

HARZA-EBASCO

Susitna Joint Venture
Document Number

1921

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SUSITNA HYDROELECTRIC PROJECT

FERC LICENSE APPLICATION DRAWINGS

REVISED EXHIBIT F

AUGUST 1984

HARZA-EBASCO

SUSITNA JOINT VENTURE

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT
FERC LICENSE APPLICATION
PROJECT NO. 7114-000

SUSITNA HYDROELECTRIC PROJECT

FERC LICENSE APPLICATION DRAWINGS

REVISED EXHIBIT F

APRIL 1984

PRELIMINARY

THE FOLLOWING DESIGN REFINEMENTS ARE THE BASIS OF THE REVISED DRAWINGS IN THIS SET
AND THE BASIS FOR THE PROJECT COST ESTIMATES DATED APRIL 1984

WATANA:

1. REDUCED BEDROCK AND ALLUVIUM EXCAVATION AND FOUNDATION TREATMENT FOR DAM.
2. REVISED CONFIGURATION AND COMPOSITION OF DAM AND COFFERDAM SECTIONS.
3. REVISED DIVERSION TUNNELS.
4. RELOCATION AND REORIENTATION OF TRANSFORMER GALLERY, POWERHOUSE AND SURGE CAVERNS.
5. REVISED POWER CONDUITS AND POWER INTAKE.
6. ELIMINATION OF FUSE-PLUG SPILLWAY AND INCREASED SIZE OF MAIN SPILLWAY TO PASS THE PMF SPECIFIED IN THE FERC LICENSE APPLICATION.
7. REVISED LAYOUT OF POWER INTAKE AND SPILLWAY APPROACH CHANNELS.
8. REDUCTION OF CONSTRUCTION FACILITIES IN ACCORDANCE WITH ABOVE REDUCTIONS ... CONSTRUCTION WORK.
9. SPEED OF UNITS INCREASED FROM 225 TO 257.1 rpm.
10. USE OF SF6 GAS INSULATED SWITCHGEAR INSTEAD OF OPEN-AIR SWITCHYARD.
11. USE OF OPEN-CUT TRENCH INSTEAD OF TUNNEL FOR DRAINAGE OF SPILLWAY CHUTE.
12. REVISED RELICT CHANNEL TREATMENT.

HARZA-EBASCO
SUSITNA JOINT VENTURE

DEVIL CANYON:

1. ELIMINATION OF FUSE-PLUG SPILLWAY AND INCREASED SIZE OF MAIN SPILLWAY TO PASS THE PMF SPECIFIED IN THE FERC LICENSE APPLICATION.

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT
FERC LICENSE APPLICATION
PROJECT NO. 7114-000

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

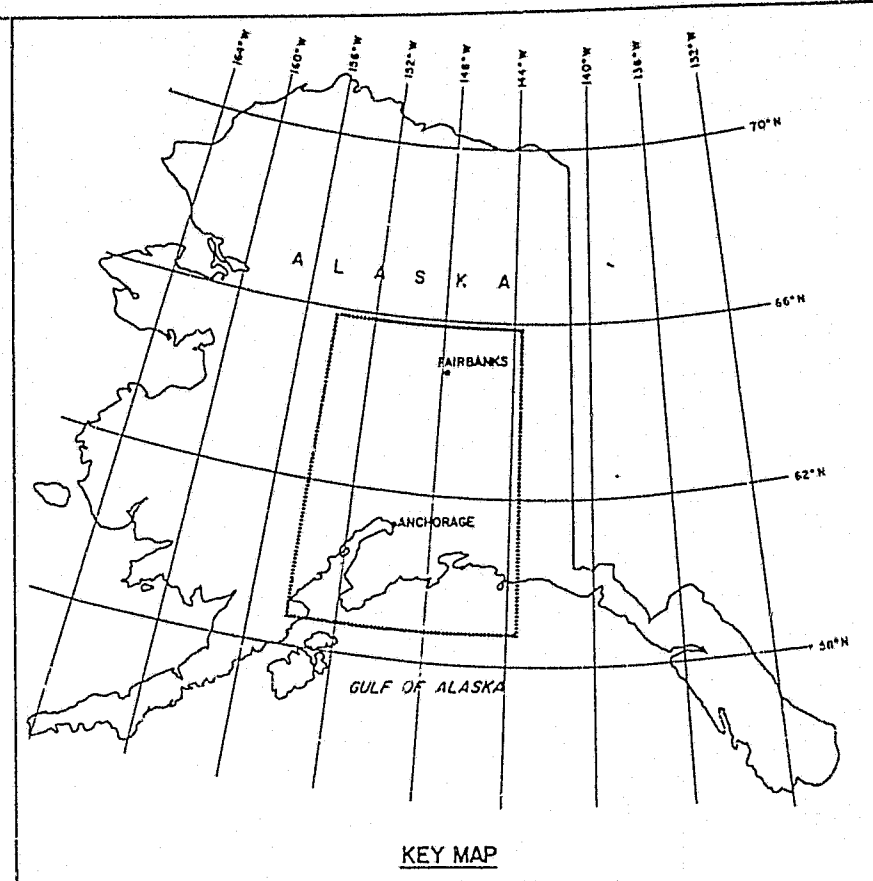
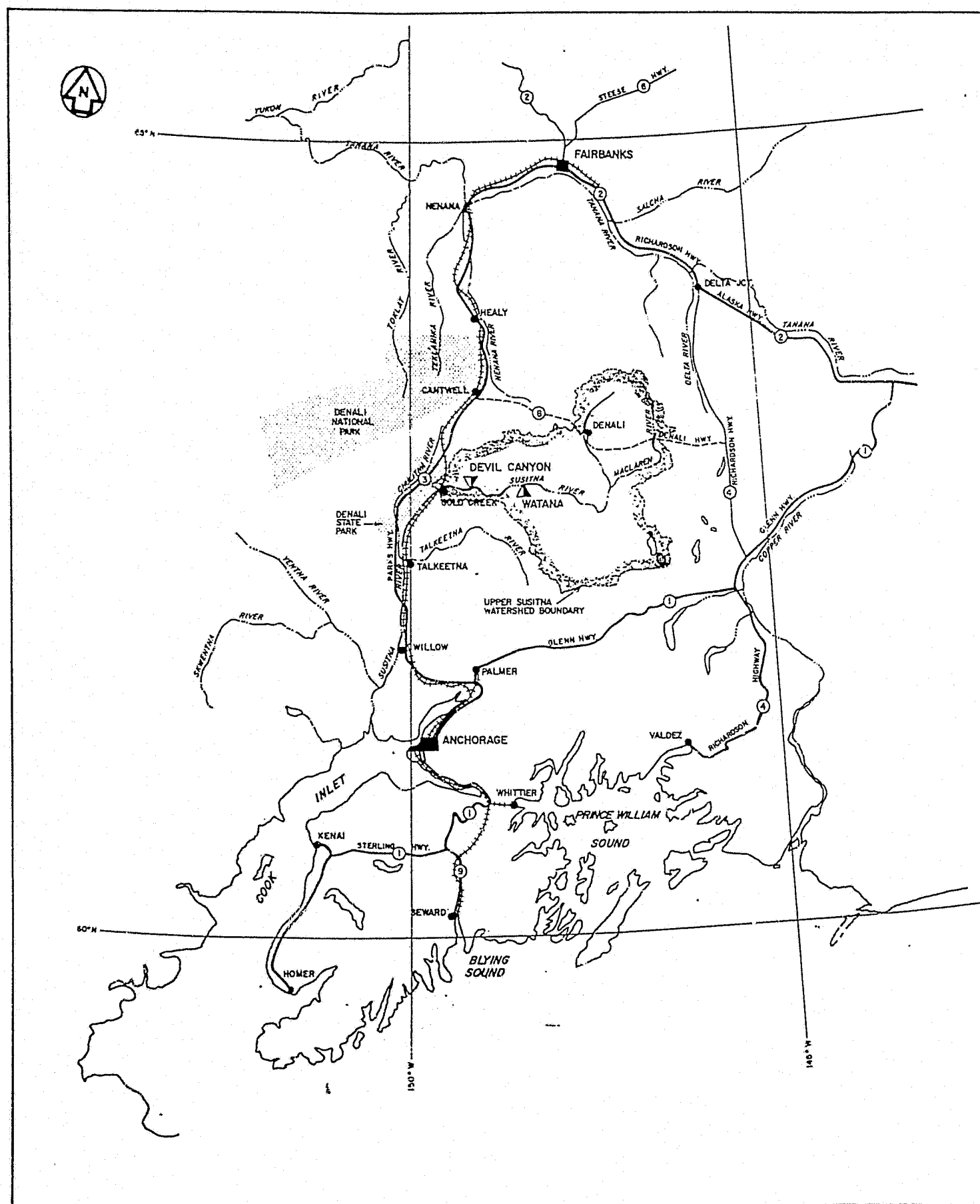
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HARZA-EBASCO
SUSITNA JOINT VENTURE

NOTES:

THOSE DRAWINGS WHICH WERE REVISED FROM
THE ORIGINAL FERC LICENSE APPLICATION ARE
DENOTED BY THE LETTER, R.



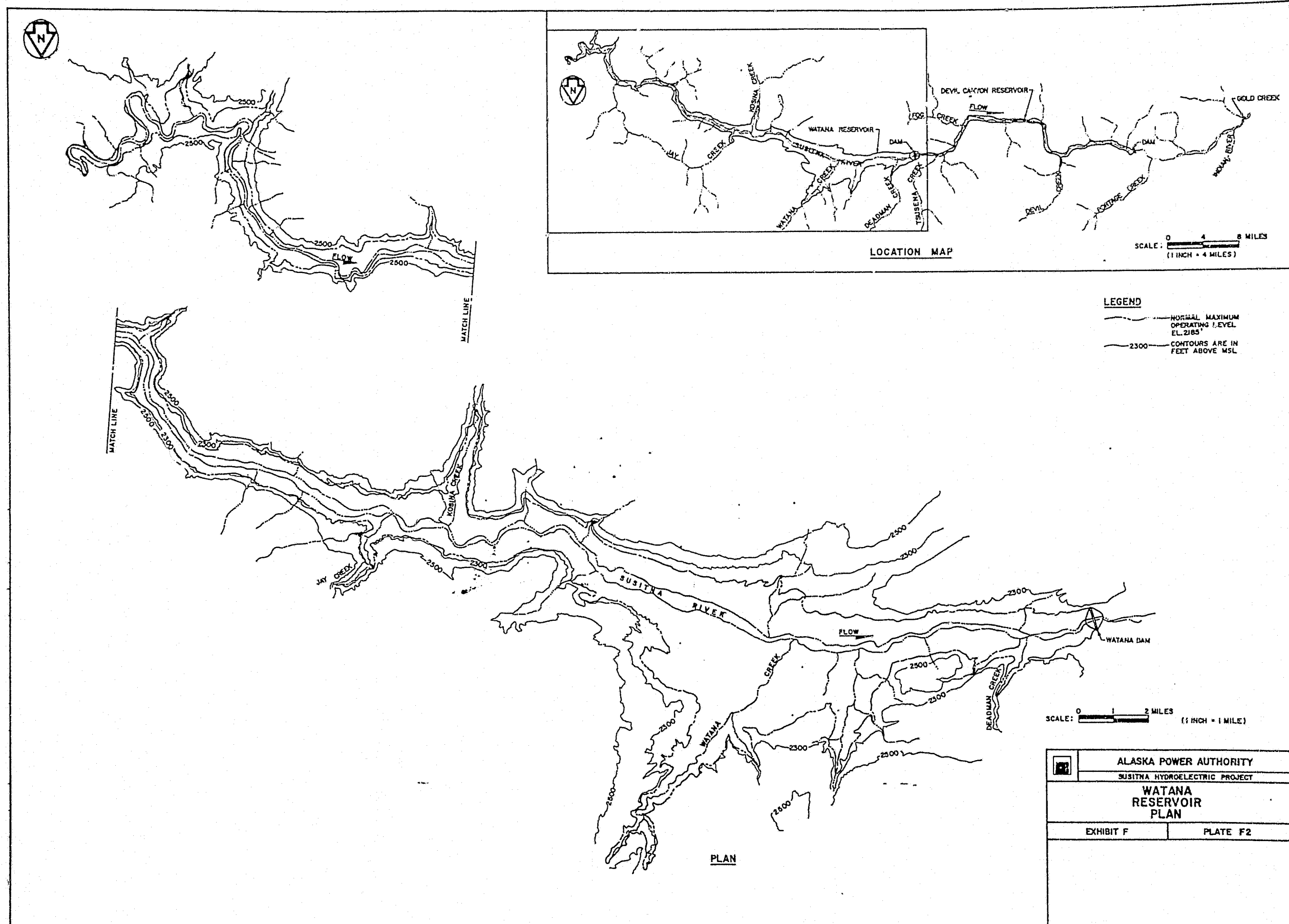
KEY MAP

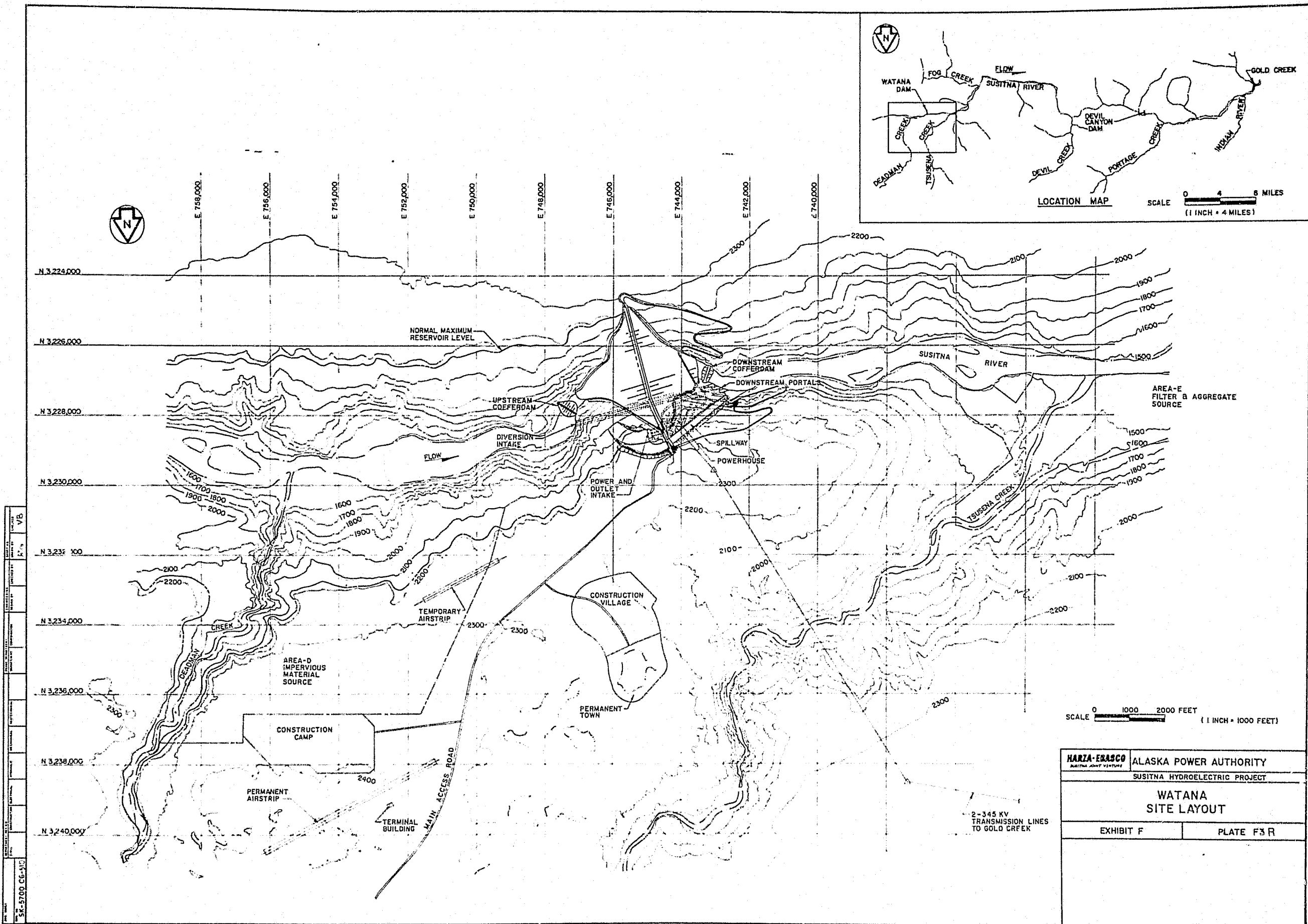
LEGEND

- ③ PRIMARY PAVED UNDIVIDED HIGHWAY
- SECONDARY PAVED UNDIVIDED HIGHWAY
- - - SECONDARY GRAVEL HIGHWAY
- RAILROAD
- RIVER

SCALE 0 20 40 MILES (1 INCH = 20 MILES)

ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
RAILBELT AREA	
EXHIBIT F	PLATE F1

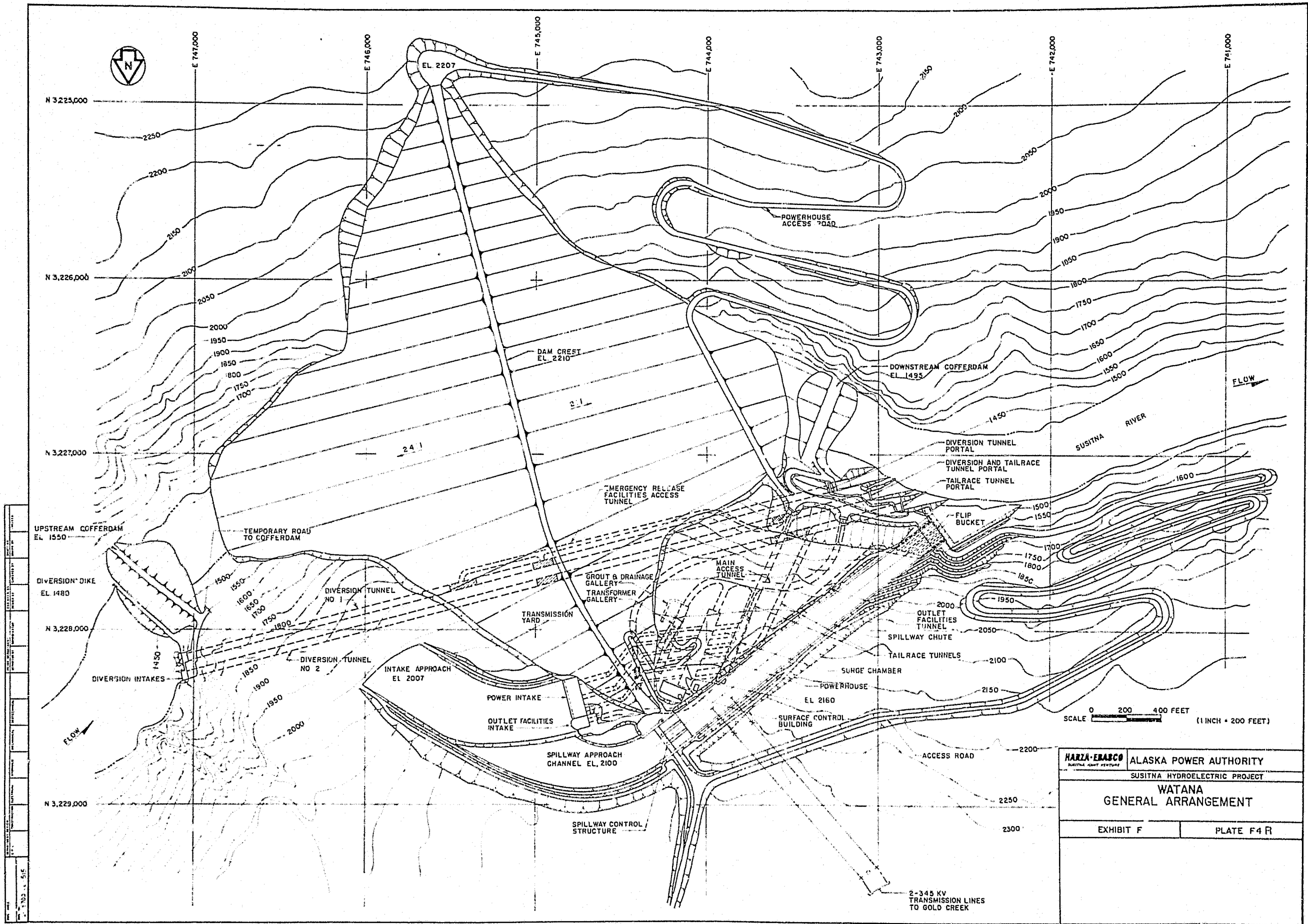




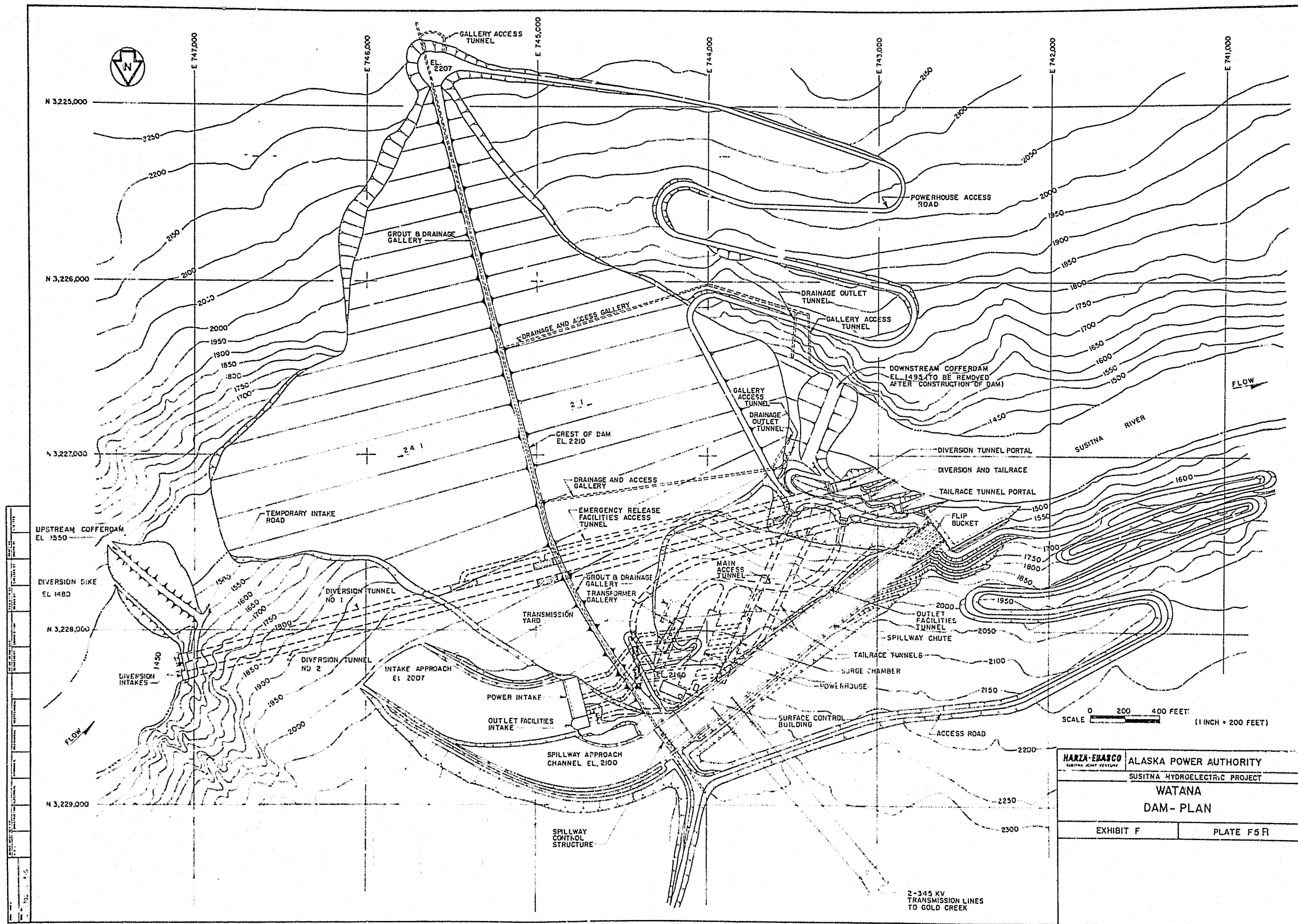
SK-5700 CG-51C

SCALE 0 1000 2000 FEET
(1 INCH = 1000 FEET)

HARZA-ENGASCO ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
WATANA SITE LAYOUT	
EXHIBIT F	PLATE F3 R

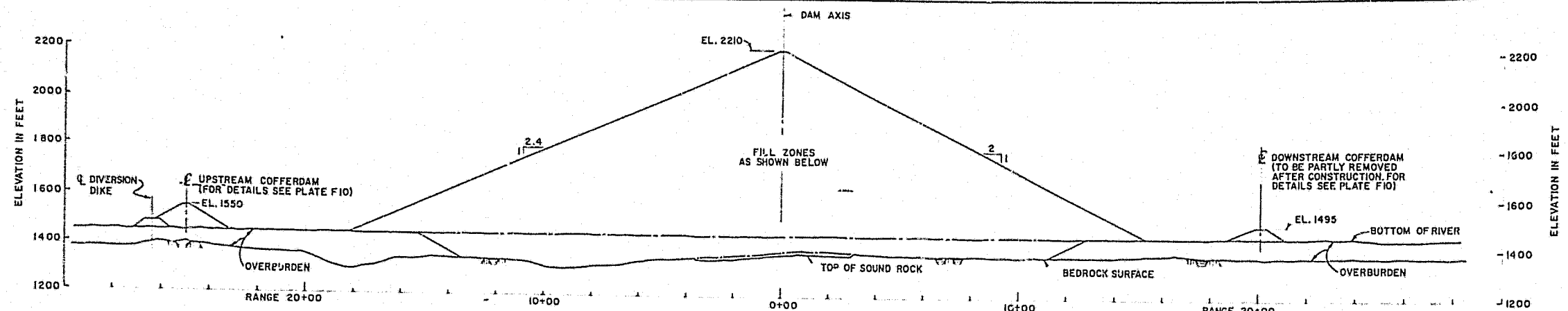


HARZA-ERASCO SUSITNA JOINT VENTURE	
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
WATANA GENERAL ARRANGEMENT	
EXHIBIT F	PLATE F4 R

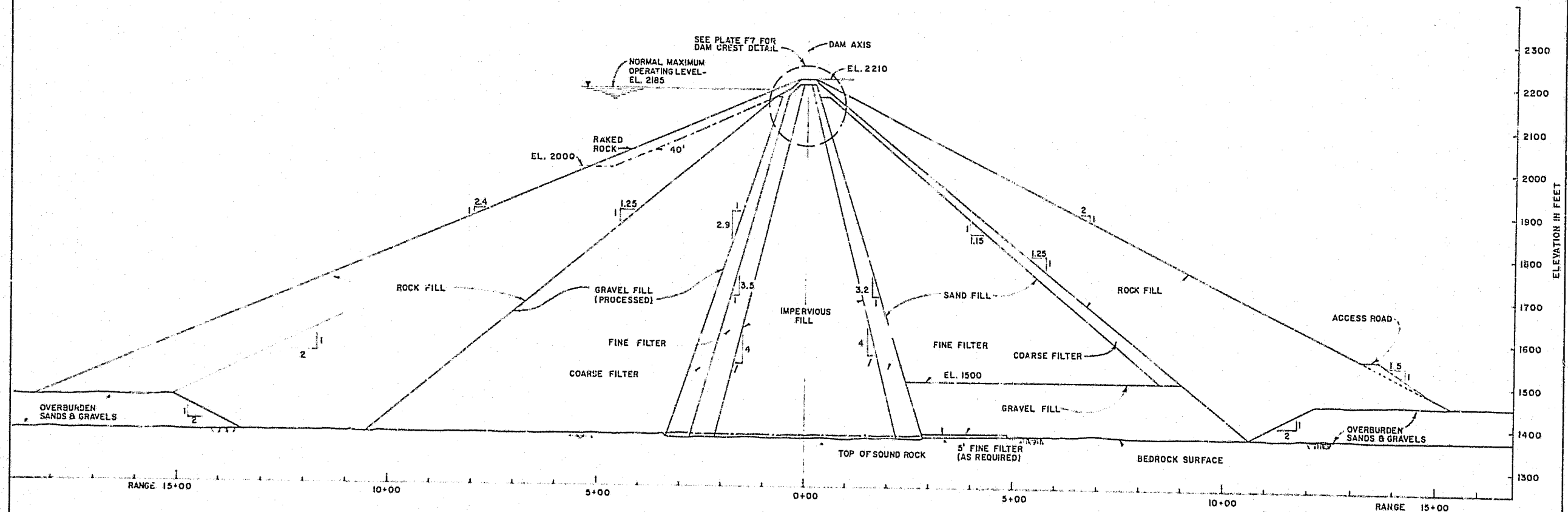


HARZA-ERASSCO SUSITNA JOINT VENTURE		ALASKA POWER AUTHORITY	
		SUSITNA HYDROELECTRIC PROJECT	
WATANA			
DAM - PLAN			
EXHIBIT F		PLATE F5R	

2-345 KV
TRANSMISSION LINES
TO GOLD CREEK



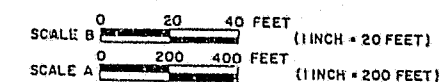
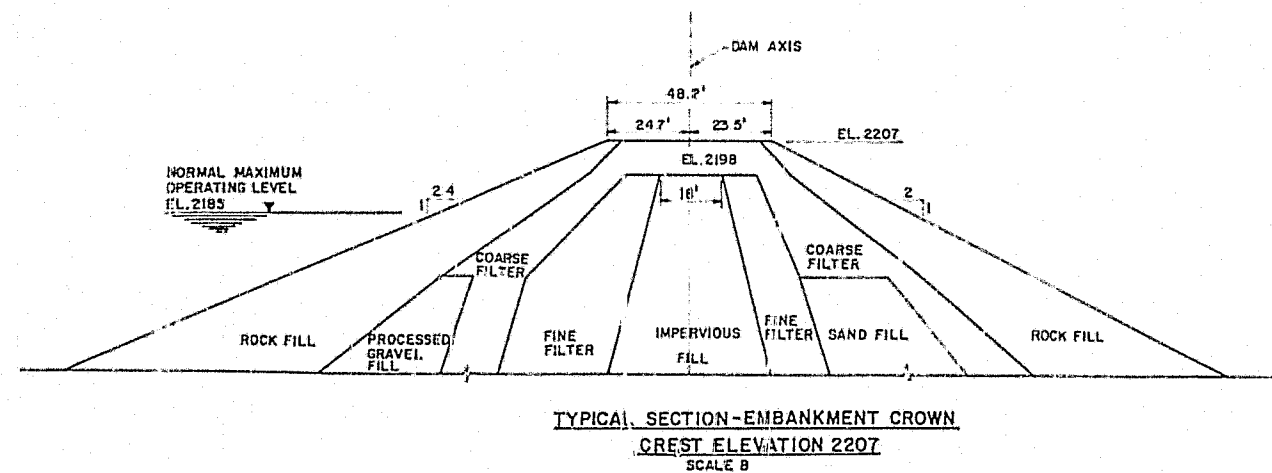
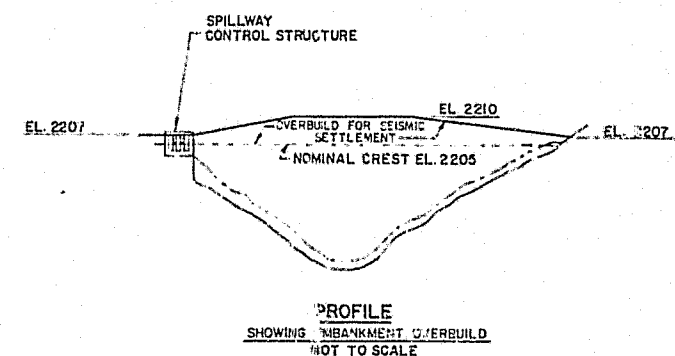
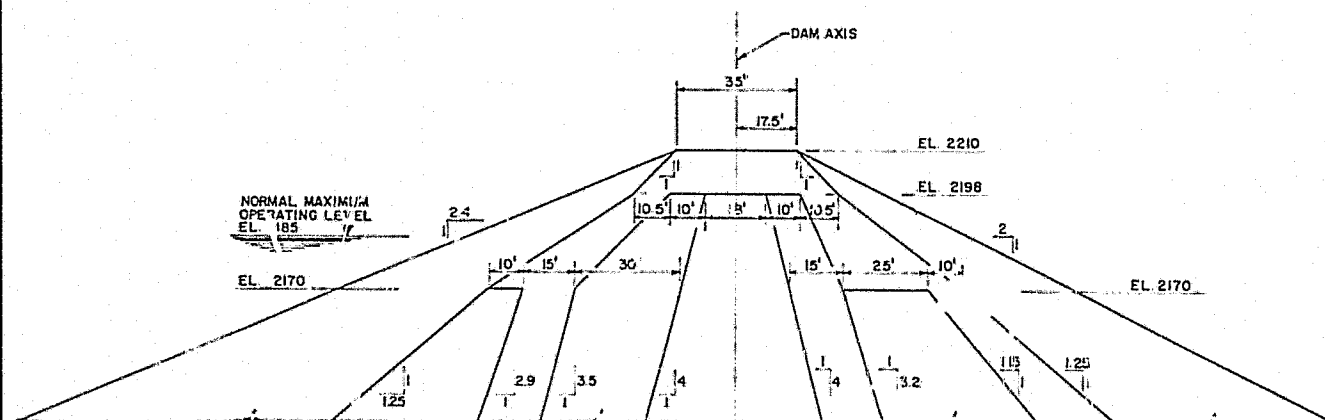
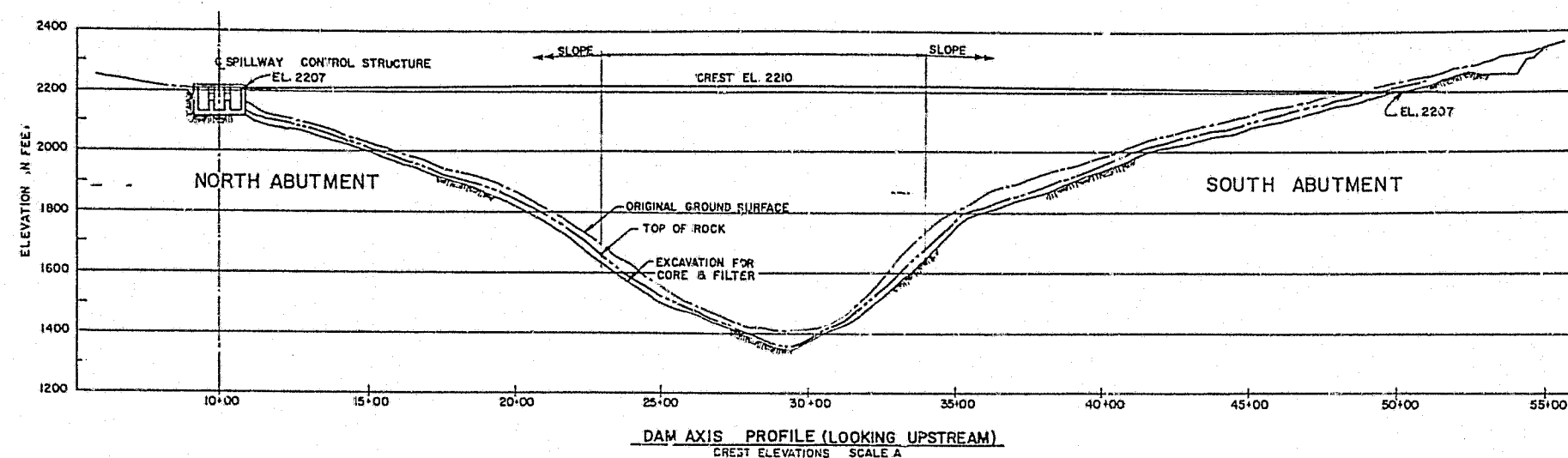
GENERALIZED SECTION - RIVER VALLEY
SCALE B



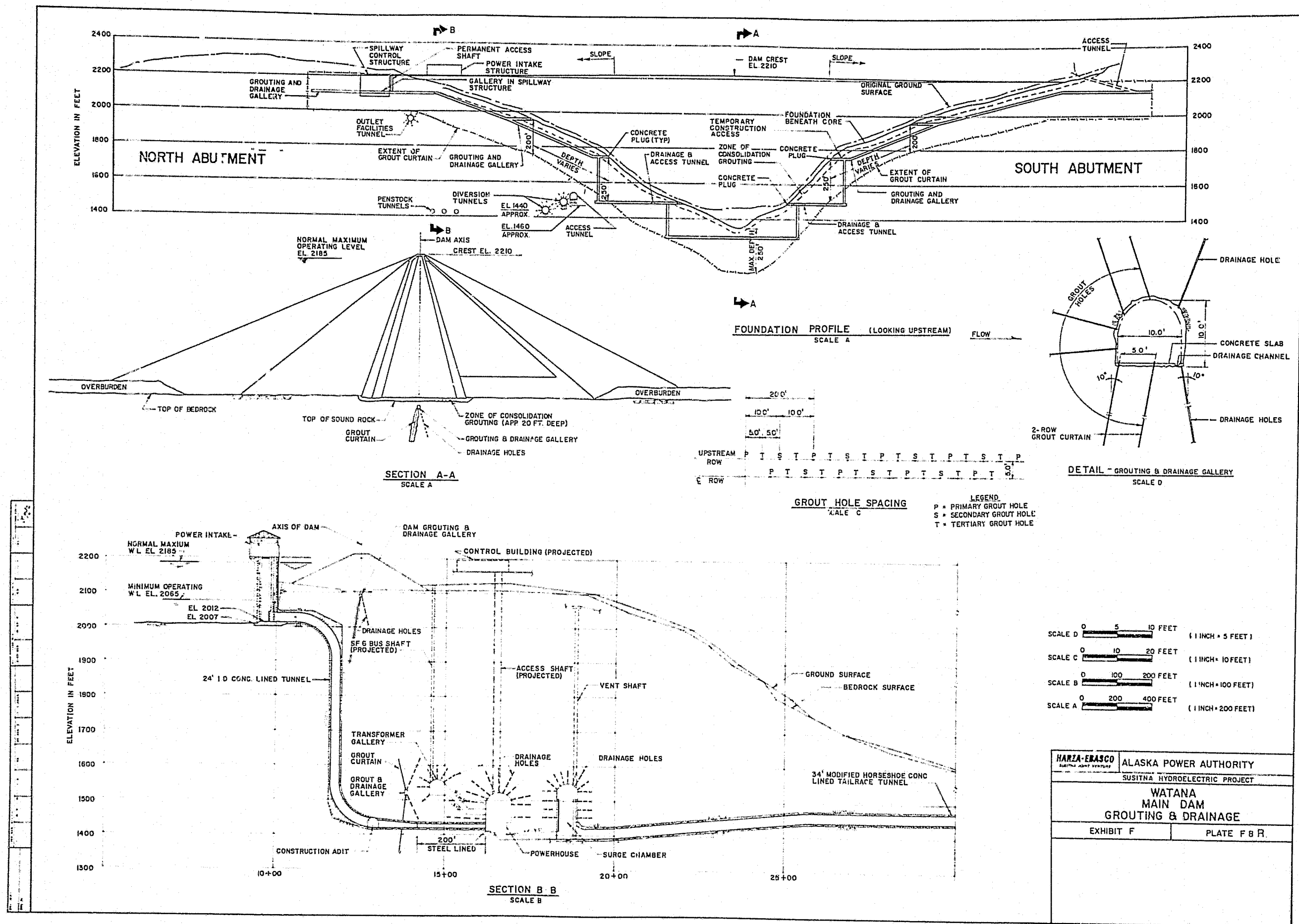
TYPICAL SECTION - DAM EMBANKMENT (MAXIMUM HEIGHT)
SCALE A

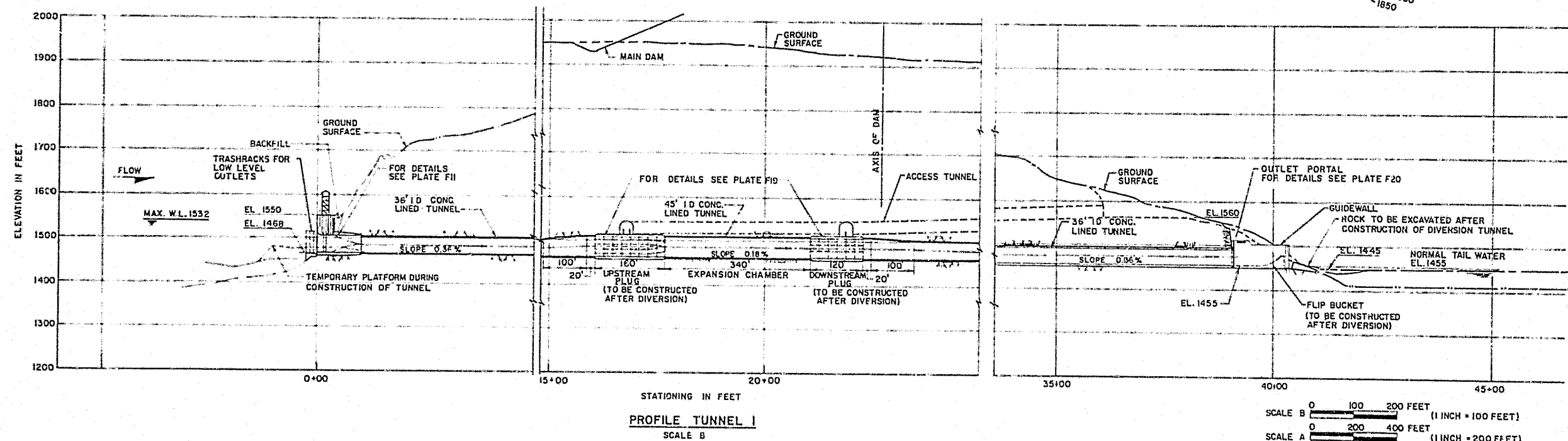
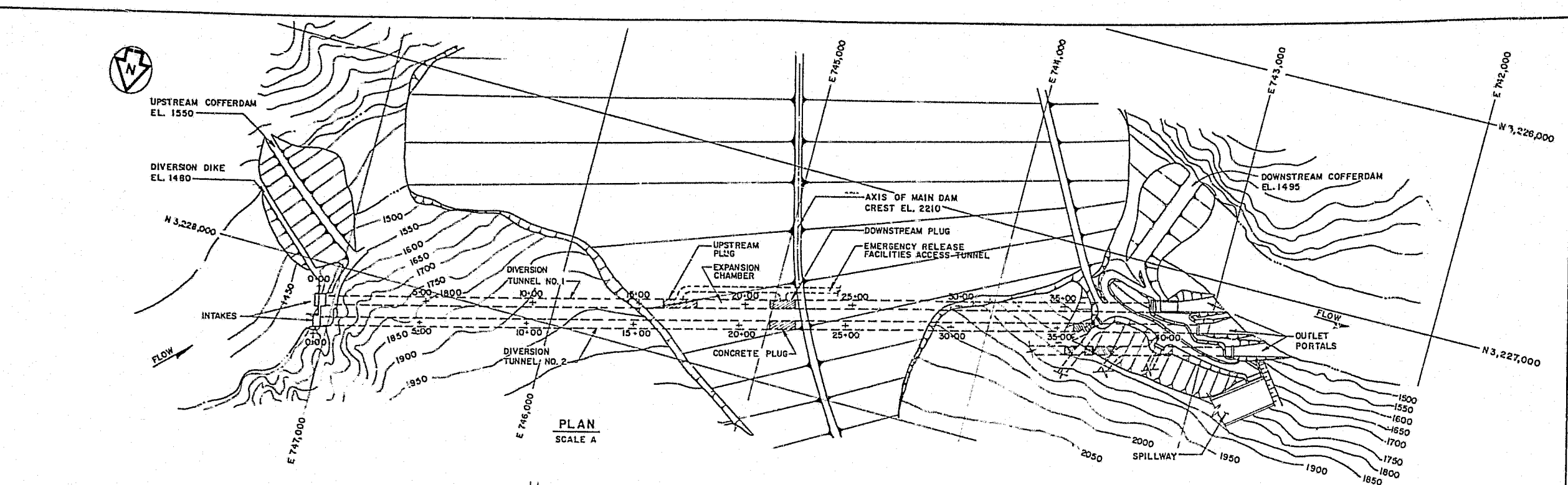
SCALE A 0 100 200 FEET (1 INCH = 100 FEET)
SCALE B 0 200 400 FEET (1 INCH = 200 FEET)

HARZA-ERASCO NORTH AMERICAN		ALASKA POWER AUTHORITY	
		SUSITNA HYDROELECTRIC PROJECT	
		WATANA DAM	
		TYPICAL SECTION	
EXHIBIT F		PLATE F6 R	



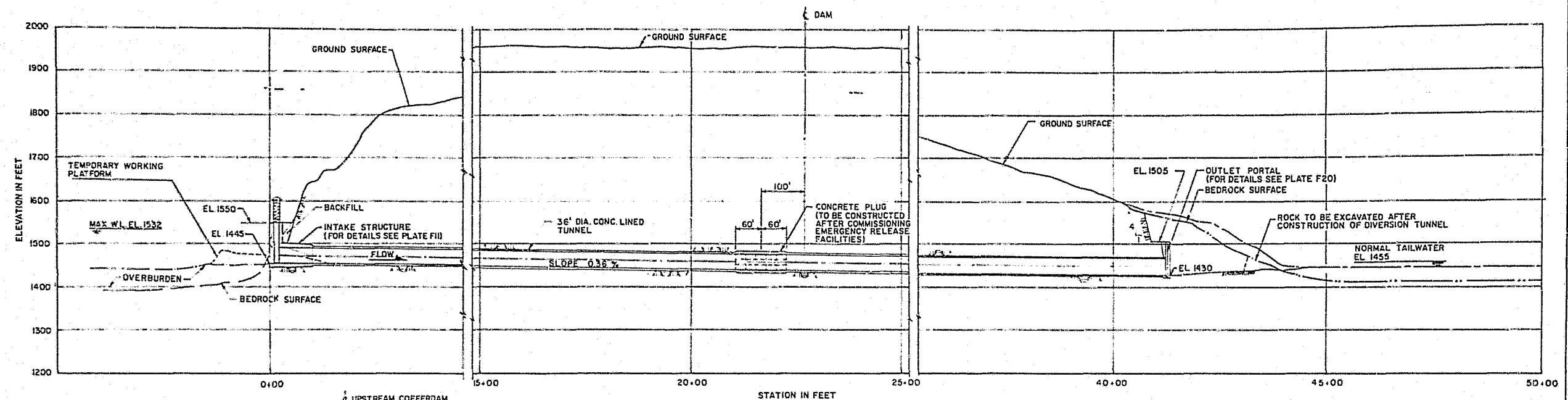
HARZA-ERASCO PAPER 4017 PARTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
WATANA	
DAM AXIS PROFILE AND CREST DETAILS	
EXHIBIT F	PLATE F7



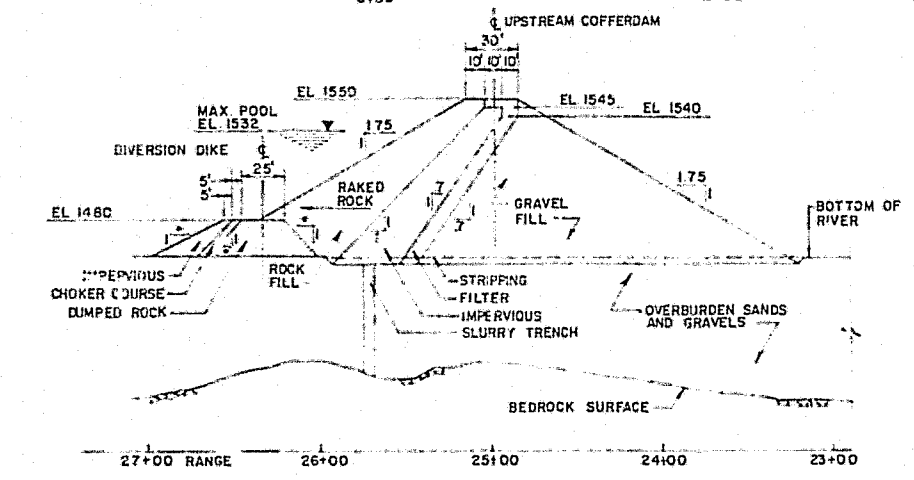


SCALE B 0 100 200 FEET (1 INCH = 100 FEET)
SCALE A 0 200 400 FEET (1 INCH = 200 FEET)

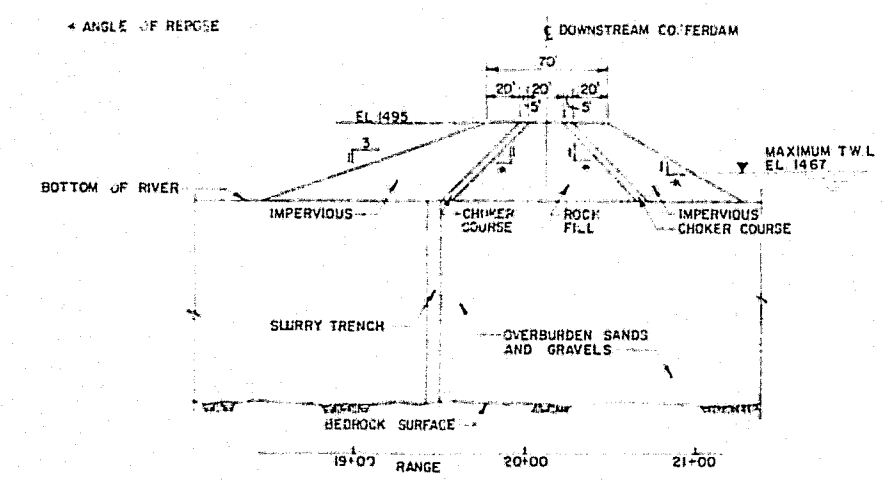
HARZA-ERASCO ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
WATANA DIVERSION GENERAL ARRANGEMENT	
EXHIBIT F	PLATE F9 R



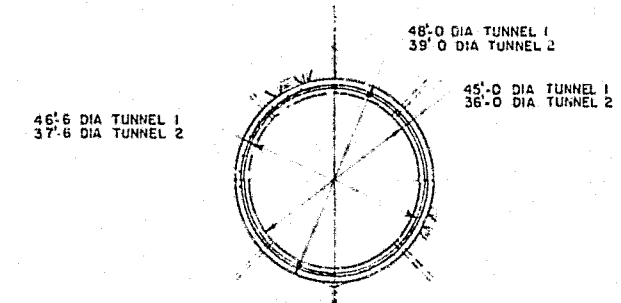
PROFILE - TUNNEL 2
SCALE A



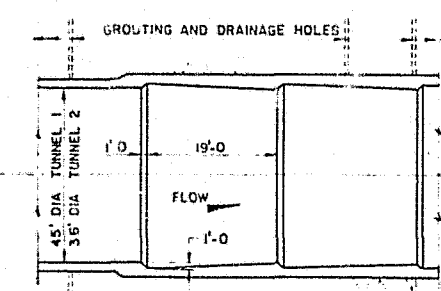
TYPICAL SECTION UPSTREAM COFFERDAM
SCALE B



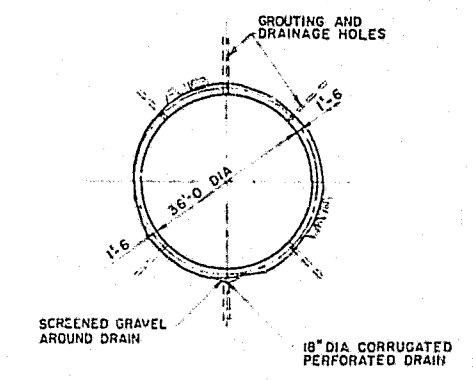
TYPICAL SECTION DOWNSTREAM COFFERDAM
SCALE B



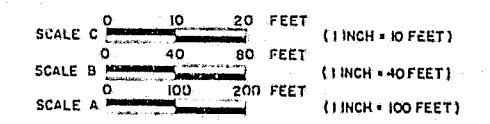
CROSS SECTION AT PLUG (TYPICAL)
N.T.S.



