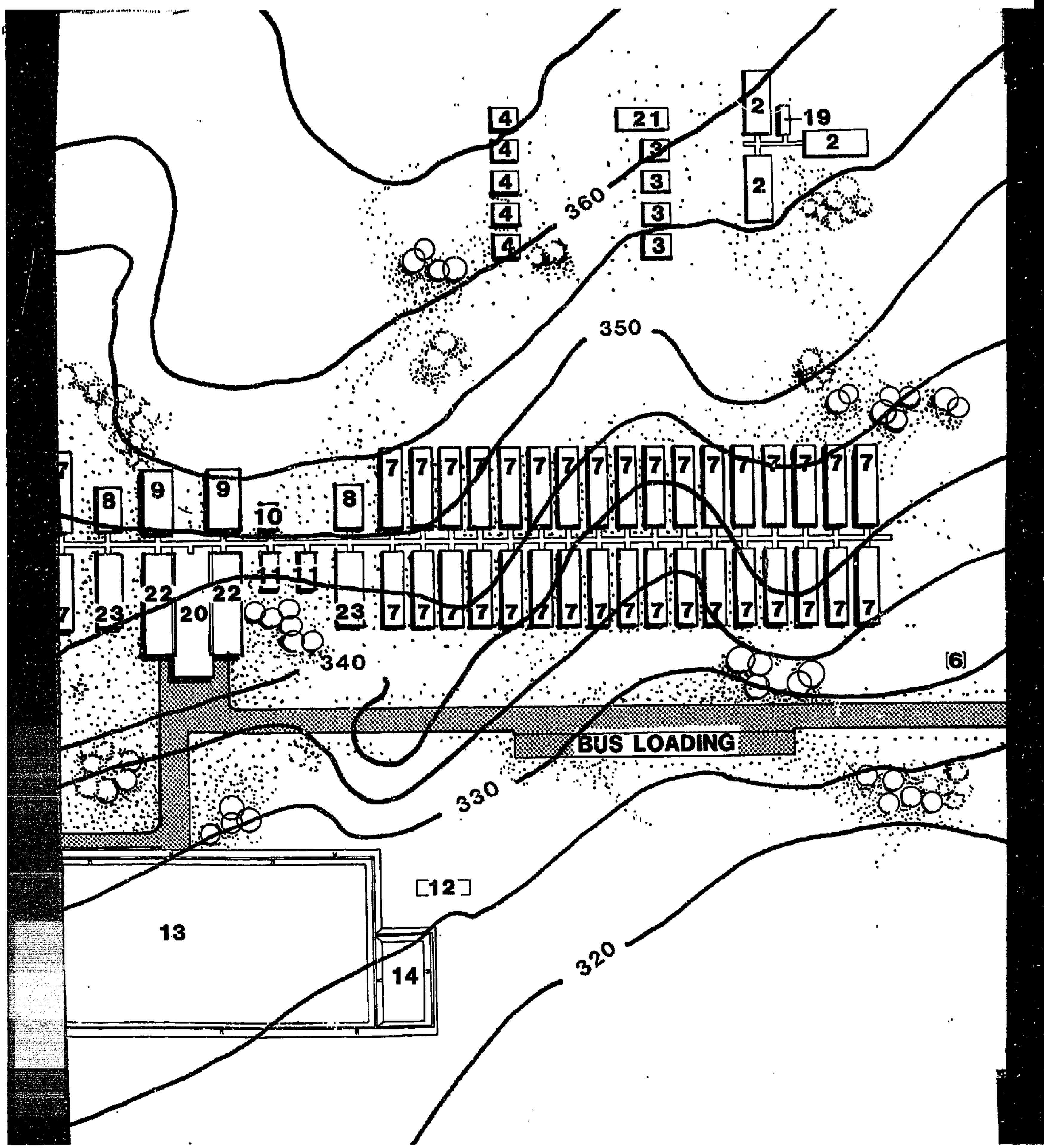

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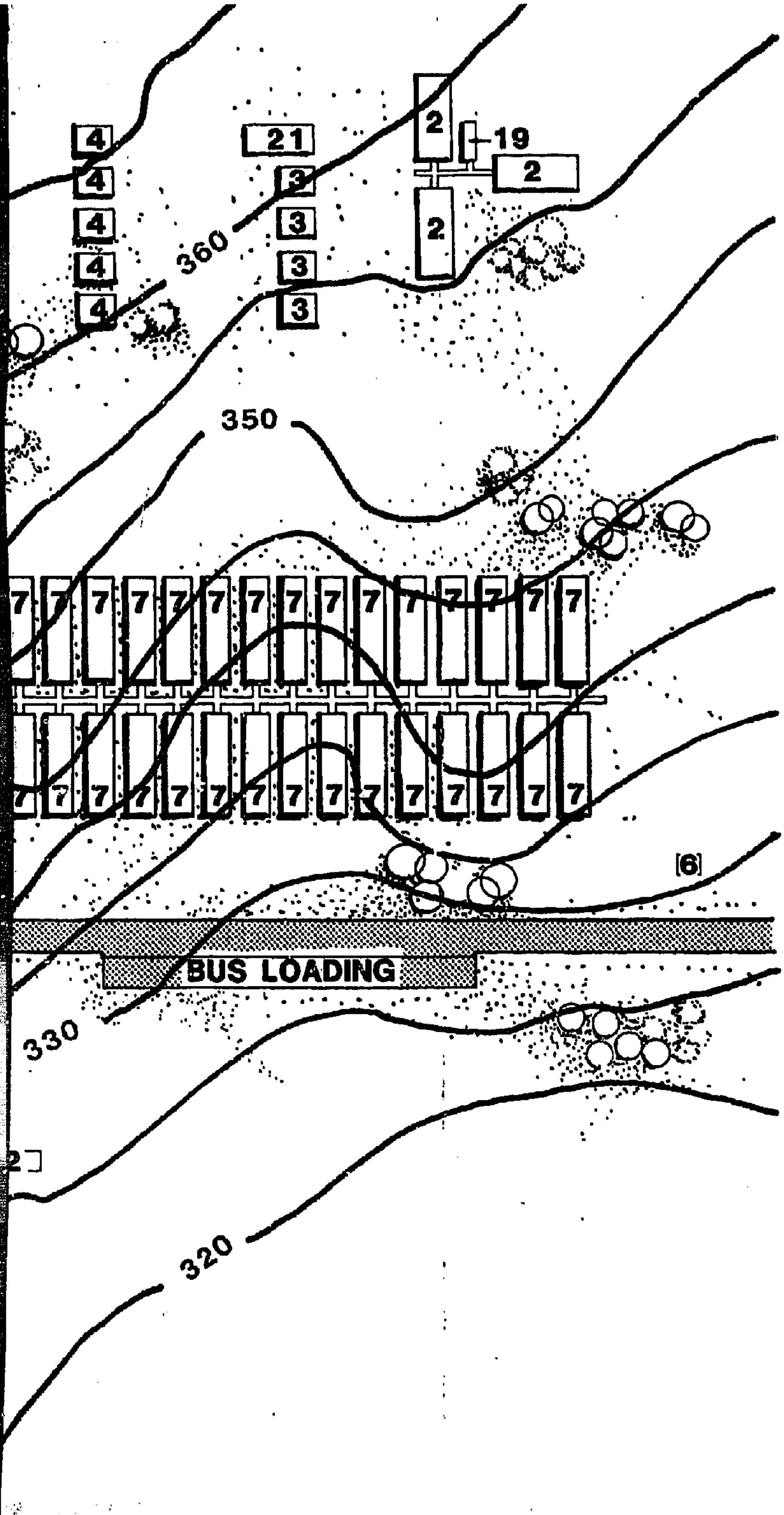

