DCNO 188 (2)

DRAFT July 22, 1982
JRP

SUSITNA HYDROELECTRIC PROJECT
ACCESS STUDY

Development of a Plan to Complete Access to Watana Within One Year of Licensing

The following report reviews the task of completing initial access to the Watana site within twelve months of receipt of FERC license. Three routes have been considered. These are Denali (Plan # 17), North (13) and South (16). In assessing the problems of constructing these alternative routes it has been concluded that the South Route would be the most difficult. Therefore, the report uses this route as the basis for developing a construction plan.
The objective of initial access construction is to provide land access for the start of delivery of heavy construction plant and materials within one year.
The task is reviewed under the following headings:

1 - Management

It is essential that the Project Management and Power Authority are committed to achieving the goal set forth, and that all necessary resources are made available well in advance of need. In addition, numerous restraints that could impede progress must be removed. The Project Team must have the authority to act quickly and in direct response to field situations as they develop, and not be required to obtain Management approval for the day to day running of the construction work. Direct on-site management by a resident engineering staff of experienced earthwork, geotechnical, civil, surveying, hydraulic and expediting personnel can alleviate the normal construction delays caused by surveys and change order approval procedures.

2 - Contract

The initial access road contract must provide flexibility of administration and the incentive for the contractor to meet targets. The contract should be based on unit prices with a target for both time and cost. A bonus payment plan should be developed. In addition to unit prices, the contract should include provisional sums to cover work that cannot be fully defined before start of construction. These provisional sums can be administered by application of appropriate unit prices and/or by cost plus with targets/bonuses individually negotiated on an as-needed basis by the resident engineer and the contractor's representative.

It must be the objective to reduce the contractor's risk, and at the same time provide every incentive for him to meet targets. Several intermediate targets as well as overall targets can be established, both by breaking the work into discrete functional packages and into physical divisions along the access route.

The initial road contract should be in two parts:

A - Construction of Initial Access

B - Maintenance of Initial Access

Part B could be either a unit price or cost plus contract under the direction of the Engineer.

Methods

3 - Construction Needs

Construction methods will have to be flexible. The specifications should be considered guides and the engineer and contractor will have to use judgement to achieve the best results possible. The effort must be to adapt to available materials and conditions. Technical problems must be resolved quickly on the spot. Specifications for general or repetitive operations should be generic performance type with standard approved feature drawings, to allow flexibility

in selection of construction methods.

A number of techniques can be used to speed up work:

a) Construct minimum width and fill depth consistent with available materials and foundation conditions.

b) Place gravel fill in winter on frozen ground.

c) Develop borrow areas ahead of road construction. If work is to be done in freezing weather, open a limited face and keep work going 24 hours per day. Backup equipment, especially loaders and dozers, will be required.

d) Install culverts by excavating through fill, or use partially prefabricated Super Arch and panel box culverts which can be rapidly placed and covered.

e) Use short construction time single span military "Bailey" or panel type bridges over narrow stream channels, which have spans up to 210 feet, and 90 ton capacities up to 110 foot spans. These can be replaced later with permanent bridges.

f) Place fill over filter or geotextile fabric, using load distribution or stress bulb spreading method.

g) Avoid cut and fill operations. Generally initial road should be constructed with gravel fill.

h) Provide adequate right-of-way width, and locally, several alternative routes, to give flexibility in alignment in areas of poor foundation conditions (bogs, permafrost, sidehill spring areas, slope stability problem areas).

i) Minimize stripping, both to save time and to avoid many of the permafrost problems - clear and fill directly.

Every effort should be made by the Engineer to define construction work ahead of time. Surveys must be completed and staking done. Review and solutions to potential problems should be detailed and reviewed ahead of construction work. While maintaining flexibility, the effort to determine and anticipate the problems must be made and the possible solutions considered.

4 - Preliminary Schedule

A preliminary schedule has been attached for the construction of initial access along the South Route and some of the front-end activities at the Watana site. See sheets 1 and 2.

The scheduling of this work has been developed as follows:

a) Procurement

These are activities to be carried out prior to issuing of FERC licensing.

A number of contracts will have to be bid and the letters of interest issued, contingent on the granting of licensing. Some materials will have to be ordered prior to licensing or arrangements made to borrow and replace materials from other agencies. Examples would be culvert pipe and single span Bailey bridges.

b) Mobilization

It is planned that the main thrust of mobilization would be through Gold Creek. The general plan would be:

(i) Mobilize construction group to develop the railhead at Gold Creek and to develop a base of operations, including an airstrip.