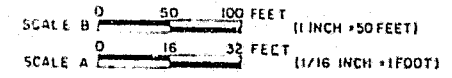
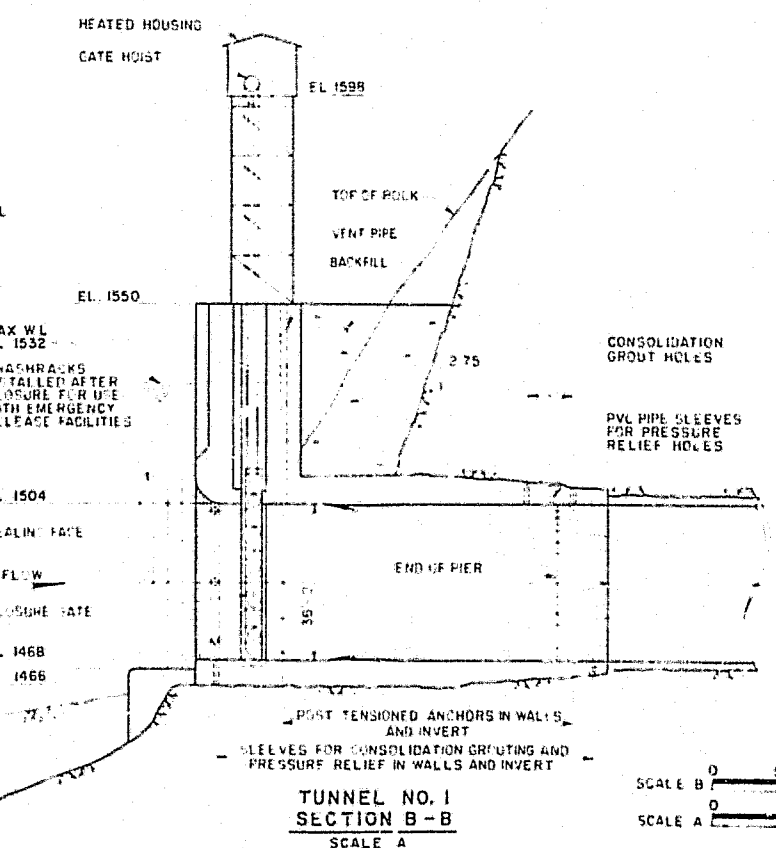
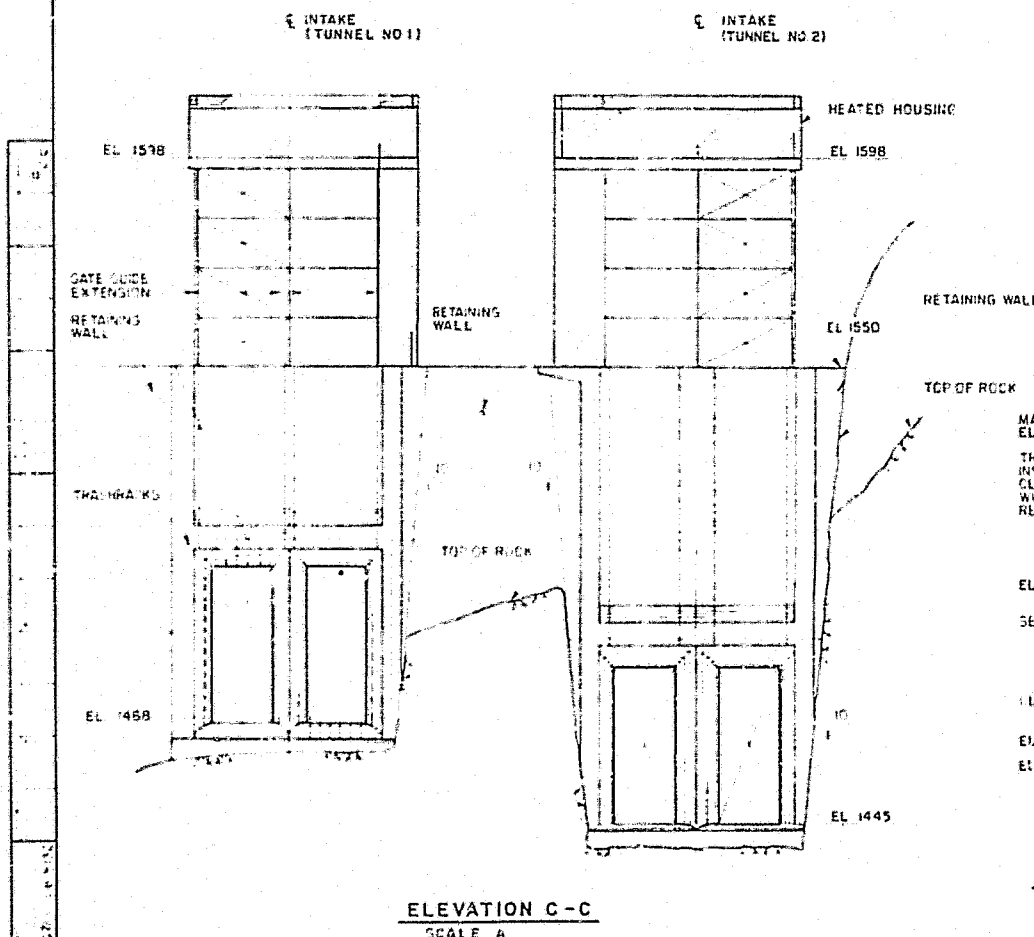
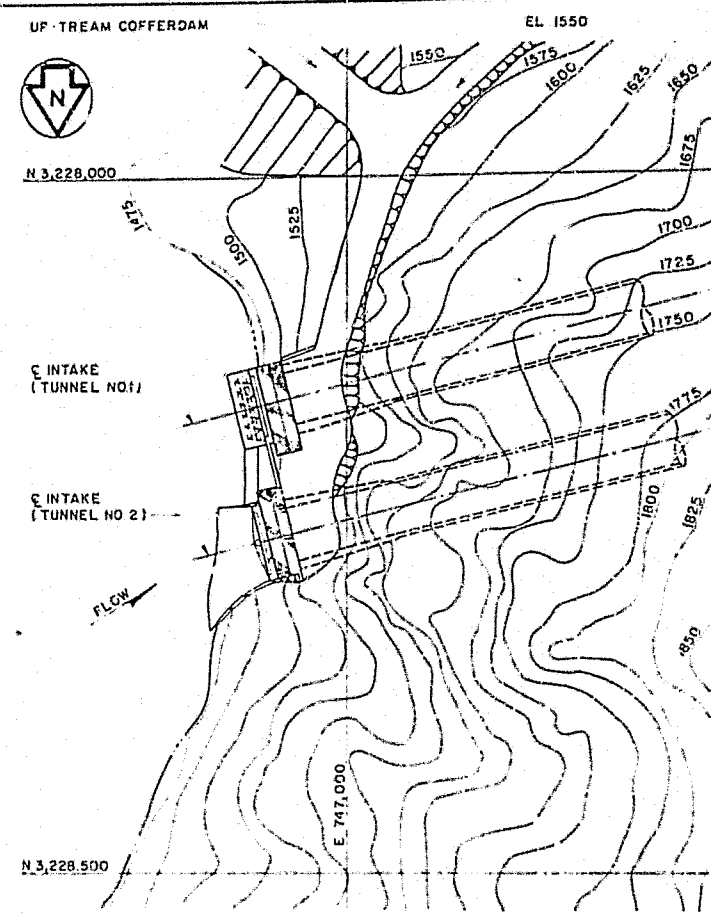
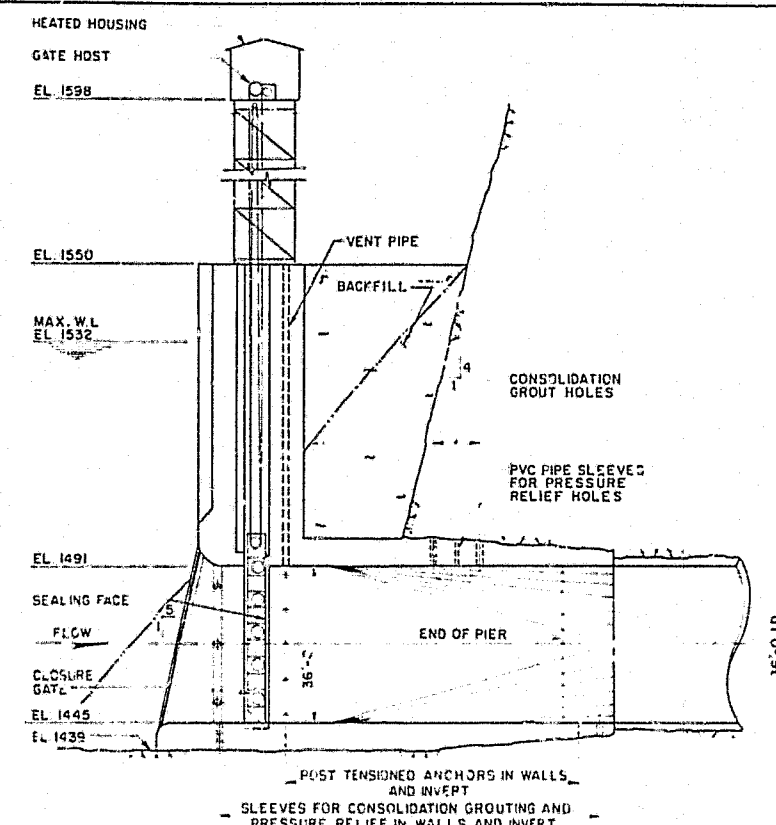
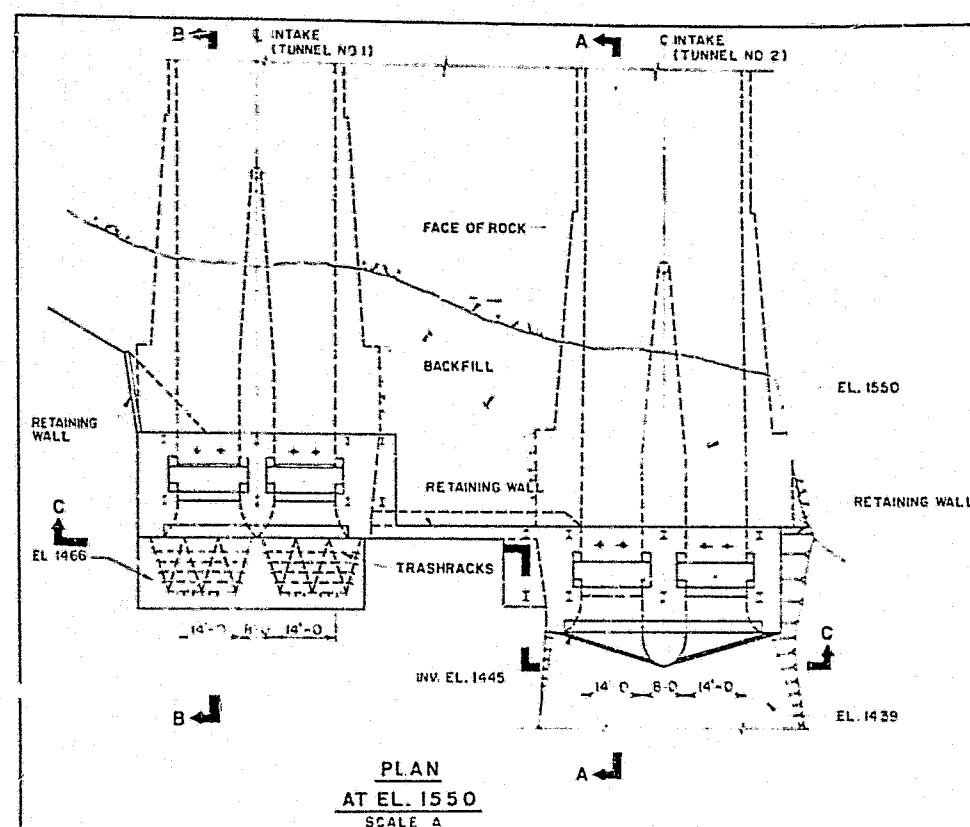
SECTION ALONG C OF TUNNEL AT
PLUG LOCATION
SCALE C



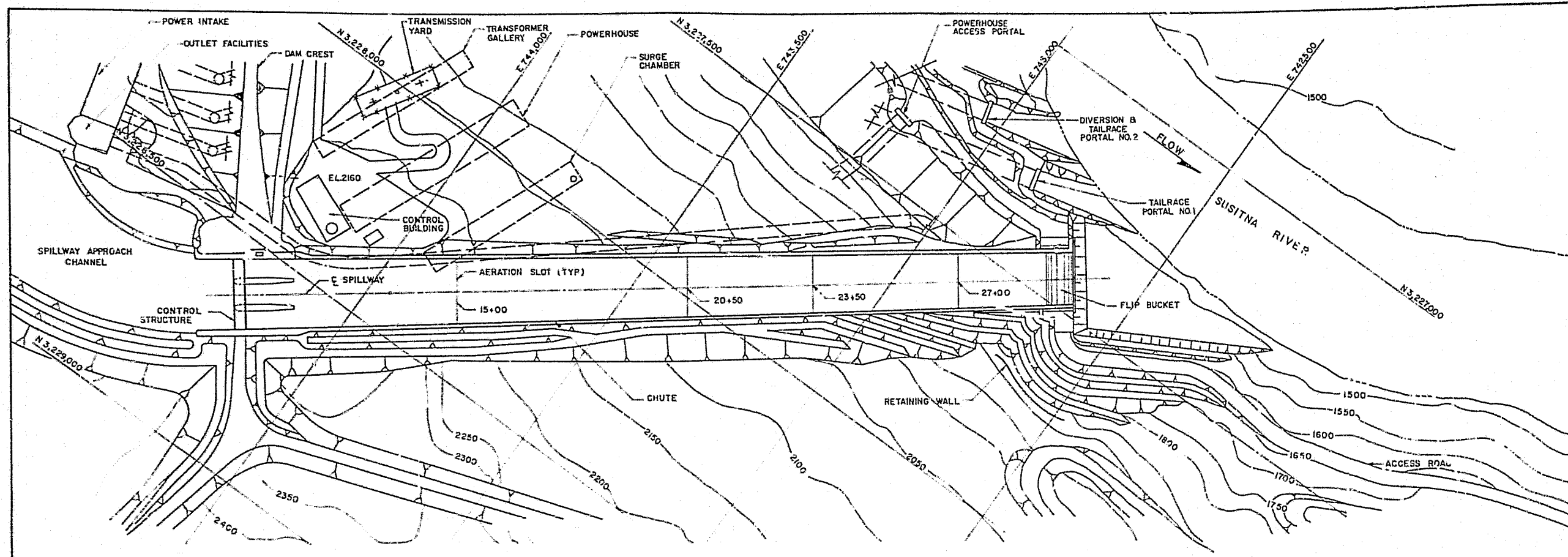
TYPICAL TUNNEL CROSS SECTION
N.T.S.



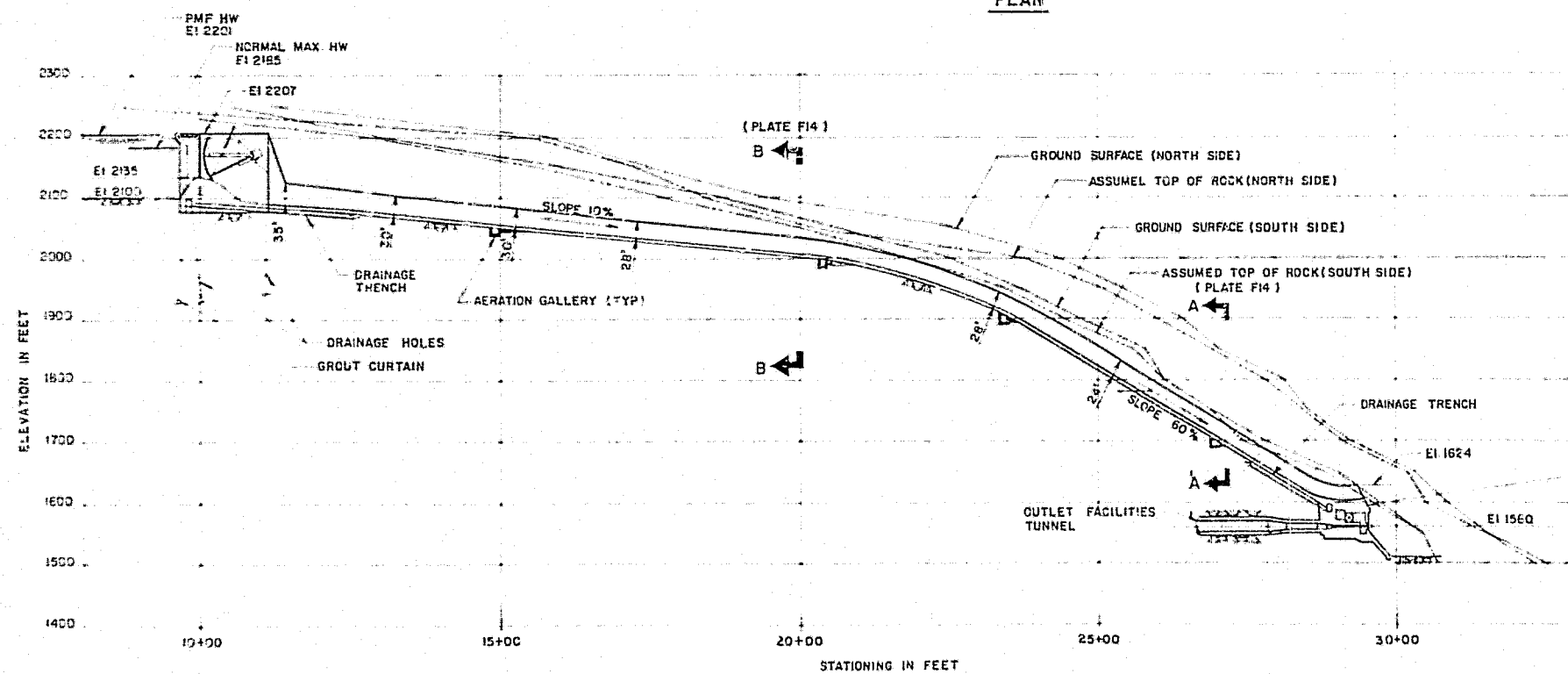
HARZA-ERASCO	
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
WATANA	
COFFERDAM AND DIVERSION TUNNEL	
PROFILE AND SECTIONS	
EXHIBIT F	PLATE F10 R



ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
WATANA DIVERSION INTAKE STRUCTURES	
EXHIBIT F	PLATE F11 R



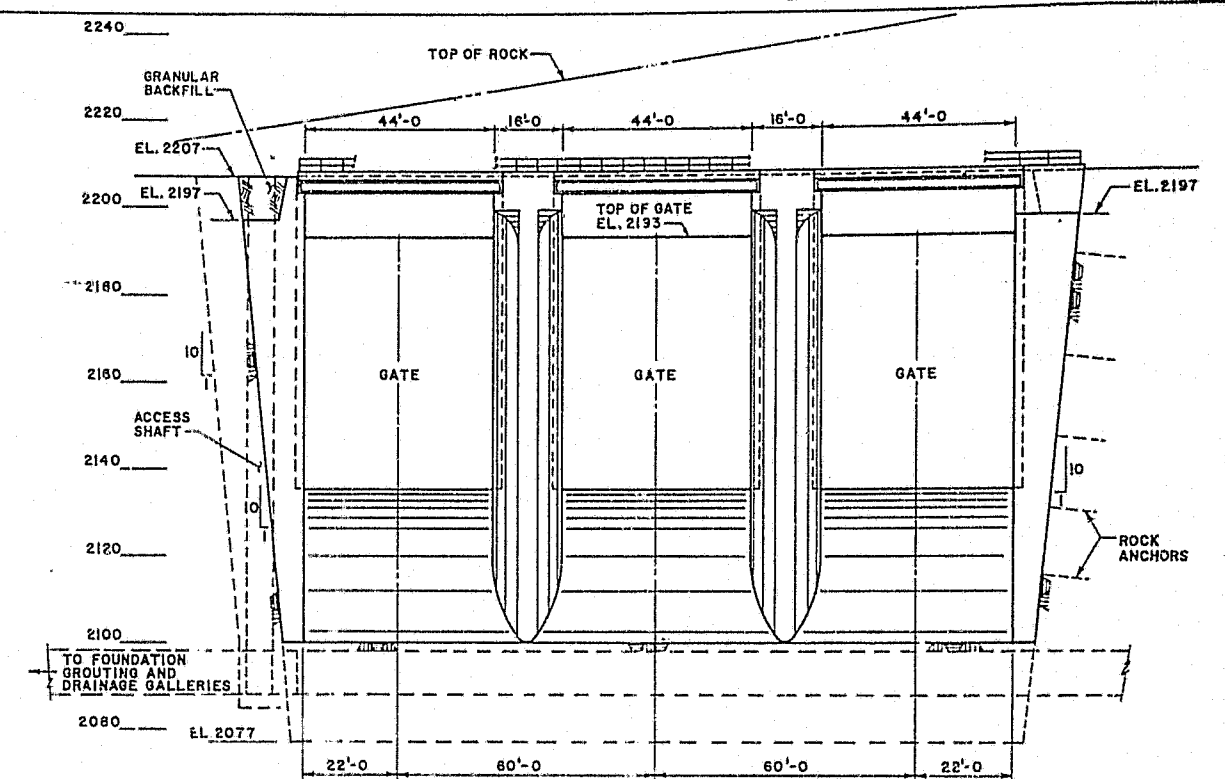
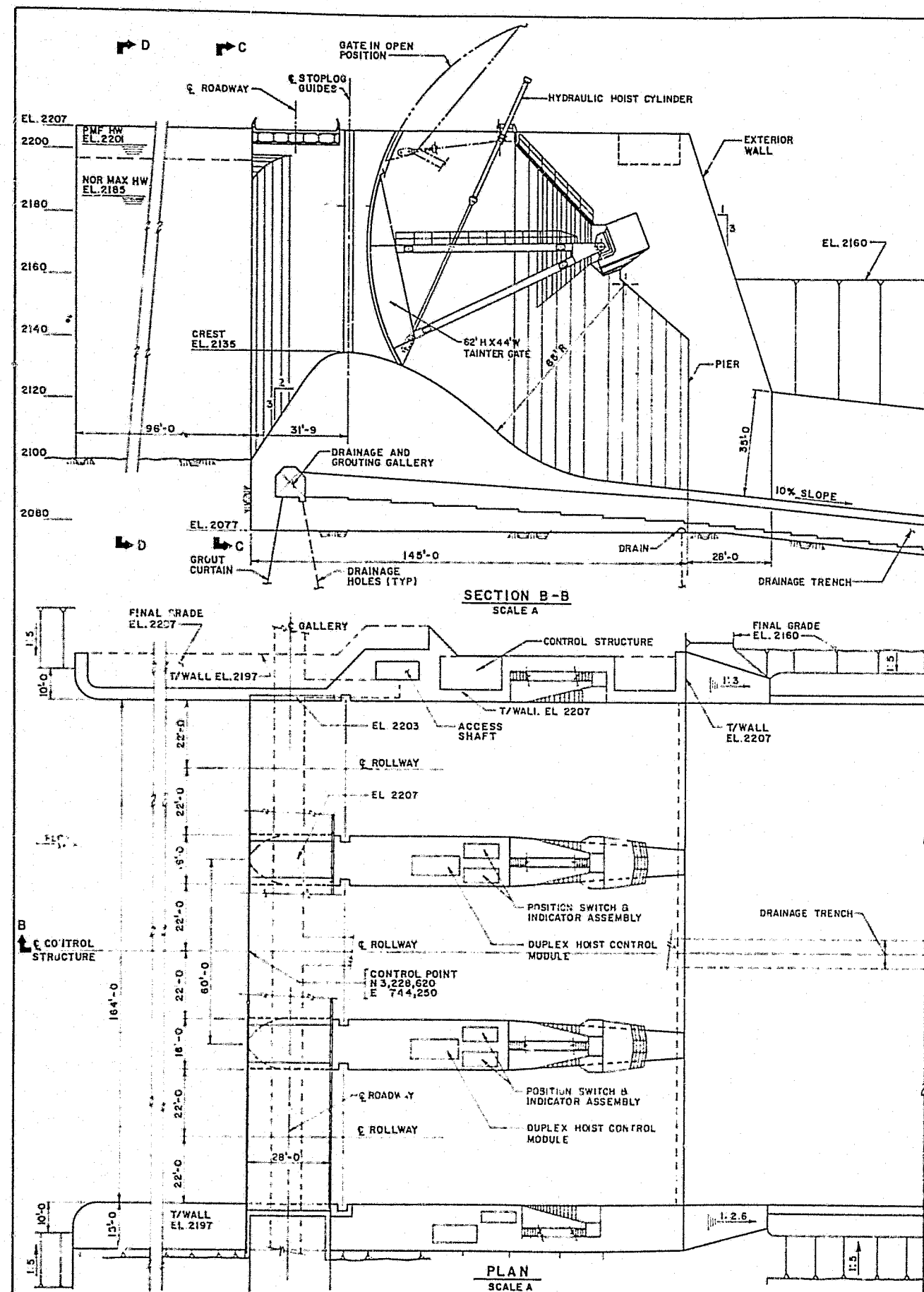
PLAN



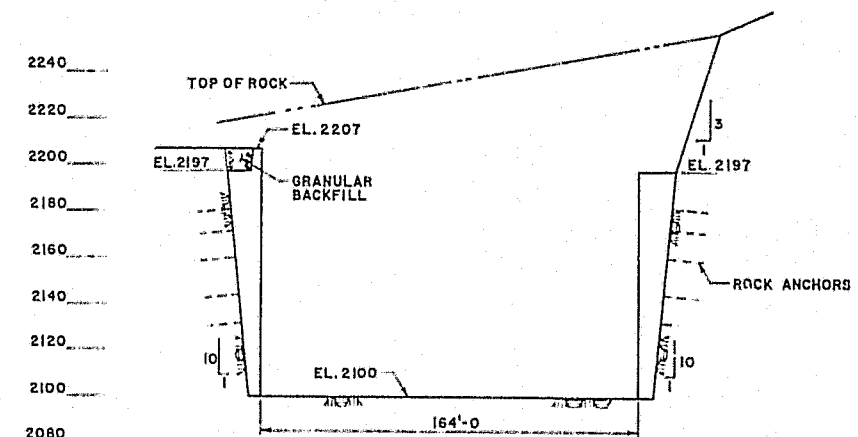
PROFILE

SCALE 0 100 200 FEET
1" = 100 FEET

HAZARD-EMASCO SUSITNA HYDROELECTRIC PROJECT	ALASKA POWER AUTHORITY
WATANA MAIN SPILLWAY GENERAL ARRANGEMENT	
EXHIBIT F	PLATE F12 R



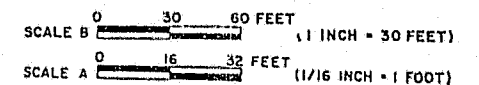
SECTION C-C
SCALE A



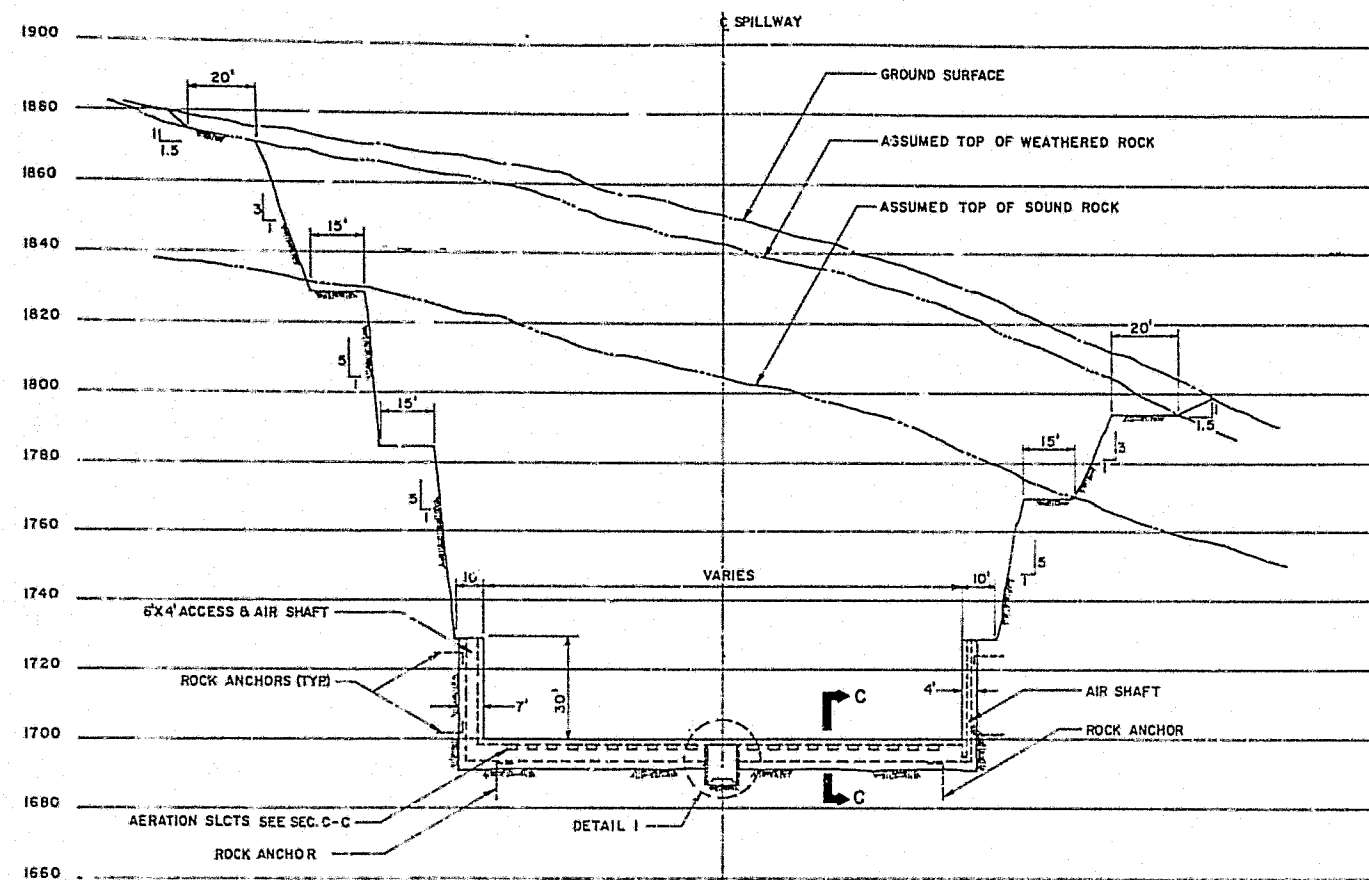
SECTION D-D
SCALE B

SPILLWAY CONTROL STRUCTURE						SECTION D
SUMMARY OF STABILITY ANALYSES						SCALE B
LOAD CONDITION	FOUNDATION STRESS US/D'S (P'SI)	X _{cg} (FT)	FACTORS OF SAFETY			
			SLIDING	SHEAR FRICTION	FLOATATION	OVERTURNING
NORMAL INCLUDES ICE LOADS	469 / 58.2	2.6'	N.A.	4.0	5.8	2.9
UNUSUAL 100/YO YR. EARTHQUAKE	217 / 83.5	14.2	N.A.	2.3	5.8	2.2
UNUSUAL DRAIN PLUGGED PMF	212 / 56.6	11.0	N.A.	3.2	2.6	1.7
EXTREME EARTHQUAKE	-24.9 / 130.0	35.6	N.A.	1.3	5.9	1.5

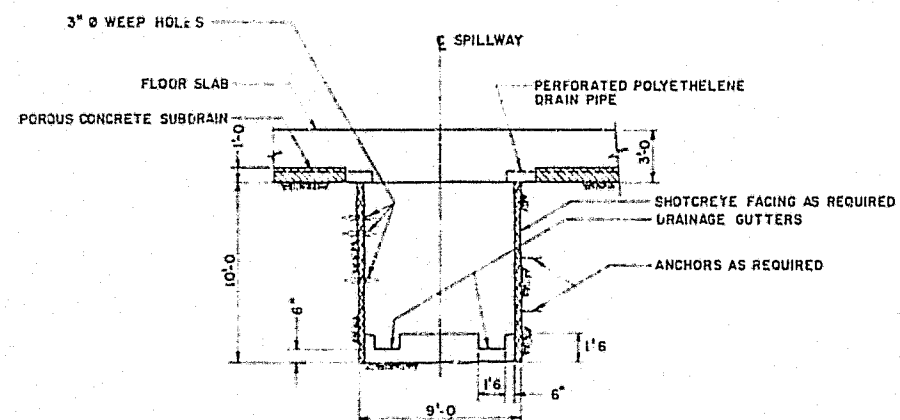
PHYSICAL PARAMETERS
 $\Phi = 41^\circ$
 $c = 30 \text{ PSI}$



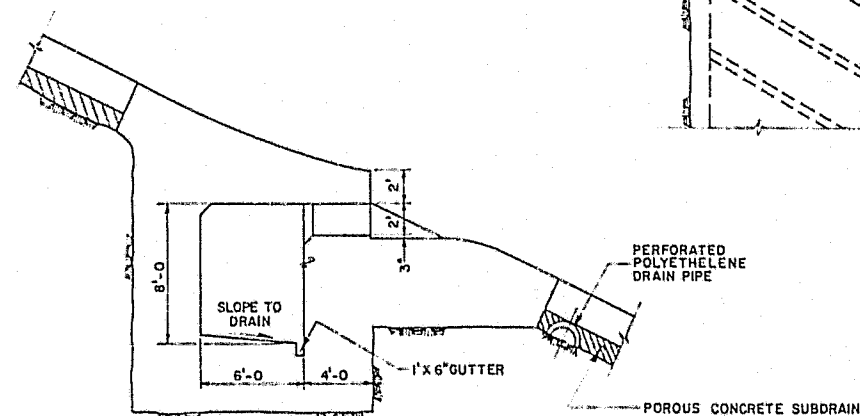
		ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT		SUSITNA HYDROELECTRIC PROJECT	
WATANA SPILLWAY CONTROL STRUCTURE			
EXHIBIT F		PLATE F 13 R	



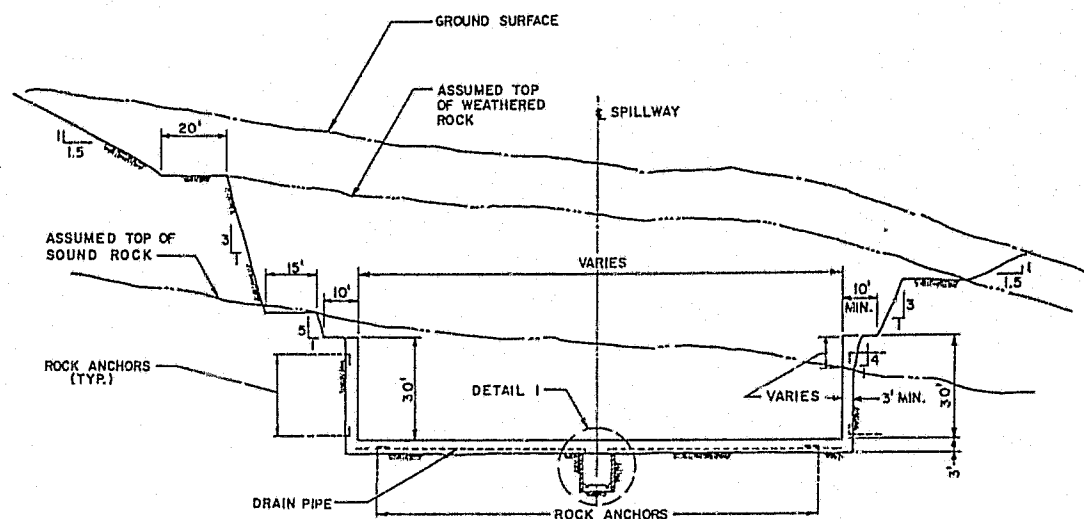
AERATION GALLERY
SECTION A-A (PLATE F12)
SCALE B



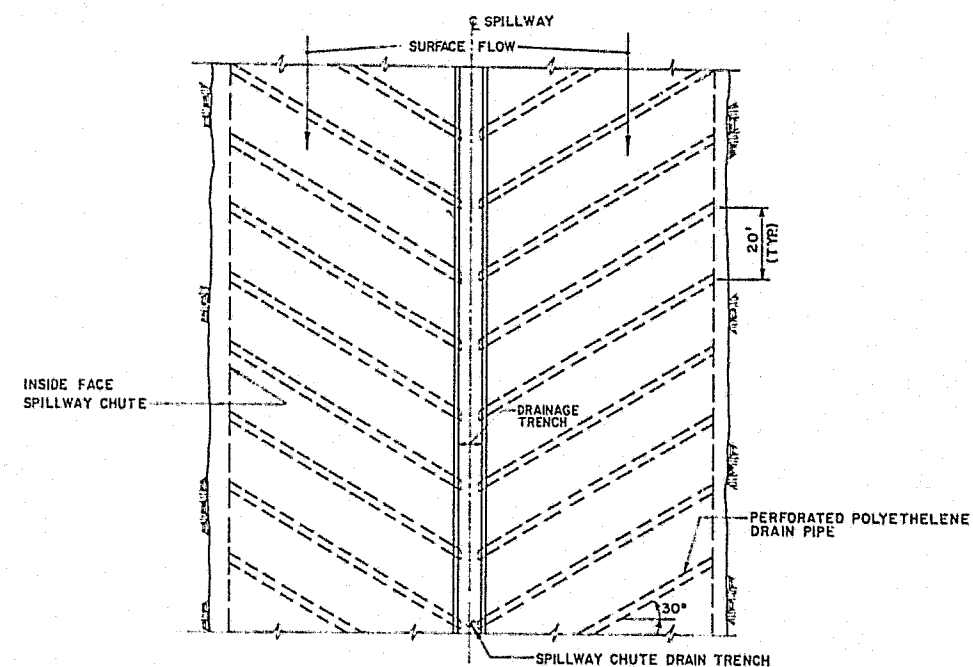
SPILLWAY CHUTE DRAINAGE TRENCH (TYPICAL)
DETAIL I
SCALE C



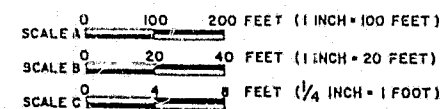
AERATION GALLERY
SECTION C-C
SCALE C



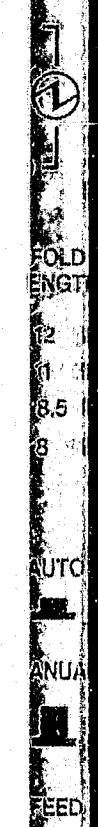
TYPICAL SPILLWAY CHUTE
SECTION B-B (PLATE F12)
SCALE B