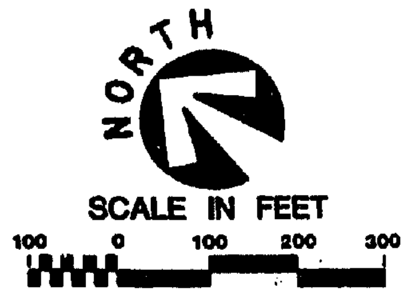

FACILITIES DESCRIPTION

1 Bulk Fuel Storage and Dispensing
2 Offices
3 Shops
4 Warehouses
5 Helipad
6 Security Office
7 52 Man Dormitories
8 500 Man Recreation Hall
9 500 Man Kitchen/Diner
10 First Aid Station
11 500 Man Laundry
12 Sewage Treatment Facilities
13 Flow Control Management Reservoir
14 Five Day Holding Pond
15 Water Treatment Facilities
16 Camp Fuel Tank
17 Electrical Facilities
18 Emergency Fuel Supply
19 Field Toilet
20 Enclosed Loading Area
21 Vehicle Equipment Shop
22 1000 Man Kitchen/Diner
23 1000 Man Recreation Hall

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CONCEPTUAL CAMP, AIRPORT, and TOWNSITE DEVELOPMENT PLAN

BELUGA METHANOL PROJECT

CAMP PLAN
FIGURE 3

REQUIRED FACILITIES AND GENERAL DESIGN CRITERIA

Introduction

Within the following paragraphs, more specific attention is given to the relationship, size, and orientation of support facilities considered necessary for a 3,000-person camp in the project area. These brief descriptions are intended to provide conceptual design parameters for the ultimate design of the camp facilities.

Dormitories

Dormitory areas in the typical camp layout are approximately 144- by 35- by 8-foot modules which can accommodate 52 persons. Given the anticipated peak camp population of approximately 3,000 construction workers, including support personnel, approximately 62 of these sleeper modules will ultimately be required for the camp. In addition to normal bed furniture, each sleeper module will generally contain complete washroom, shower and toilet facilities; clothes washers and dryers; closets; chairs; and other camp amenities.

Kitchen/Diner

Standard prefabricated and preinstalled kitchen/diner modules are readily available in sizes accomodating 125, 250, 500 and 1,000 persons. Assuming the incremental development of four modular quadrants (Figure 3), two 500-person and two 1,000-person kitchen/diner facilities are provided in the typical camp layout.

However, the 500- and 1,000-person kitchen/diner facilities can accommodate up to 35 percent beyond design capacity for short-term periods as other kitchen/diner facilities are mobilized or demobilized from the camp.

Recreation Hall

The recreation hall is a vital component of any remote camp because of its direct influence on the morale of the construction work force and O/M. Assuming that at least two work shifts are used during full camp loading, it is believed that the ultimate development of two 1,000-person recreation halls will be adequate to provide various indoor recreational opportunities for camp residents. Indoor recreational equipment included within the recreation halls will encourage activities such as table tennis, billiards, and "Foosball." In addition, a small commissary and post office will be incorporated within one of the two 1,000-person recreation halls.

First-Aid Station

A first-aid station will be centrally located within the camp facilities. The station will consist of installed facilities and equipment which will allow medical personnel to 1) assess and stabilize medical emergencies prior to air evacuation of injured workers to major medical facilities in Anchorage; 2) coordinate injury assessment and treatment methods with Anchorage medical specialists; and 3) provide selected outpatient services.

Laundry Facilities

Each 52-person dormitory will contain approximately four domestic clothes washers and dryers which will provide workers with facilities to clean personal clothing. Bed linen and bath towels will ultimately be handled during the nighttime hours by a camp laundry facility which will be capable of processing and cleaning the following approximate daily volumes (Goodman, 1981):

Quantity	Type of Laundry	Approximate Total Weight (Pounds)
1,100	Bedsheets	2,200
550	Pillow cases	330
550	Large bath towels	550
550	Small bath towels	275
550	Wash clothes	150
		3,505

Installed laundry equipment will generally consist of 250-pound commercial washing machines, automatic detergent dispensers, and automatic folding machines.

An alternative to providing on-site laundry facilities at the camp is the daily air transport of bed linen and bath towels to the commerial cleaning facility in Anchorage. This alternative should be assessed in greater detail during preliminary camp design as air transportation costs become more precise.