(ii) Mobilize construction group to construct the initial access from the railhead at Gold Creek to Devil Canyon, including development of borrow areas.

(iii) Following the establishment of (i) and (ii), mobilize a construction group to extend initial access from Devil Canyon to river crossing.

(iv) Mobilization of a construction group to build the section from Watana to the river crossing. This work would be tied in with the advance mobilization needed at Watana for airstrip and initial site roads.

(v) Mobilization of a construction group to install a temporary bridge over the Susitna.

c) Construction

Construction of initial access has been rescheduled over a twelve month period. Since the exact date of FERC licensing is not known the schedule has been given at 1 to 12 month time mode. Flexibility and float has been built into the schedule for weather constraints.

Sheet 1 of the schedule shows the main activities required to complete initial access within one year. Actual construction required to achieve this objective is about 8 months.

Another 2 months are allowed for mobilization and 2 months for road upgrading and/or float.

Construction rates have been listed for the three sections of the roadways. Rates of progress are from 1200 to 1700 linear feet of road per day and that is about 3000 to 4400 cy of fill per 20 hour work day. These rates are within the capabilities of construction experience.

Major quanities of work to complete initial access are as follows:

Fill	761,000 cy
Gravel	100,000 cy
Bridges	7 @ 30'; 3 @ 50'; 3 @ 100'
Fabric	990,000 ~~sy~~ sy

5 - Construction Resources

The construction effort to complete the initial access will require a large commitment of personnel and equipment. The resources can be grouped as follows:

. Railhead Expansion

. Gold Creek to Devil Canyon

. Devil Canyon to River Crossing

. Bridge

. Watana to River Crossing

Worksheets (2) have been attached which list the manpower and equipment needed to construct these sections. Total equipment and manpower has not been estimated as this will be derived from the results of contract packaging and resource levelling. A rough manpower demand curve has been developed which shows the expected requirements. It is estimated that total manpower would peak in the order of 400 persons.

In order to support the construction effort the following services would have to be utilized and developed.

a - Rail service to Gold Creek with forward movement of supplies by truck and helicopter

b - Airfield near RR heading area for personnel and freight

c - Helicopter service of personnel from RR heading to forward camps and work areas

d - In winter conditions:

. move equipment and materials to forward work area

. use Stephan Lake for Hercules air strip for heavy freight

6 - Examples of Similar Construction

The following examples of rapid access road construction are given:

Location	Length	Duration
Lower Churchill	57 miles	3 months
Ling Spruce, Manitoba	14 miles	6 months
Limestone, Manitoba	20 miles	5 months
Cat Arm, Newfoundland(1)	15 miles	12 months
Upper Salmon, Newfoundland (2)	42 miles	19 months
TAPS	360	One summer season

(1) Extensive rock excavation required

(2) Contractor defaulted and work had to be relet.

APPENDIX A

Contractor Packaging

1 - . RR Heading Subgrade

. Rd RR Heading to D.C. or next camp

. Airstrip

. Main Camp

. Rd to Susitna River Bridge

. Supply of ballast

2 - Rd D.C. to River Crossing
. Temporary Bridge

3 - Rd Watana to River Crossing (part of site initial access roads)

4 - RR ext. - ballast + rail + controls etc.

5 - Procurement Contracts

. Camps

. Culverts

. Railway Bridges

. Fabric

. Rail

6 - Services/Supplies would be included in No. 1 or CM

. Shipping to site (rail and air)