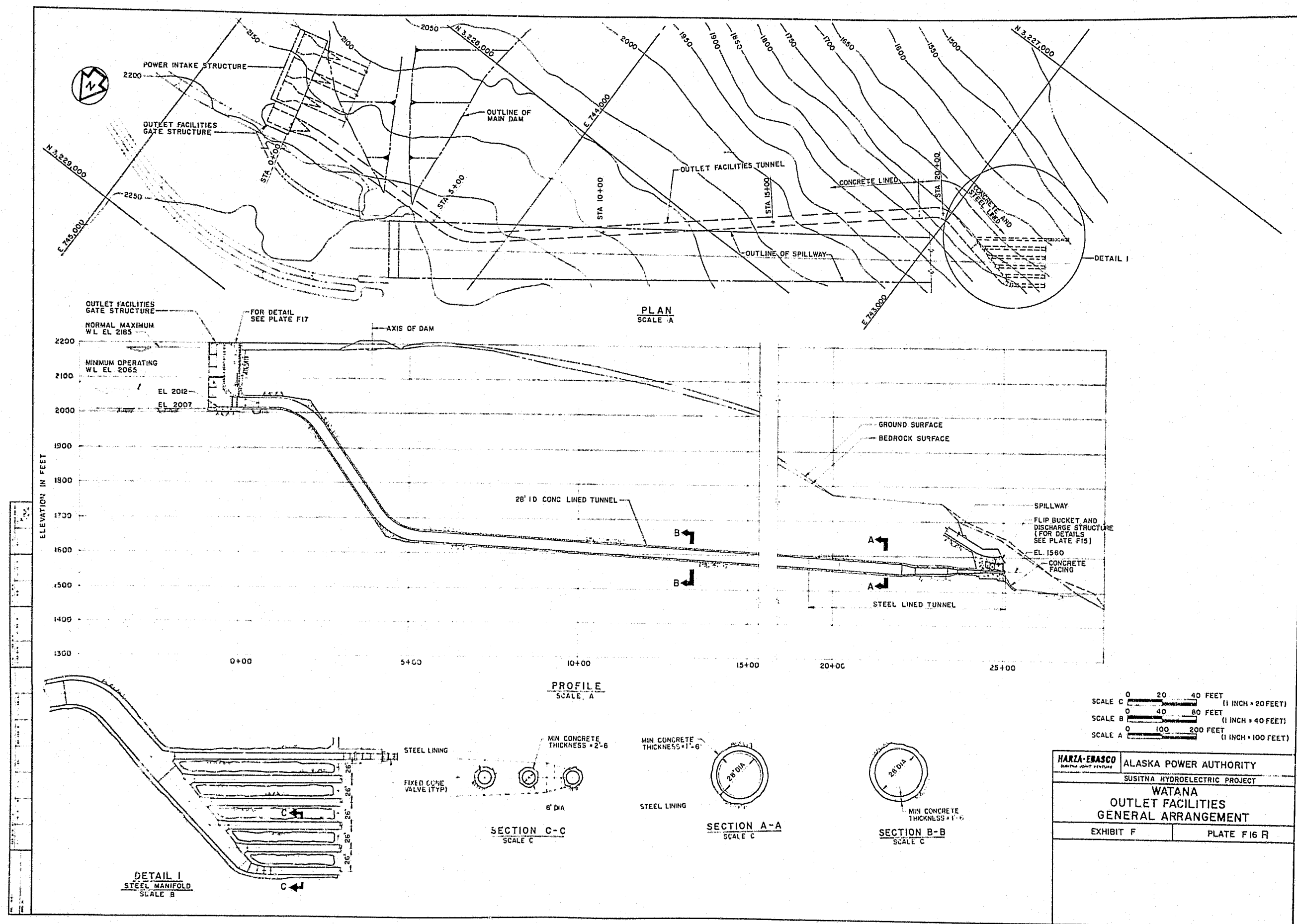


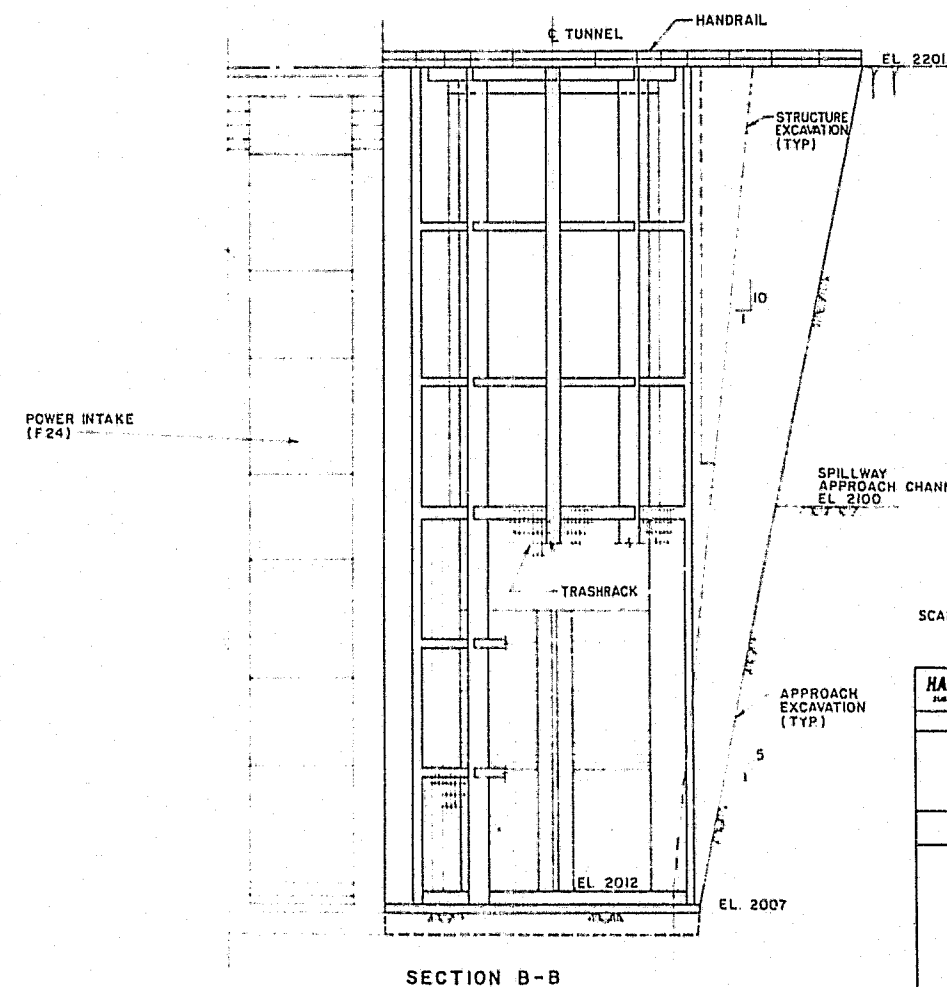
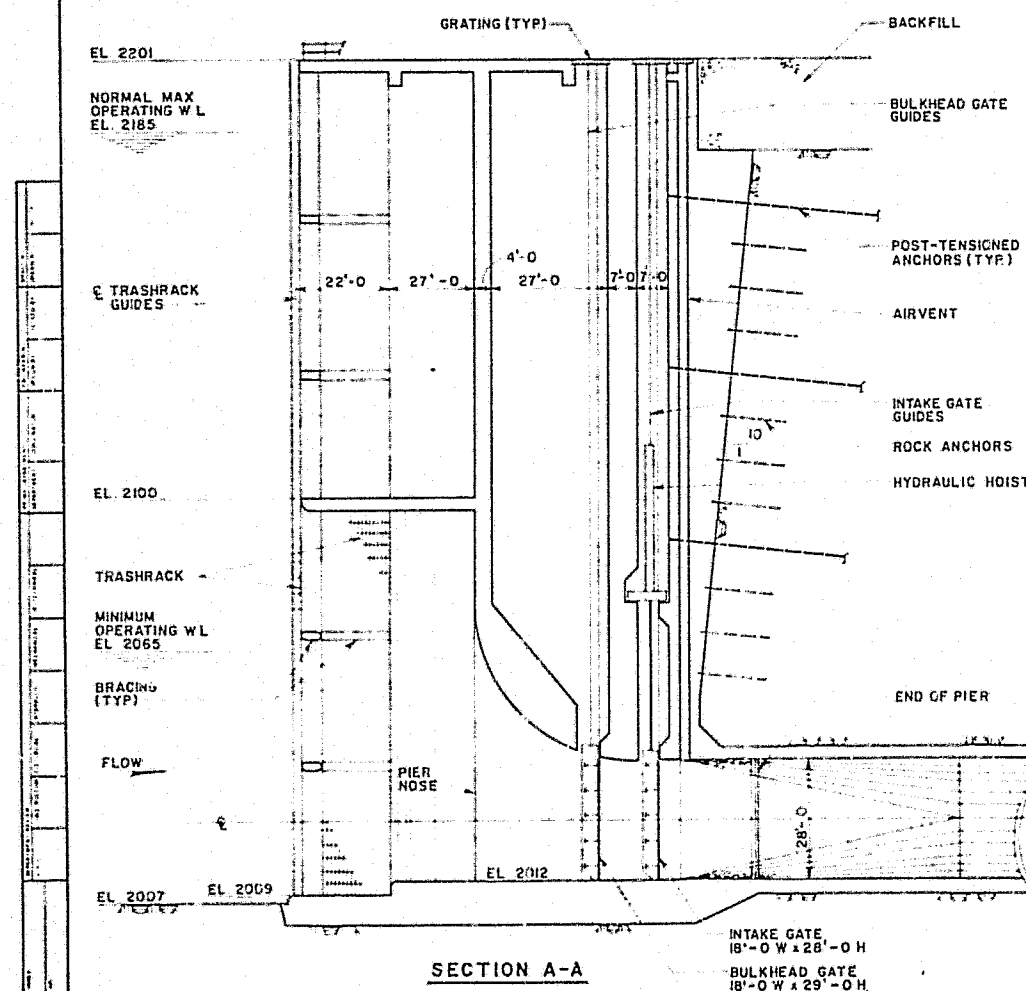
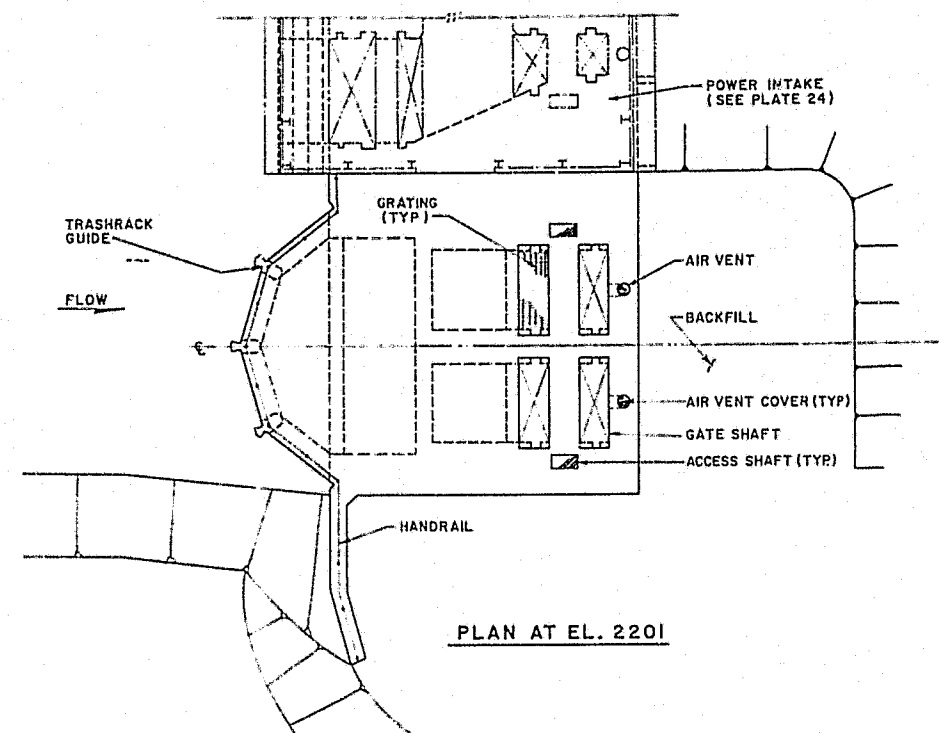
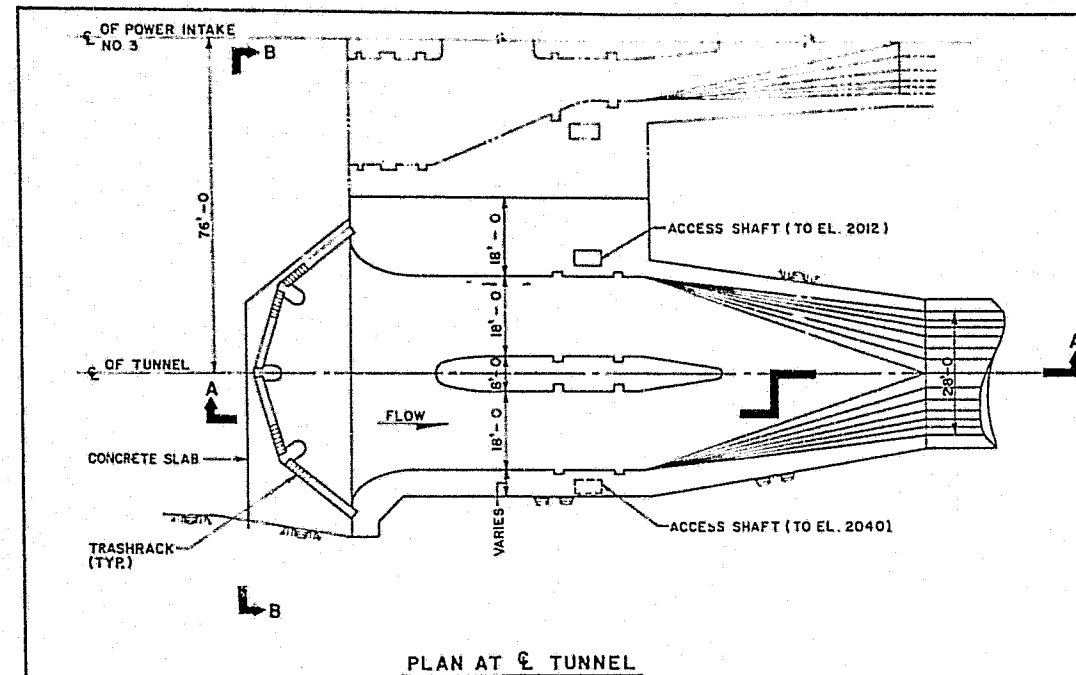
DRAIN PLAN
SCALE B



HARZA-ERASCO ENGINEERING & CONSTRUCTION	ALASKA POWER AUTHORITY
	SUSITNA HYDROELECTRIC PROJECT
WATANA SPILLWAY PROFILE, SECTIONS & DRAINAGE FEATURES	
EXHIBIT F	PLATE F 14 R

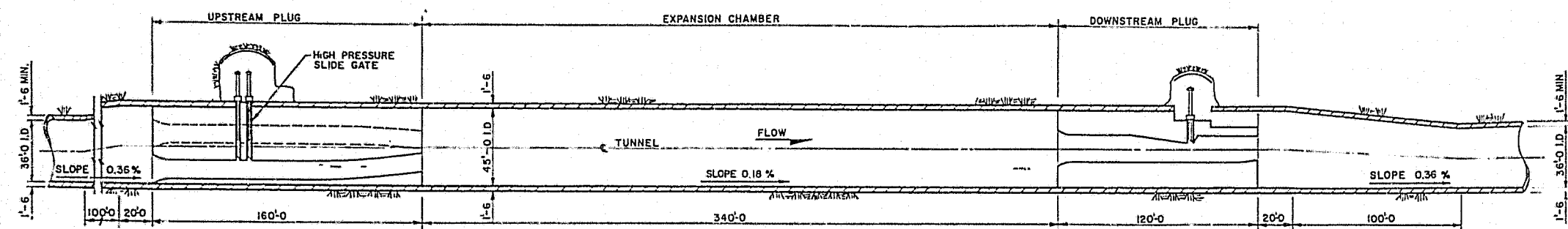






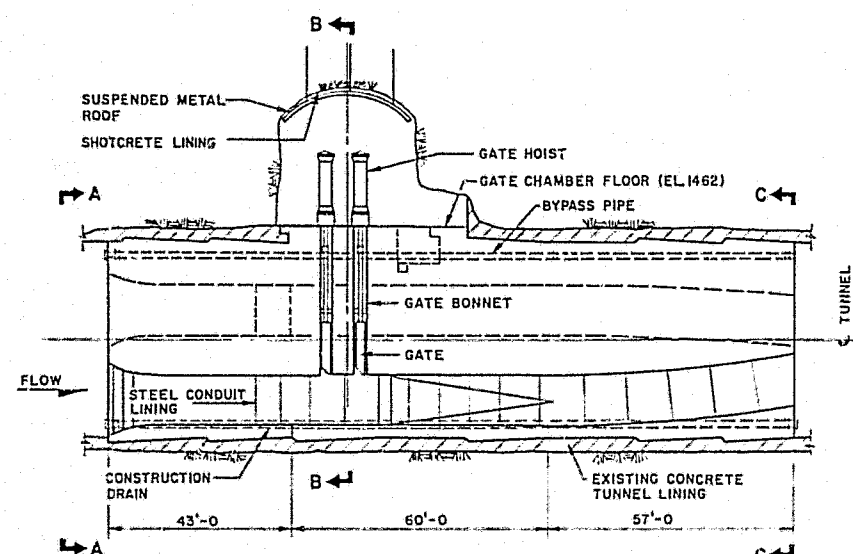
SCALE A 0 16 32 FEET (1/16 INCH = 1 FEET)

HARZA-ERASCO	
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
WATANA OUTLET FACILITIES GATE STRUCTURE	
EXHIBIT F	PLATE F17 R

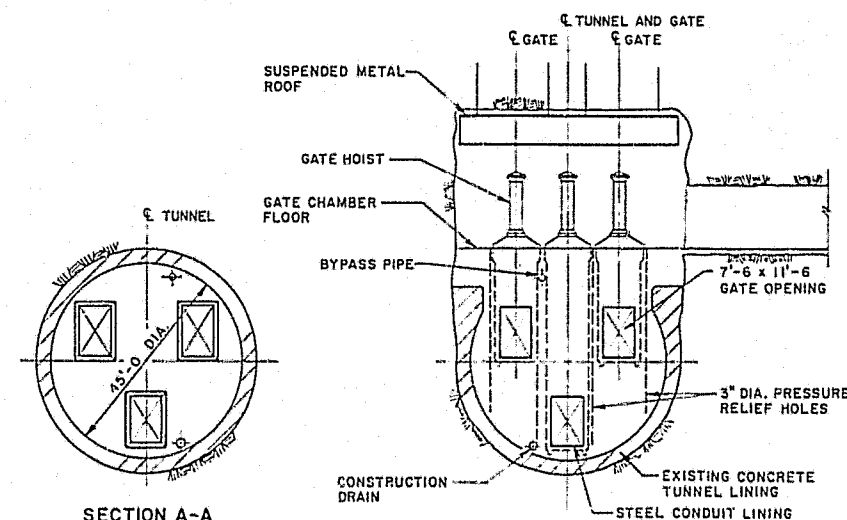
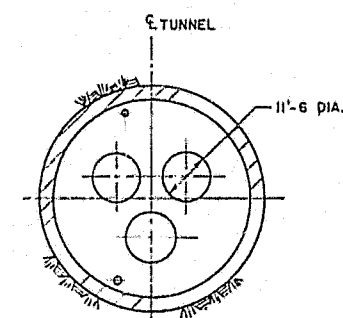
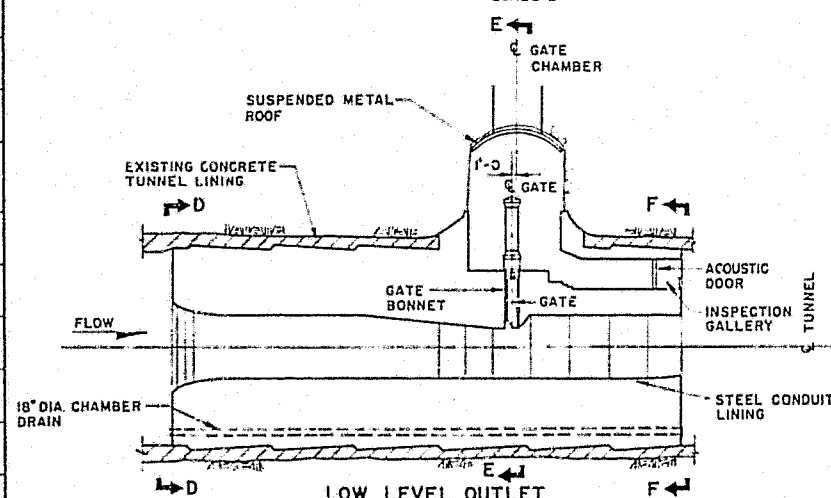


SECTION ALONG C OF TUNNEL NO. 1

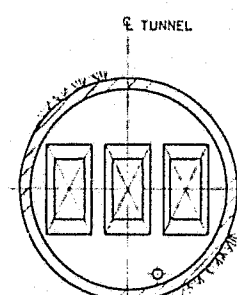
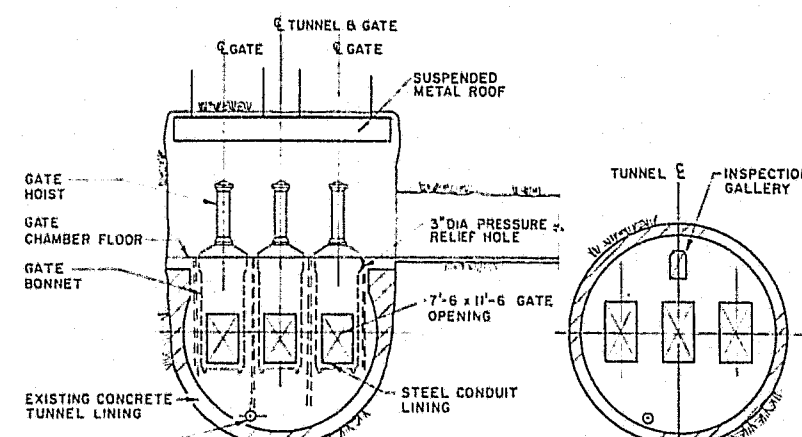
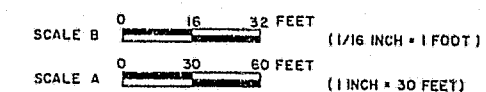
SCALE A

LOW LEVEL OUTLET
UPSTREAM PLUG

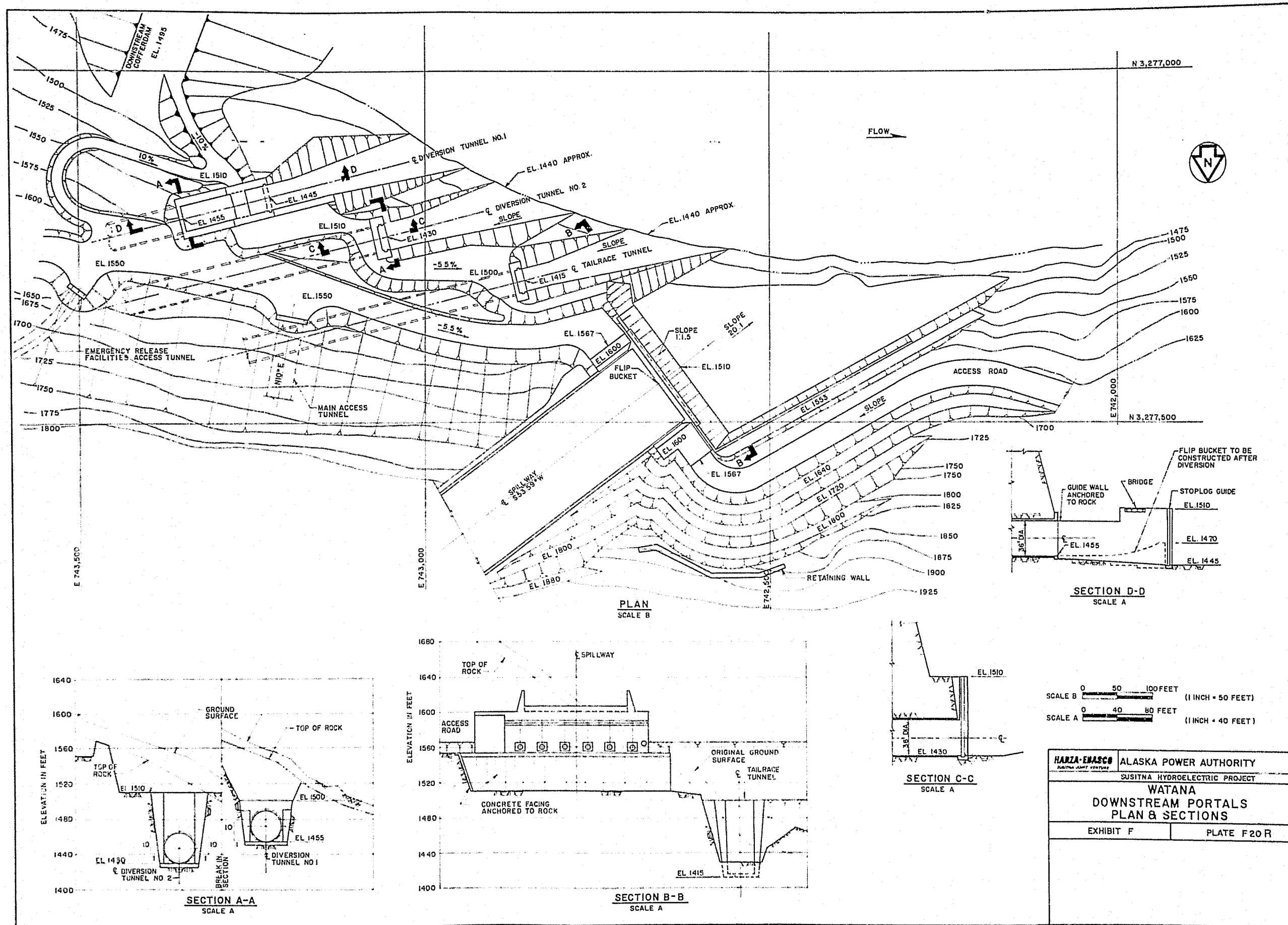
SCALE B

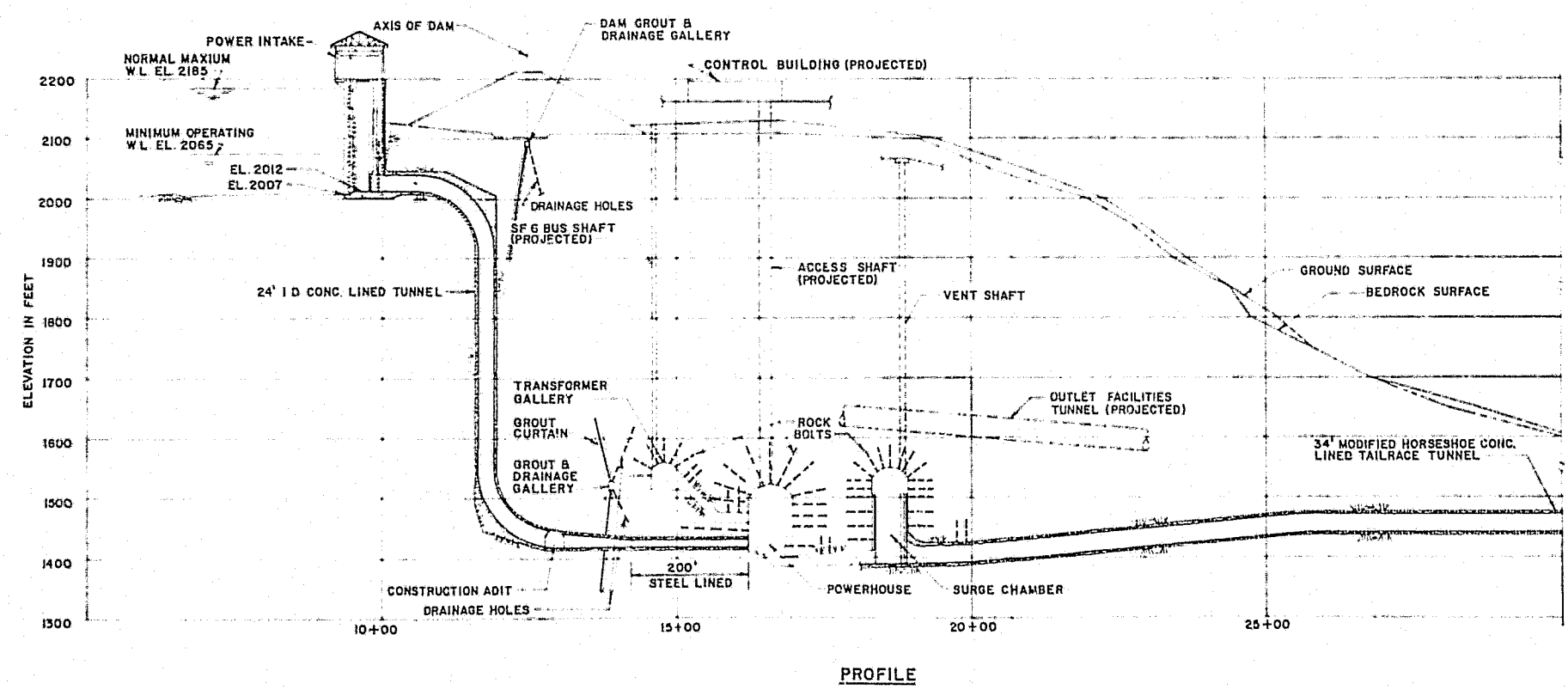
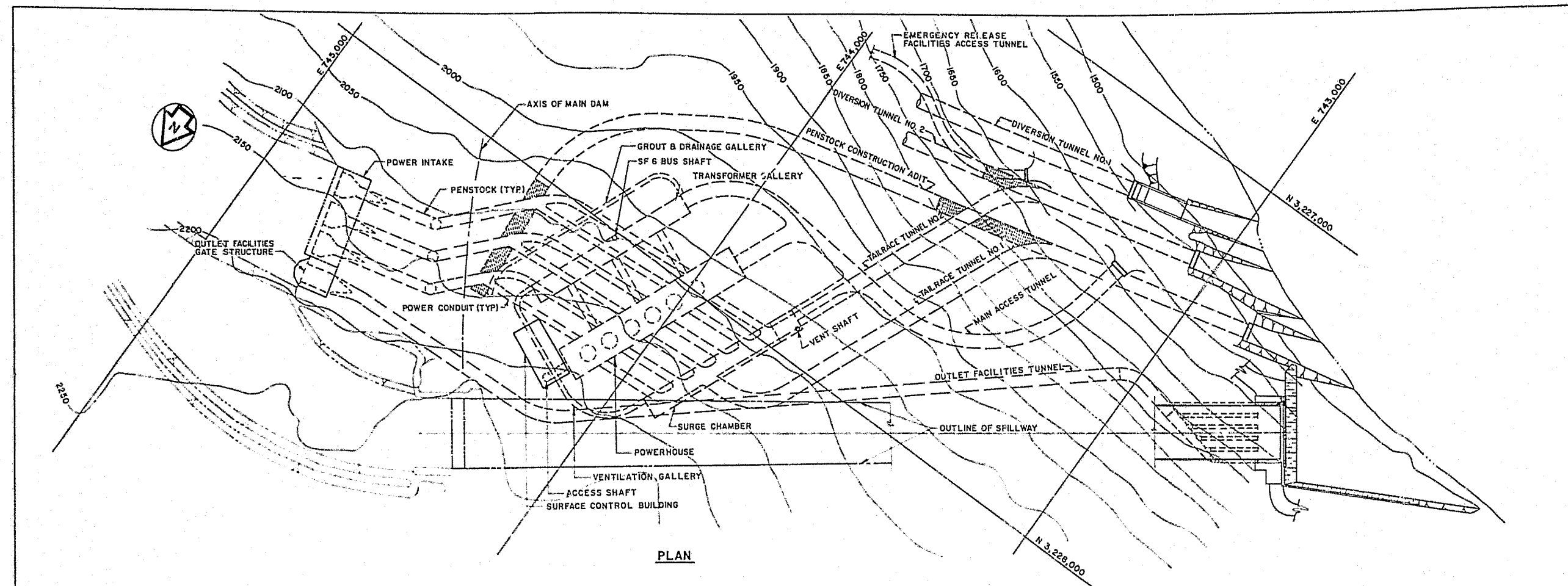
SECTION A-A
SCALE BSECTION B-B
SCALE BSECTION C-C
SCALE BLOW LEVEL OUTLET
DOWNSTREAM PLUG

SCALE B

SECTION D-D
SCALE BSECTION E-E
SCALE BSECTION F-F
SCALE B

HANZA-ERASSO	ALASKA POWER AUTHORITY
SUSITNA RIVER PROJECT	SUSITNA HYDROELECTRIC PROJECT
	WATANA
	EMERGENCY RELEASE FACILITIES
	SECTIONS
EXHIBIT F	PLATE F13 R

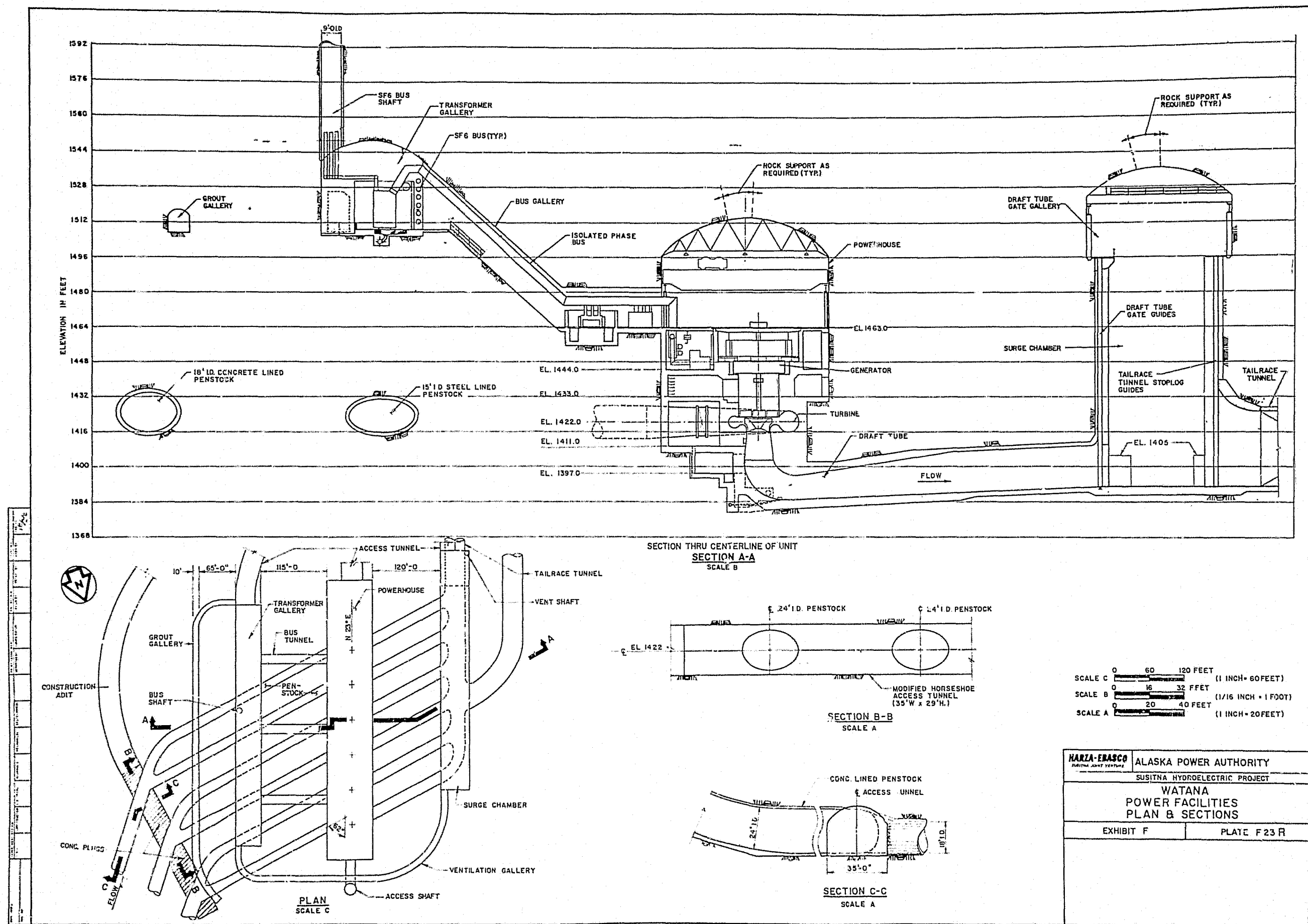


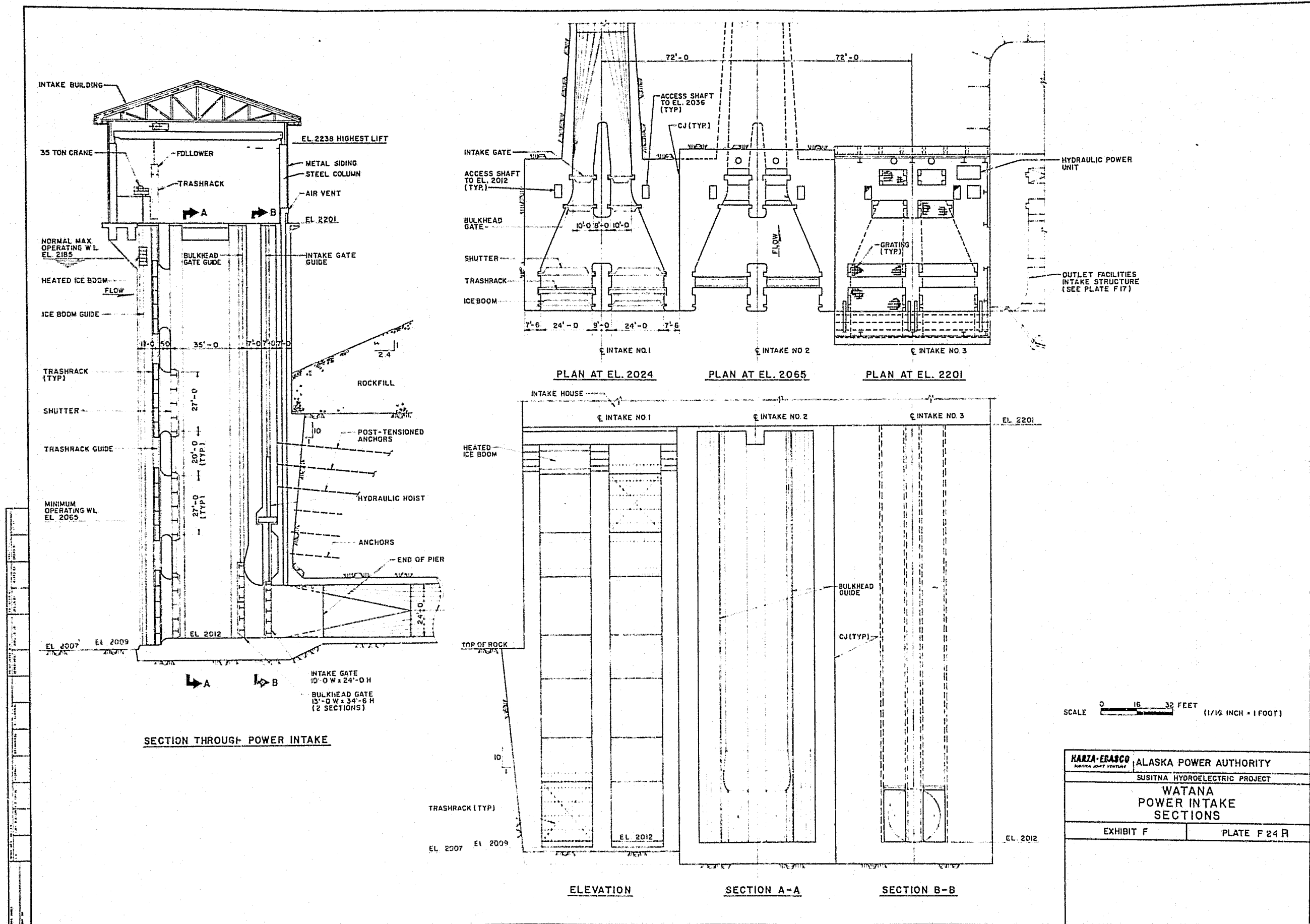


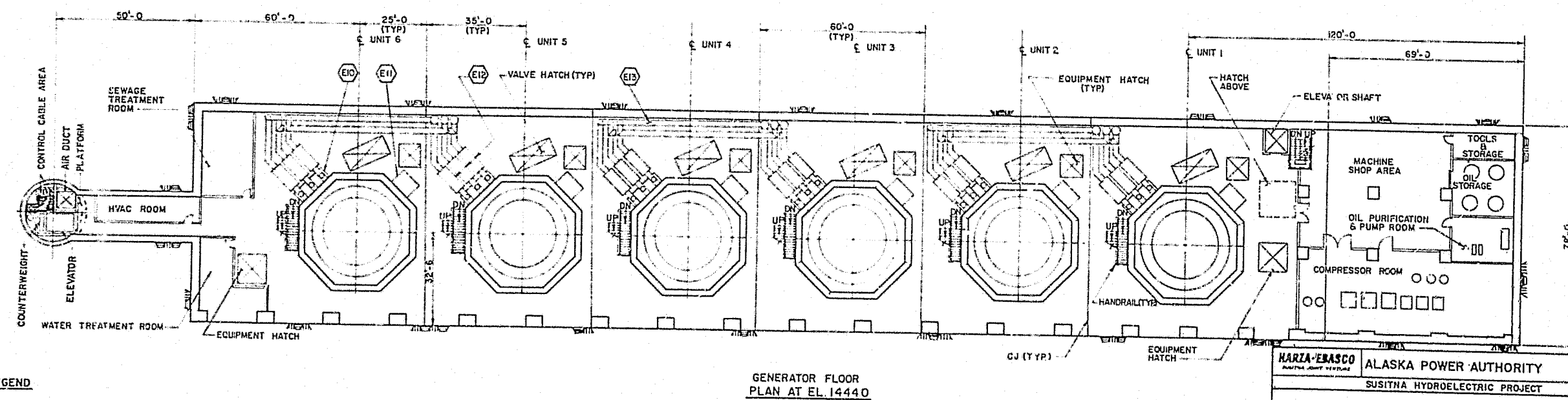
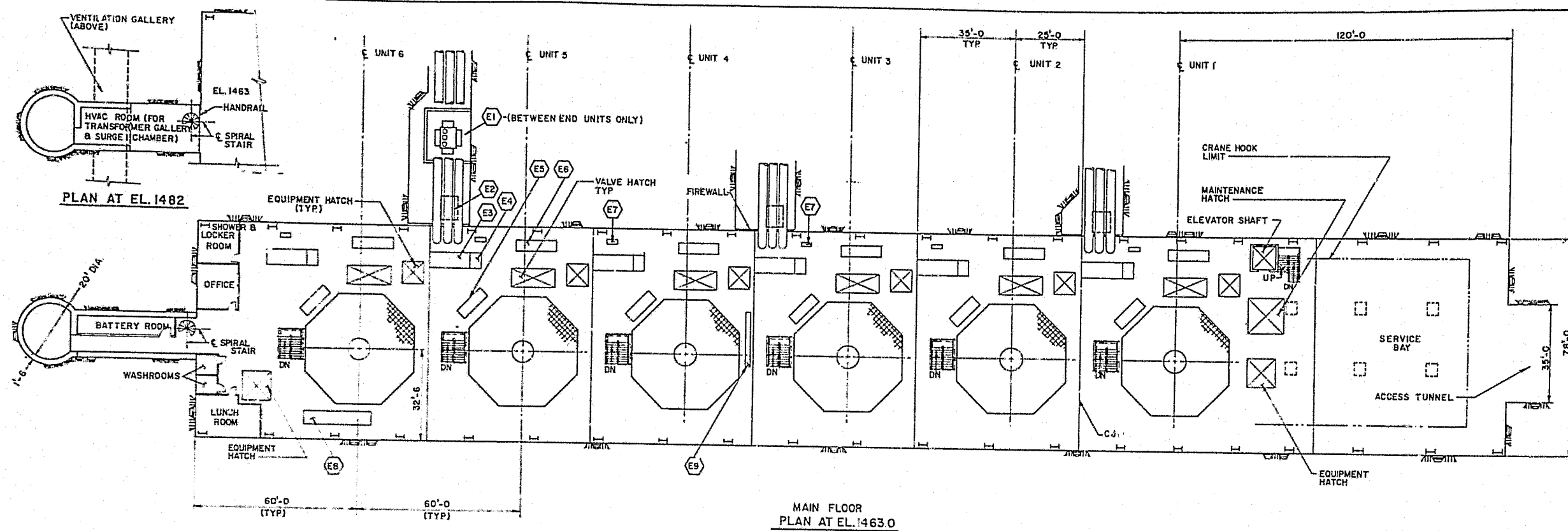
SCALE 0 100 200 FEET (1 INCH = 100 FEET)

HARZA-ERASCO ENGINEERS ARCHITECTS	ALASKA POWER AUTHORITY	
	SUSITNA HYDROELECTRIC PROJECT	
	WATANA POWER FACILITIES GENERAL ARRANGEMENT	
	EXHIBIT F	PLATE F21 R