Utilities

Water Supply, Treatment, and Distribution

Design standards established by the State Department of Labor for camp potable water systems require the use of a minimum potable water consumption rate of 50 gallons per person per day and a flow rate of 2.5 times the average hourly demand (State Department of Labor, 1975). However, given the extent of facilities required for the camp, it is assumed that a consumption rate of approximately 80 gallons per day is more reasonable. Assuming a maximum camp population of approximately 3,000 persons, the anticipated domestic water consumption will be approximately 240,000 gallons per day. The pump at the well and the booster pump will be sized for approximately 417 gallons per minute which includes a peak factor of 2.5 times the average flow to account for maximum peak day water requirements.

Fire flow is the quantity of water in gallons per minute that is required for a specified duration of time to give effective control of a major fire or fires at any designated point within a community. Fire flow criteria by the National Board of Fire Underwriters suggest that the camp should be provided with a fire flow of approximately 1,800 gallons per minute for two hours, or 216,000 gallons.

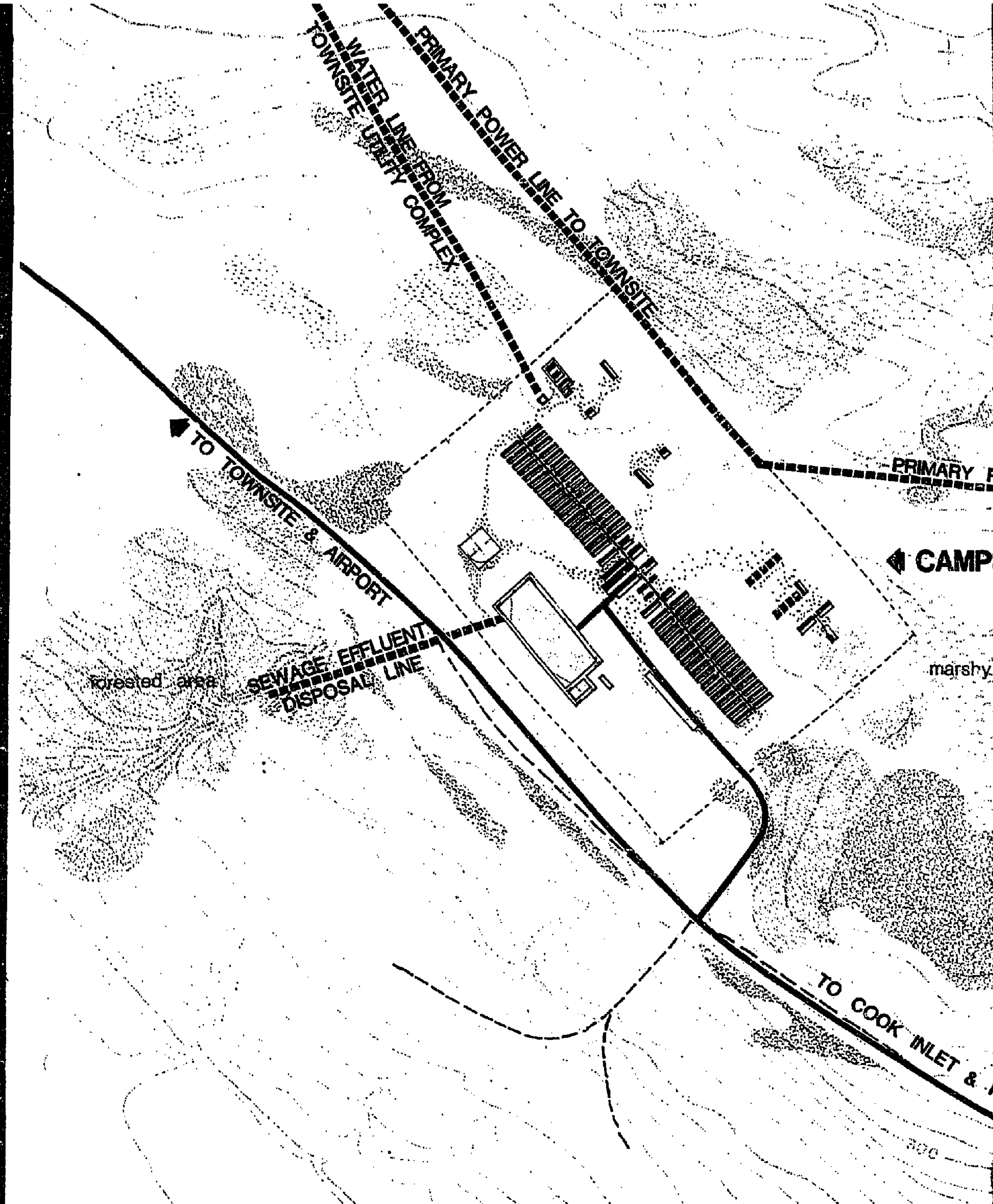
The water source for the campsite would ideally be obtained from the existing aquifer in the vicinity of the townsite utility complex in order that the same supply could eventually be used in conjunction with the permanent townsite. However, this approach will only be cost-effective if the campsite is located within 1.5 miles of the permanent townsite. Whether or not adequate groundwater potential is available to supply the anticipated potable water demand cannot be adequately assessed until test well investigations are undertaken within specific alternate townsite locations. Consequently, several groundwater wells may ultimately be necessary to provide the quantity and flow of potable water required for the camp facility.

The storage requirements for the potable water system will be based on the sum of the fire demand and one-half the daily domestic demand, or a total of 336,000 gallons. This storage will either be a ground storage tank located uphill of the campsite, or an elevated storage tank in the vicinity of the well pump site. While in storage, domestic supplies will undergo some degree of treatment to enhance the acceptability of the potable water by camp residents, and maintain potable water quality at levels which are keeping with the water quality standards of the State Department of Environmental Conservation. Such treatment may include the use of sediment filters; charcoal filters for taste, odor and color removal; water softeners for iron or manganese removal; and iodinators for bacterial disinfection.

Depending on the outcome of test well investigations, a booster pump station may be required to provide the water pressure necessary for potable water storage and distribution. However, every effort will be made to take advantage of gravity flow from the storage tank to the campsite by siting this tank on a high elevation. Otherwise, a single distribution system is presently visualized to provide domestic and fire requirements for the campsite. This system will consist of an approximate 8-inch main transmission line from the townsite utility complex to the campsite (Figure 4). The water transmission line will be installed aboveground in arctic pipe which generally consists of standard metal pipe, polyurethane insulation, electric heat trace, and a corrugated metal pipe cover. Small diameter pipe will be utilized for distribution within the camp.