. Fuel

. Camp O & M

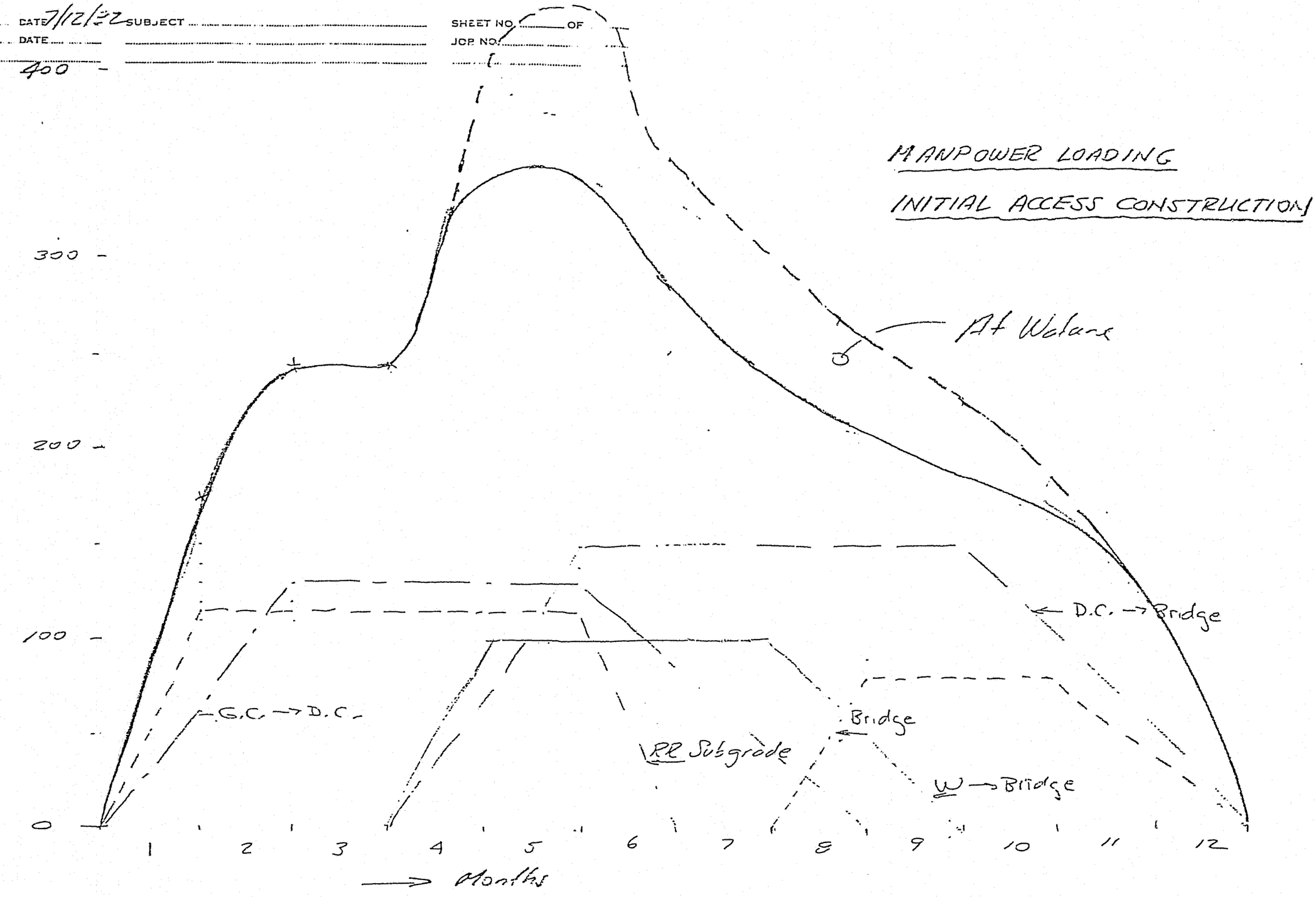
. Helicopter Services

BY JRP DATE 7/12/72 SUBJECT

CHKD. BY DATE

SHEET NO. OF

JOB NO.