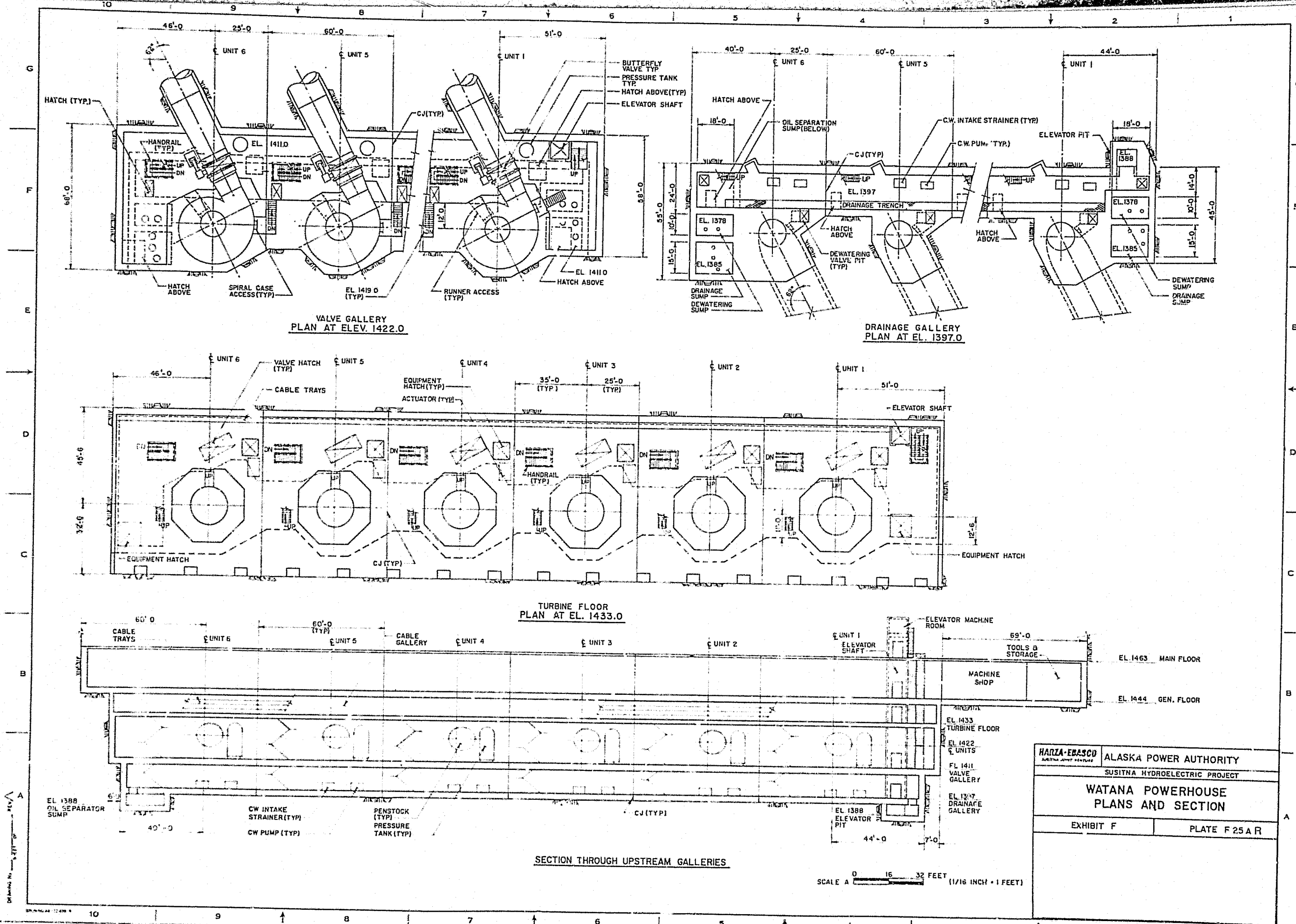


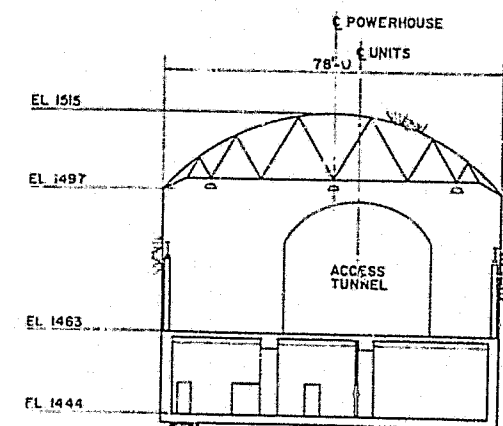
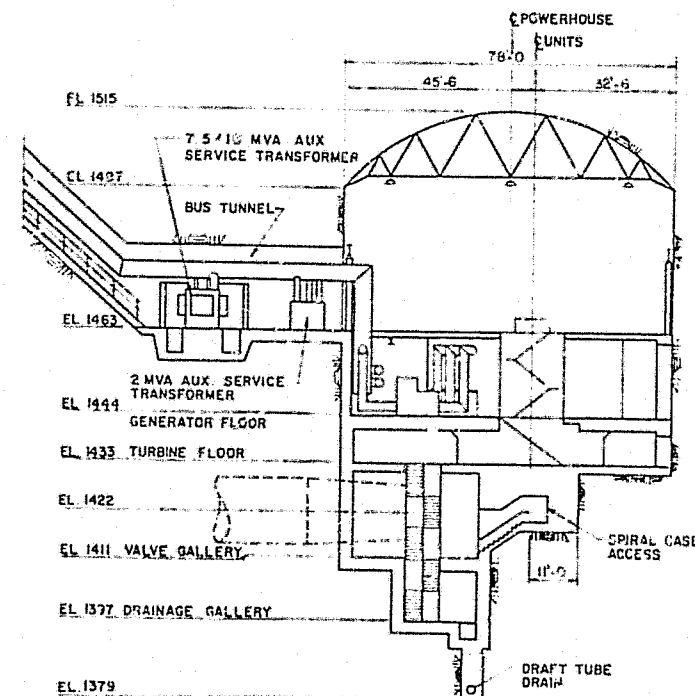
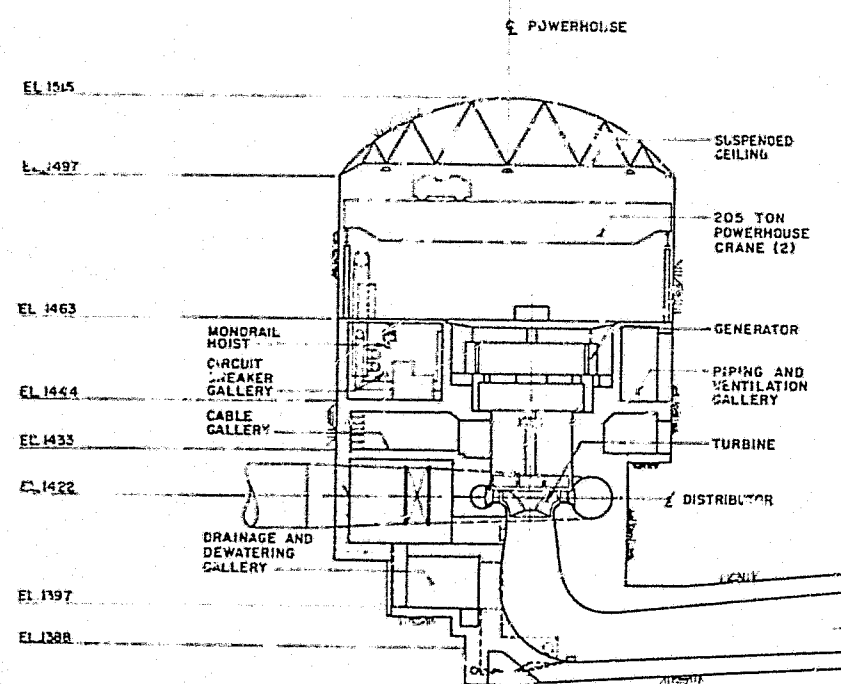
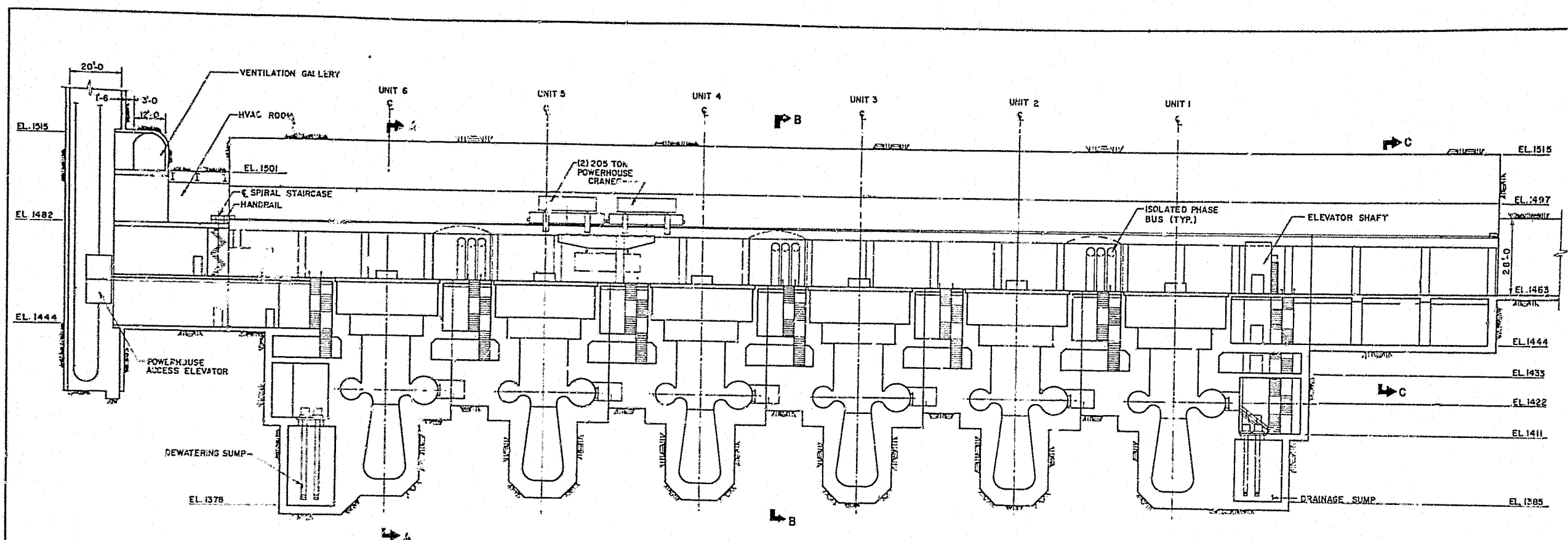
LEGEND

- E1 AUXILIARY SERVICE TRANSFORMER 7.5/10MVA
- E2 AUXILIARY SERVICE TRANSFORMER 2 MVA (TYP)
- E3 UNIT CONTROL SWITCH BOARD (TYP)
- E4 GOVERNOR ELECT CUBICLE (TYP)
- E5 EXCITATION TRANSFORMER (TYP)
- E6 EXCITATION CUBICLES (TYP)
- E7 480V PDP (TYP)
- E8 STATION SERVICE SWITCHGEAR (480V)
- E9 ESSENTIAL AC/DC SWBD
- E10 GENERATOR SURGE PROTECTION CUBICAL
- E11 GENERATOR NEUTRAL CUBICLE
- E12 GENERATOR CIRCUIT BREAKERS
- E13 15KV ISOLATED PHASE BUS

SCALE 0 16 32 FEET
(1/16 INCH = 1 FOOT)

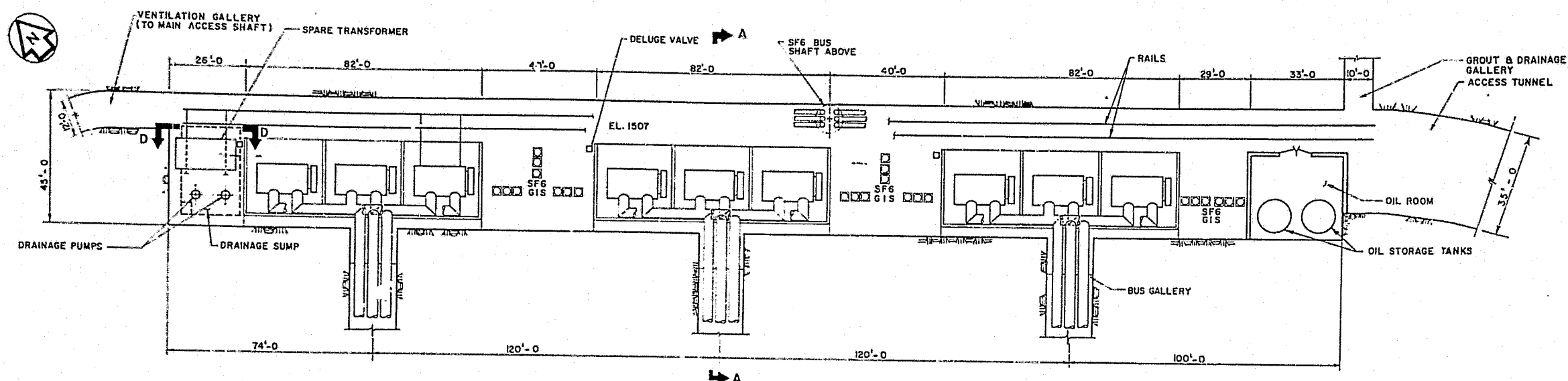
HARZA-ERASCO	
ALASKA POWER AUTHORITY	
SUSITHA HYDROELECTRIC PROJECT	
WATANA POWERHOUSE PLANS	
EXHIBIT F	PLATE F25 R



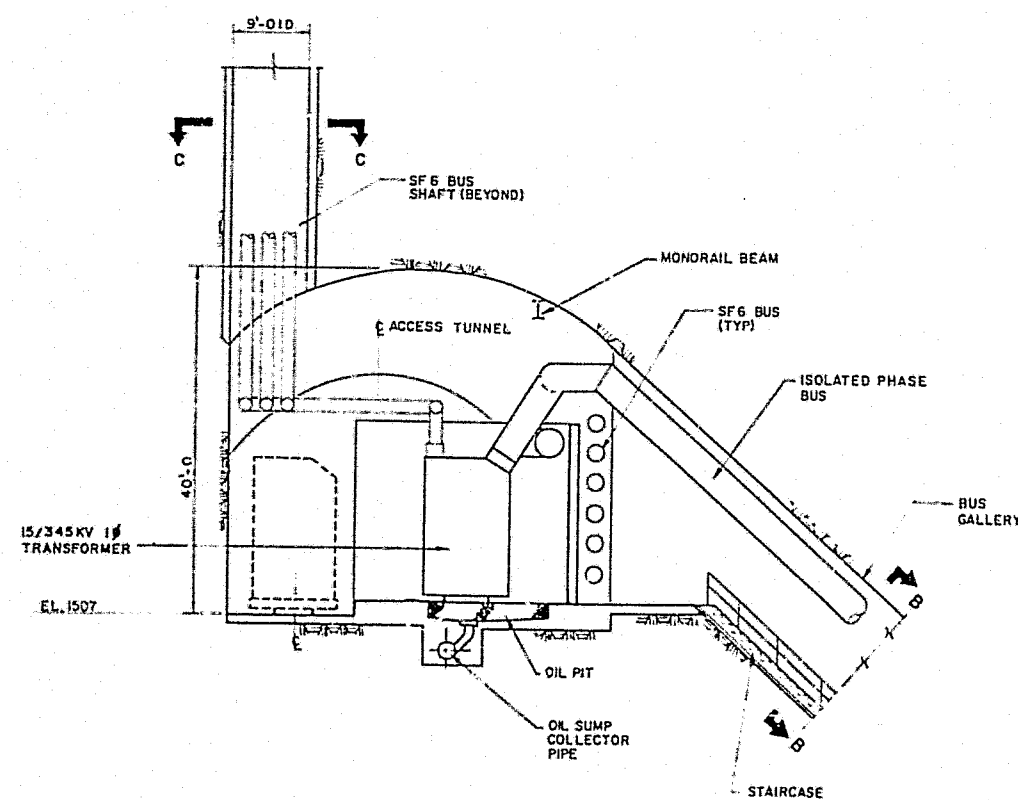


SCALE 0 16 32 FEET
(1/16 INCH = 1 FOOT)

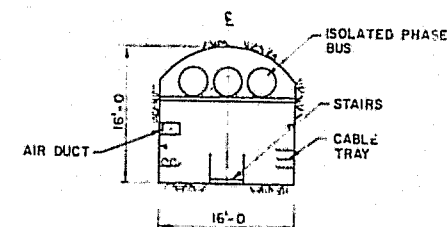
HARZA-ERASCO NORTH AMERICAN	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
WATANA POWERHOUSE SECTIONS	
EXHIBIT F	PLATE F 26 R



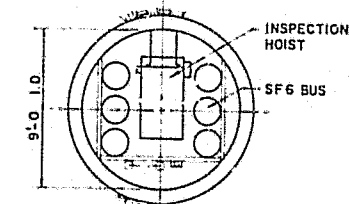
PLAN
SCALE A



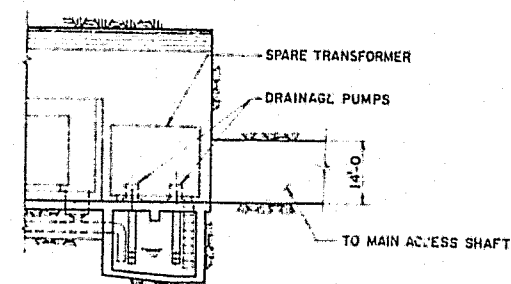
SECTION A-A
SCALE B



SECTION B-B
THROUGH BUS GALLERY
SCALE B



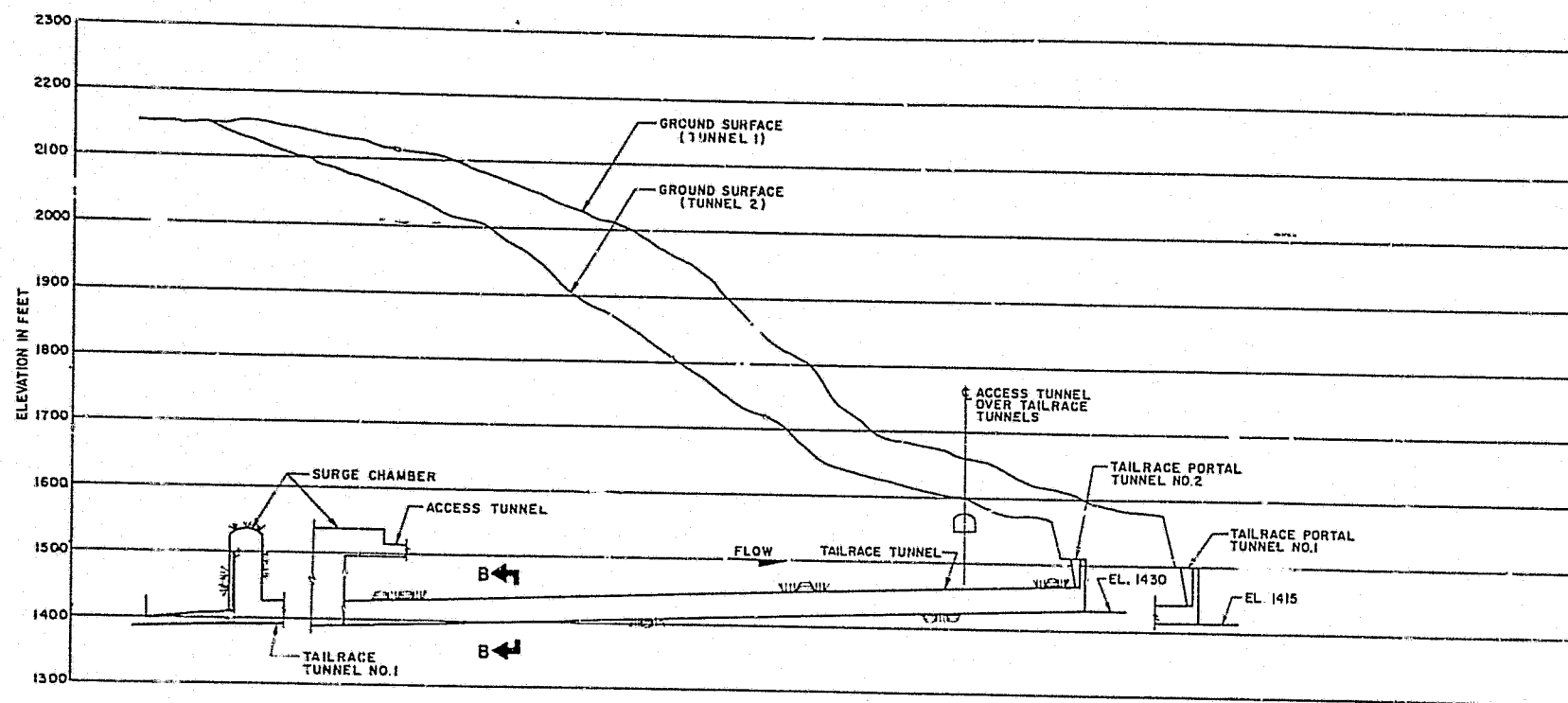
SECTION C-C
THROUGH BUS SHAFT
SCALE C



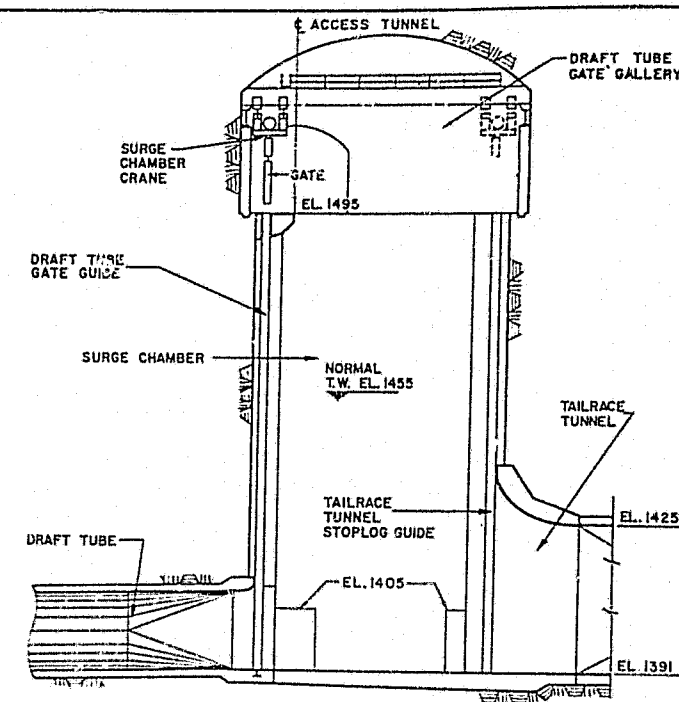
SECTION D-D
THROUGH SUMP
SCALE A

SCALE C 0 4 8 FEET (1/4 INCH = 1 FOOT)
SCALE B 0 8 16 FEET (1/8 INCH = 1 FOOT)
SCALE A 0 16 32 FEET (1/16 INCH = 1 FOOT)

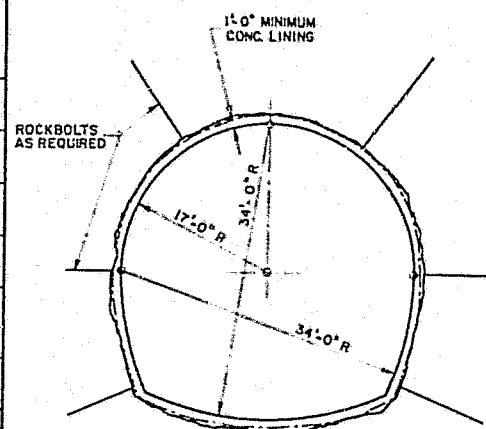
HARZA-ERASCO	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
WATANA TRANSFORMER GALLERY PLAN & SECTIONS	
EXHIBIT F	PLATE F27 R



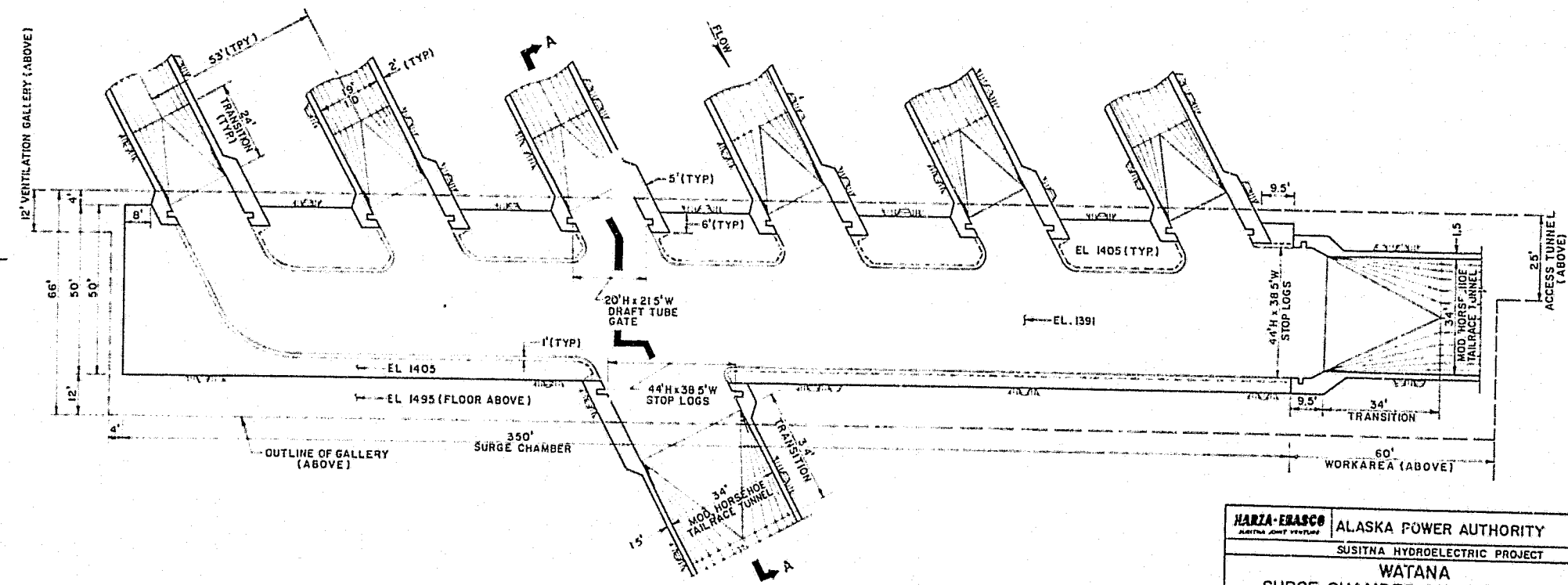
PROFILE
SCALE A



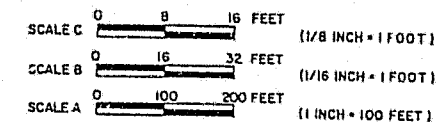
SECTION A-A
SCALE B



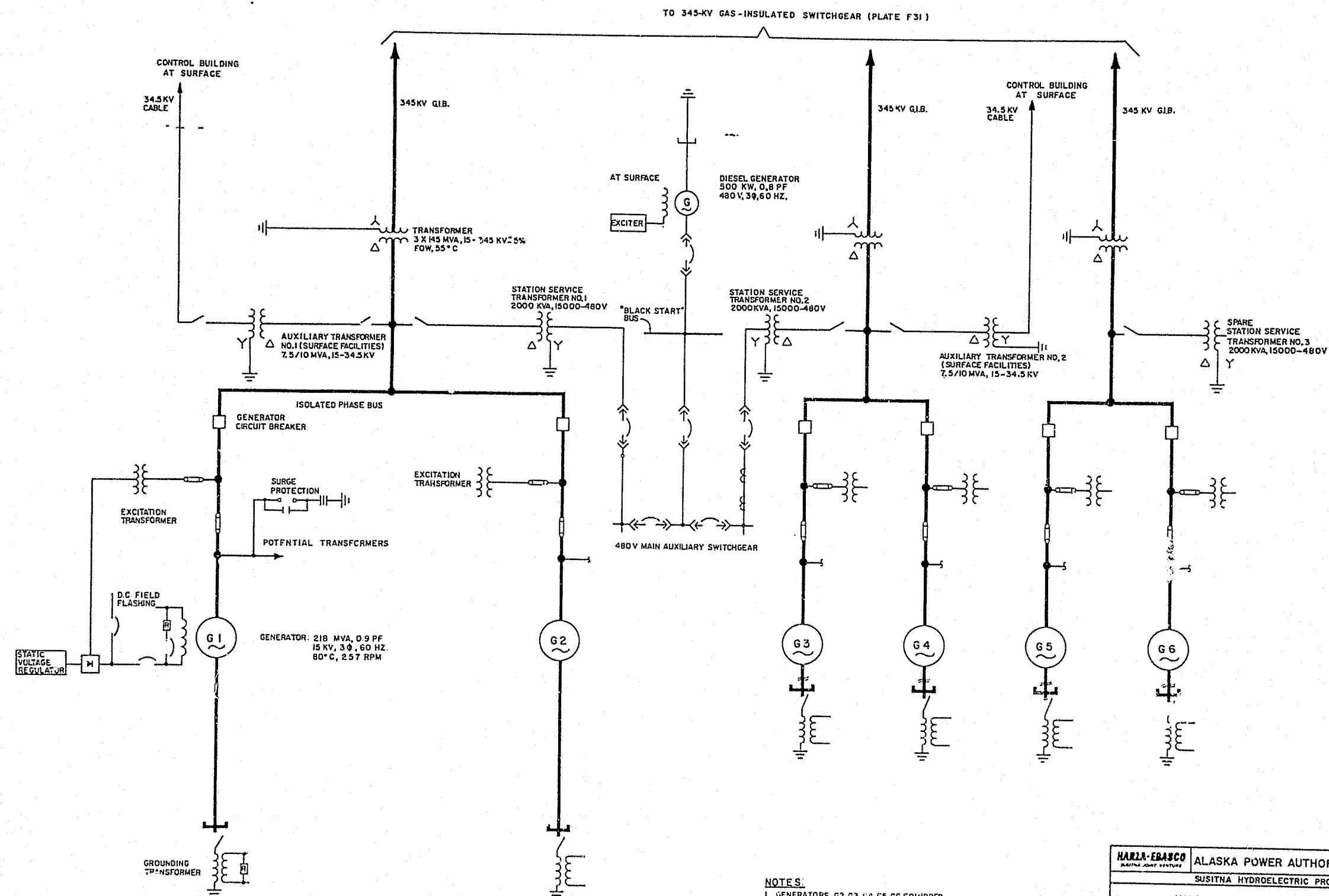
SECTION B-B
CONCRETE LINED TAILRACE TUNNEL
SCALE C



SECTIONAL PLAN
SCALE B



HARZA-ERASSO	
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
WATANA	
SURGE CHAMBER AND TAILRACE	
SECTIONS	
EXHIBIT F	PLATE F28 R



NOTES:

1. GENERATORS G2, G3, G4, G5, G6, EQUIPPED EXACTLY AS GENERATOR G1.
2. SYMBOLS SHOWN ON F31

HARZA-ERASCO WATANA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
WATANA POWERHOUSE SINGLE LINE DIAGRAM	
EXHIBIT F	PLATE F30 R

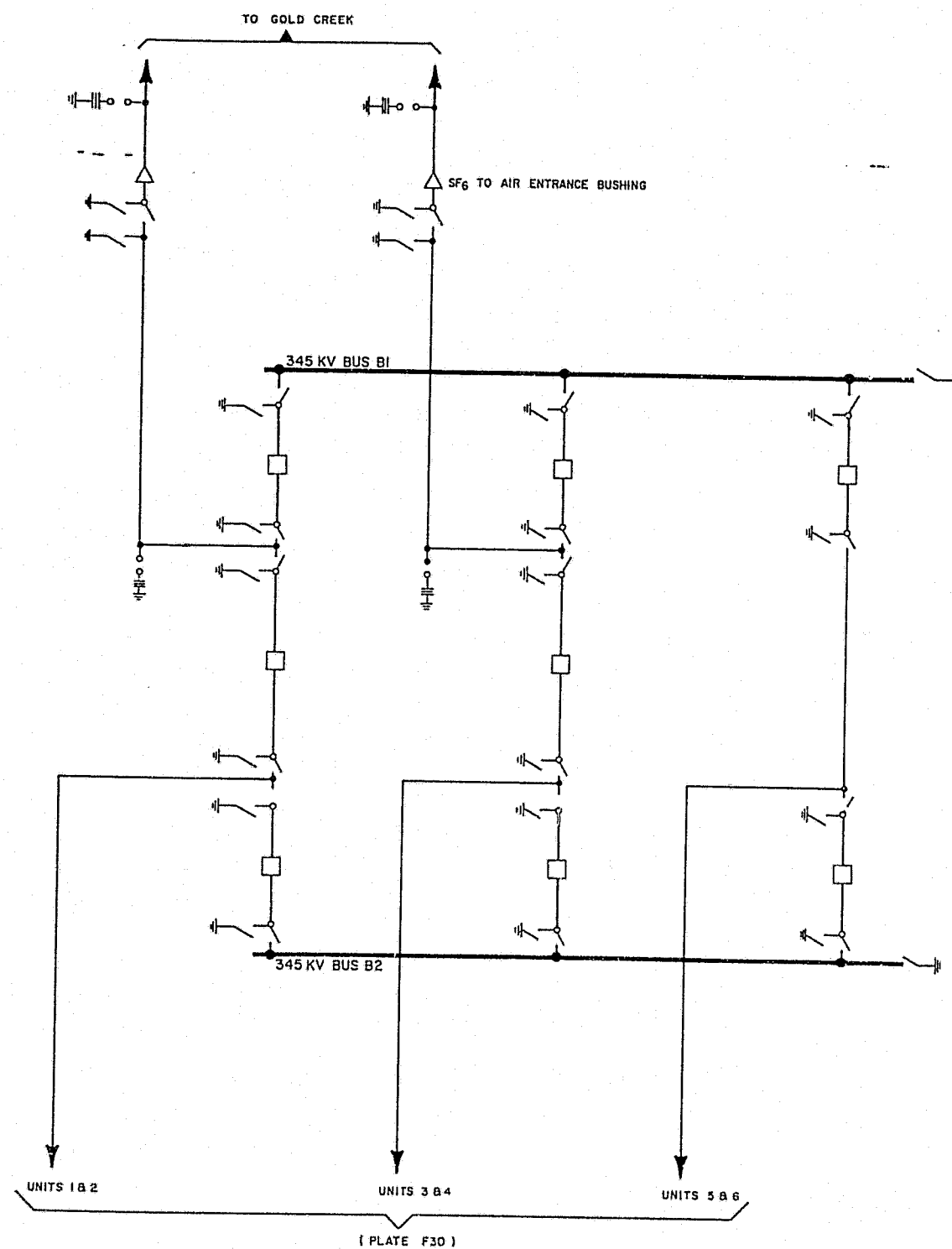
FOLD LENGTH

12
11
8.5
8

AUTO

MANUAL

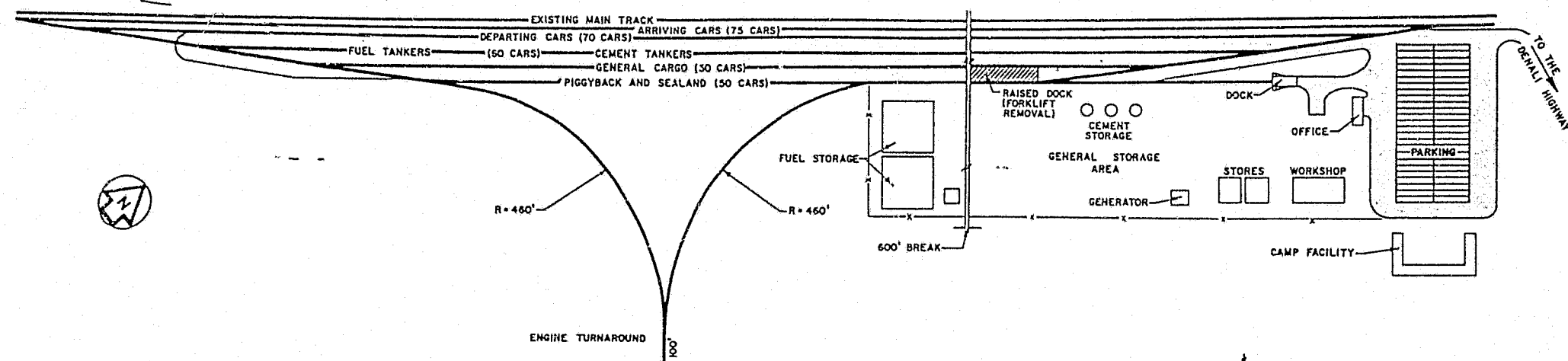
FEED



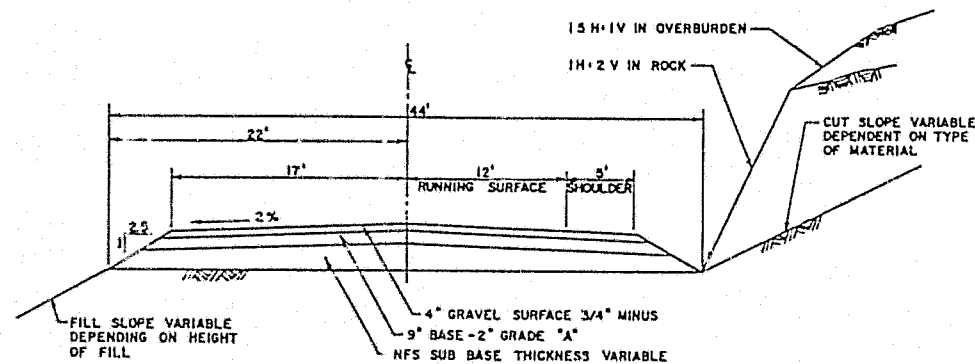
LEGEND

	AC GENERATOR, 3 PHASE, 60HZ, WYE CONNECTED
	TRANSFORMER
	AUTO TRANSFORMER
	CIRCUIT BREAKER
	DRAWOUT CIRCUIT BREAKER
	LOW VOLTAGE AIR CIRCUIT BREAKER
	LINK IN ISOLATED PHASE BUS
	DISCONNECT SWITCH
	GROUND CONNECTION
	RESISTOR, / ADJUSTABLE
	RESISTANCE TEMPERATURE DETECTOR
	STANDARD DEVICE
	CURRENT TRANSFORMER
	TRANSFORMER CONNECTION 3 PHASE, 3 WIRE, DELTA
	TRANSFORMER CONNECTION 3 PHASE, 3 WIRE, WYE
	REACTOR, / ADJUSTABLE
	VOLTAGE TRANSFORMER
	CAPACITOR
	BUSHING CURRENT TRANSFORMER
	LIGHTNING ARRESTOR
	CAPACITOR COUPLING VOLTAGE TRANSFORMER
	RECTIFIER
GLS.	GAS-INSULATED SWITCHGEAR
G.I.B.	GAS-INSULATED BUS

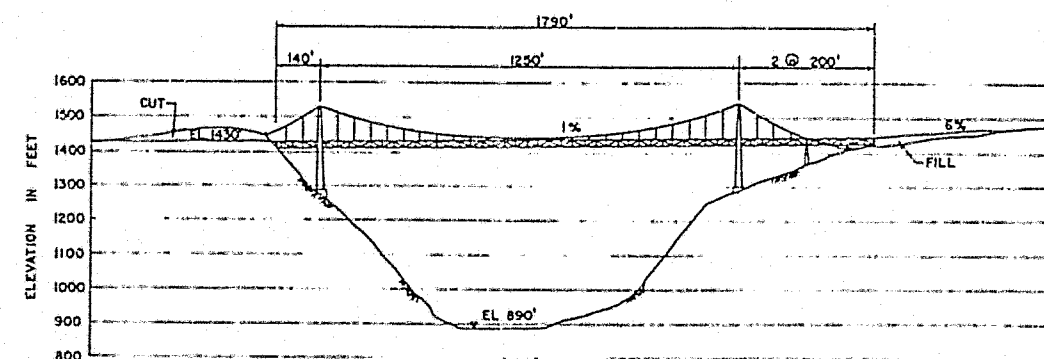
HANZA-ERASCO	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
WATANA	
SF-6 GAS-INSULATED SWITCHGEAR	
SINGLE LINE DIAGRAM	
EXHIBIT F	PLATE F 31 R



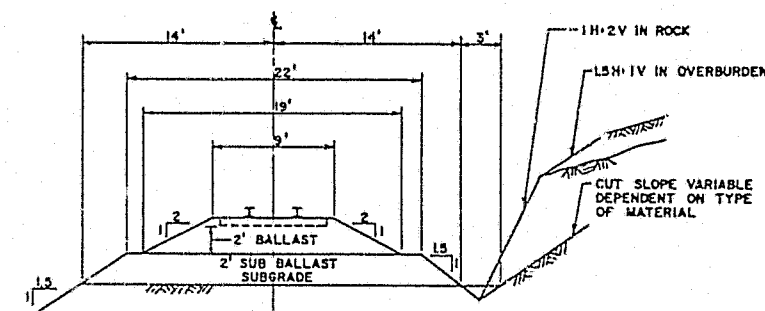
RAILHEAD FACILITY AT CANTWELL - PLAN
SCALE A