Sewage Collection, Treatment, and Effluent Disposal

Sewage flows generated by the 3,000-person camp will be at a rate of approximately 60 gallons per person per day (Smith, Reed, et al, 1979), or a total camp flow of approximately 180,000 gallons per day. Variable size collector lines will



WATER LINE FROM TOWNSITE UTILITY COMPLEX
PRIMARY POWER LINE TO TOWNSITE
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CAMPS
TO TOWNSITE & AIRPORT
SEWAGE EFFLUENT DISPOSAL LINE
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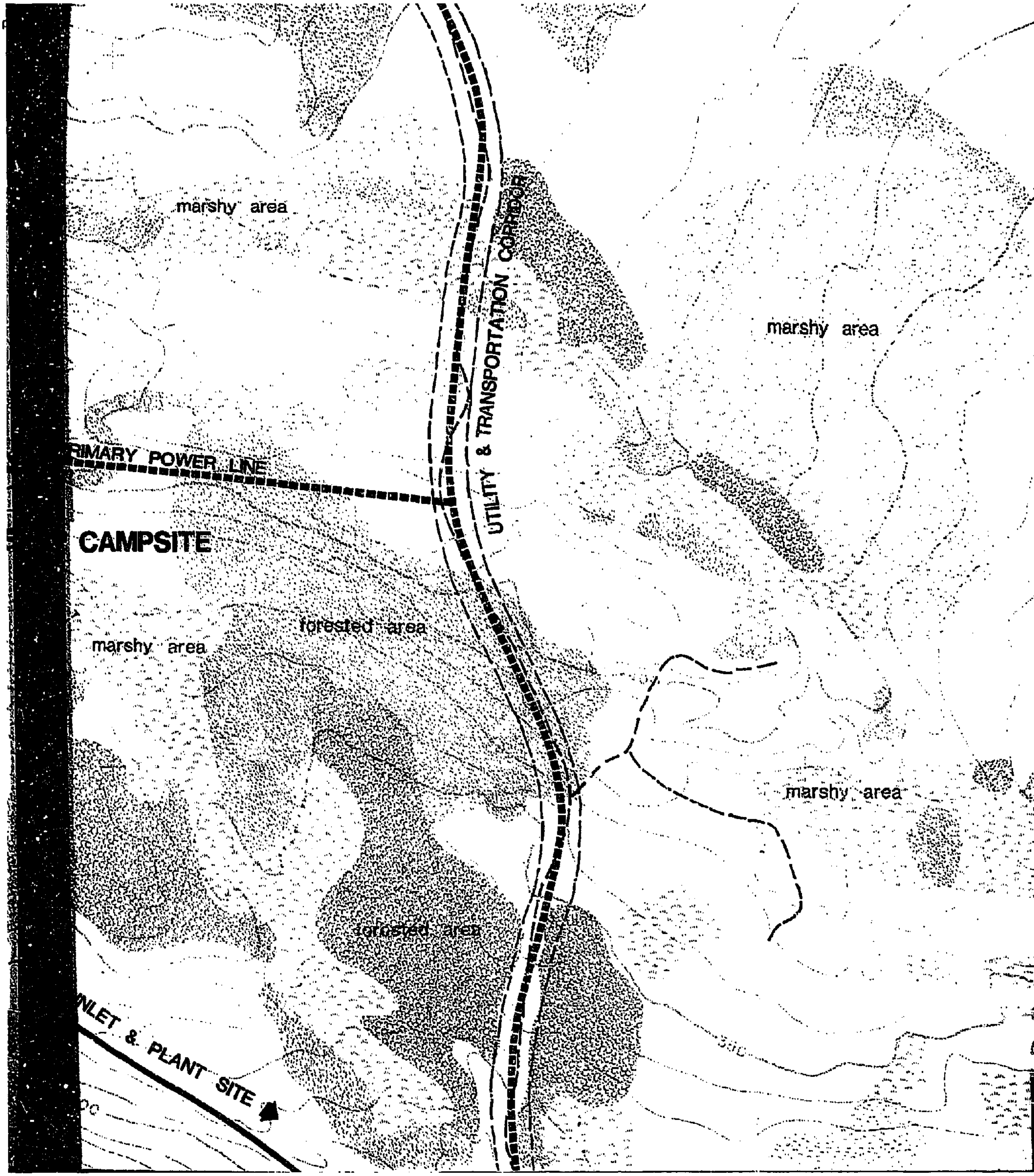