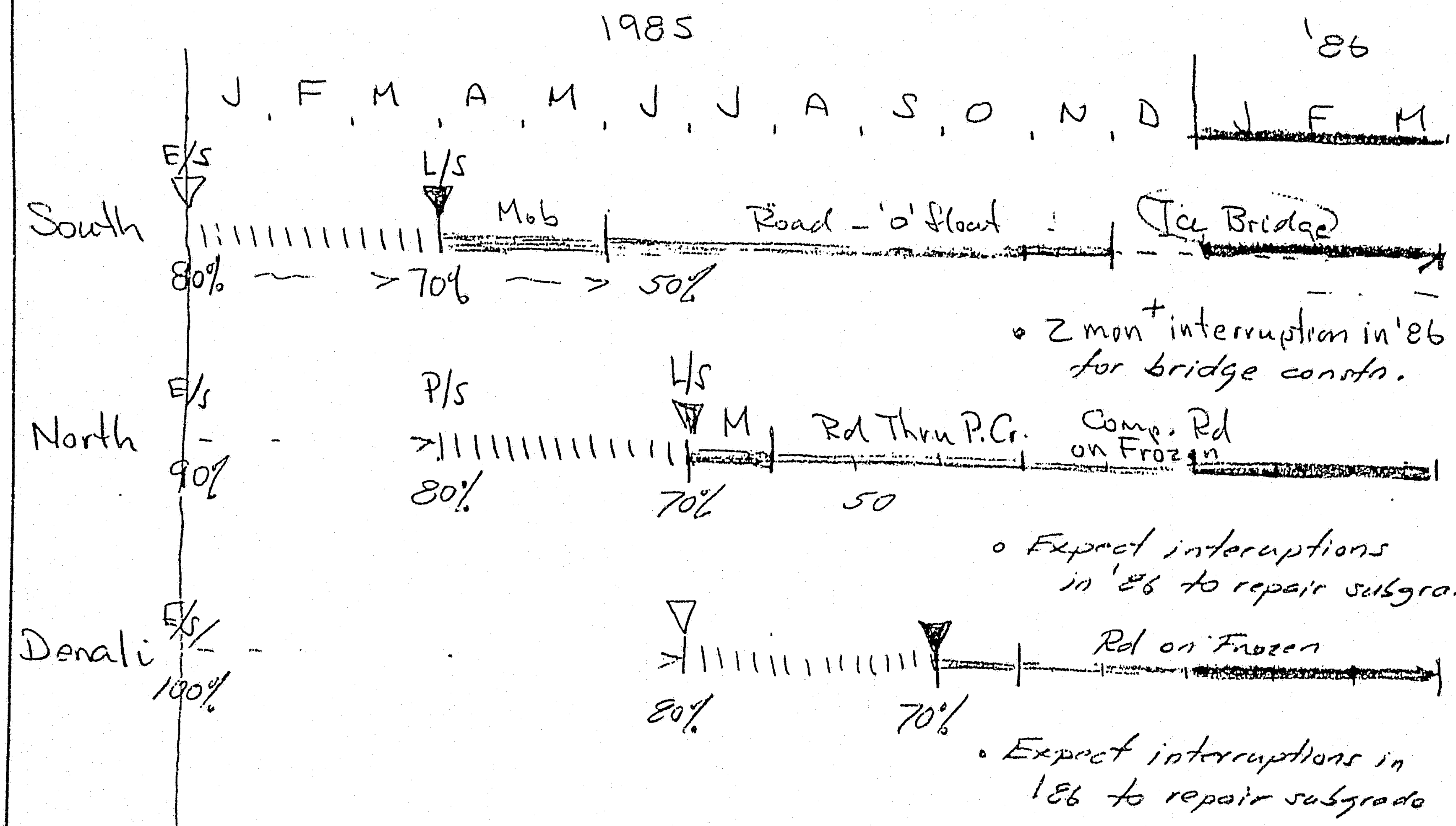
BY JJP DATE 7/20/82 SUBJECT WATANA DEVELOPMENT SHEET NO. ____ OF ____
CHKD. BY ____ DATE ____ INITIAL ACCESS JOB NO. ____
EQUIPMENT & MANPOWER ESTIMATE

	RAILHEAD SUBGRADE		G.C→D.C.		D.C→BRIDGE		WATANA→BRIDGE		BRIDGE		TOTALS
PIT	Equip.	Men	E	M	E	M	E	M	E	M	
D7 DOZERS	2	4	2	4	2	4	2	4	2	4	
950 LOADERS	2	4	2	4	2	4	2	4	2	2	
FUEL TRUCKS	2	4	1	2	1	2	1	2	1	2	
MAINT. TRUCKS	2	4	2	4	2	4	2	4	1	2	
CRUSHER/SCREEN	1	4	1	4	1	4					
HAULING											
20 TON DUMPS	6	12	12	24	14	28	10	22	6	12	48 x .77 = 37
35 TON "	6	12	—	—							
SPREAD & COMPACT											
130G GRADERS	2	4	2	4	2	4	1	2			
D7 DOZERS	2	4	2	4	2	4	1	2	2	4	
815 COMPACTORS	2	4	2	4	2	4	1	2			
WATER TRUCKS	1	2	1	2	1	2	—	—			
CLEARING											
D7 DOZERS	1	2	2	4	2	4	1	2			
MISC											
814 TRACTORS	2	4	1	2	1	2	1	2	2	2	
TRACK DRILLS	4	8	2	4	3	6	1	2	2	2	
COMPRESSORS	4	2	2	2	3	2	1	2	2	} 2	
GEN/LIGHTS	2	2	3	1	3	1	3	2	2		
235 BACKHOE			1	2	1	2	1	2	1	2	
SM BACKHOE			1	2	1	2	1	2	2	4	
50 TON CRANE			1	2	1	2	1	2	1	1	
LO-BOY TRUCKS	1	2	2	2	2	2	1	2	1	—	
PICKUP TRUCKS	4	—	4	—	4	—	2	—	2	—	
PERSONNEL "	2	—	1	—	2	—	1	—			
ROAD MAINTENANCE											
130G GRADER			1	2	3	6	1	2			
D7 DOZER			1	2	3	6	1	2			
FUEL/MAINT			1	2	1	2	1	2			
LABORS		12		12		12		8		10	
CARPENTERS/RIGGERS		—		4		4		4		10	
		90		95		109		77		59	
SUPPORT SERVICES		32		33		38		27		21	
		122		132		151		104		80	591/450 PEAK