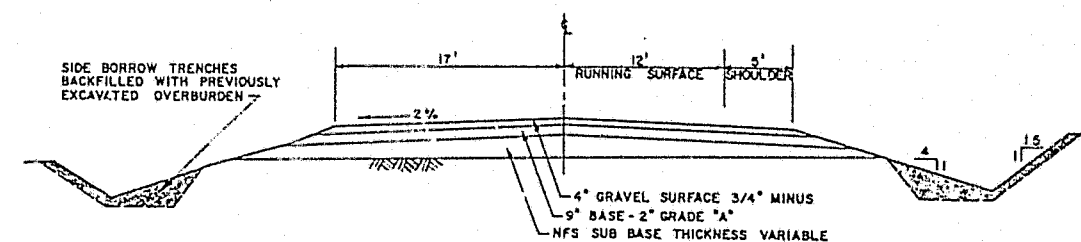
TYPICAL 'SIDEHILL CUT' SECTION
SCALE B



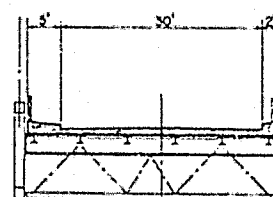
HIGH LEVEL SUSITNA RIVER BRIDGE
SCALE C



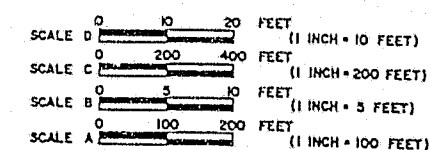
TYPICAL RAILROAD CROSS SECTION
SCALE B



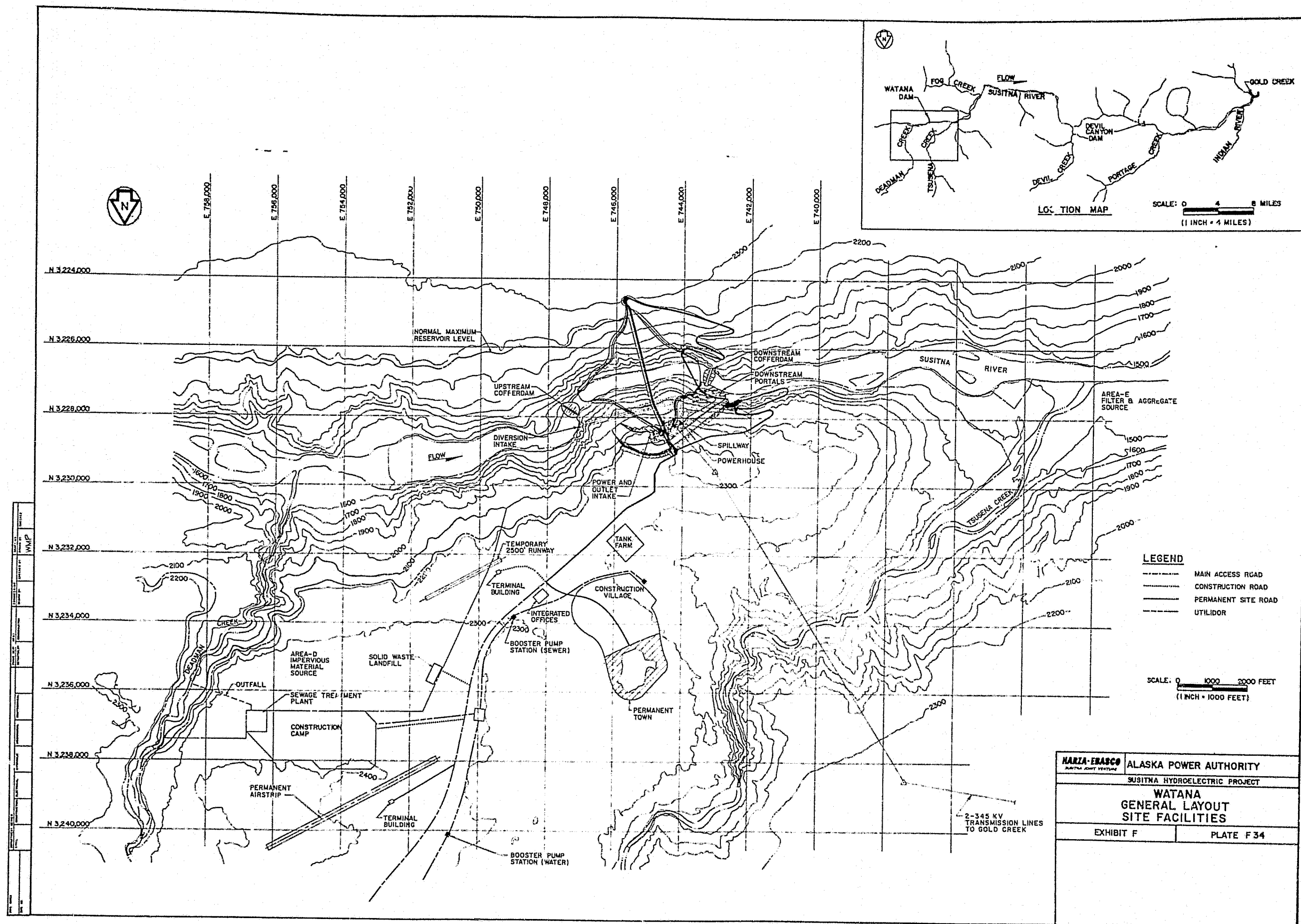
TYPICAL 'SIDE BORROW' SECTION
SCALE B

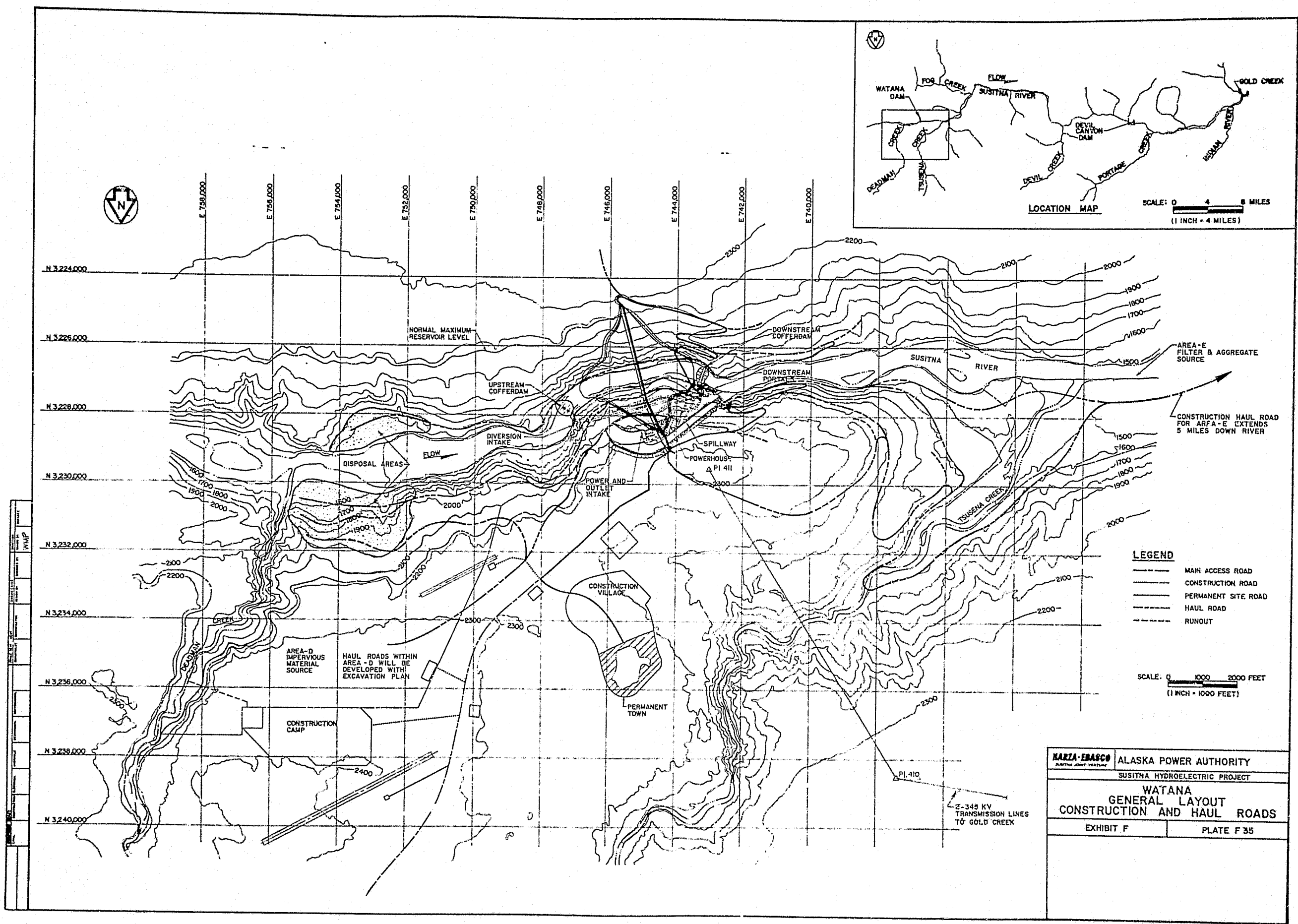


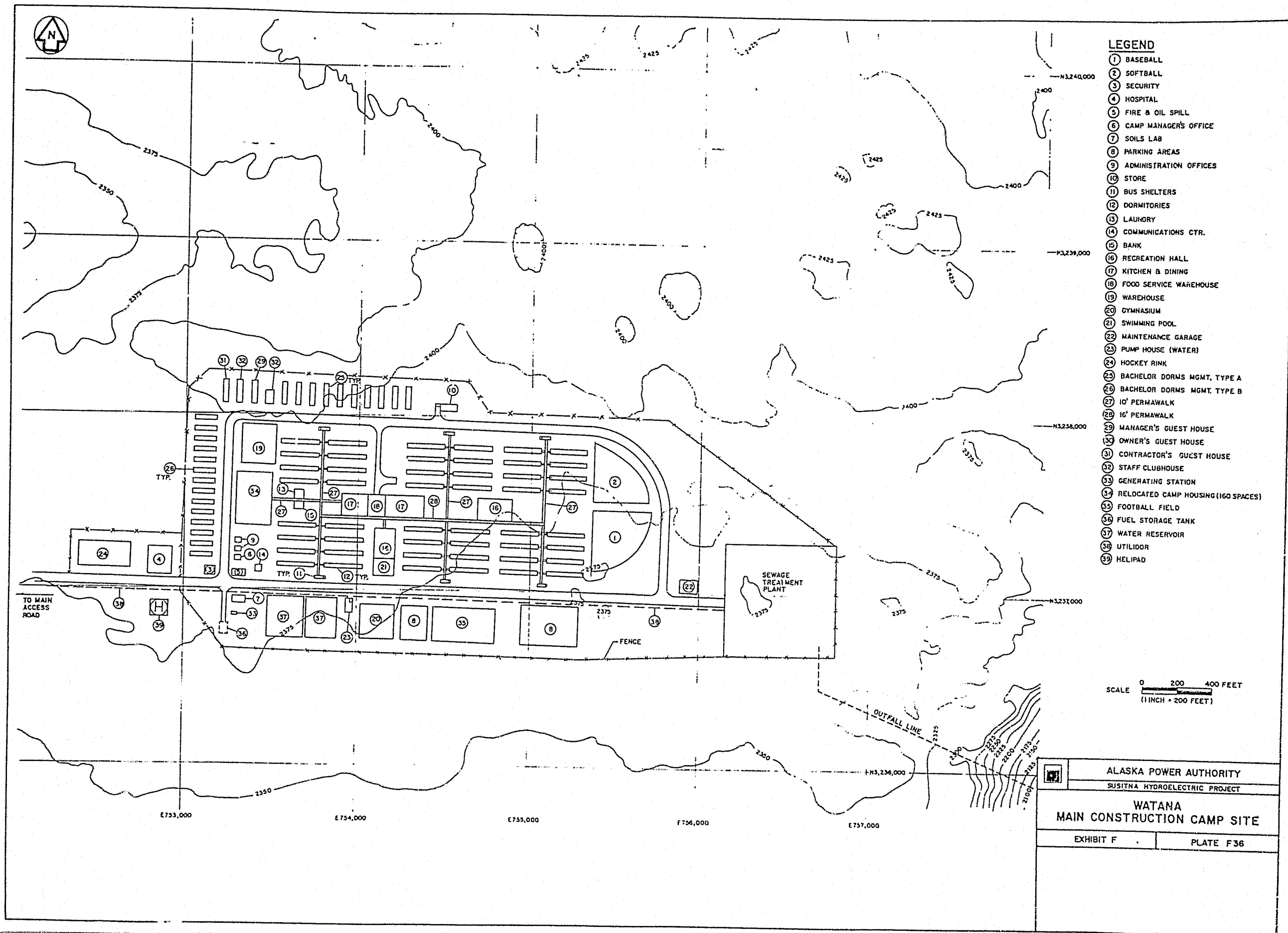
TYPICAL CROSS SECTION
HIGH LEVEL SUSITNA RIVER BRIDGE
SCALE D

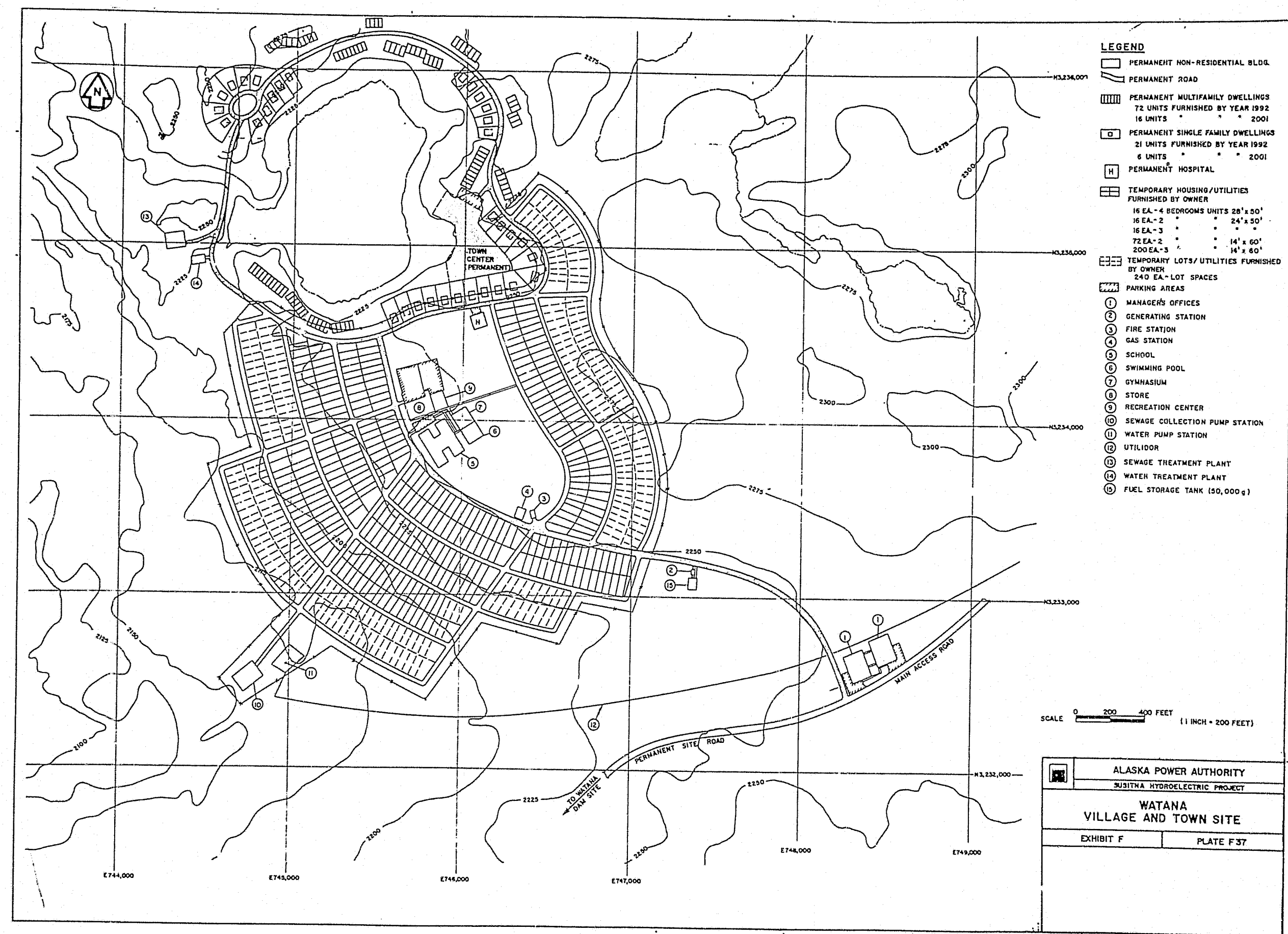


ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
ACCESS PLAN TYPICAL DETAILS	
EXHIBIT F	PLATE F 33







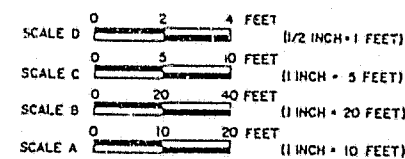
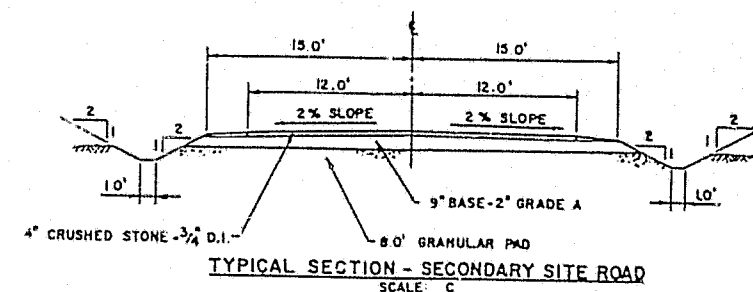
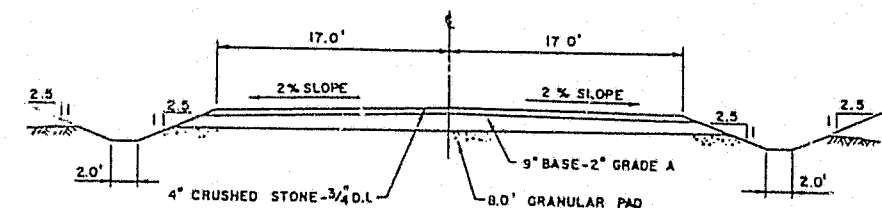
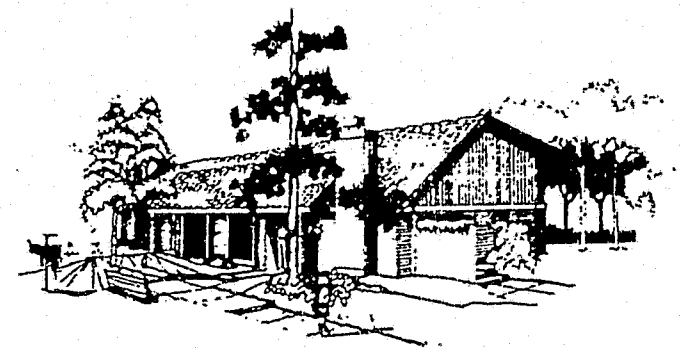
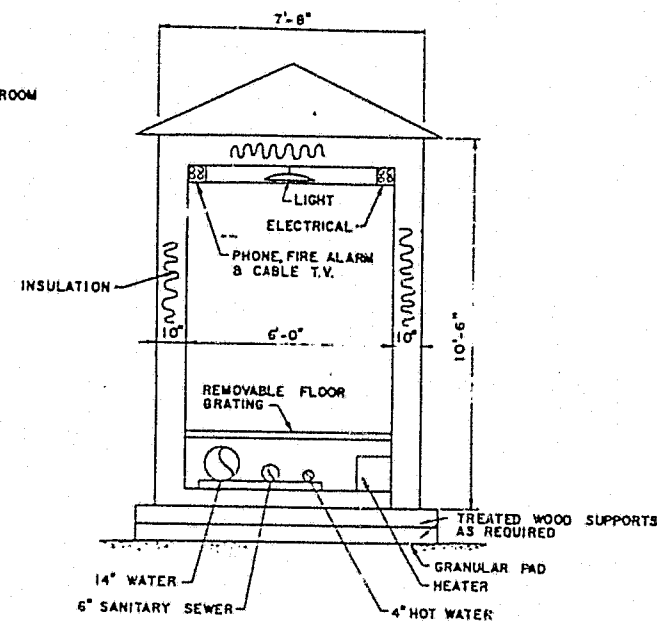
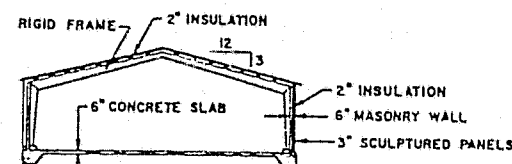
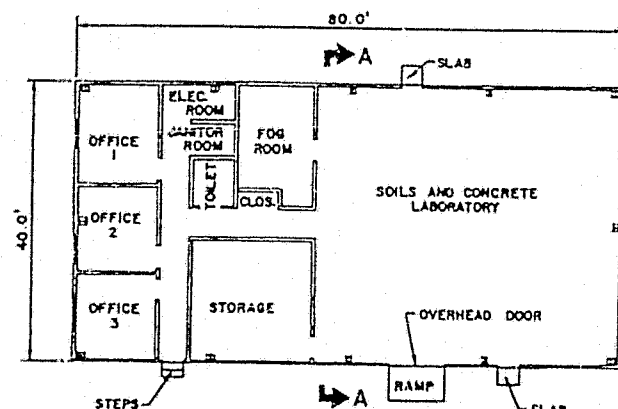
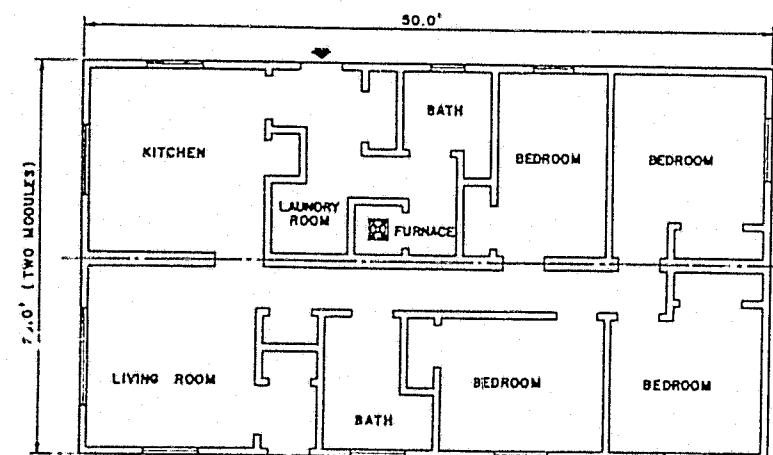
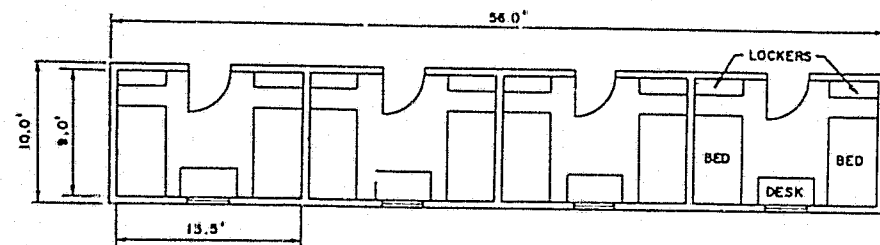
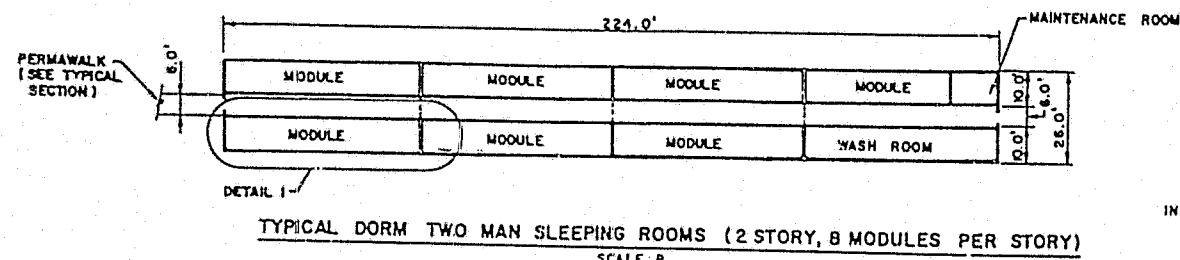


LEGEND

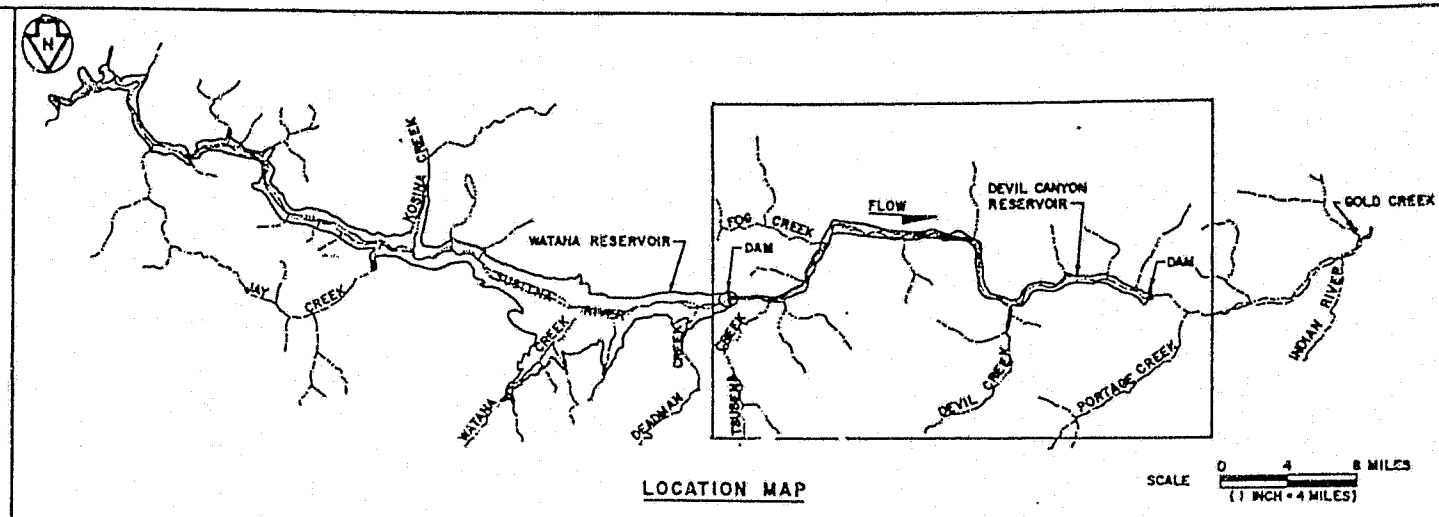
- PERMANENT NON-RESIDENTIAL BLDG.
- PERMANENT ROAD
- PERMANENT MULTIFAMILY DWELLINGS
72 UNITS FURNISHED BY YEAR 1992
16 UNITS " " " 2001
- PERMANENT SINGLE FAMILY DWELLINGS
21 UNITS FURNISHED BY YEAR 1992
6 UNITS " " " 2001
- PERMANENT HOSPITAL
- TEMPORARY HOUSING/UTILITIES FURNISHED BY OWNER
16 EA. - 4 BEDROOMS UNITS 28' x 50'
16 EA. - 2 " " " 24' x 50'
16 EA. - 3 " " " 14' x 60'
72 EA. - 2 " " " 14' x 60'
200 EA. - 3 " " " 14' x 60'
- TEMPORARY LOTS/UTILITIES FURNISHED BY OWNER
240 EA. LOT SPACES
- PARKING AREAS
- 1 MANAGER'S OFFICES
- 2 GENERATING STATION
- 3 FIRE STATION
- 4 GAS STATION
- 5 SCHOOL
- 6 SWIMMING POOL
- 7 GYMNASIUM
- 8 STORE
- 9 RECREATION CENTER
- 10 SEWAGE COLLECTION PUMP STATION
- 11 WATER PUMP STATION
- 12 UTILIDOR
- 13 SEWAGE TREATMENT PLANT
- 14 WATER TREATMENT PLANT
- 15 FUEL STORAGE TANK (50,000 g)

SCALE 0 200 400 FEET
(1 INCH = 200 FEET)

ALASKA POWER AUTHORITY	
SUJITNA HYDROELECTRIC PROJECT	
WATANA VILLAGE AND TOWN SITE	
EXHIBIT F	PLATE F-37



ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
WATANA AND DEVIL CANYON	
CONSTRUCTION CAMP DETAILS	
EXHIBIT F	PLATE F 38

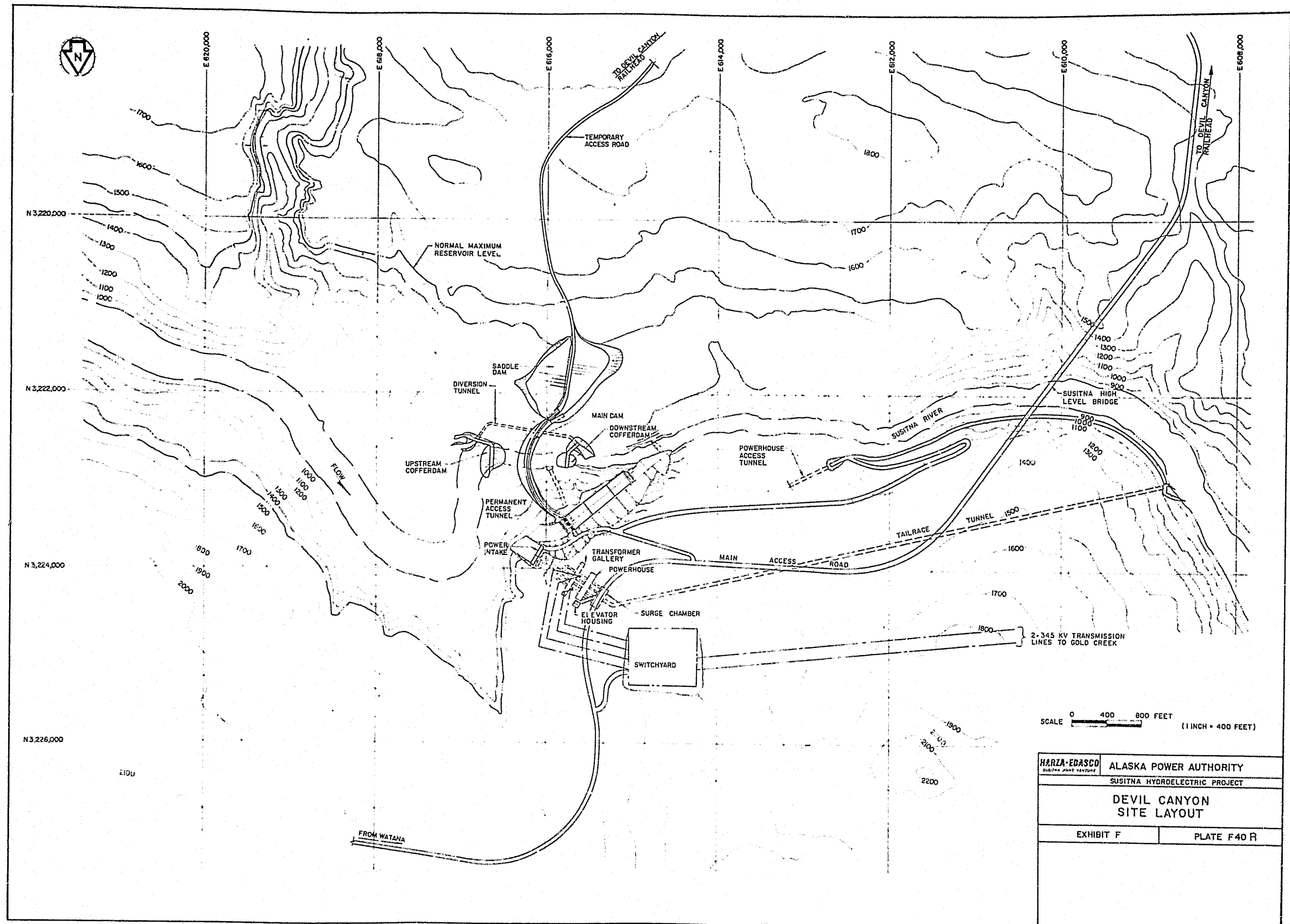


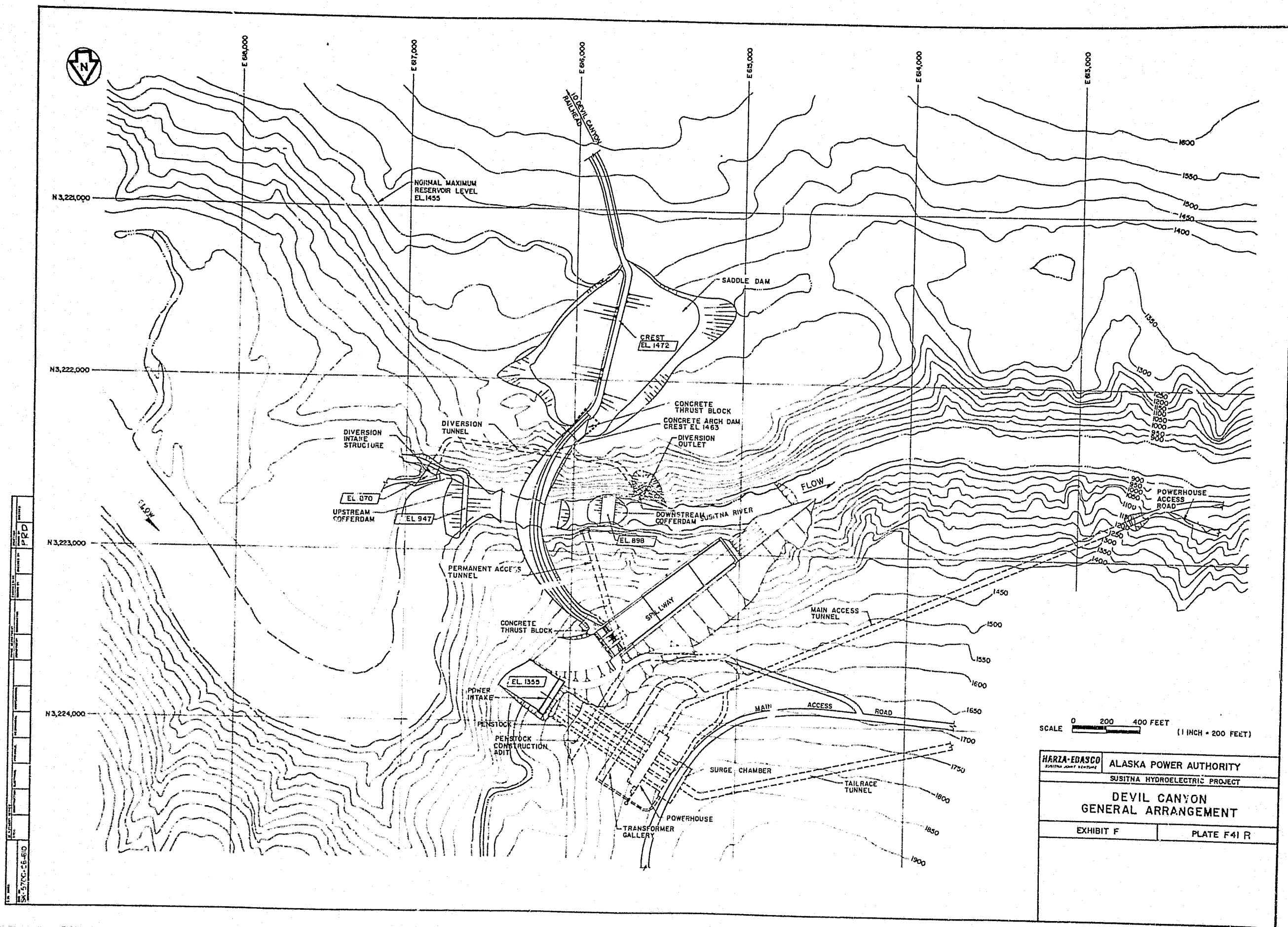
LEGEND

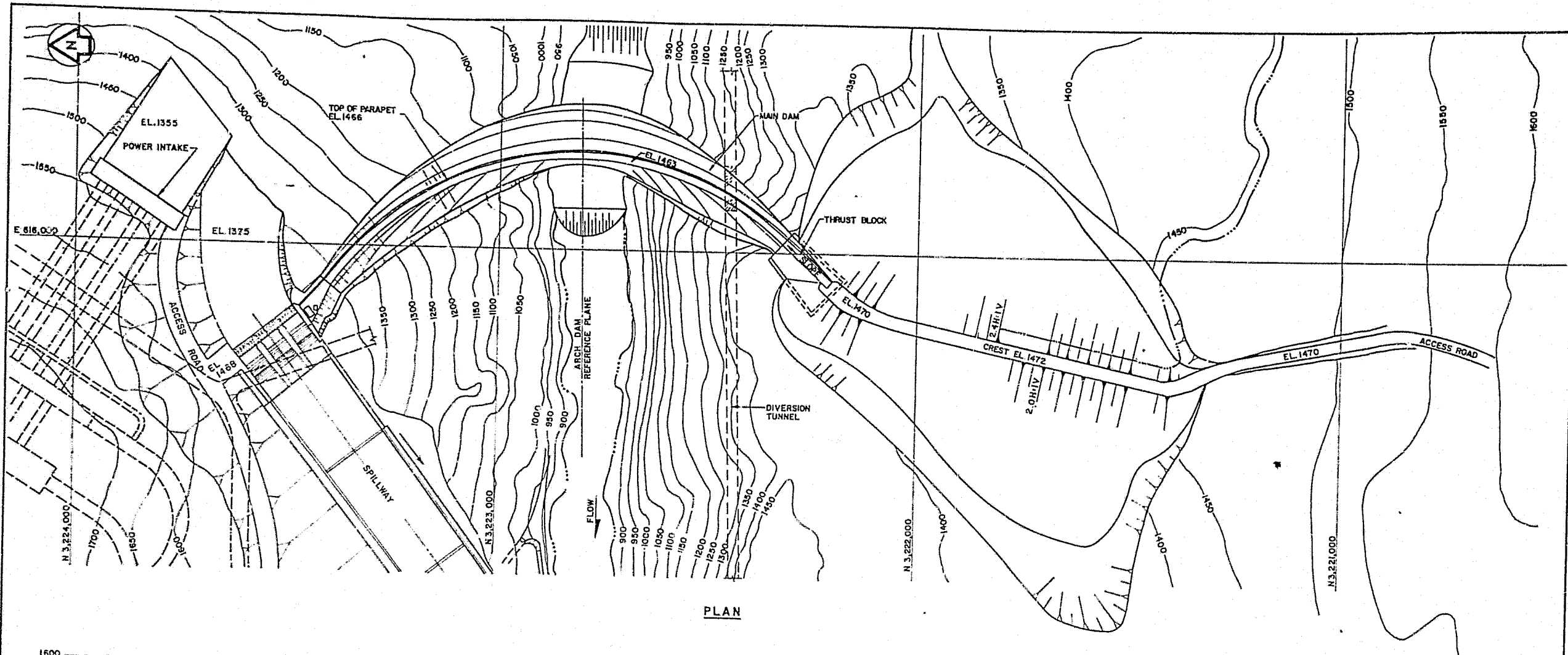
- NORMAL MAXIMUM
OPERATING LEVEL
EL. 1435
- 2000
CONTOUR IN FEET
ABOVE MSL



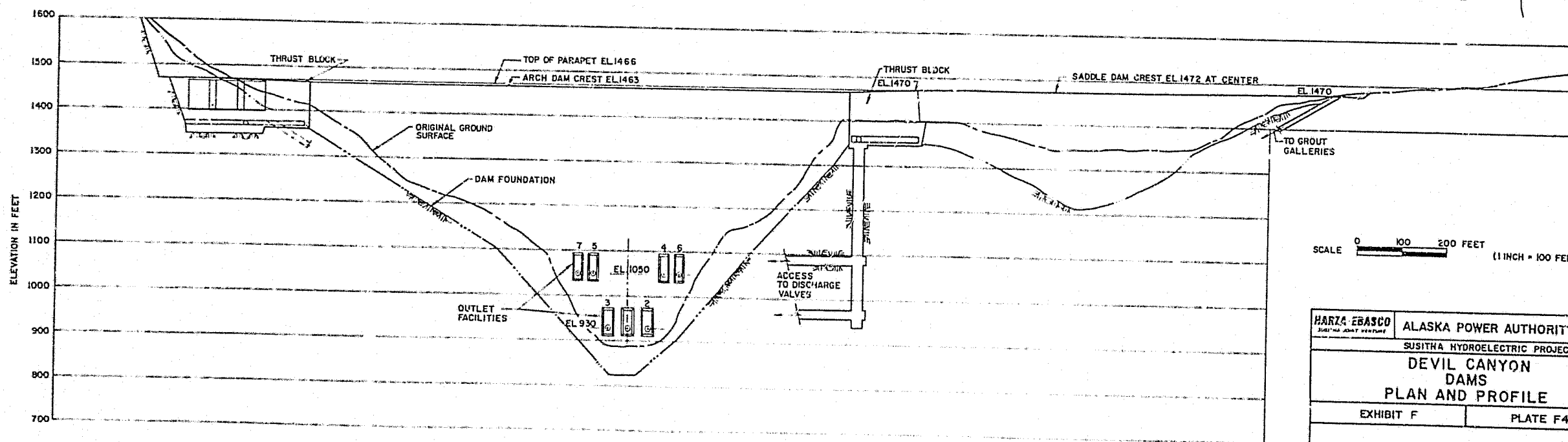
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON RESERVOIR PLAN	
EXHIBIT F	PLATE F39







PLAN



PROFILE (DEVELOPED - LOOKING UPSTREAM)

SCALE 0 100 200 FEET
(1 INCH = 100 FEET)

HARZA ENGINEERING	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON DAMS	
PLAN AND PROFILE	
EXHIBIT F	PLATE F42 R

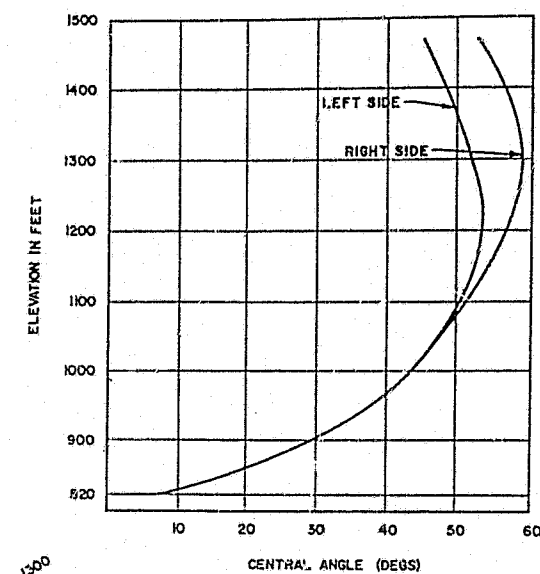
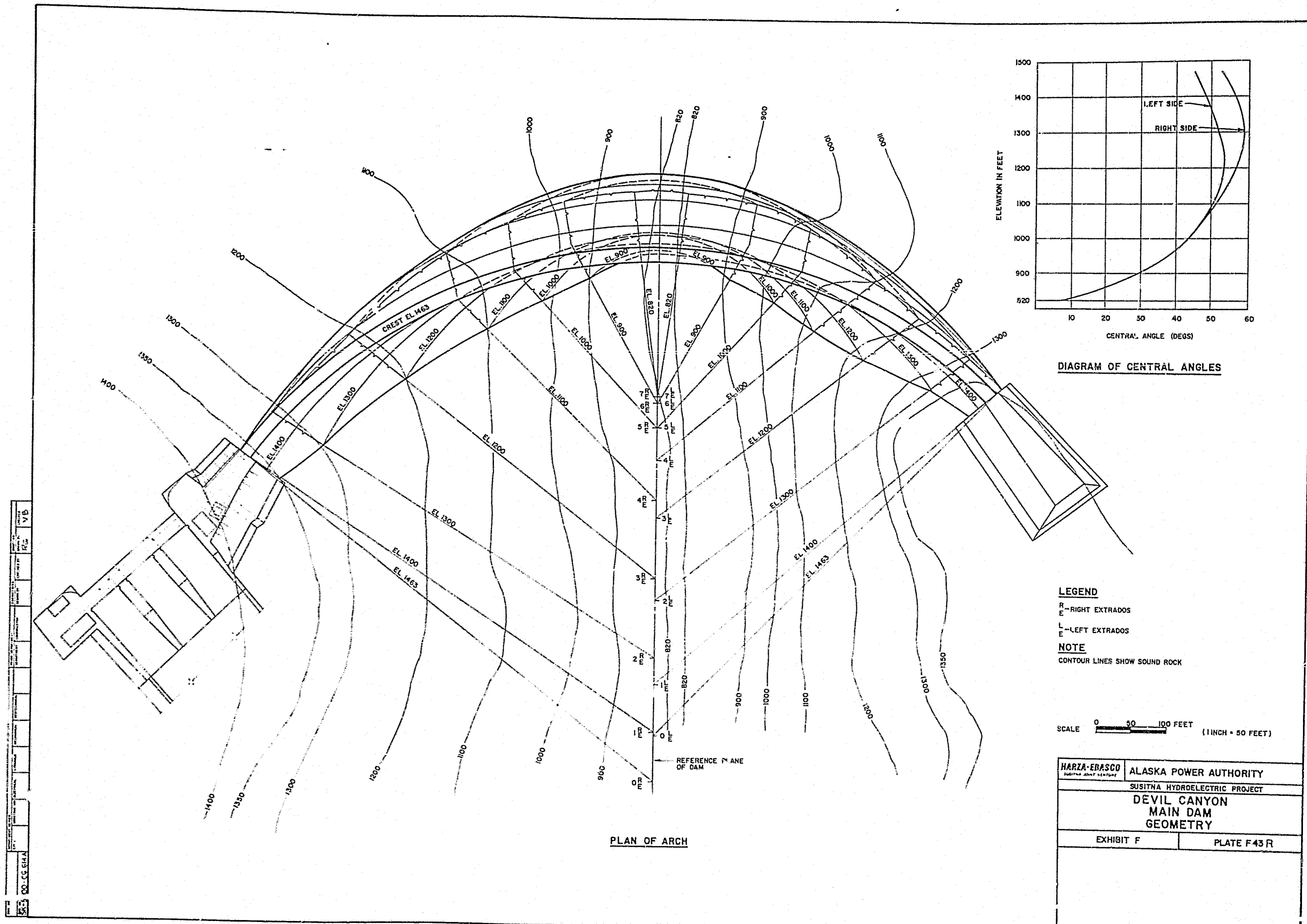


DIAGRAM OF CENTRAL ANGLES

LEGEND

R - RIGHT EXTRADOS
 E - LEFT EXTRADOS

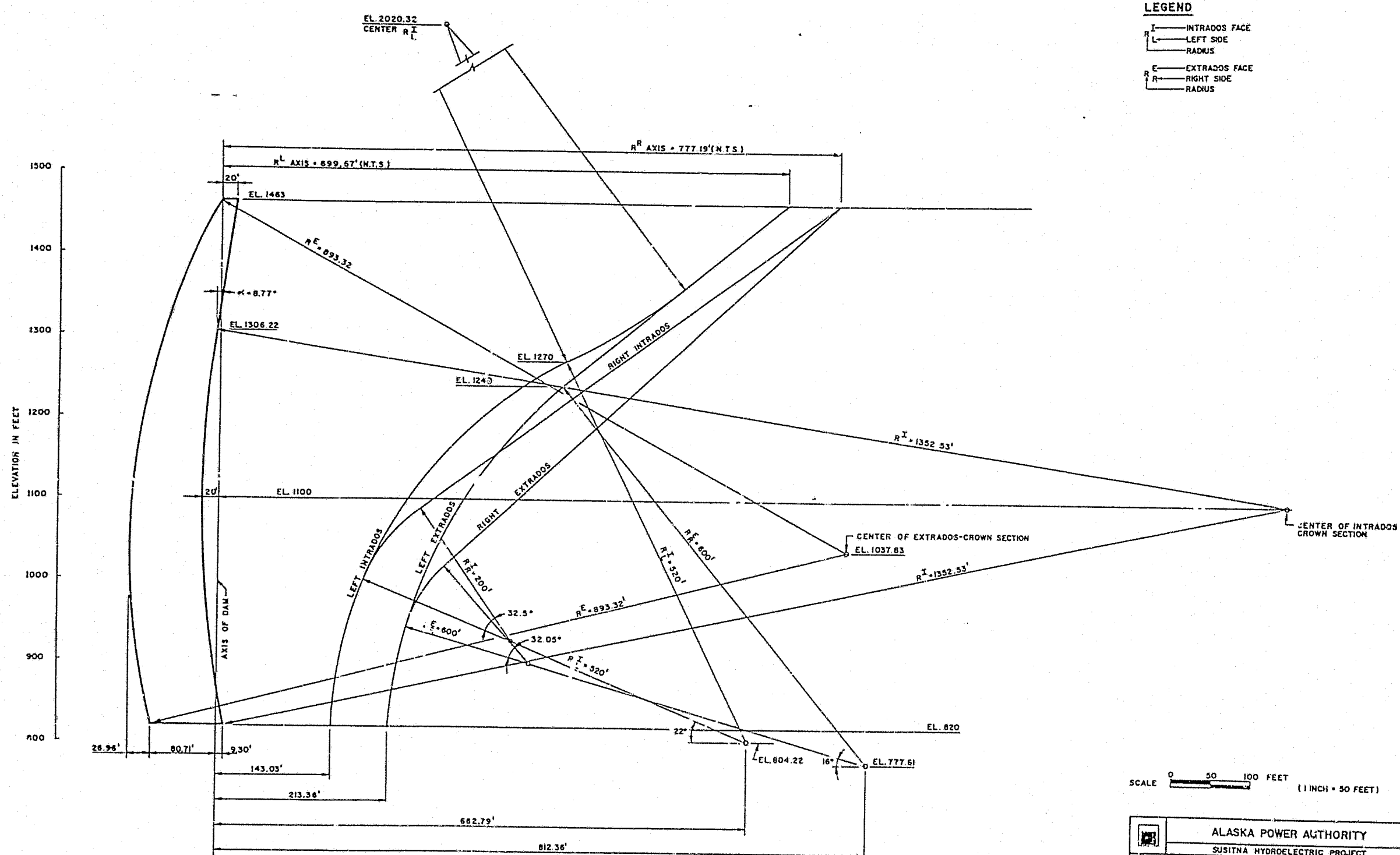
NOTE

CONTOUR LINES SHOW SOUND ROCK

SCALE 0 50 100 FEET (1 INCH = 50 FEET)