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UTILITY & TRANSPORTATION CORRIDOR
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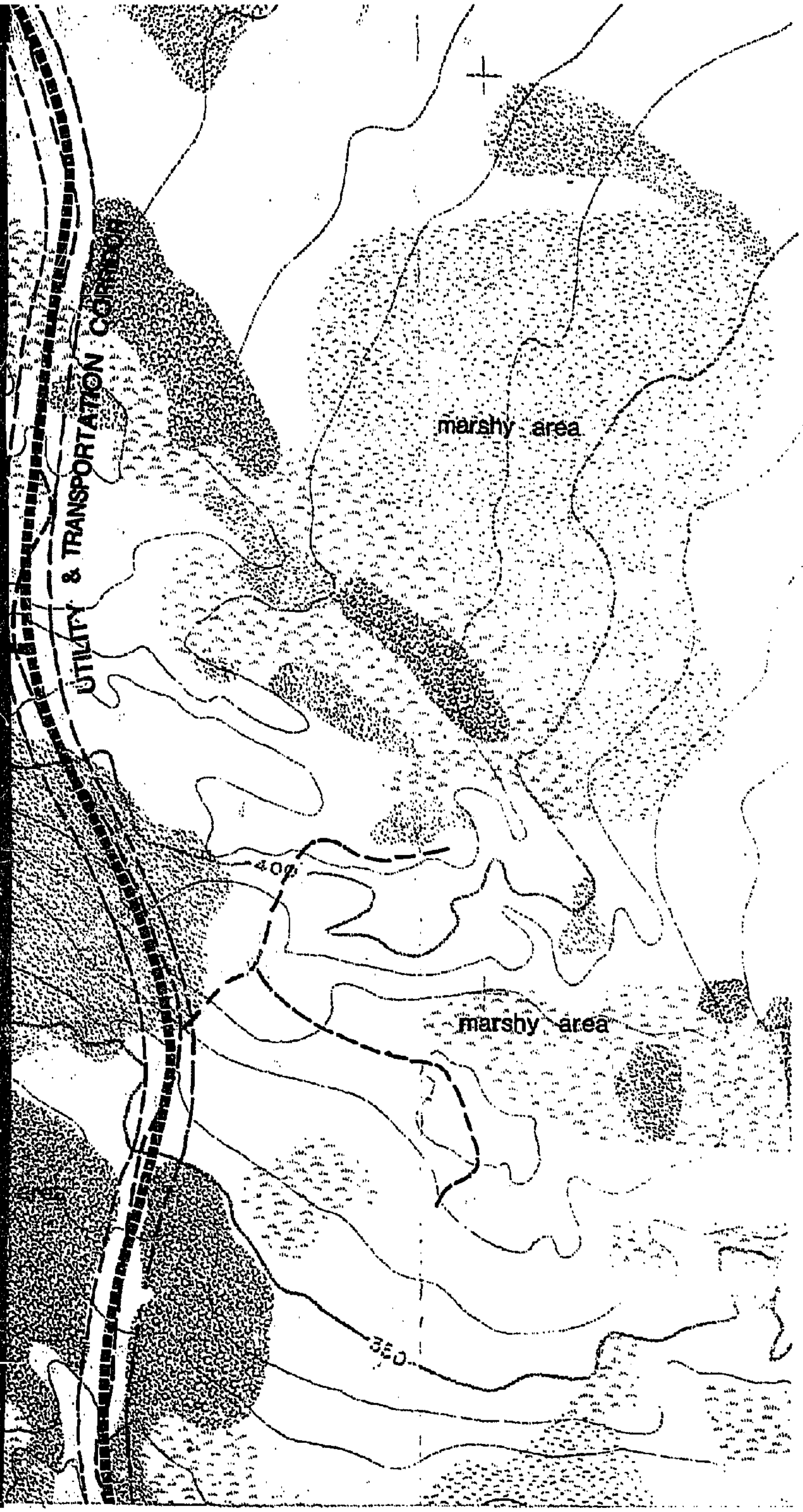

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CONCEPTUAL CAMP, AIRPORT, and TOWNSITE DEVELOPMENT PLAN

BELUGA METHANOL PROJECT

CAMP SITING CONSIDERATIONS
FIGURE 4

transport the sewage to a tertiary treatment facility within the camp.

The treatment process will consist of four 50,000-gallon package plants, for example, extended aeration, which will be preinstalled in prefabricated modules delivered to the camp, and incrementally placed on-line as the camp population increases. This approach will facilitate the initial transportation of treatment plants by barge, and allow for eventual relocation and reuse of the treatment plants in the permanent townsite as the camp population gradually decreases.

The disposal of tertiary-treated effluent may be accomplished through the discharge of effluent, via insulated arctic pipe, to a natural drainageway situated downslope of the camp (Figure 4). Using this method, a portion of the effluent, during the spring and summer months, would be absorbed in the substratum while the remaining discharge would eventually flow downslope to Nikolai Creek. During the winter, a considerable accumulation of frozen effluent would likely occur within the drainageway.

A significant salmon fishery is present within Nikolai Creek along Cook Inlet (Arminsky, 1981). Consequently, careful planning and coordination with the State Department of Fish and Game and the State Department of Environmental Conservation will be required during the design phase of the camp sewage system to ensure that fishery resources in this area will not be significantly affected by the upstream discharge of tertiary-treated effluent.

If the accumulation of frozen effluent in a downslope drainageway is considered unacceptable for aesthetic reasons, or there is ecological concern for the rate of effluent discharge into Nikolai Creek, a holding pond could be constructed within the camp. Effluent would still freeze within the pond during the winter months; however, containment of frozen effluent within one central area, and/or the option of a controlled rate of discharge, may be more acceptable for the mitigation of environmental concerns.

Power Supply and Distribution

Power requirements for the camp will probably be met through the exclusive use of electrical power in light of the uncertain availability of natural gas from nearby Cook Inlet production facilities. Based on this assumption, the minimum power requirement anticipated for the campsite is approximately 7.0 megawatts (MW). However, should more detailed engineering studies during Phase IIA of the project indicate that sufficient quantities of natural gas are readily available, approximately 4.1 MW could possibly be deleted from the total electrical power requirements.

The total electrical power requirement is based on the use of the following equation and a general facility analysis of the schematic camp plan (Figure 3).

$$P = \begin{matrix}\text{(Total Camp}\\ \text{Power}\\ \text{Requirements}\\ \text{in Megawatts)}\end{matrix} = \frac{\text{I (181 amps) x E(249 kilovolts) x 1.73 x 0.9 (power factor)}}{10^3 \text{ (conversion factor)}}$$

Rough calculation of the connected loads generated by the use of the camp facilities is estimated to be approximately 302 amps at 24.8 kilovolts on a 3-phase, 4-wire system. The demand load is assumed to be approximately 60 percent of the connected load as shown in the preceding equation.

A 165-MW coal-fired power plant will ultimately be included as part of the overall Beluga Methanol Project. However, construction and subsequent use of the campsite will require the availability of the minimum power requirement for several years prior to the development of the coal-fired power plant. As a result, electrical power will need to be obtained from the use of on-site diesel engine generators and/or Chugach Electric's Beluga Power Plant.

Initially, two 400-kW diesel engine generators will be used to supply temporary power for the construction camp. The generators will be used alternately to assure reliability and reserve capacity. Once a permanent power source is established for the camp, these generators will be used for providing emergency power to essential camp and facilities and services.