Calculations

SUBJECT *Schedule Probability.*

By ____ Date ____
Checked ____ Date ____
Project No. ____
Calculation No. ____
Page 8 of ____



Expect traffic over each route Jan - Mar '86 on frozen subgrade.

Probability ~ 80 - 100 High
70 - 80 Acceptable
70 - Low

Rev	By	Checked

AGRES

Calculations

SUBJECT SHP — ACCESS ROAD DEVELOPMENT (4 Shts)

By _____ Date _____ Project No. _____

Checked _____ Date _____ Calculation No. _____

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Rev	By	Checked

SCHEDULE COMPARISON

Ref:

(1) Preliminary Logic
Watana Access Road Plan
South Route — 16 Sheet 1 of 2

Preliminary Logic - Watana
1985-86 Sheet 2 of 2

(2) SHP Access Study
Development of a Plan to Complete Access to Watana Within One Year of Licencing July 22/82

Development of logic and durations based on South Plan. Activity durations for North and Denali estimated from this base.

Factors affecting schedule

	S	N	D
1 — Length of road	56	52	40
2 - Ease of constn.	3	2	1
3 - Gravel Available	✓	✓	✓
4 - Haul Distance			
5 - Bridges. - Major	1	0	0
Minor.	2	4	0
6 - Excav. (Permanent)	2.7×10^6	2.6×10^6	2.2×10^6
Fill			

Plan	Mob	Road Constn	Rd Constn Float	Bridge Constn	Float Bridges	Total
South	2	6	1	2	1	12
North	1	6	1	1	0	9
Denali	1	4	1	0	0	6

Notes: (1) About 10 m. constructed back from Wufama for each plan.

(2) Durations are calculated on p. 7.

AGRES Calculations
SUBJECT
By ____ Date ____ Project No. ____
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60.04.03 Form 148B

ACRES Calculations
SUBJECT

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Constn Rates (by road distance)

South

G.C. → D.C	13 m	1400 lf/d	≈ 50 days	≈ 2
D.C → Br.	32 "	1700	= 100 "	= 4
				6 mo
W → Br.	11	1200	50	
	56			

North

H. → D.C.	11 m	1400 lf/d	≈ 40	6 mo
Portage Cr.	7 "	1200	= 30	
P.Cr → 'x'	24 "	1700	50	
W → 'x'	10			
	52			

Denali

D.H. → 'y'	30 m	1700 lf/d	≈ 100	= 4 mo
W. → 'y'	10 m	1200	= 50	

60.04.03 Form 1488

A

ACRES

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

PRELIMINARY LOGIC - WATANA
1985 & 1986

JRP 7/21/82				DATE 15 JULY 82	SCALE
				DEPARTMENT	DRAWING NO. / REV.
IS	CH.	APP.	APP.	ACRES AMERICAN INCORPORATED / PROJECT P570059	SHEET 2 OF 2 / 1

3 2 1

ARCHITECTURAL	CIVIL	CONSTRUCTION	ELECTRICAL	GEOTECHNICAL	HYDRAULIC	MECHANICAL		DESIGNED	DRAWN	CHECKED

ACRES

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

PRELIMINARY LOGIC - WATANA
ACCESS ROAD PLAN
SOUTH ROUTE - 16

JRP 7/21/82				DATE 15 JULY 82	SCALE
				DEPARTMENT	DRAWING NO. / REV.
NS	CH.	APP.	APP.	ACRES AMERICAN INCORPORATED / PROJECT P570059	SHEET 1 OF 2 / 1

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