HARZA-ERASCO	ALASKA POWER AUTHORITY
SUSITHA HYDROELECTRIC PROJECT	SUSITHA HYDROELECTRIC PROJECT
DEVIL CANYON MAIN DAM GEOMETRY	
EXHIBIT F	PLATE F43 R

PLAN OF ARCH

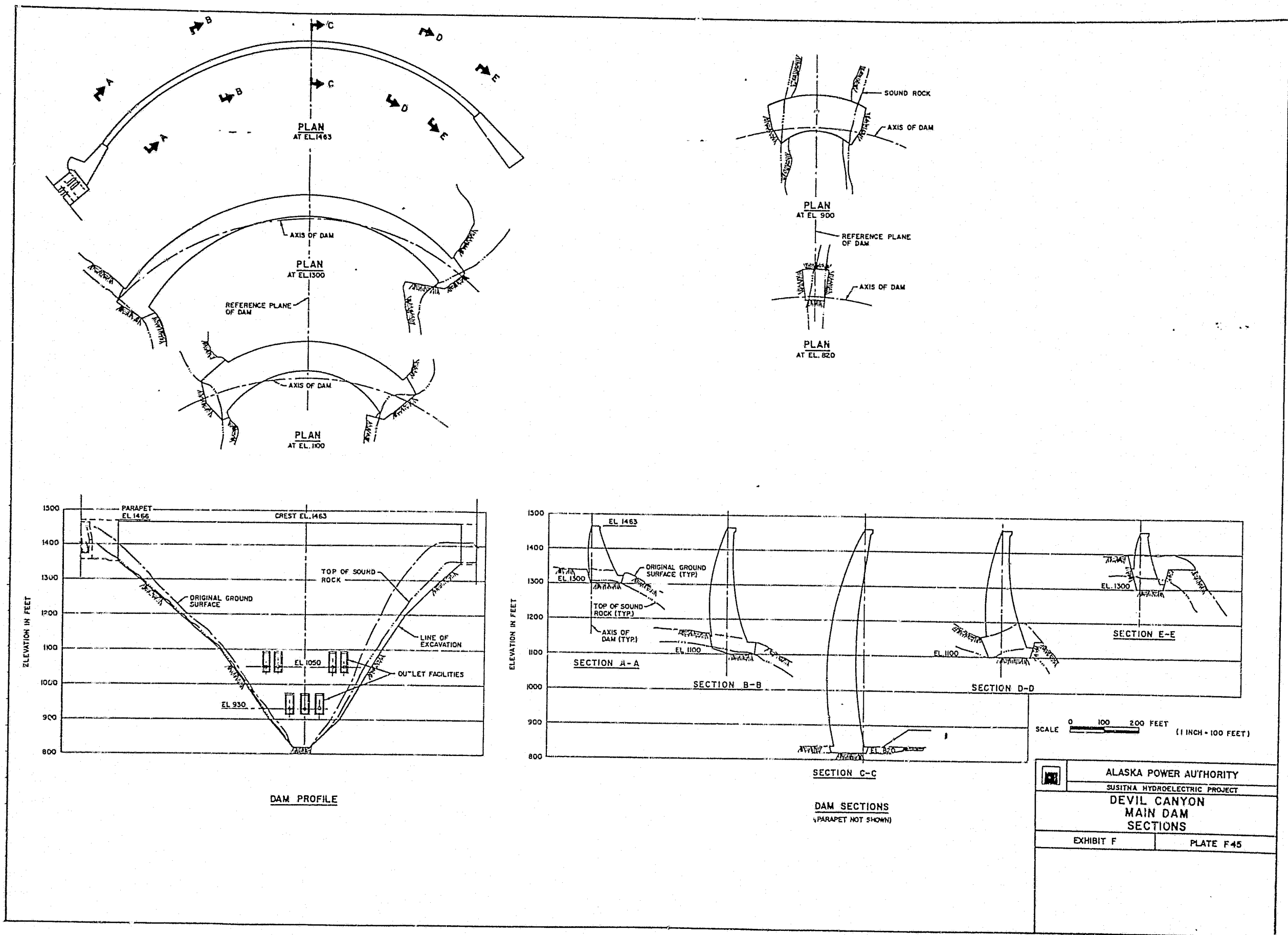


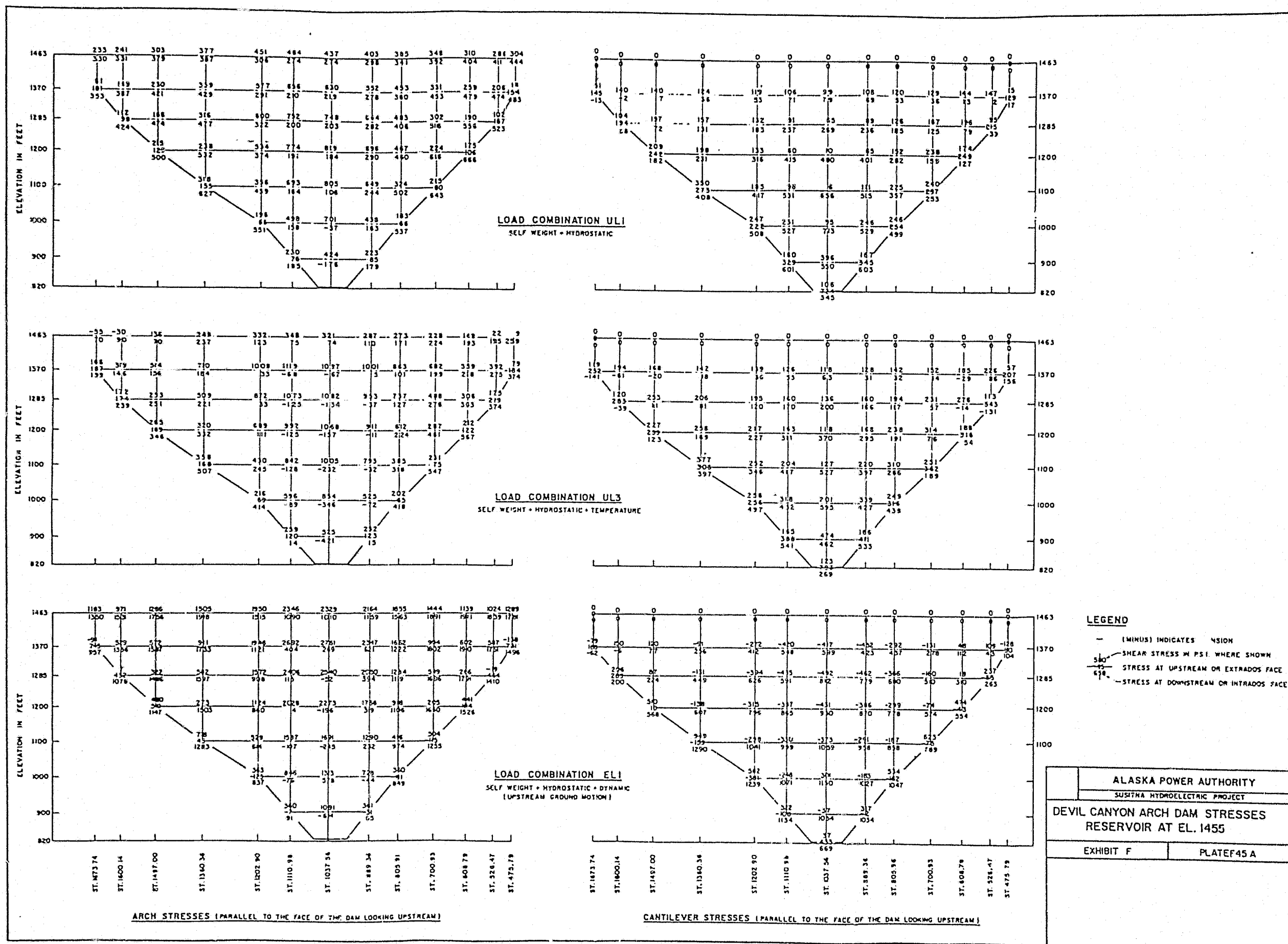
LEGEND

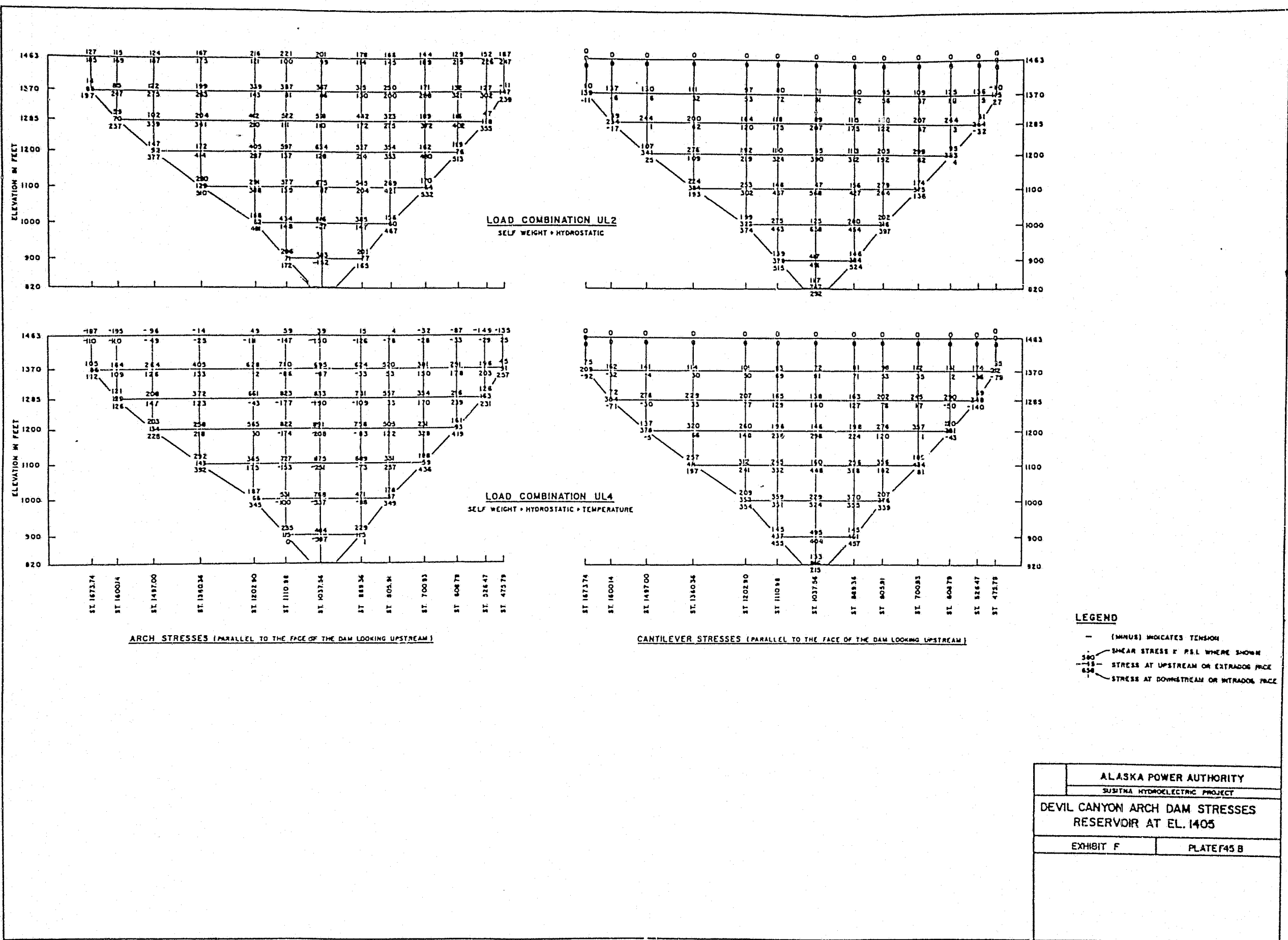
- I — INTRADOS FACE
- L — LEFT SIDE
- R — RIGHT SIDE
- E — EXTRADOS FACE
- R — RIGHT SIDE
- R — RADIUS

SCALE 0 50 100 FEET
(1 INCH = 50 FEET)

ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON	
MAIN DAM	
CROWN SECTION	
EXHIBIT F	PLATE F44



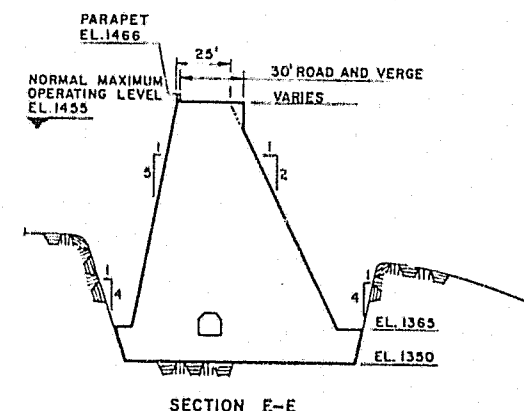
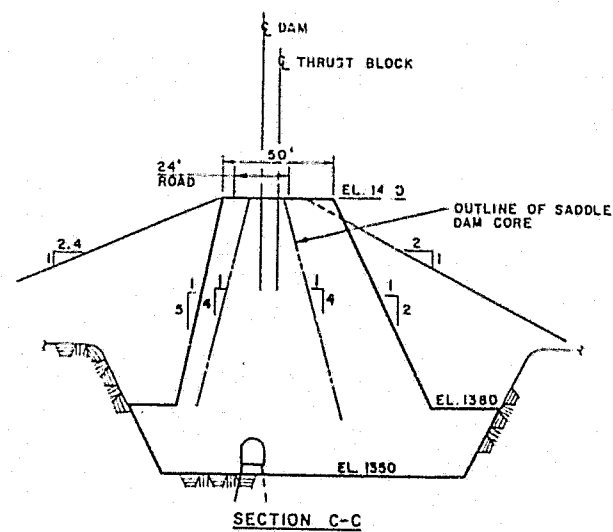
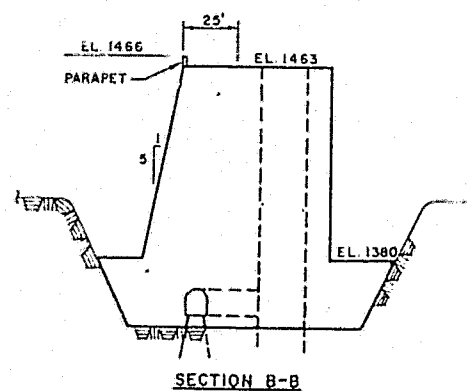
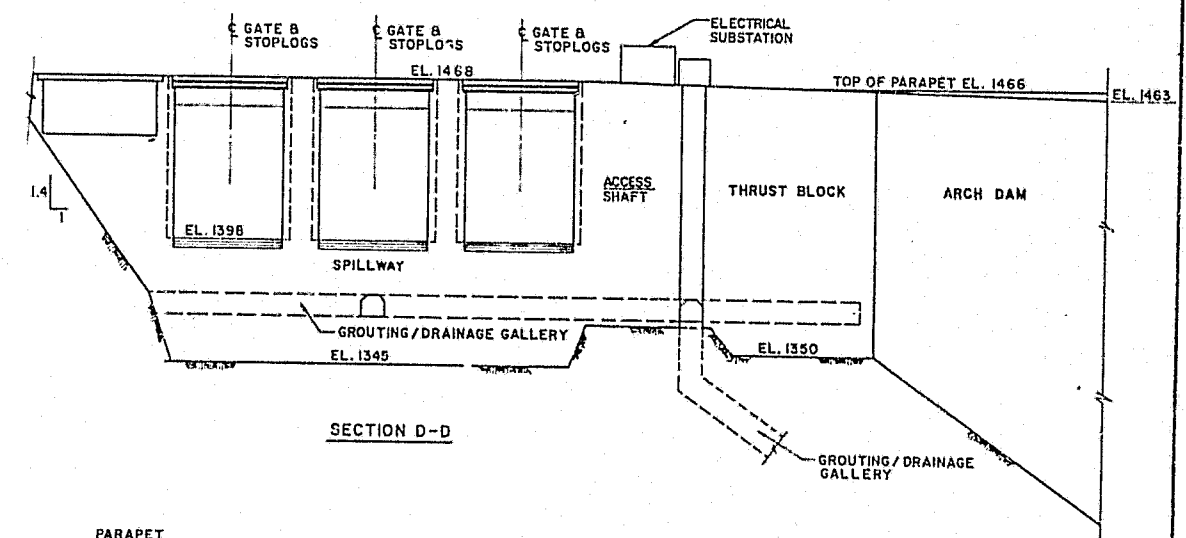
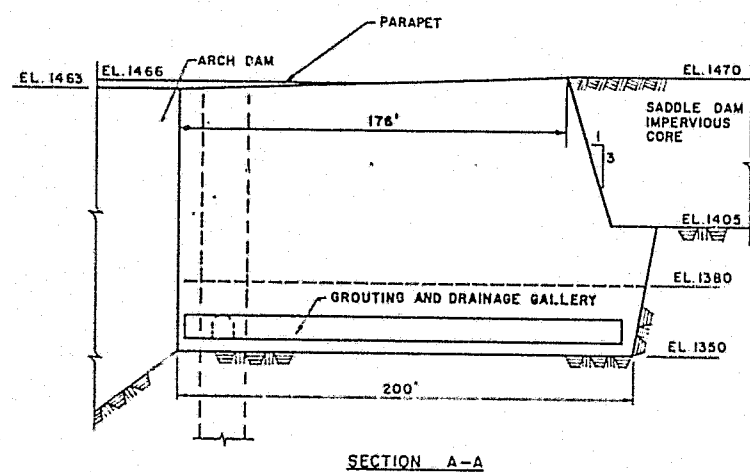
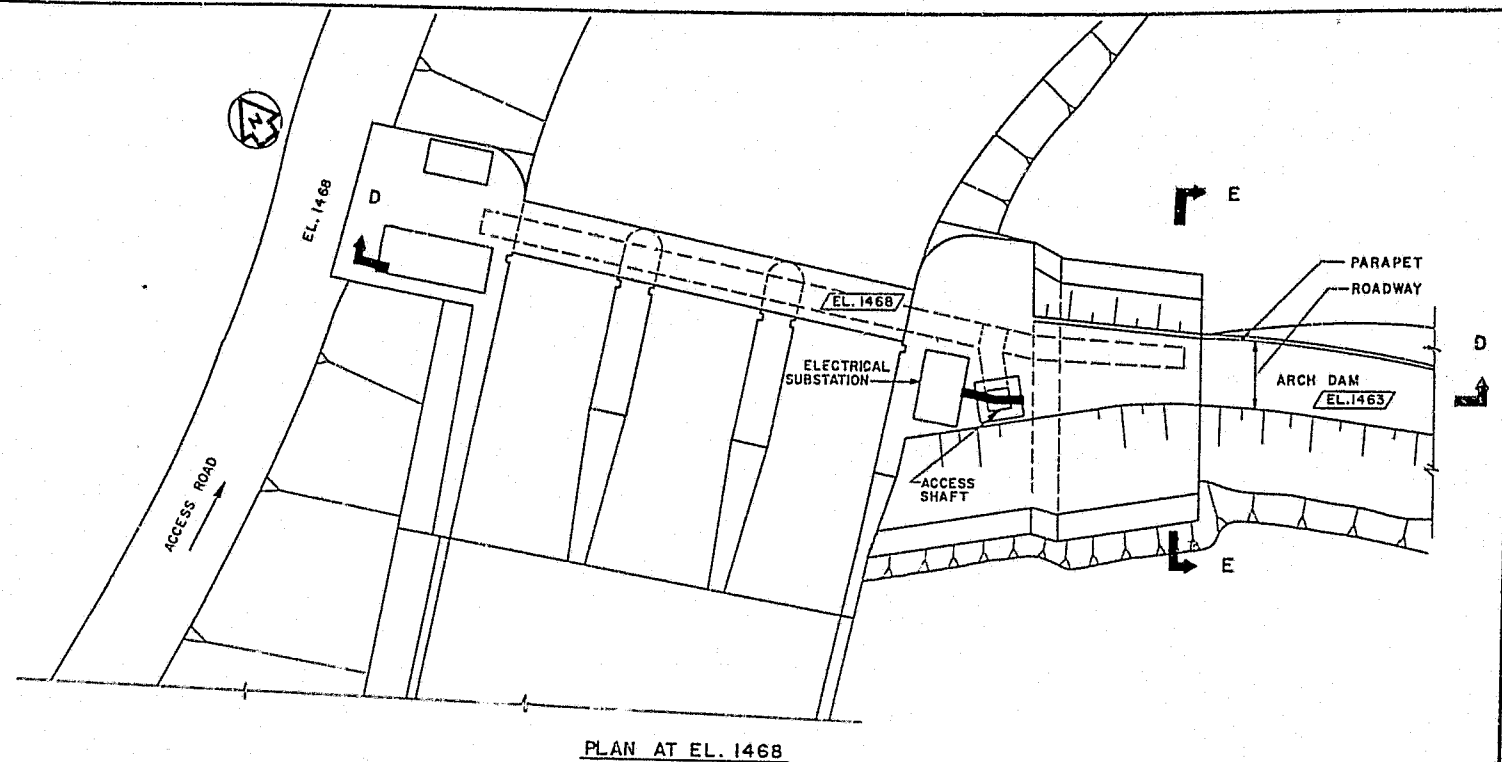
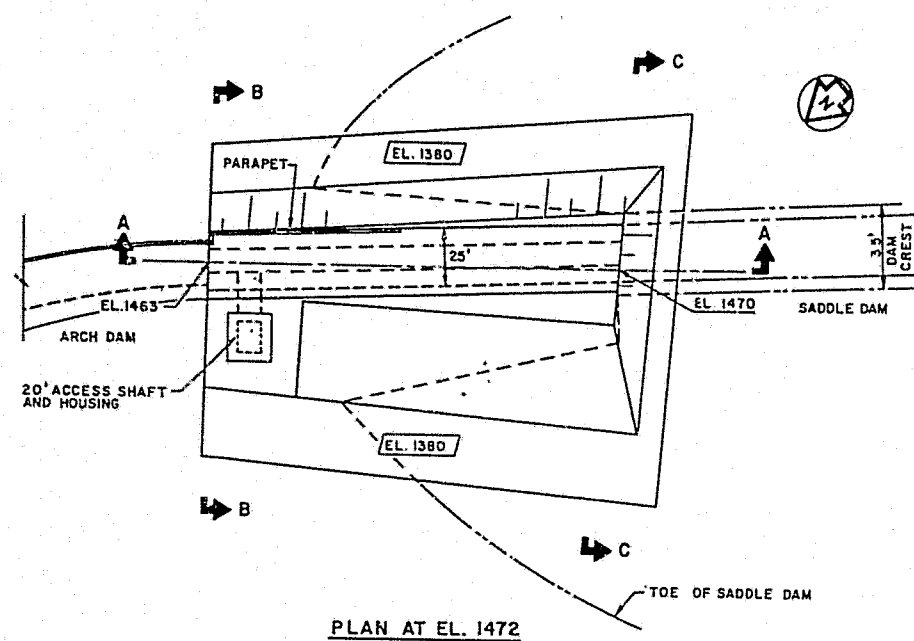


FOLD
LENGTH12
11
8.5
8

AUTO

MANUAL

FEED

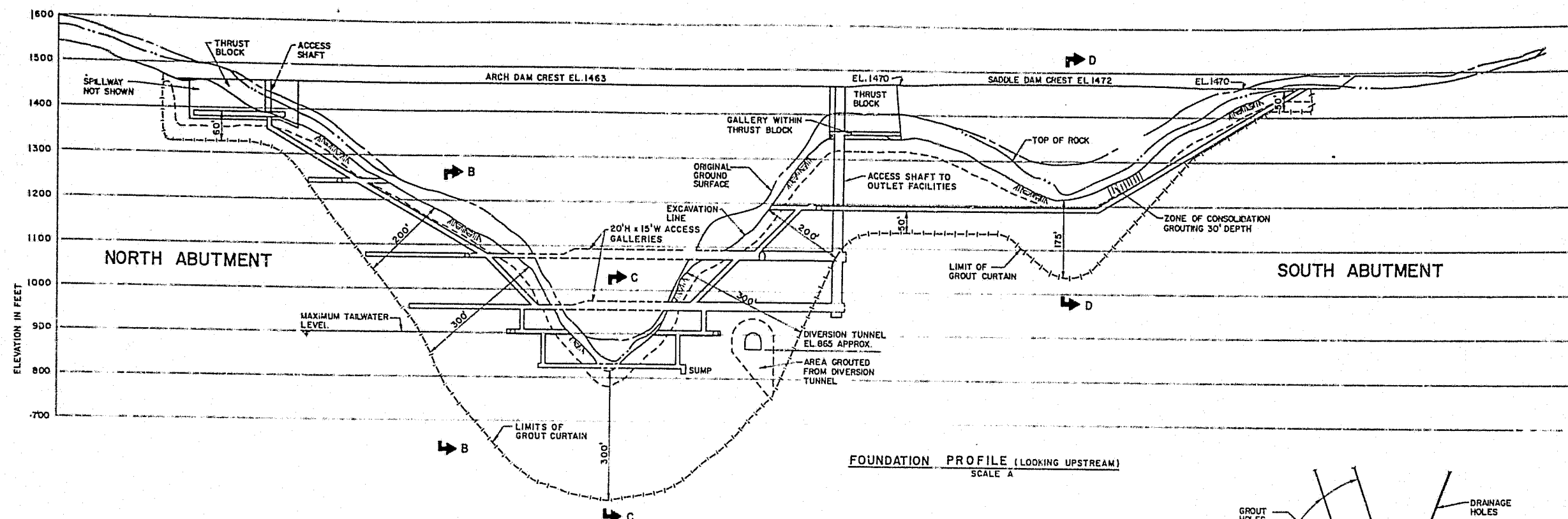
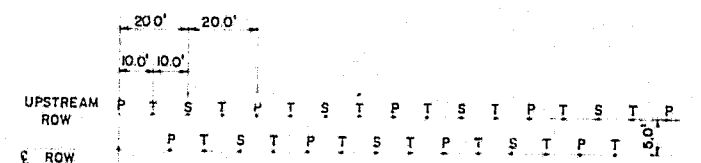


LEFT ABUTMENT THRUST BLOCK

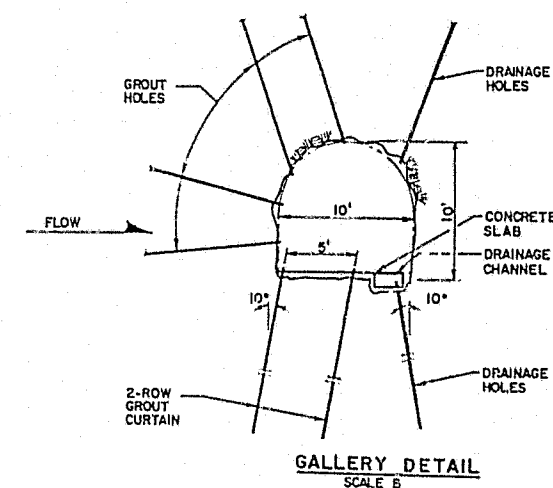
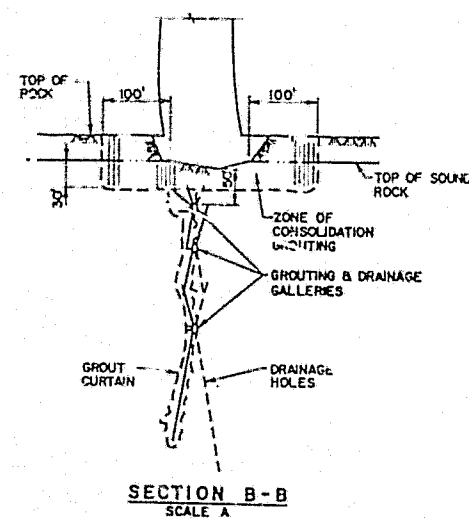
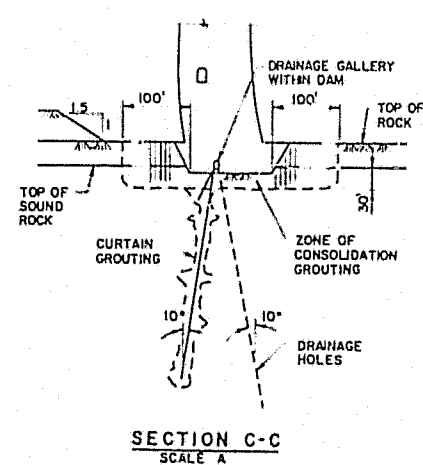
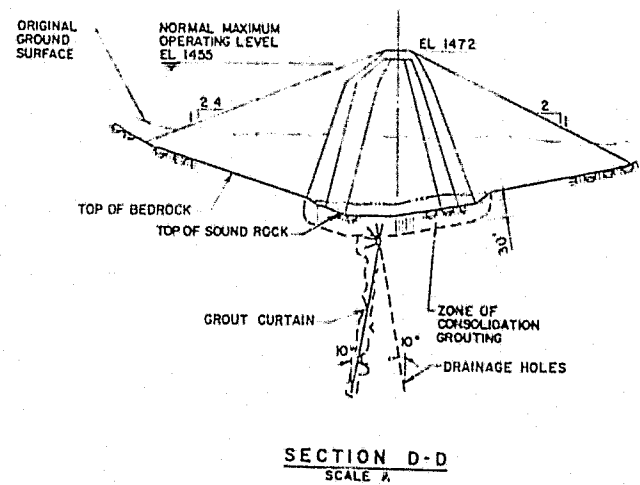
RIGHT ABUTMENT THRUST BLOCK

SCALE 0 30 60 FEET
(1 INCH = 30 FEET)

MARZA-ERASSO	
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON	
MAIN DAM	
THRUST BLOCKS	
EXHIBIT F	PLATE F46 R

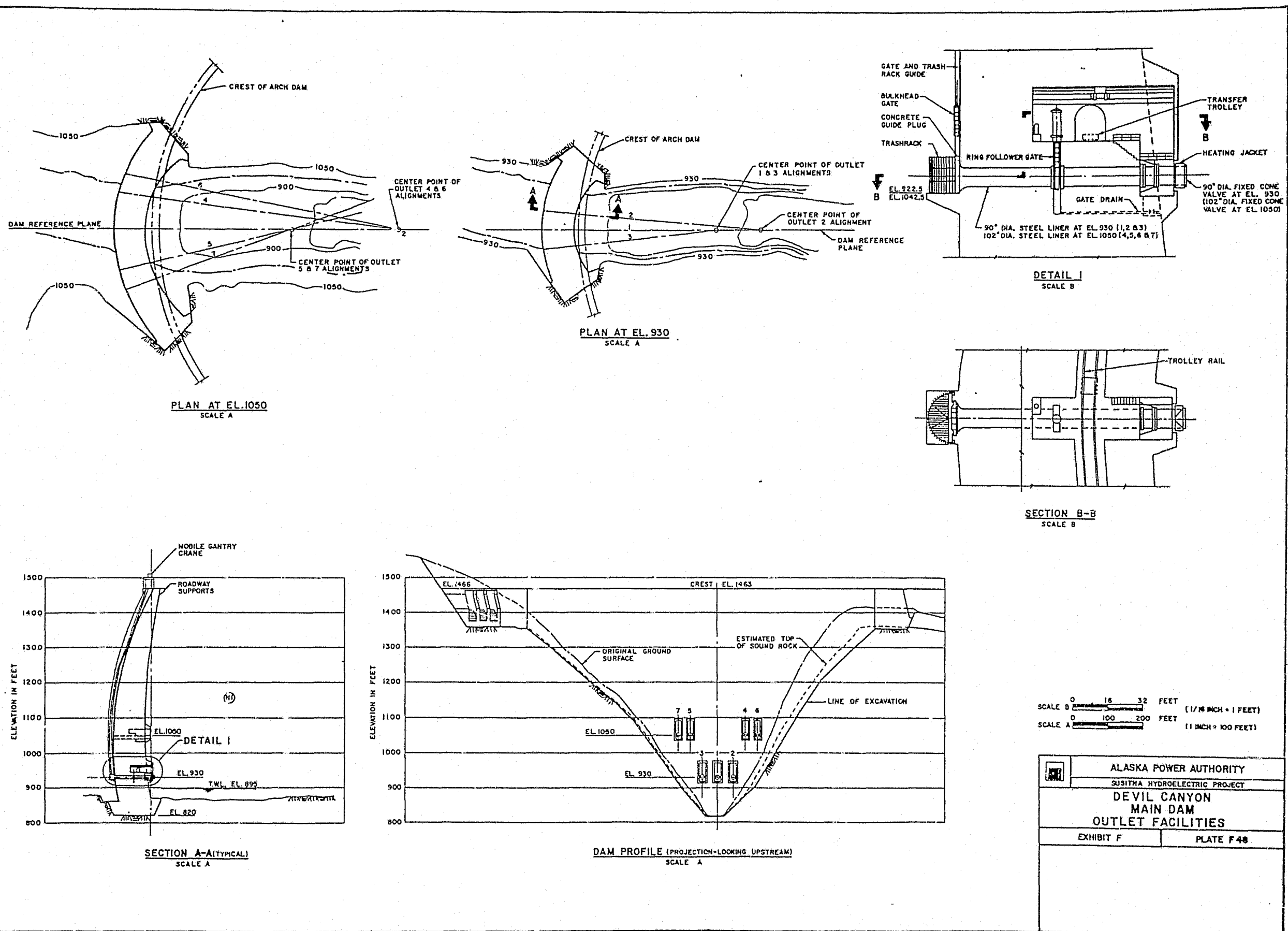
FOUNDATION PROFILE (LOOKING UPSTREAM)
SCALE AGROUT HOLE SPACING
SCALE C

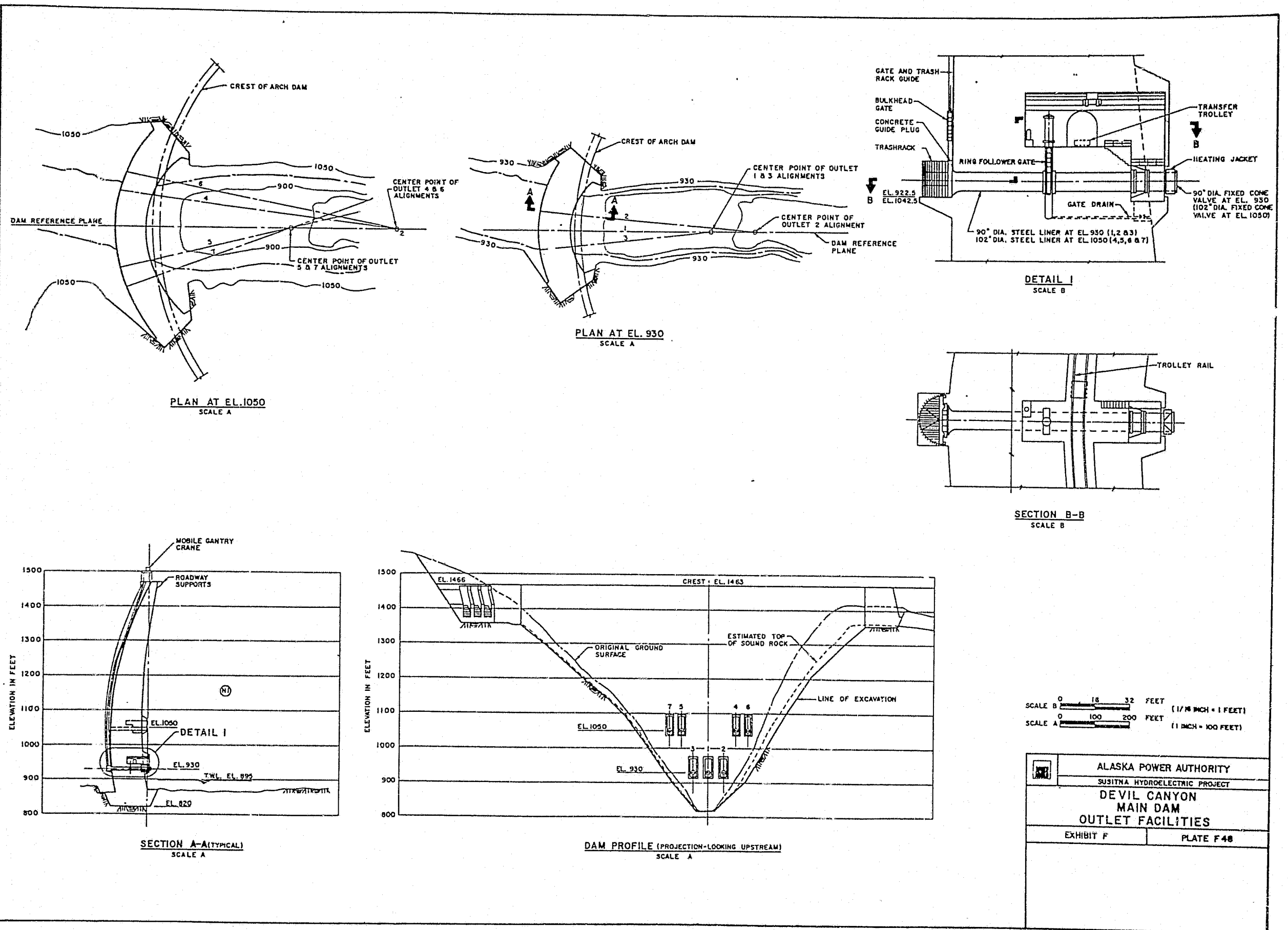
LEGEND
 P = PRIMARY GROUT HOLE
 S = SECONDARY GROUT HOLE
 T = TERTIARY GROUT HOLE

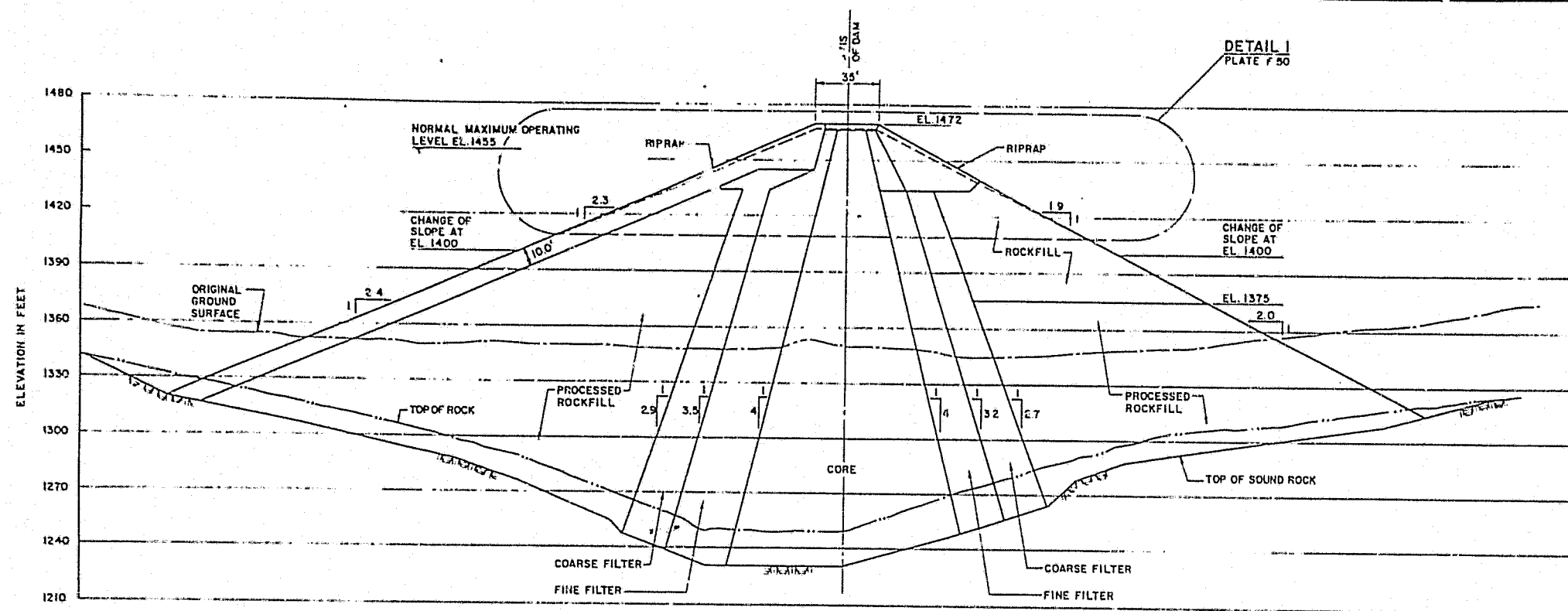
GALLERY DETAIL
SCALE BSECTION B-B
SCALE ASECTION C-C
SCALE ASECTION D-D
SCALE A

SCALE B 0 5 10 FEET (1 INCH = 5 FEET)
 SCALE A 0 100 200 FEET (1 INCH = 100 FEET)

HARZA-ERASCO ALASKA POWER AUTHORITY
 SUSITNA HYDROELECTRIC PROJECT
 DEVIL CANYON
 MAIN DAM & SADDLE DAM
 GROUTING AND DRAINAGE
 EXHIBIT F PLATE F47 R

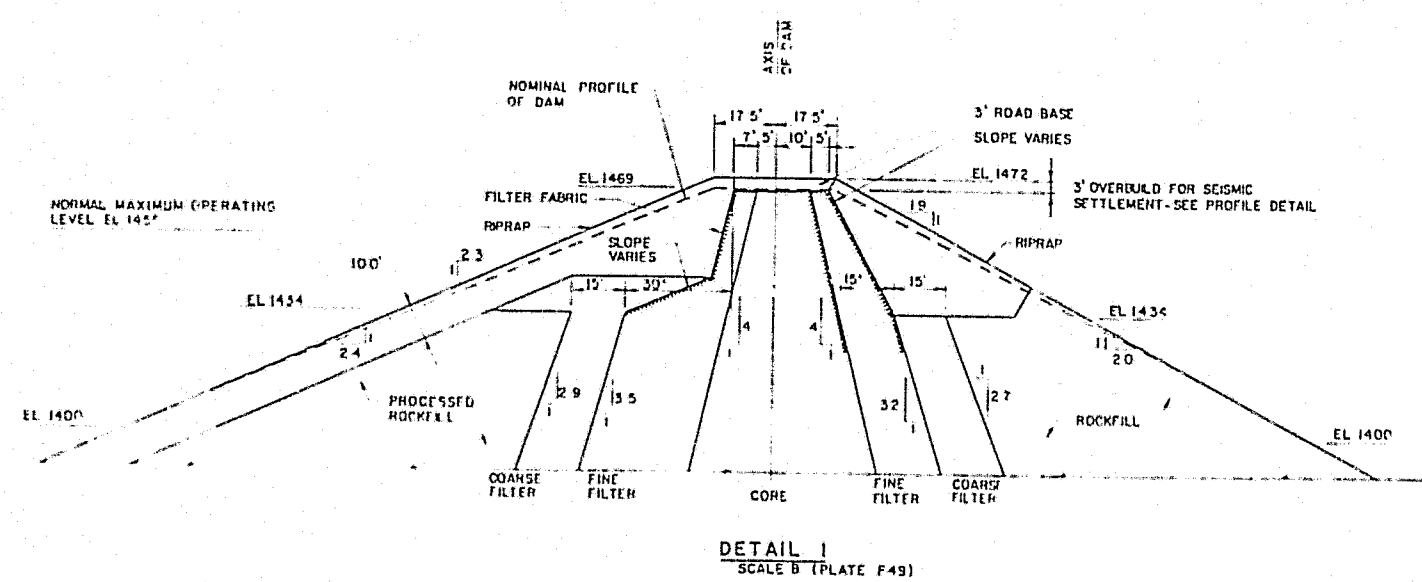
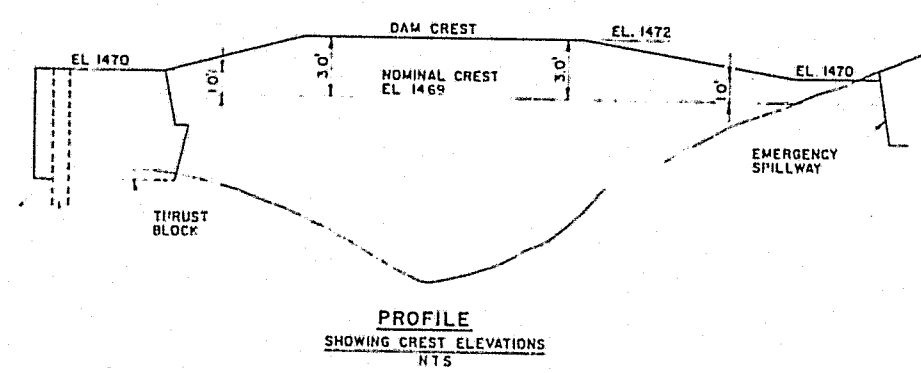
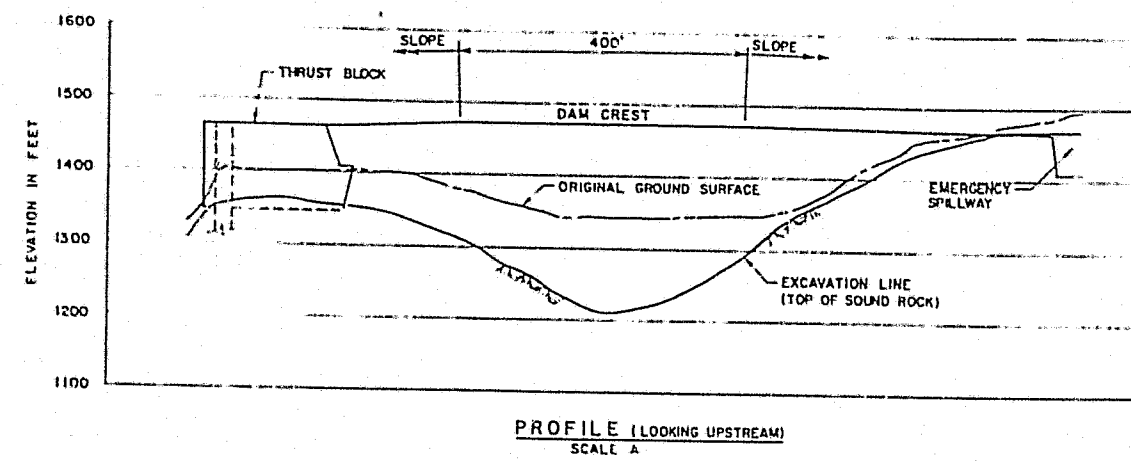