Chugach Electric's Beluga Power Station has a 14.4/24.9-kV overhead transmission line to Tyonek Lumber Company in Tyonek (Figure 2). Excess power is technically available on this line. One of the first priorities of the overall construction effort for the Beluga Methanol Project should be the installation of a 14.4/24.9-kV overhead transmission line from the Tyonek Lumber facility to the eventual campsite which would probably be located at some point along the potential transportation and utility corridor (Figure 2). However, Kodiak Lumber Company of Tokyo, Japan, owner of Tyonek Lumber Company, is 90 percent owner of the existing transmission line. Consequently, successful negotiations between CIRI/PLACER and Kodiak Lumber will have to be initiated and completed if this transmission line extension is to occur. Assuming installation of the transmission line along the transportation and utility corridor, a 14.4/24.9 kV, 3-phase, primary line will be installed to the campsite (Figure 4).

Pole-mounted transformers will be used for all camp facilities except the 500- and 1000-person kitchen/diner facilities. The kitchen/diner facilities will be provided electrical service through the use of pad-mounted transformers.

Solid Waste Collection, Reduction, and Disposal

The use, operation, and maintenance of the camp will generate approximately 8 pounds of solid waste material per person per day. The composition of this material will consist of roughly 10,320 pounds per day of burnable material and approximately 1,680 pounds per day of noncombustibles. After daily collection by camp O/M personnel, a dumpster will be used to haul garbage to a landfill which should be situated in a downwind location from the permanent townsite.

Another early construction priority should be the construction of a solid waste management facility in the townsite utility complex which would provide solid waste reduction facilities for both the construction and operational phases of the project. Upon completion of the solid waste management facility, solid wastes from the camp will initially be hauled to this facility for incineration and compaction prior to ultimate disposal within the landfill area.

Petroleum, Oil, and Lubricant (POL) Storage

Diesel oil and other oil-based products required for camp O/M will be stored within a lined POL berm which is capable of containing all stored fuels in the event of an emergency spill. Consequently, the berm will be designed to provide a minimum 115 percent storage capacity. In addition, the facility will be sited at an adequate distance from other camp facilities in order to reduce the risk of any potential

POL fire and/or explosion injuring camp personnel or damaging adjacent camp facilities.

CAMP O/M CONSIDERATIONS

Introduction

Incremental construction work force sizes have not been determined at the time of this report. As a result, camp O/M requirements are presented for assumed incremental camp populations of 50, 500, 1,000, and 3,000 workers. Table 2 summarizes the basic O/M labor requirements for each of those camp sizes; however, the requirements for each job classification are more specifically described in Appendix A. Within the following paragraphs, the scope of camp O/M services is discussed in somewhat greater detail.

Fifty-Person Tent Camp

The initial construction work force will establish a small tent camp in the vicinity of the ultimate campsite. Workers will be provided with sleeping bags. Laundry service and food supplies will be transported to and from the camp on a weekly basis via fixed wing aircraft. Life support utilities for food preparation and dining, water storage, sewage treatment, power supply, showers, and toilets will be temporarily provided in pre-installed, skid-mounted utility buildings.

Due to the nature of the camp and the limited work force size, the initial O/M crew will be limited to approximately 5 O/M workers in the field (Table 2). Three administrative personnel, who eventually will reside at the camp, also will be supporting field efforts from Anchorage and preparing for future camp expansion during this period.

TABLE 2

ANTICIPATED CAMP O/M LABOR REQUIREMENTS
VARIABLE CAMP POPULATIONS

Type of Work	50-Person Camp	500-Person Camp	1000-Person Camp	3000-Person Camp
	Number of Required O/M Workers			
Project Management	1	2	2	2
Administration	1	11	13	18
Facilities	2	17	20	30
Logistics	1	13	21	45
Community Services	3	31	52	118
Total	8	74	108	213

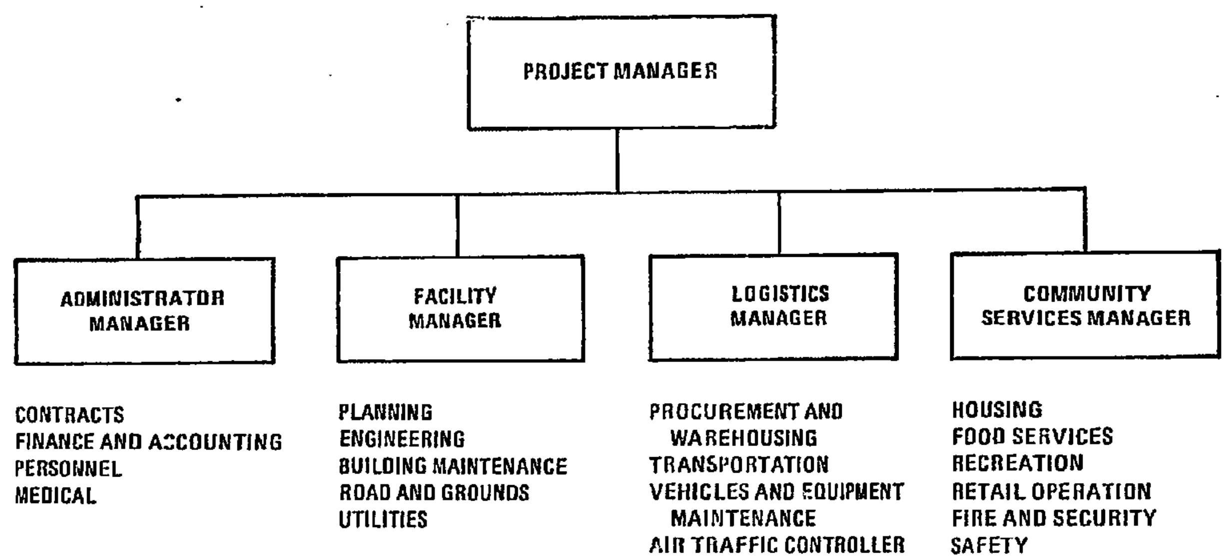
500-, 1000-, and 3000-Pers n Camp

General Organization

As the construction work force increases to at least 500 workers and the first quadrant of camp development is nearing completion, O/M services at the camp will begin to function within a more structured field organization (Table 3). Under this approach, O/M services will consist of five types of services--project management, administration, facilities, logistics, and community services. The staffing requirements for each of these O/M services is generally presented in Table 2; however, the requirements for each job classification are more specifically described in Appendix A.

TABLE 3

CONCEPTUAL CAMP OPERATION AND MAINTENANCE SERVICES ORGANIZATION 500-, 1000-, AND 3000-PERSON CAMP



Project Management

Overall management of O/M services for the camp and airport will be the responsibility of a designated project manager who will resolve any day-to-day problems or differences that cannot be handled by the reporting managers for administration, facilities, logistics, and community services. The project manager will also serve as the primary contact with visiting governmental officials, subcontractor representatives, and other agencies or individuals frequenting the campsite.

Camp Administration

Camp administration will generally assume the responsibility for handling all contractual and financial matters associated with camp and airport O/M. In addition, it will provide limited general supervision to medical personnel assigned to the camp.

Facilities Management

The camp facilities group will establish a preventative operations and maintenance program for the camp, as well as design and carry out necessary repairs and improvements associated with this responsibility. In conjunction with its operation and maintenance of life support systems, it will also collect various biochemical field samples and perform related analysis which are required by the State Department of Environmental Conservation and necessary for proper facility monitoring. Some of these analyses can be performed more cost-effectively in Anchorage laboratory facilities. Consequently, utility operators will need to coordinate these efforts with the logistics manager.

Within the scope of building, road, grounds, and utility maintenance, the facilities group will also maintain facilities for the airport in order than an unnecessary duplication of O/M labor and equipment can be avoided. However, such activities will be carried out under the auspices of the logistics manager and his day-to-day airport supervisor, the air traffic controller.

Logistics

Procurement and logistics support required for the resupply, repair, or improvement of camp facilities and community services will be accomplished by the logistics group. The logistics group will continuously coordinate its work with the facility management and community services managers. In addition, financial commitments made through procurement actions will initially require the logistics group to obtain appropriate approvals from the administration manager prior to purchase.

The logistics manager will also coordinate bus transportation to and from the camp, as well as air cargo and passenger transport to Anchorage and/or Kenai from the project area. In conjunction with these responsibilities, the logistics group will provide all vehicle and equipment maintenance for the camp and airport. Due to the interdependency of the logistics and facility management groups, it will be imperative for these two aspects of camp O/M to coordinate and schedule their activities as closely as possible.

As stated earlier, daily airport operations will be the responsibility of the logistics manager and his supervising air traffic controller. Because of the limited air traffic anticipated, the air traffic controller will probably be the direct interface with facilities management in terms of airport O/M.

Community Services

Community Services will carry out all activities necessary to provide food preparation, housekeeping, security, room assignments, and recreational services within the camp. This group will coordinate its efforts primarily with the logistics manager for necessary procurement and resupply efforts. However, its coordination with facilities management will be essential if the camp preventative maintenance program is to be successful.

Another important activity of the community services group will be its responsibility for fire suppression within the camp and airport. Most emergencies in the camp will involve security, fire safety, and/or medical treatment. As a result, camp emergency procedures will need to reflect the coordinated effort of the administrative, logistics manager, and community services groups.

CAMP CONSTRUCTION AND O/M COSTS

Introduction

On the basis of conceptual requirements for camp facilities and equipment, general design criteria, and related O/M considerations, CIRI/H&N has developed general order-of-magnitude estimates for camp construction and O/M (Tables 4, 5, 6, and 7). These estimates were primarily derived from price quotations recently obtained by CIRI/H&N from equipment vendors, transportation companies, and building contractors in Alaska, as well as camp module manufacturers and equipment suppliers in the lower 48 states. However, to ensure the validity and accuracy of these price quotations, these estimates were carefully analyzed and compared with competitive pricing information available from Holmes & Narver's computerized estimating system for modular camps.

Construction Costs

Cost estimates for camp construction are segregated by mobilization, facility construction, and utility installation costs (Tables 4, 5, and 6).

Construction Mobilization

Mobilization costs reflect the assumption that CIRI/PLACER, via its construction manager, will contract air and barge services for the transport of heavier and more bulky equipment to the project area. It is assumed that barged material will be off-loaded at some point along Trading or Beshta Bay Shoreline (Figure 2). Subsequently, the materials will be temporarily stored at a staging area until materials can be

TABLE 4

PRELIMINARY CONSTRUCTION ESTIMATE
CONCEPTUAL CAMP DEVELOPMENT PLAN
CONSTRUCTION MOBILIZATION

Transportation	Quantity	Payload Capacity (pounds)	Estimated Mobilization Period	Rate	Amount
Ocean Barge (U.S. West Coast to Anchorage)					$1,560,000
Hover Barge (Anchorage to Project Area)	2	160,000/unit	6 months	$100,000/unit/ month (includes fuel)	1,200,000
Lockheed Hercules C-130 Aircraft (Anchorage to Project Area)	1	45,000	100 round-trips over 6 months	4,700/roundtrips (includes fuel)	470,000
Flatbed Trucks (within project area)	2	40,000	4 trips/day 5 days/week for 6 months	$320/day/truck	84,480
				Total	$3,314,480

Estimate of Cost is Based on Midpoint 1981.

TABLE 5

PRELIMINARY CONSTRUCTION ESTIMATE
CONCEPTUAL CAMP DEVELOPMENT PLAN
FACILITY CONSTRUCTION AND UTILITY INSTALLATION

FACILITY	QUANTITY	TOTAL COST
52-Person Dorm	62	$ 7,500,000
500-Person Kitchen/Diner	2	600,000
1000-Person Kitchen/Diner	2	930,000
500-Person Recreation Hall	2	250,000
16-Person Office	3	220,000
500-Person Laundry	2	130,000
First-Aid Station	1	12,000
Maintenance Shop	1	57,000
Warehouse	1	52,000
POL Berm and Liner	1	154,000
Helipad	4	40,000
50,000-Gallon Pillow Bladders	6	165,000
50,000-Gallon Sewage Treatment Plant	-	1,360,000
Site Preparation and Foundations	480,000 Ft^2	1,150,000
SUBTOTAL		$12,620,000

Estimate of Cost is Based on Midpoint 1981.