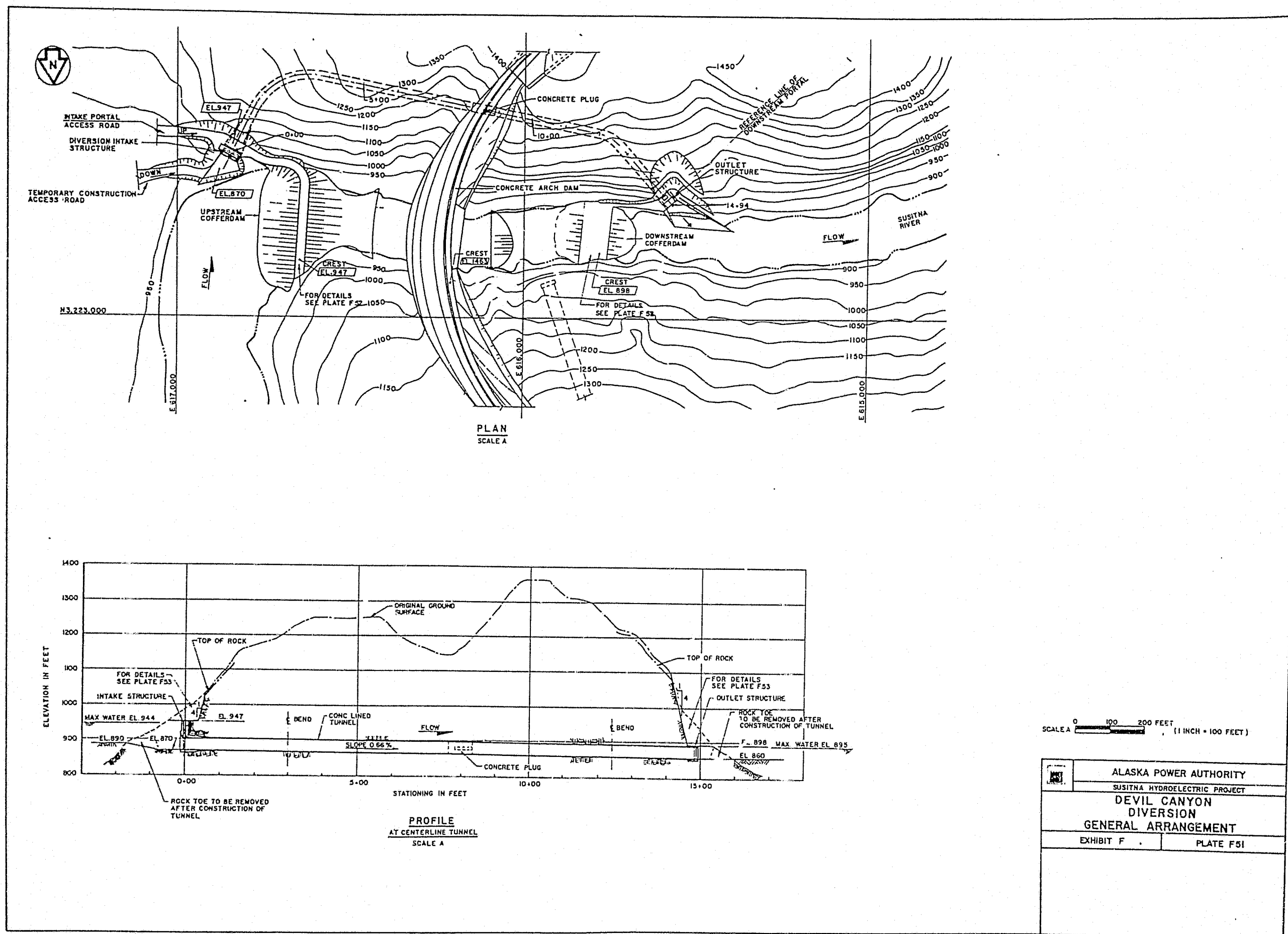
SCALE 0 30 60 FEET
(1 INCH = 30 FEET)

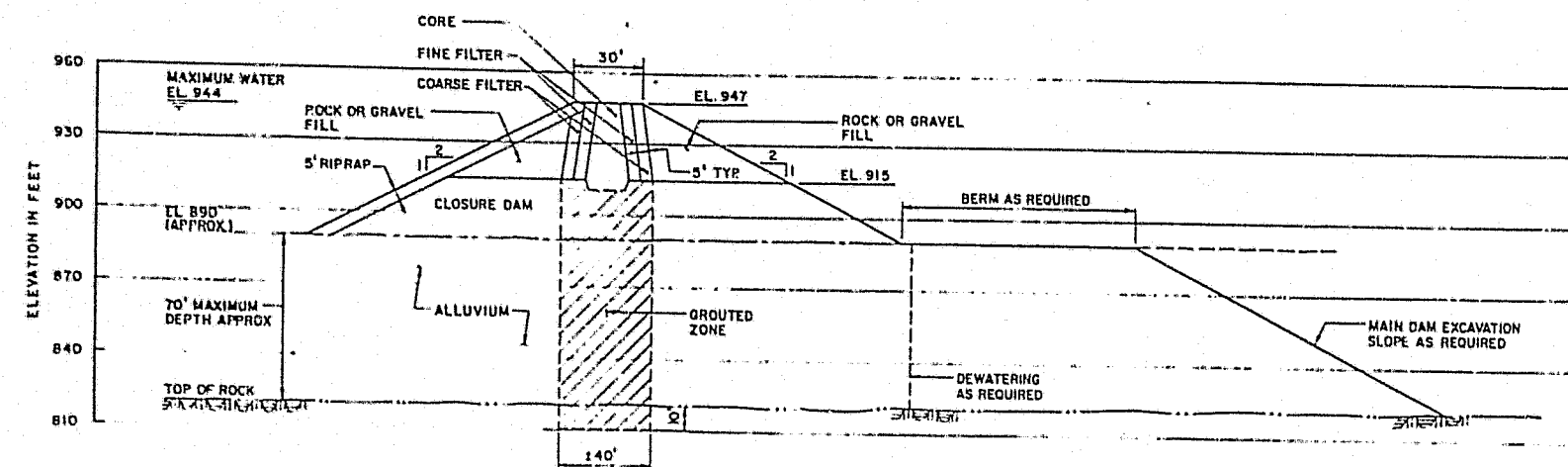
	ALASKA POWER AUTHORITY	
	SUSITNA HYDROELECTRIC PROJECT	
	DEVIL CANYON SADDLE DAM SECTION	
	EXHIBIT F	PLATE F49



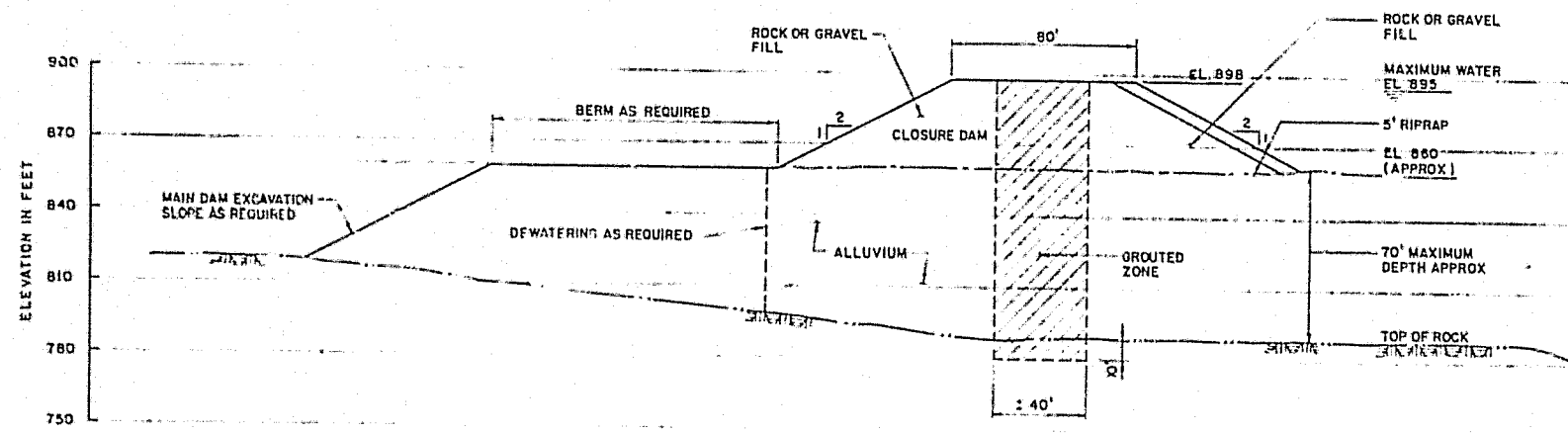
SCALE B 0 20 40 FEET (1 INCH = 20 FEET)
SCALE A 0 100 200 FEET (1 INCH = 100 FEET)

127	ALASKA POWER AUTHORITY SUSITNA HYDROELECTRIC PROJECT
	DEVIL CANYON SADDLE DAM PROFILE AND DETAIL
EXHIBIT F	PLATE F50





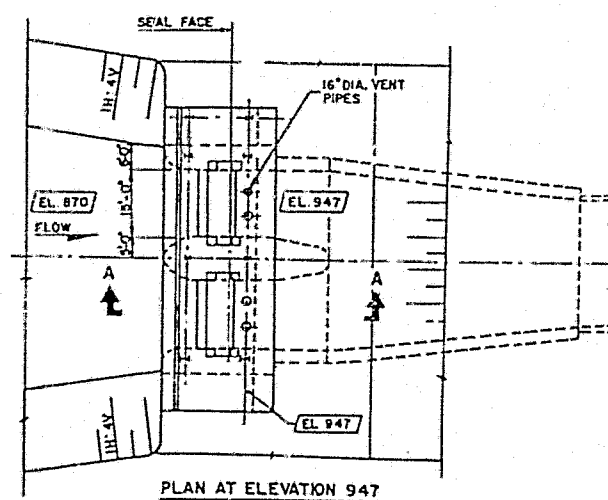
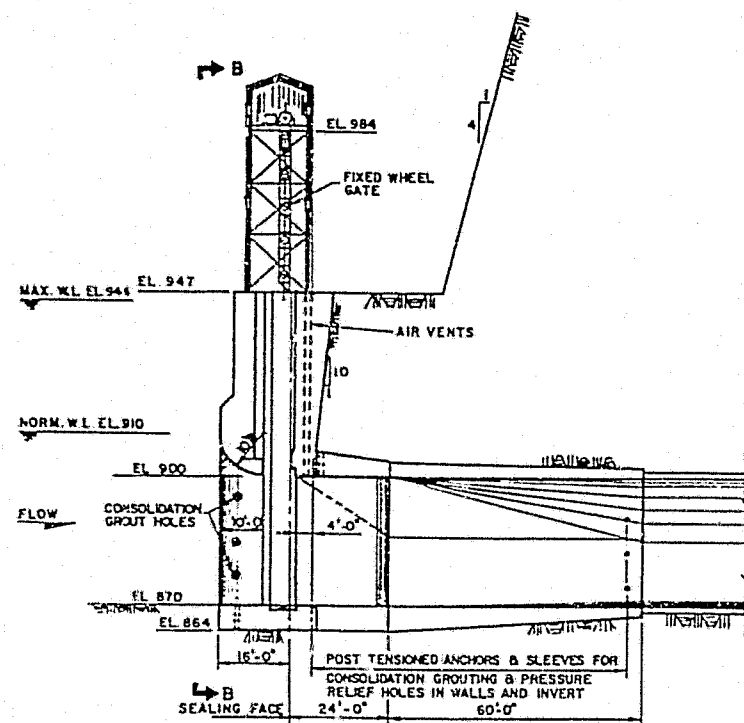
TYPICAL CROSS SECTION (PLATE F51)
UPSTREAM COFFERDAM



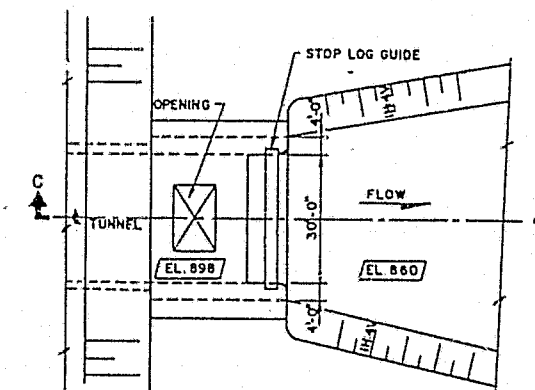
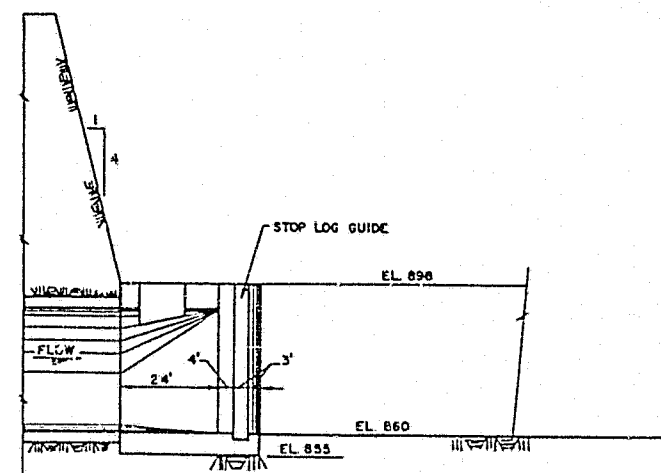
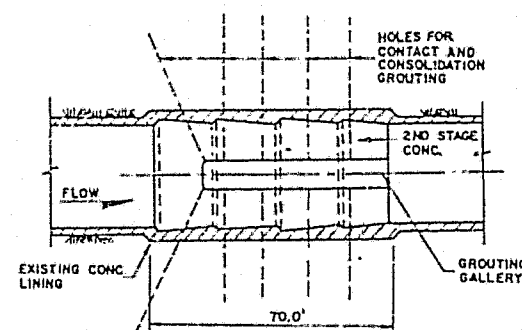
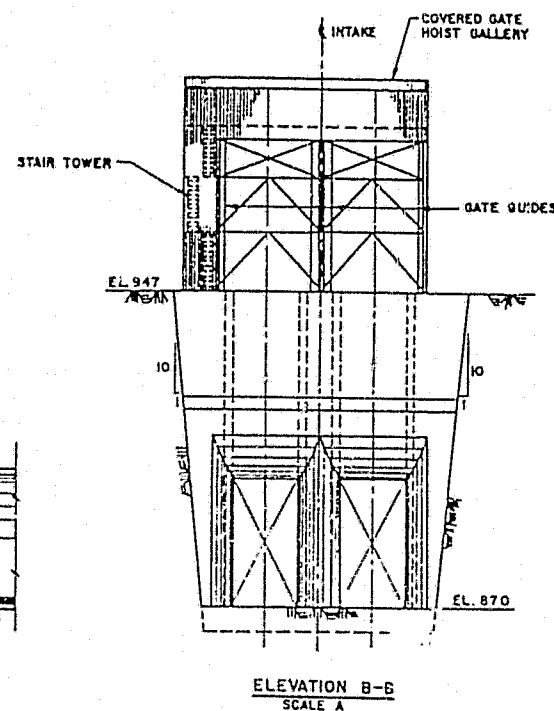
TYPICAL CROSS SECTION (PLATE F51)
DOWNSTREAM COFFERDAM

SCALE 0 30 60 FEET (1 INCH = 30 FEET)

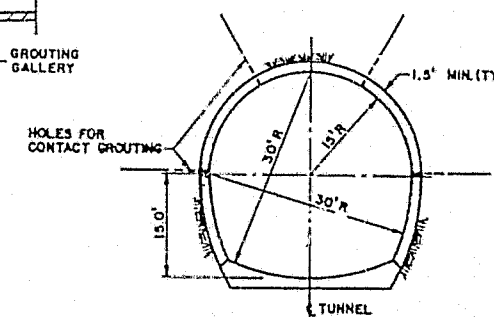
ALP	ALASKA POWER AUTHORITY
	SUSITNA HYDROELECTRIC PROJECT
	DEVIL CANYON
	DIVERSION
	COFFERDAM SECTIONS
	EXHIBIT F
	PLATE F52



DIVERSION INTAKE STRUCTURE (PLATE F51)

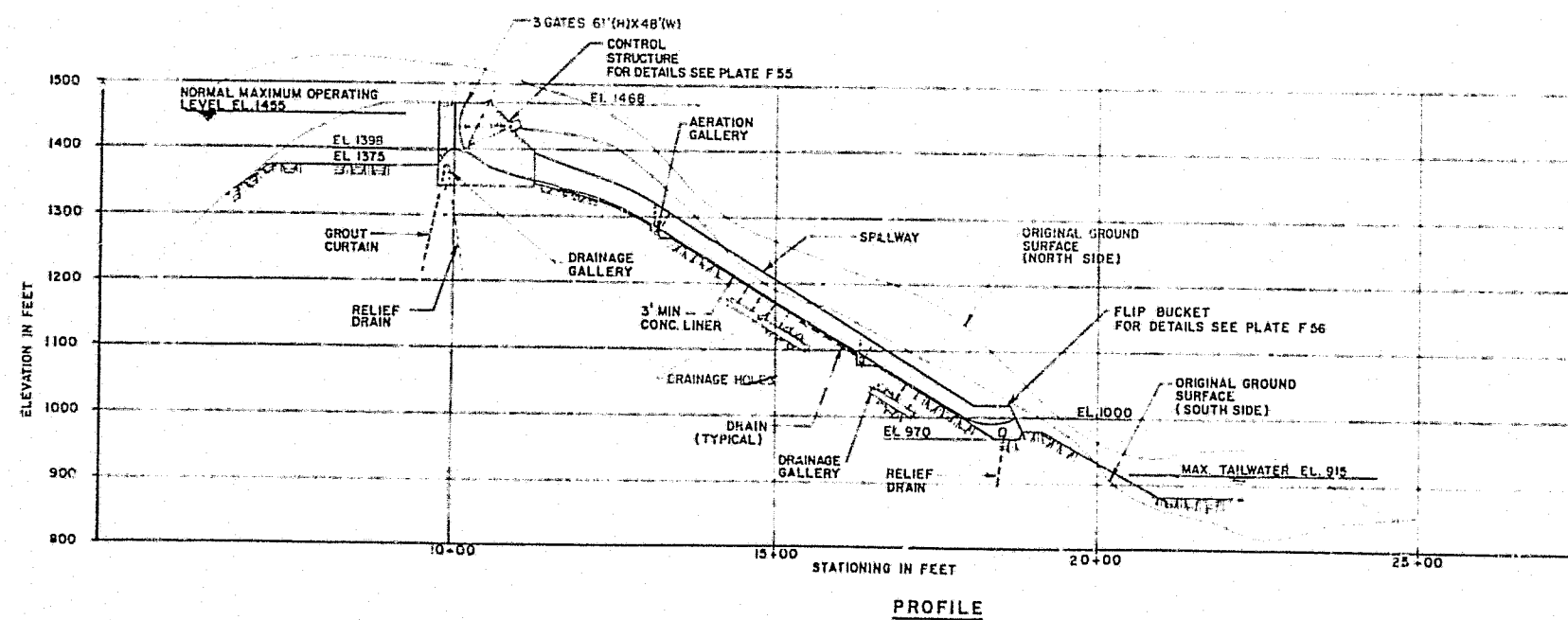
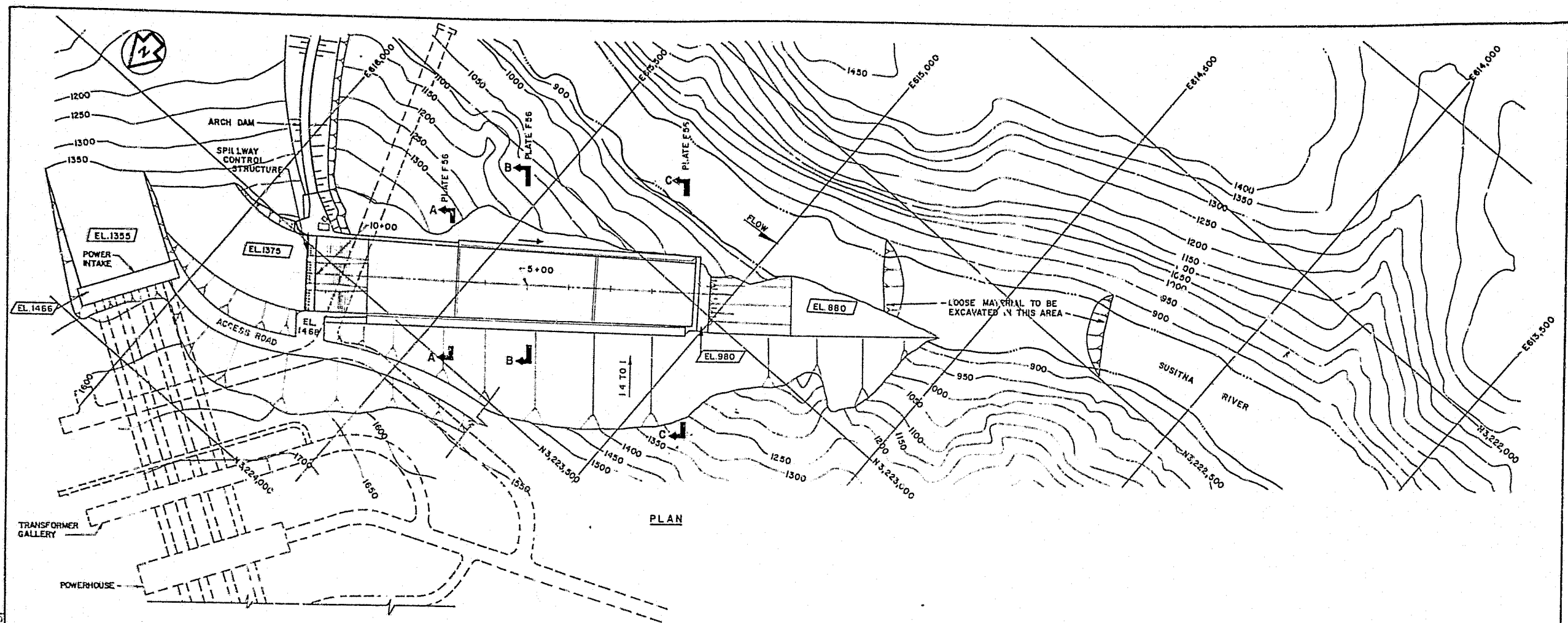


DIVERSION OUTLET STRUCTURE (PLATE F51)



SCALE F.C. 0 10 20 FEET (1 INCH = 10 FEET)
SCALE B 0 20 40 FEET (1 INCH = 20 FEET)
SCALE A 0 16 32 FEET (1 INCH = 16 FEET)

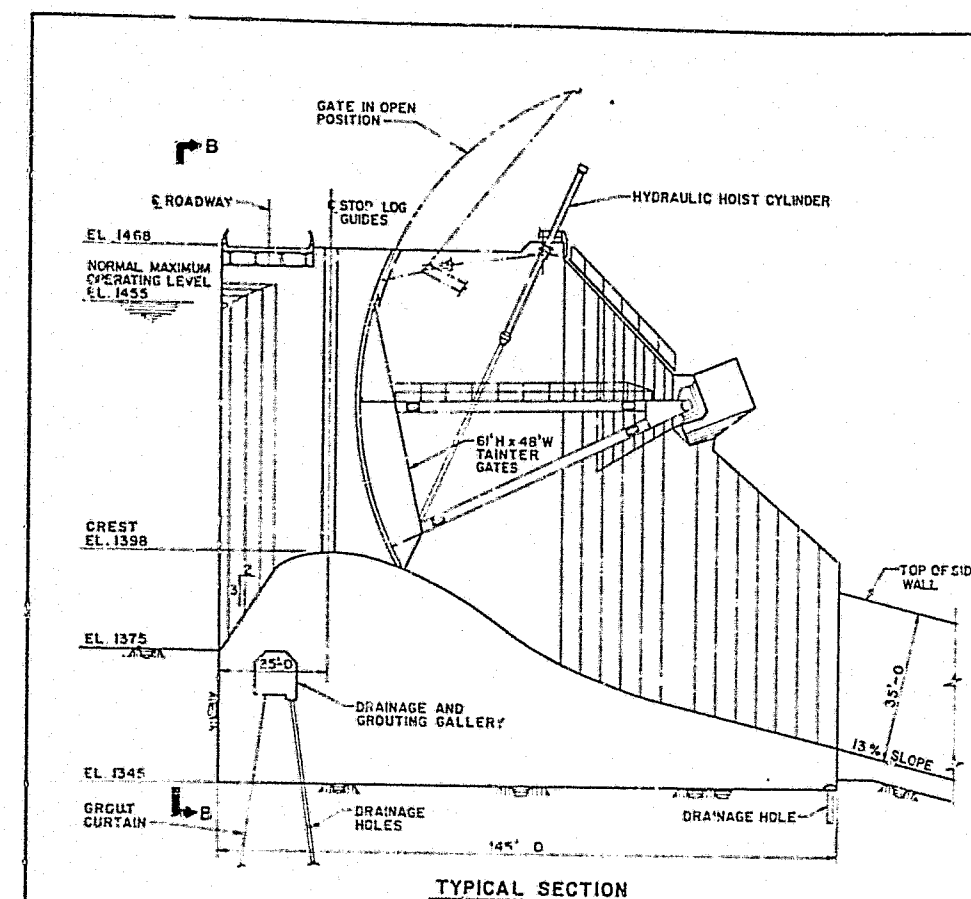
ALASKA POWER AUTHORITY	
BUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON DIVERSION SECTIONS	
EXHIBIT F	PLATE F53



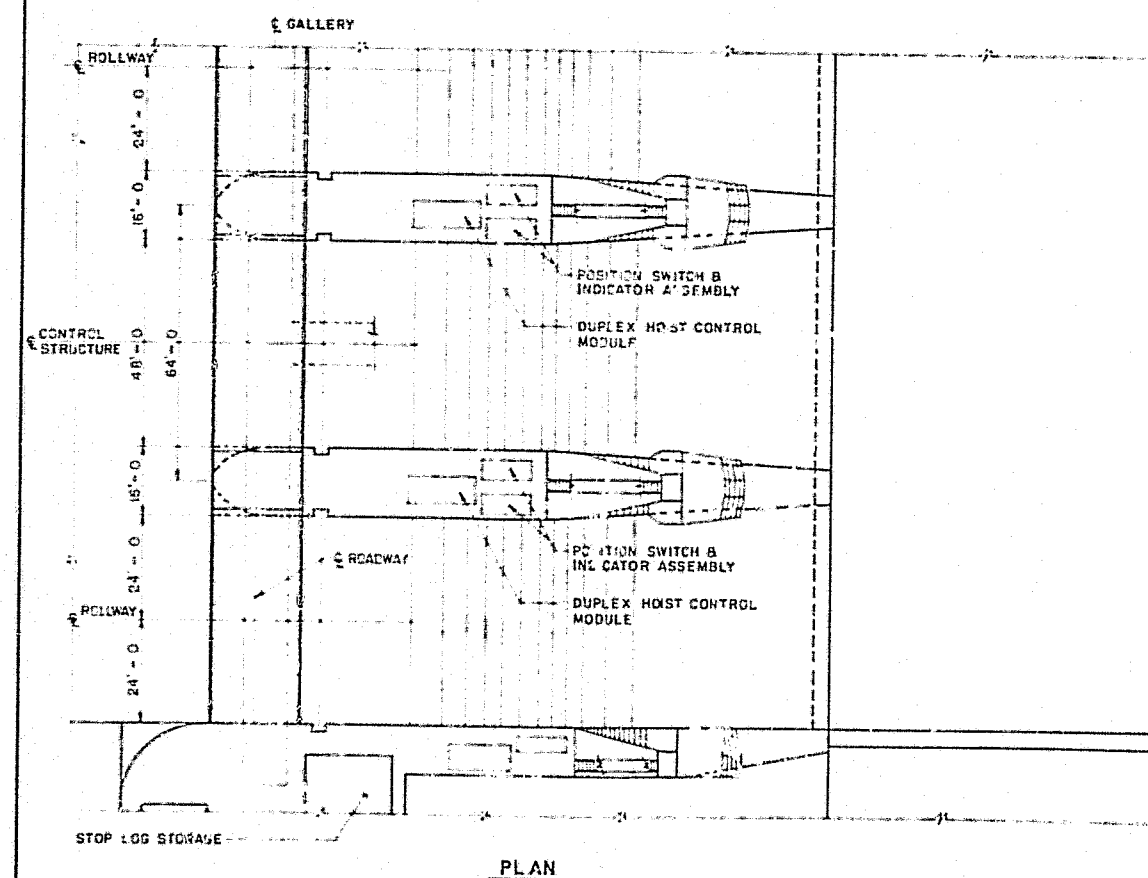
NOTE: FOR SECTIONS SEE PLATE F56

SCALE 0 100 200 FEET
(1 INCH = 100 FEET)

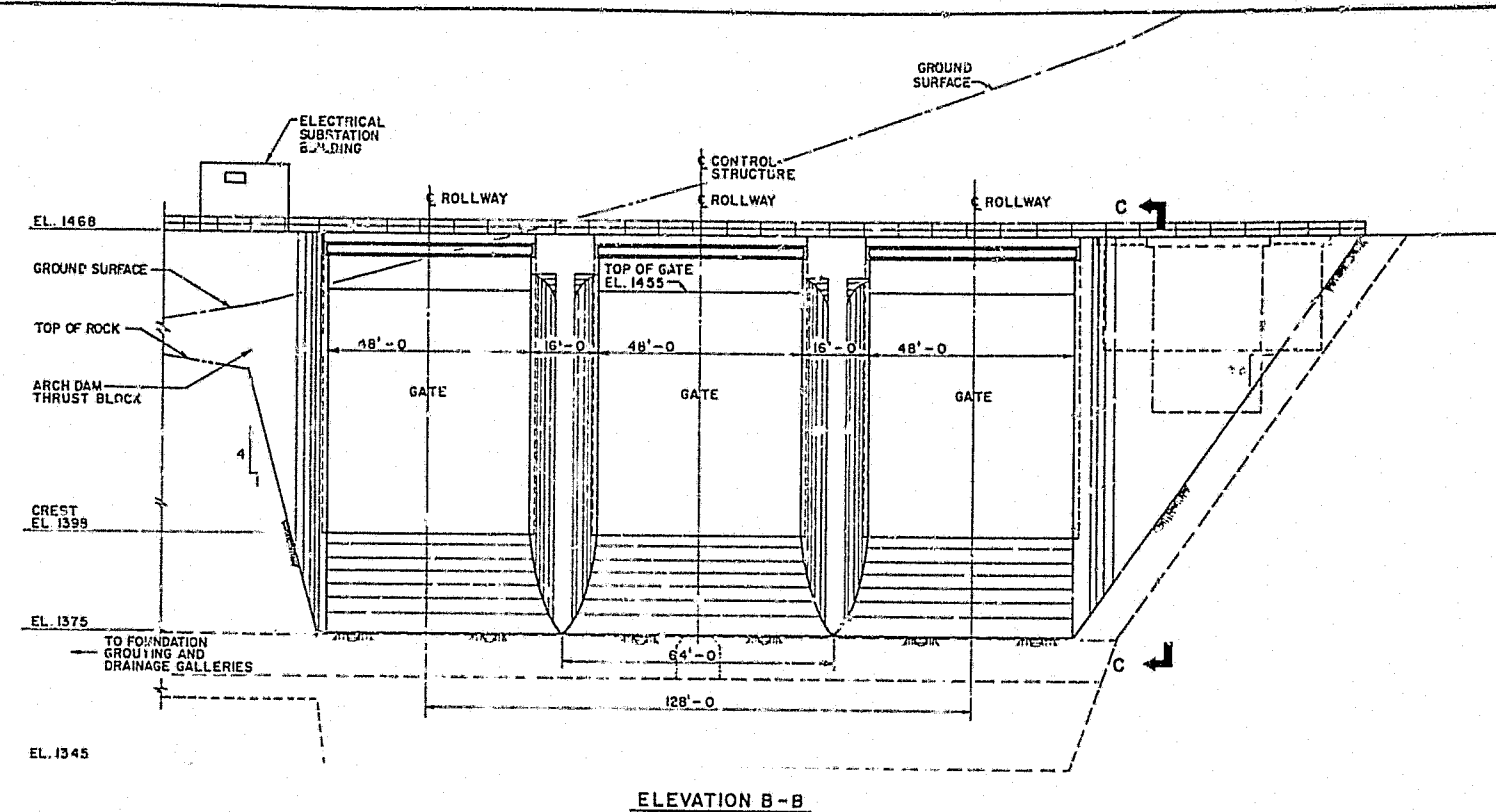
HARZA-EDASCO	ALASKA POWER AUTHORITY
SUSITNA JUMP VENTURE	SUSITNA HYDROELECTRIC PROJECT
DEVIL CANYON SPILLWAY	
GENERAL ARRANGEMENT	
EXHIBIT F	PLATE F54 R



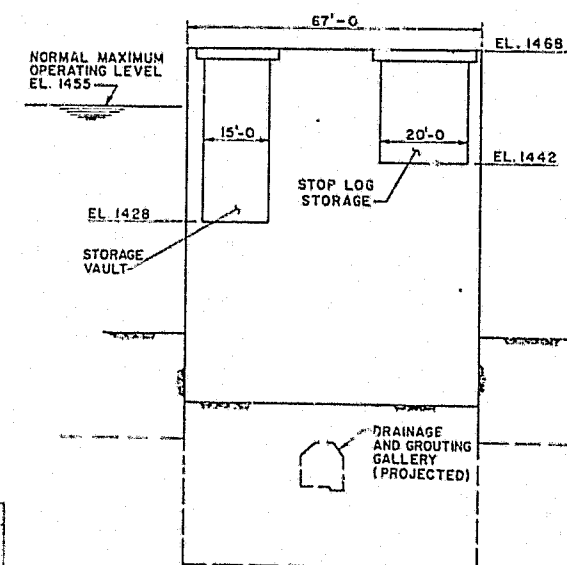
TYPICAL SECTION



PLAN



ELEVATION B-B



SECTION C-C

SPILLWAY CONTROL STRUCTURE
SUMMARY OF STABILITY ANALYSES

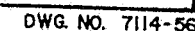
LOAD CONDITION	FOUNDATION STRESS U.S./O.S. (PSI)	Xc3 (FT)	FACTORS OF SAFETY			
			SLIDING	SKEAR FRICTION	FLOATATION	OVERTURNING
NORMAL INCLUDES ICE LOADS	41.5/49.6	2.1	N.A.	3.3	5.2	2.7
UNUSUAL 1/100/110 YR. EARTHQUAKE (0.20g)	21.7/69.4	12.7	N.A.	2.0	5.2	2.1
UNUSUAL DRAINS PLUGGED, PMF	21.1/44.2	1.6	N.A.	2.9	2.4	1.7
EXTREME EARTHQUAKE (0.57g)	19.2/110.3	34.3	N.A.	1.2	5.2	1.5

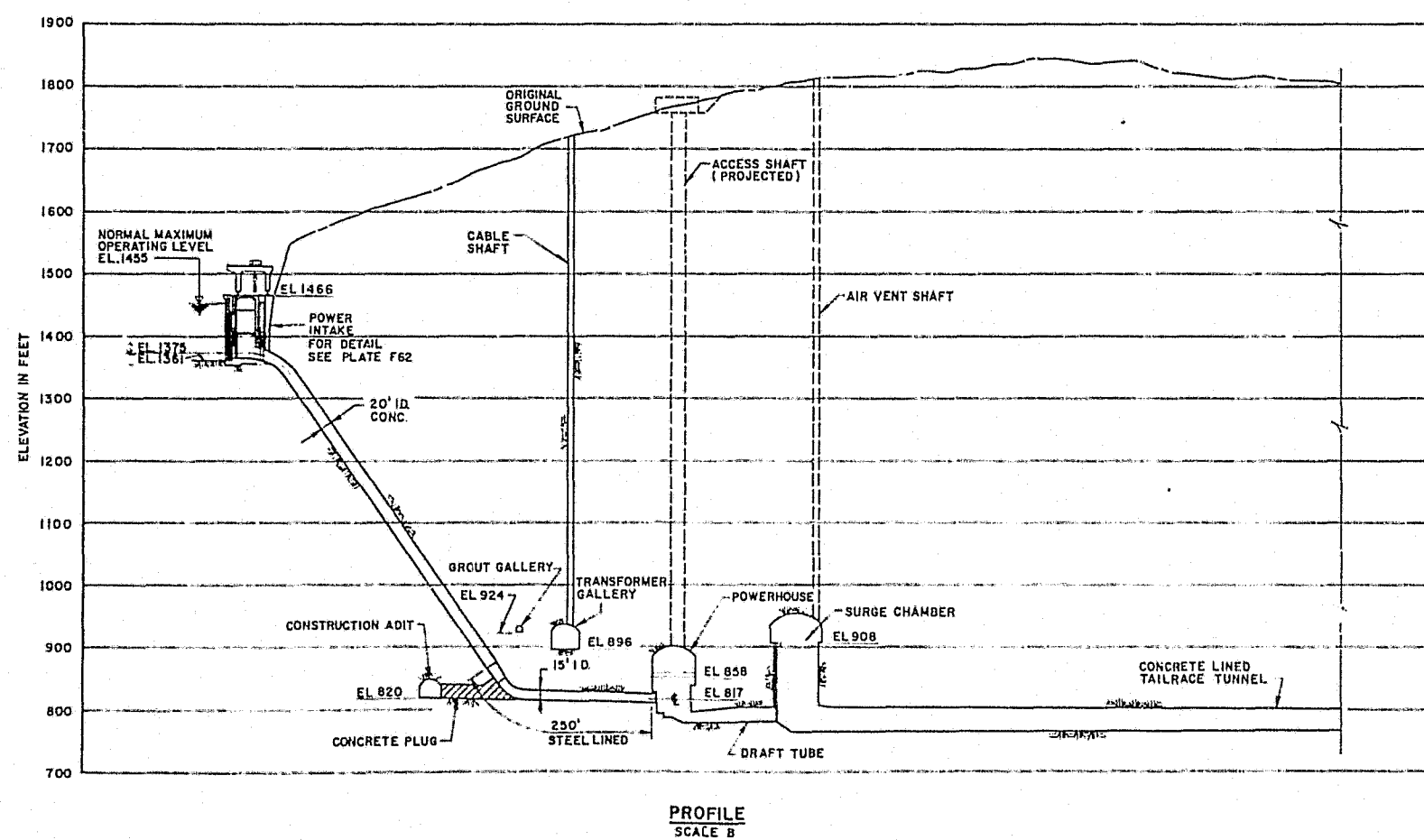
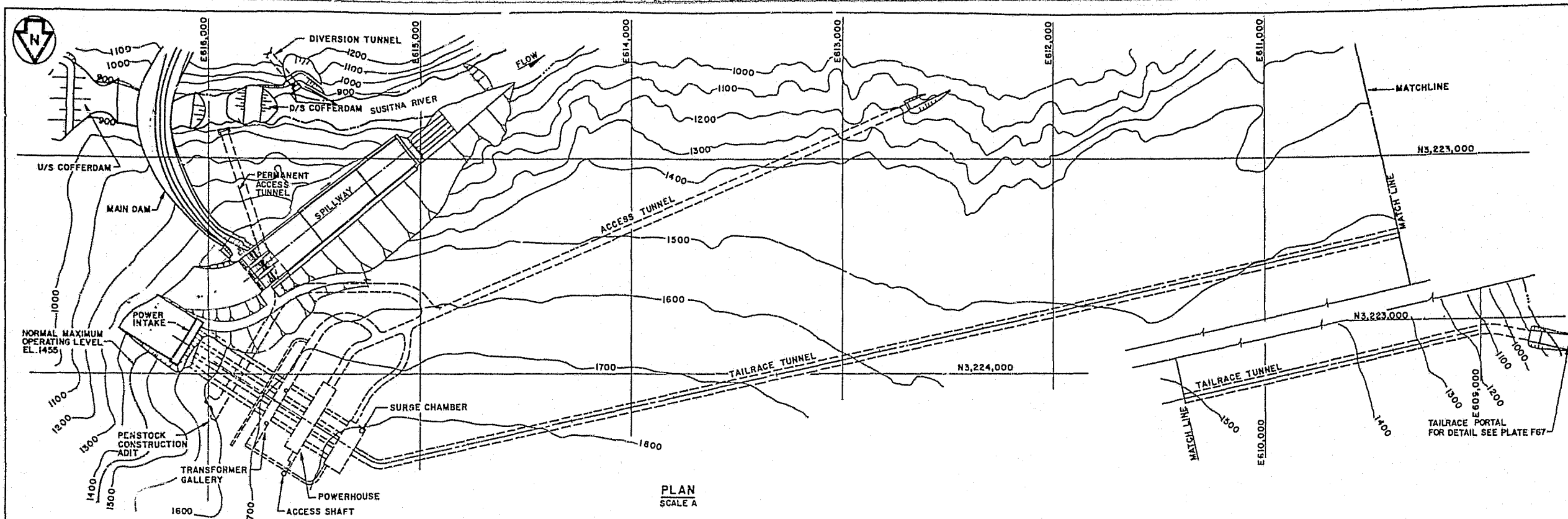
PHYSICAL PARAMETERS
 $\phi = 35^\circ$
 $c = 30$ PSI

SCALE 0 16 32 FEET
 (1/16 INCH = 1 FEET)

HARZA-EDASCO	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON	
SPILLWAY	
CONTROL STRUCTURE	
EXHIBIT F	PLATE F55R

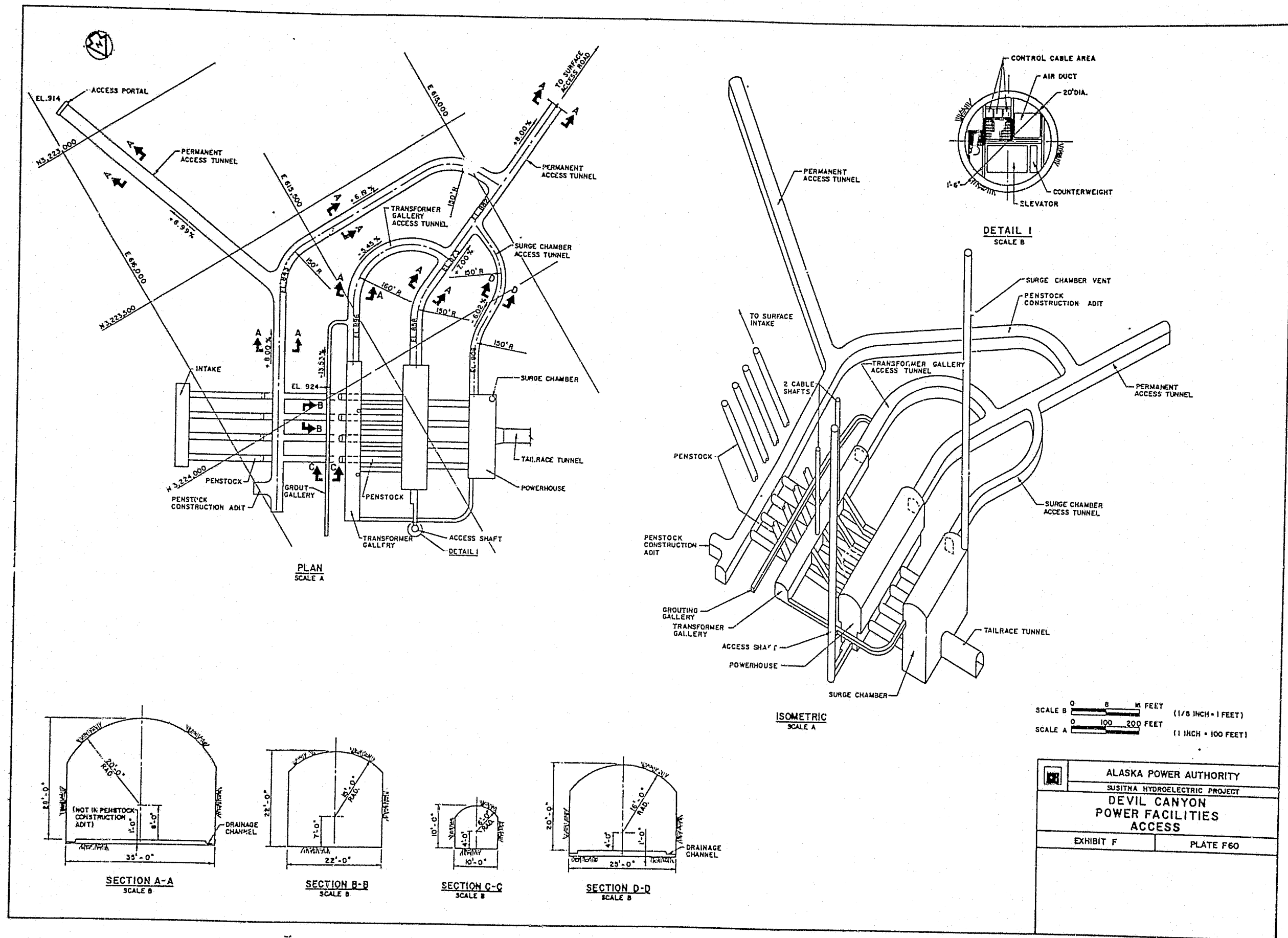
1. FOR LOCATION OF SECTIONS AND FLIP BUCKET, SEE PLATE #54