TABLE 5 (Continued)

FACILITY	QUANTITY	TOTAL COST
Sewage Collection (with Campsite)	2,500 LF	$ 651,000
Sewage Effluent Holding Point (400 x 400 x 15 feet)	1	621,600
Water Treatment Facility	Included within townsite estimate only	
Water Transmission (from Townsite to Camp)	7,920 LF	1,031,200
Water within Campsite Distribution	2,500 LF	651,000
Power Transmission (from Corridor to Campsite)	2 miles	98,000
Power Distribution (within Campsite)	L.S.	1,022,000
Temporary Power Motor Generators	2	218,300
SUBTOTAL		$ 4,293,100

Estimate of Cost is Based on Midpoint 1981.

TABLE 5 (Continued)

ITEM	COST
Construction Mobilization	$3,314,500
Facility Construction	12,620,000
Utility System Installation	$ 4,293,100
SUBTOTAL	$20,227,600
Field Construction	$ 3,000,000
Home Office (design-Engineering Services)	696,900
SUBTOTAL	$23,924,500
Fees 5%	1,196,200
TOTAL CAMPSITE INSTALLED COST	$25,120,700

Estimate of Cost is Based on Midpoint 1981.

loaded onto flatbed trucks which would deliver the materials, via existing logging roads, to the campsite. Upon completion of a suitable airstrip, construction materials and equipment, as well as O/M supplies, will also be transported to the project area via Lockheed Hercules aircraft. Upon arrival, materials will be temporarily stored at an airport staging

TABLE 6

ANTICIPATED CAMP AND AIRPORT O/M COSTS
VARIABLE CAMP POPULATIONS

	Average Person Per Day Costs			
Labor	50-Person Camp	500-Person Camp	1000-Person Camp	3000-Person Camp
Project Management	$ 8.71	$ 1.38	$ 0.69	$ 0.23
Administration	6.75	7.21	4.31	1.93
Facilities	13.94	11.87	6.83	3.40
Logistics	7.62	8.47	6.66	4.68
Community Services	19.53	20.02	16.53	12.35
Subtotal	$56.55	$48.95	$35.02	$22.59
Food and Consumables	$11.00	$10.00	$9.00	$8.50
Entertainment	0.25	0.17	0.15	0.10
Tools, Fuel, and Small Parts	1.00	0.90	0.75	0.50
Linen and Small Ware	1.00	0.67	0.60	0.50
Subtotal	$13.00	$11.74	$10.50	$ 9.60
Total Cost Per Man Day	$69.80	$60.69	$45.52	$32.19

Estimate of Cost is Based on Midpoint 1981.

TABLE 7

ANTICIPATED HEAVY EQUIPMENT REQUIREMENTS
CAMP AND AIRPORT O/M

DESCRIPTION	UNIT PRICE EACH	50-MAN CAMP (EST. QUANTITY)	500 MAN CAMP (EST. QUANTITY)	1,000 MAN CAMP (EST. QUANTITY)	3,000 MAN CAMP (EST. QUANTITY)
Fire truck - Crash w/Foam	$150,000	0	1	1	1
Fire truck - Pumper	125,000	0	1	1	1
POL Truck - 9,200 Gal.	90,000	1	1	1	2
Forklift - Rough Terrain Diesel 4,000 Lbs	30,000	1	1	1	1
Forklift - Warehouse Gas, 2,000 Lbs	18,000	1	1	1	2
Motor Grader CAT #12	140,000	1	1	1	1
Backhoe - 1 Cu Yd	170,000	1	1	1	1
Ditch-Witch	25,000	1	1	1	1
Snow Plot Truck Mounted St. Brade	50,000	1	1	2	2
Portable Air Compressor 300 cfm Gas	20,000	1	1	1	2
Portable Welder 200 AMP Gas	5,000	1	1	1	2
Bulldozer - D-7	200,000	1	1	1	1
Hand Tools etc. (Est. Lot Cost)		$50,000	$100,000	$150,000	$300,000

Estimate of Cost is Based on Midpoint 1981.

TABLE 7 (Continued)

DESCRIPTION	UNIT PRICE EACH	50-MAN CAMP (EST. QUANTITY)	500 MAN CAMP (EST. QUANTITY)	1,000 MAN CAMP (EST. QUANTITY)	3,000 MAN CAMP (EST. QUANTITY)
Pickup 1/2 Ton 6 Cyl. 4 Speed 4x4	$ 7,000	2	8	12	15
Truck Stake Bed 3/4 Ton 44x4 Hyd. Lift	15,000	1	2	3	4
Bus 45 Passenger Adult Diesel 35 Feet Long	40,000	0	2	4	10
Bus 20 Passenger	30,000	1	2	3	4
Van 9 Passenger	13,000	1	1	1	2
Dump Truck 5 Ton	35,000	1	1	1	1
Pole Truck w/Pole Claw and Auger	20,000	0	1	1	1
Line Truck w/Bucket	60,000	0	1	1	1
Crane Truck Mounted Rough Terrain (30 Ton)	290,000	1	1	1	1
Mechanic Service Truck	15,000	1	1	1	1
Plumber Service Truck w/Pipe Packs	15,000	1	1	1	1
Solid Waste Truck	30,000	1	1	1	1
Dempsey - Dumpsters	70,000	2	4	8	20
Ambulance	27,000	0	1	1	1

facility until truck delivery, via existing logging roads, is available to transport the materials to the campsite.

Facility Construction and Utility Installation

Facility construction and utility installation estimates assume the use of prefabricated modules which have been preinstalled with fixed equipment such as washroom facilities, water treatment plant, and food preparation equipment. Utility transmission and distribution costs reflect labor materials, and equipment required to transport off-site water and power supplies to the campsite, and provide on-site distribution lines for water, sewer, power, and fuel.

O/M Costs

Due to the incremental nature of the proposed camp development. O/M costs are presented for 50-, 500-, 1,000-, and 3,000-person camp populations. These costs include requirements for labor, food and consumables, entertainment, tools and small parts, as well as linen and smallware. In addition to these on-going daily O/M costs, camp O/M activities will also require the use of various heavy equipment (Table 7) which should be regarded as an initial front-end O/M cost.