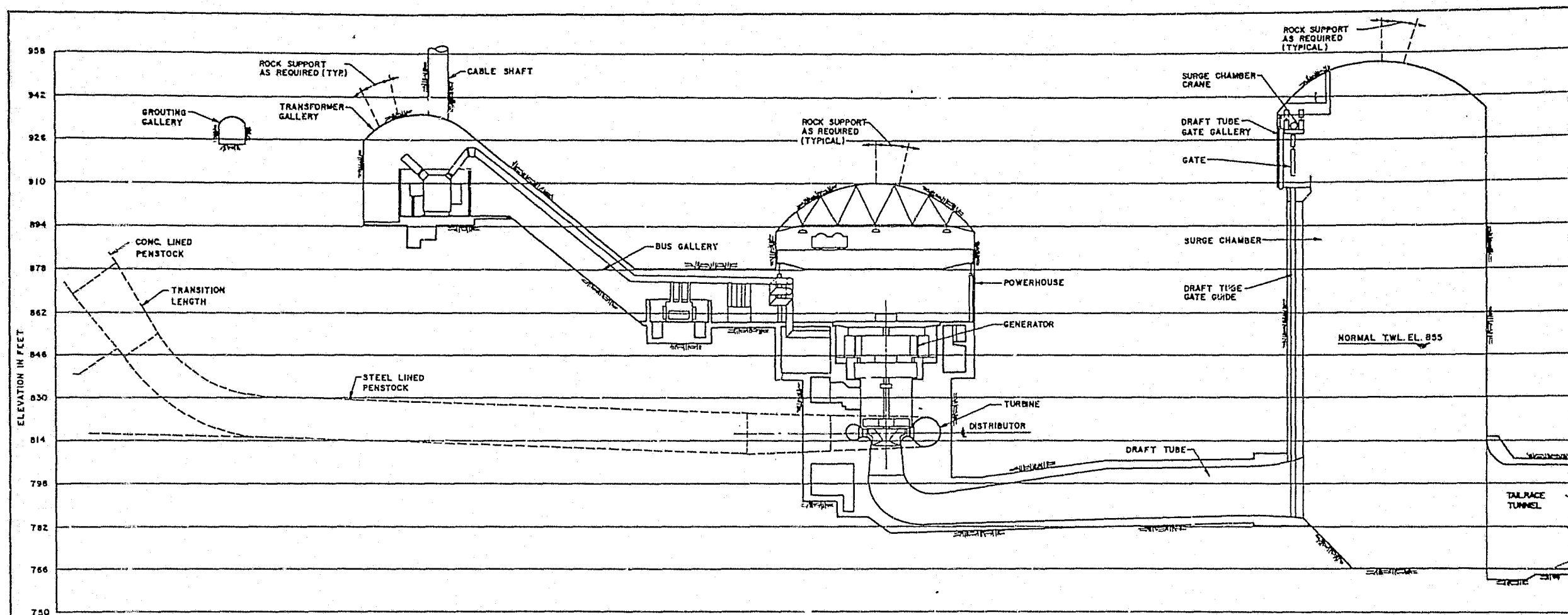




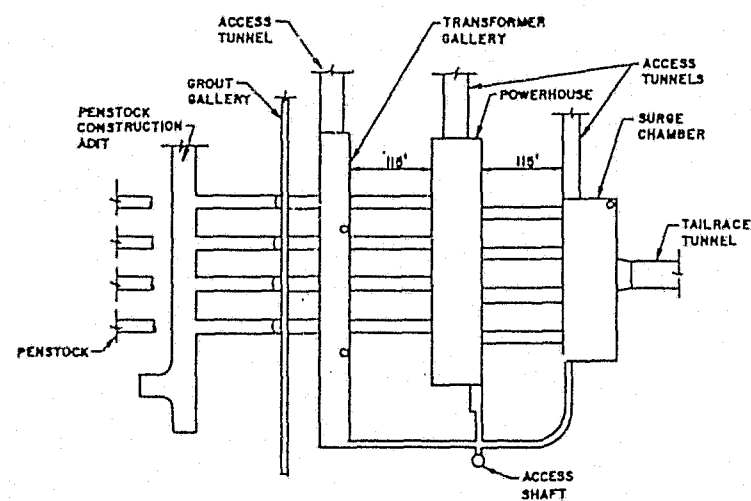
SCALE B 0 100 200 FEET (1 INCH = 100 FEET)
SCALE A 0 200 400 FEET (1 INCH = 200 FEET)

HARZA-EBASCO	ALASKA POWER AUTHORITY
SUSITNA JOINT VENTURE	
SUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON POWER FACILITIES GENERAL ARRANGEMENT	
EXHIBIT F	PLATE F59 R

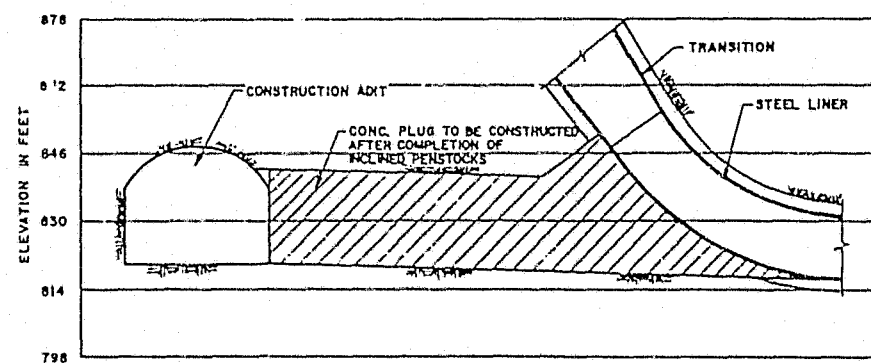




SECTION A-A
SCALE B



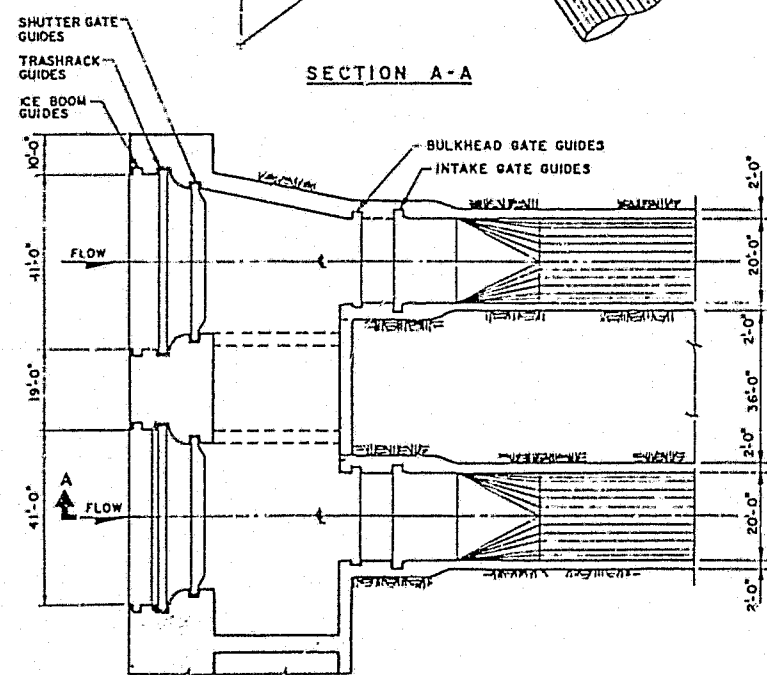
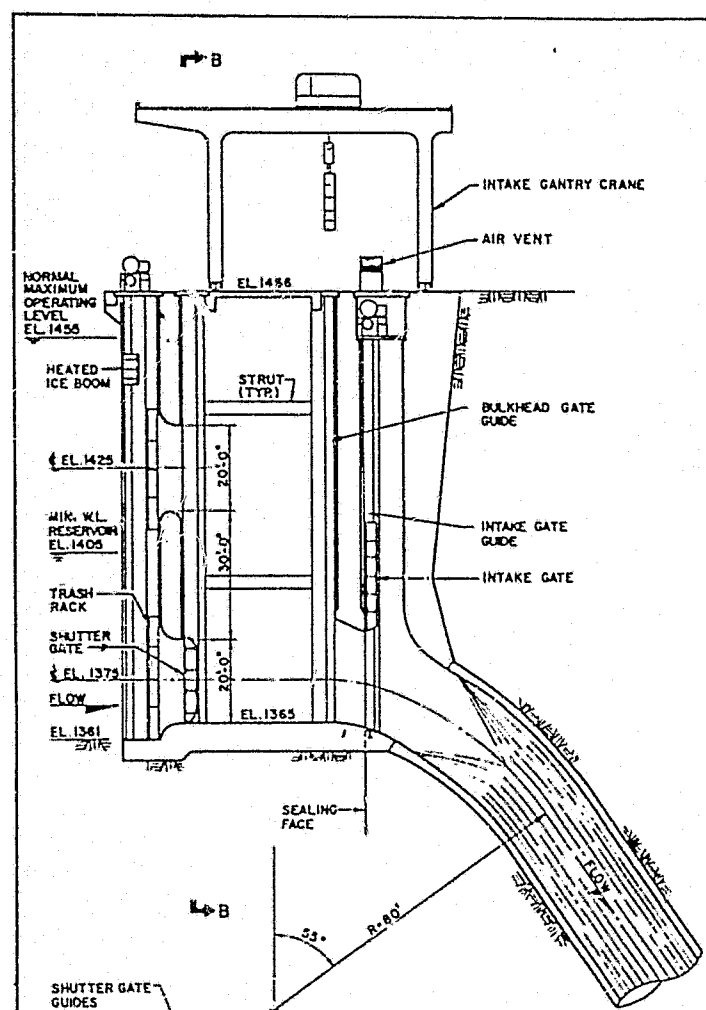
PLAN
SCALE A



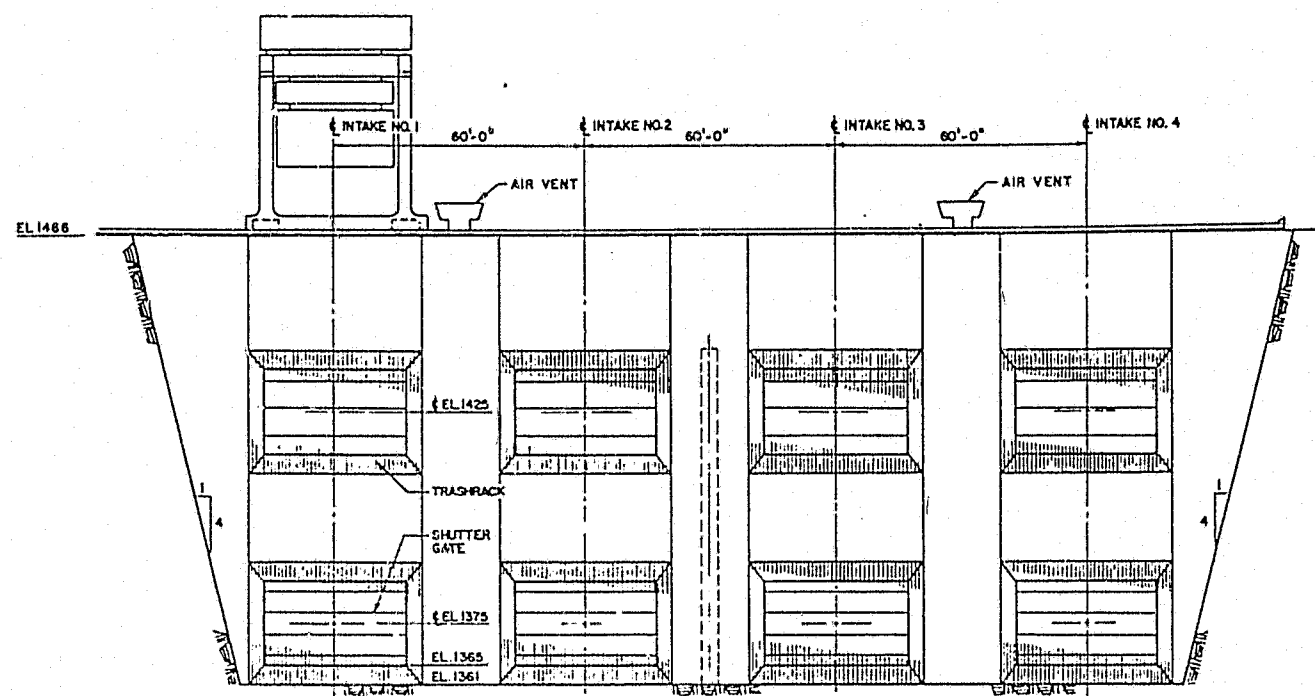
SECTION B-B
SCALE B

SCALE B 0 16 32 FEET (1/16 INCH = 1 FEET)
SCALE A 0 100 200 FEET (1 INCH = 100 FEET)

ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON POWER FACILITIES PLAN & SECTIONS	
EXHIBIT F	PLATE F 61



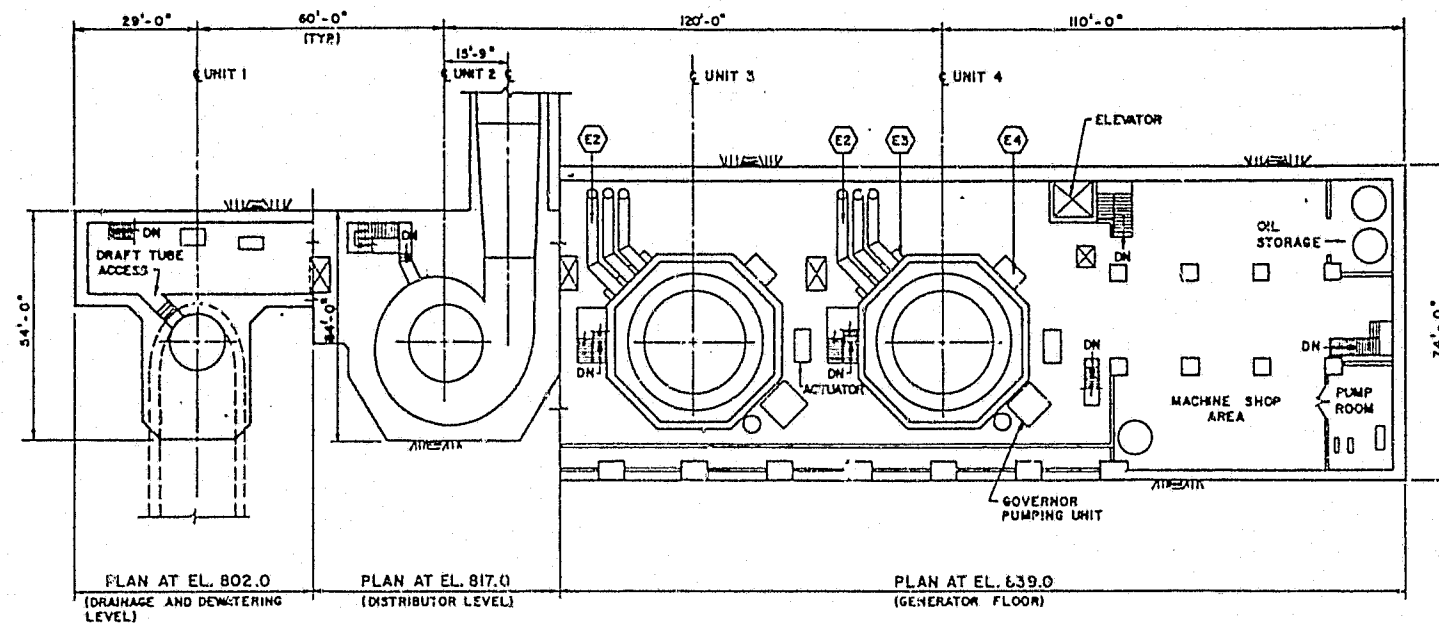
PLAN AT INTAKE CENTERLINE



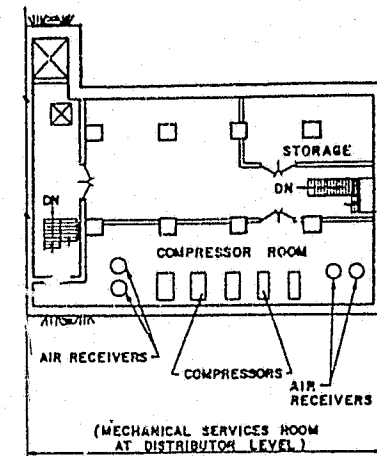
ELEVATION B-B

SCALE 0 16 32 FEET
(1/16 INCH = 1 FOOT)

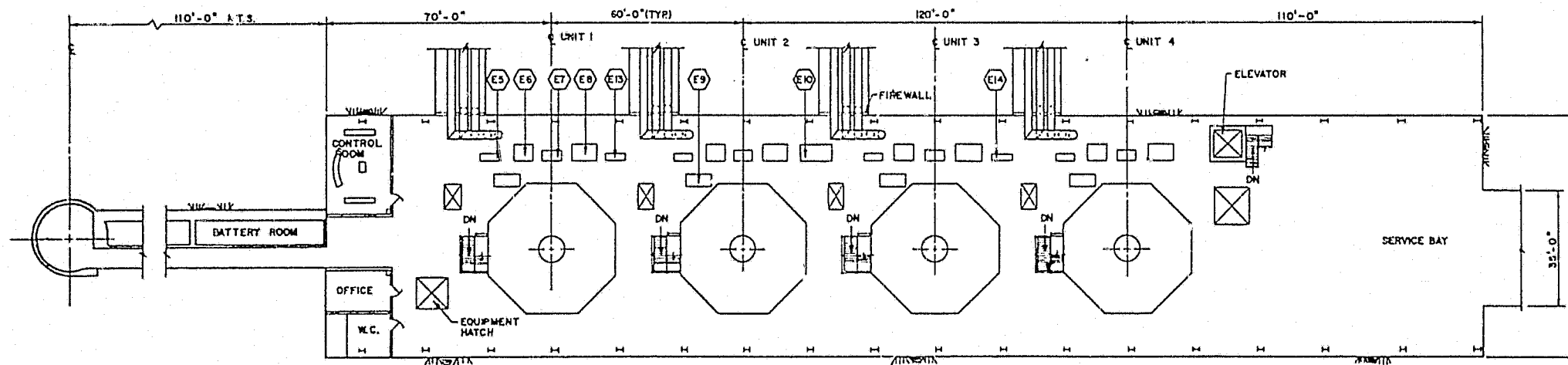
ALASKA POWER AUTHORITY	
SISITNA HYDROELECTRIC PROJECT	
DEVIL CANYON	
POWER INTAKE	
SECTIONS	
EXHIBIT F	PLATE F 62



POWERHOUSE PLAN



PLAN AT EL. 817.0



POWERHOUSE PLAN AT EL. 858.0

LEGEND

- E1 NOT USED
- E2 15 KV ISOLATED PHASE BUS
- E3 GENERATOR TERMINAL CUBICAL
- E4 GENERATOR NEUTRAL CUBICAL
- E5 UNIT AUXILIARY SWITCHBOARD
- E6 RELAY BOARD
- E7 TURBINE-GENERATOR CONTROL BOARD
- E8 EXCITATION BOARD
- E9 EXCITATION TRANSFORMER
- E10 MAIN AUXILIARY SWITCHBOARD
- E11 AUXILIARY SERVICE TRANSFORMER (5/7.5 MVA)- PLATE F64
- E12 AUXILIARY SERVICE TRANSFORMER (2 MVA)- PLATE F64
- E13 GENERAL AUXILIARY SWITCHBOARD
- E14 ESSENTIAL SERVICES SWITCHBOARD

SCALE 0 16 32 FEET (1/16" INCH = 1 FEET)

ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON POWERHOUSE PLANS	
EXHIBIT F	PLATE F63

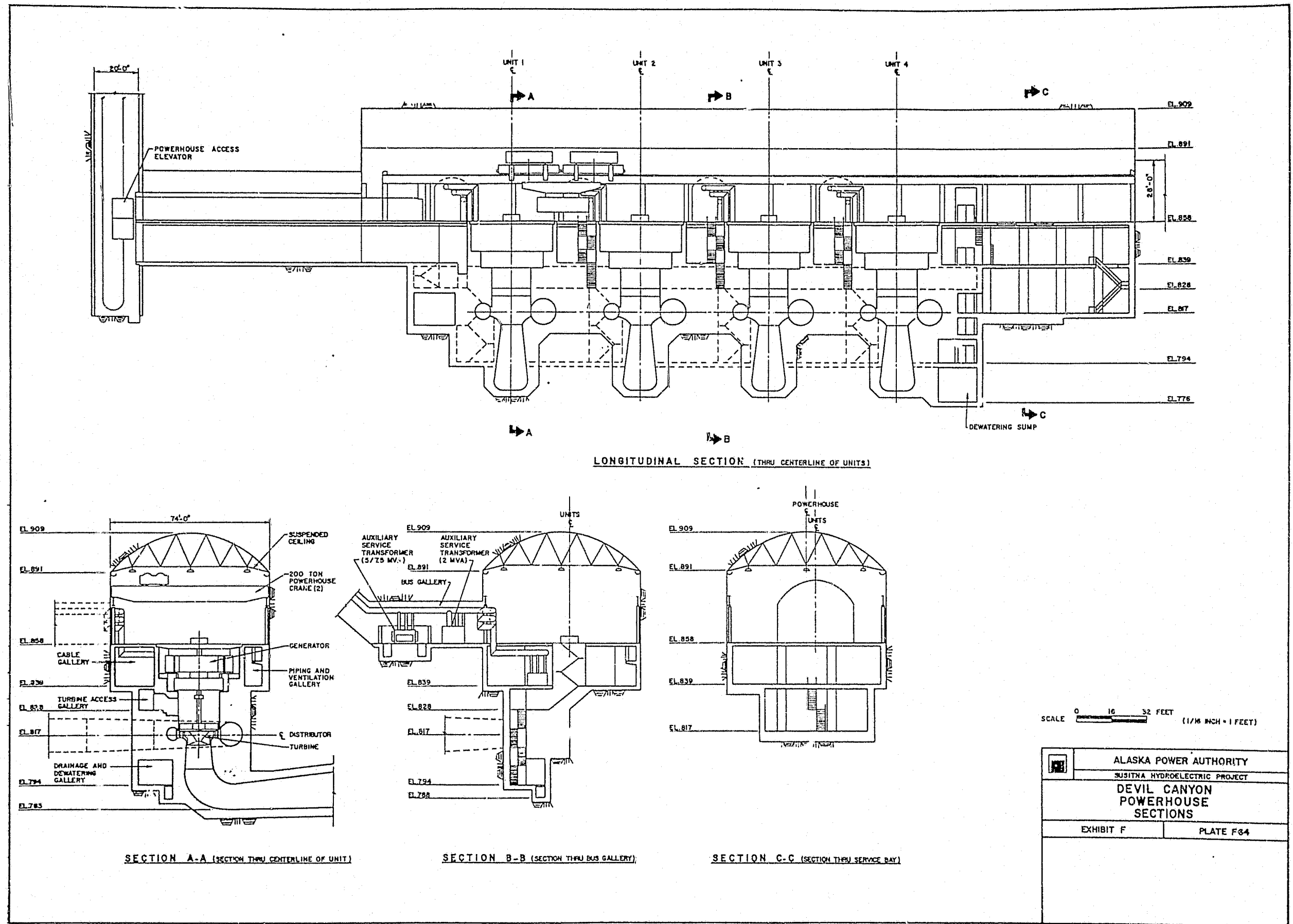
FOLD LENGTH

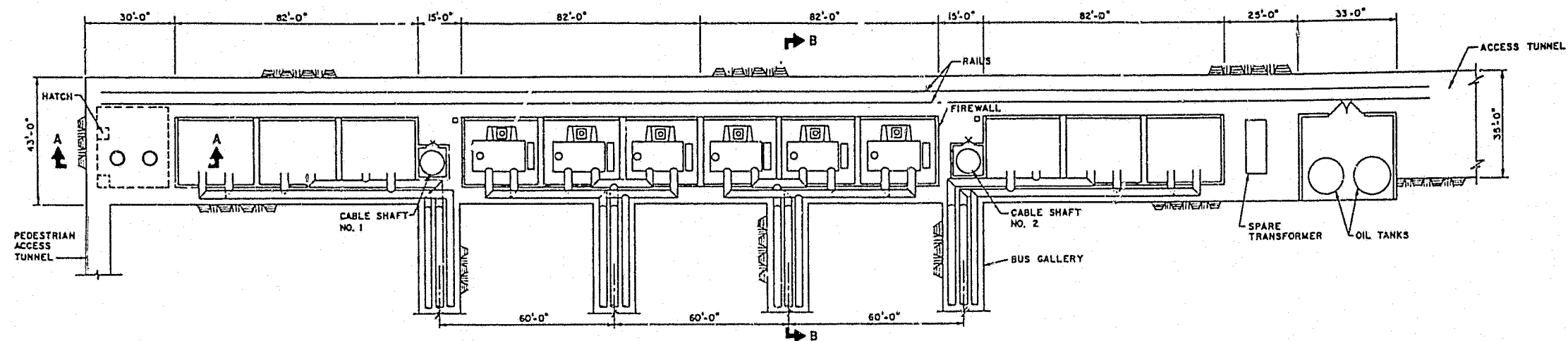
12
11
8.5
8

AUTO

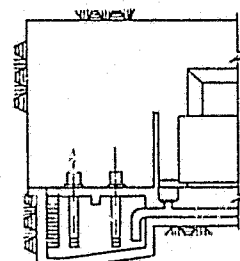
MANUAL

FEED

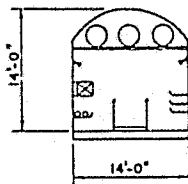




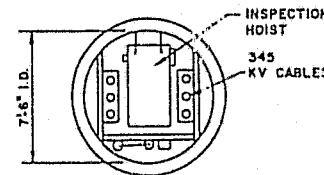
PLAN
SCALE A



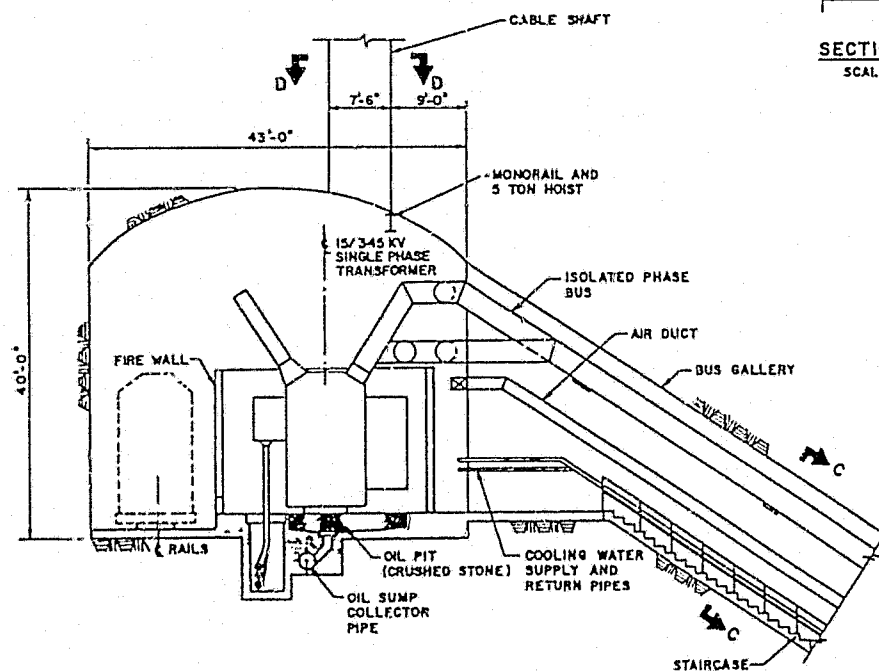
SECTION A-A
SCALE A



SECTION C-C
SCALE B



SECTION D-D
SCALE C

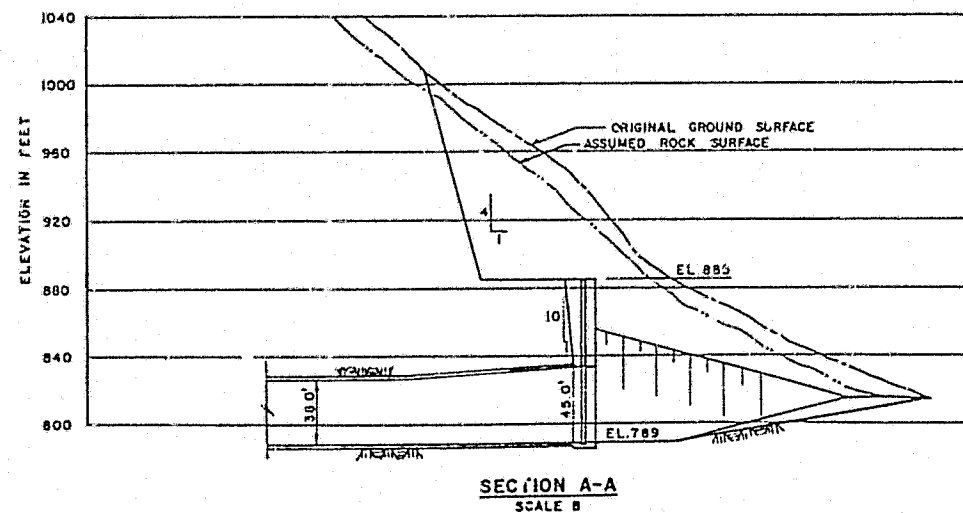
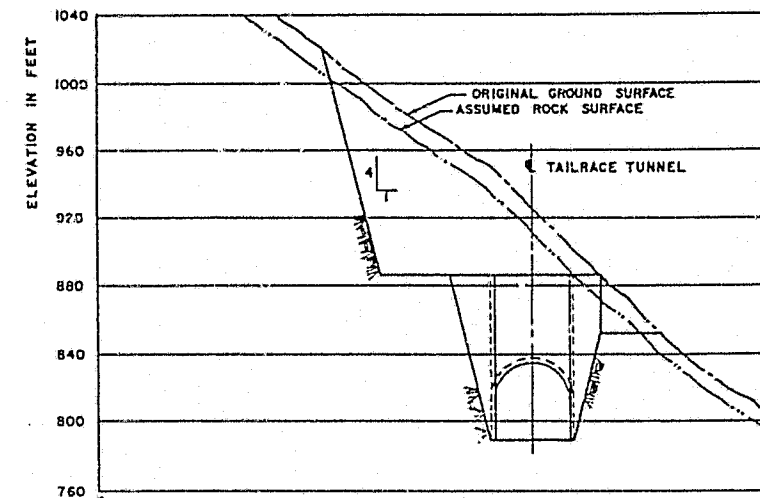
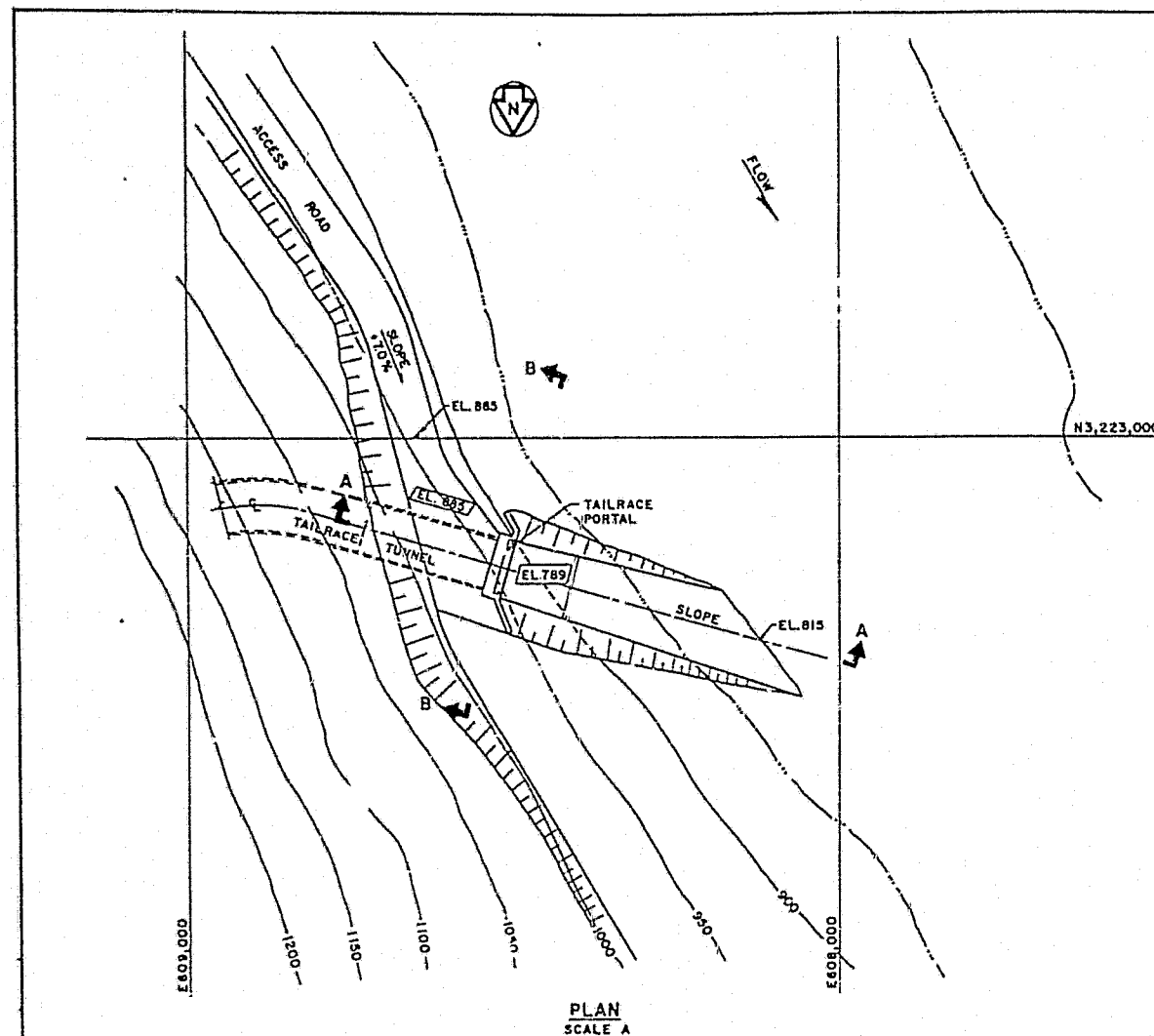


SECTION A-A
SCALE B

SCALE C 0 4 8 FEET (1/4 INCH = 1 FEET)
SCALE B 0 8 16 FEET (1/8 INCH = 1 FEET)
SCALE A 0 16 32 FEET (1/16 INCH = 1 FEET)

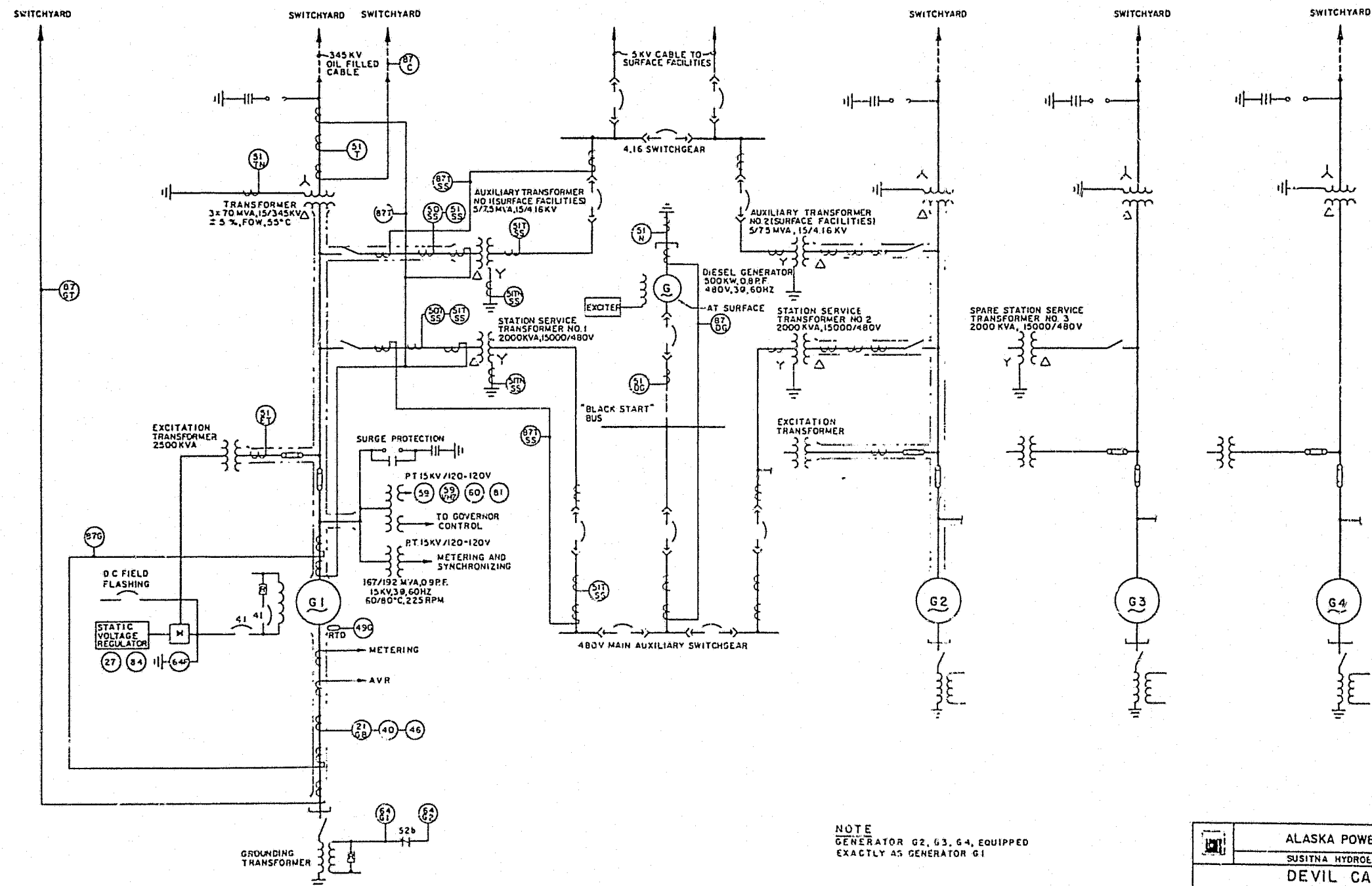
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON TRANSFORMER GALLERY PLAN AND SECTIONS	
EXHIBIT F	PLATE F65





SCALE B 0 40 80 FEET (1 INCH = 40 FEET)
SCALE A 0 50 100 FEET (1 INCH = 50 FEET)

ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON TAILRACE PORTAL PLAN AND SECTIONS	
EXHIBIT F	PLATE F67



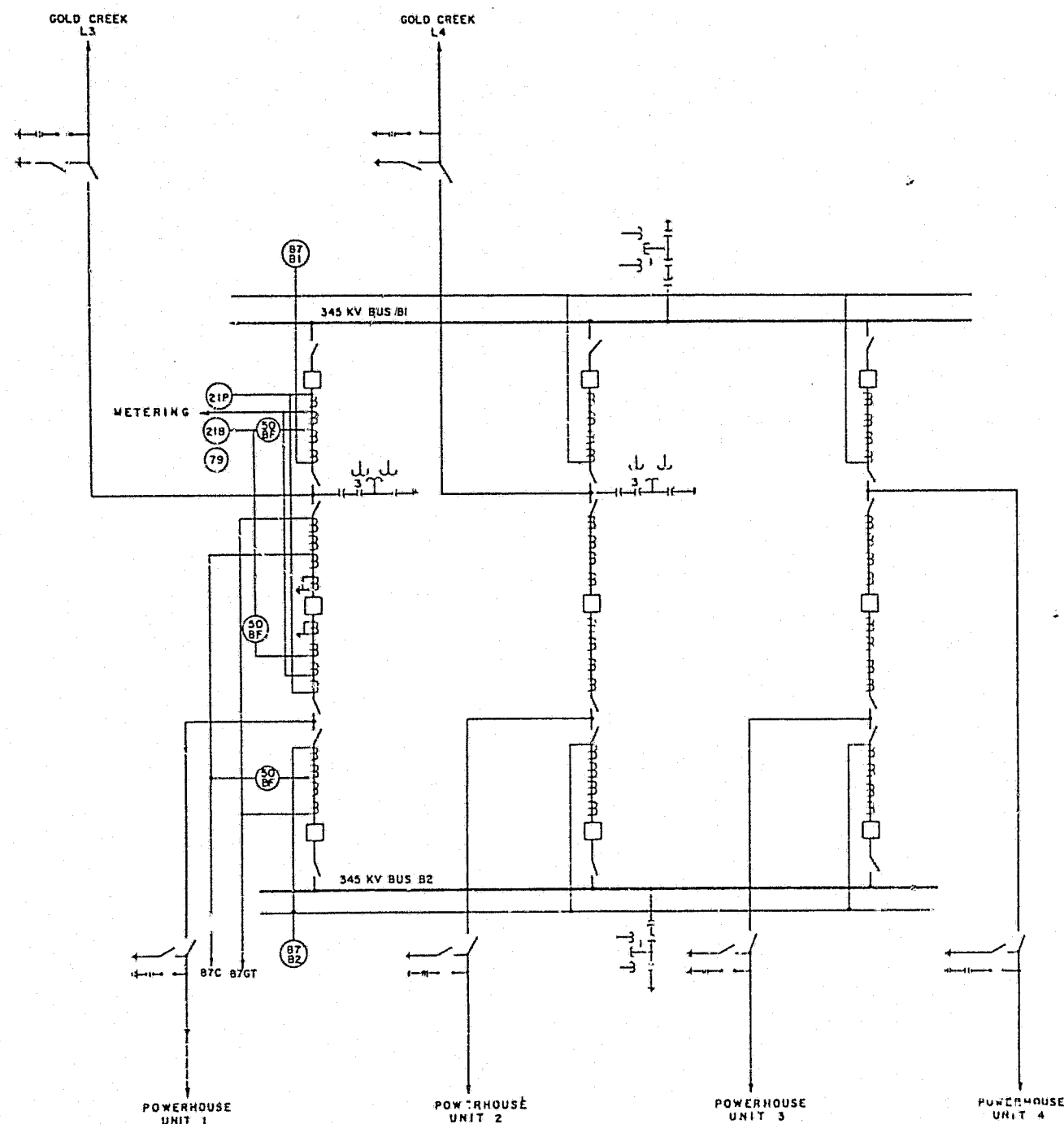
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON POWERHOUSE	
SINGLE LINE DIAGRAM	
EXHIBIT F	PLATE F68

FOLD
LENGTH12
11
8.5
8

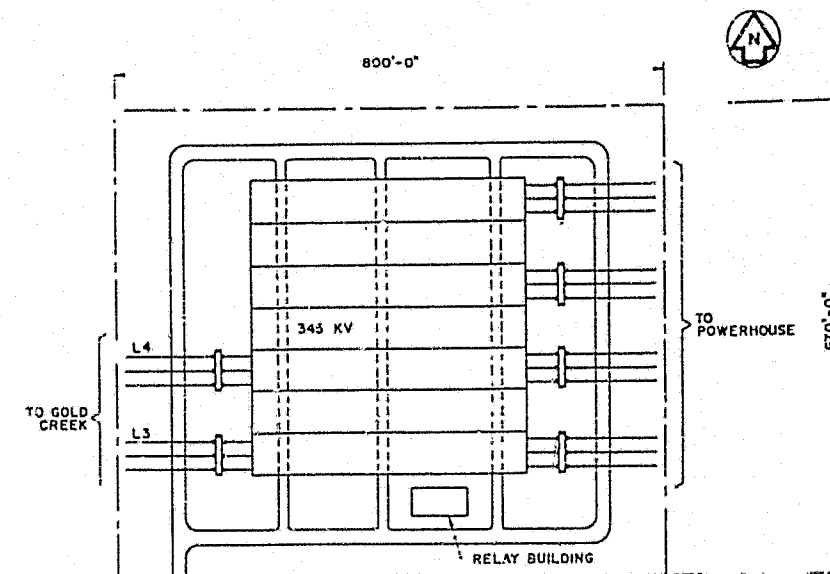
AUTO

MANUAL

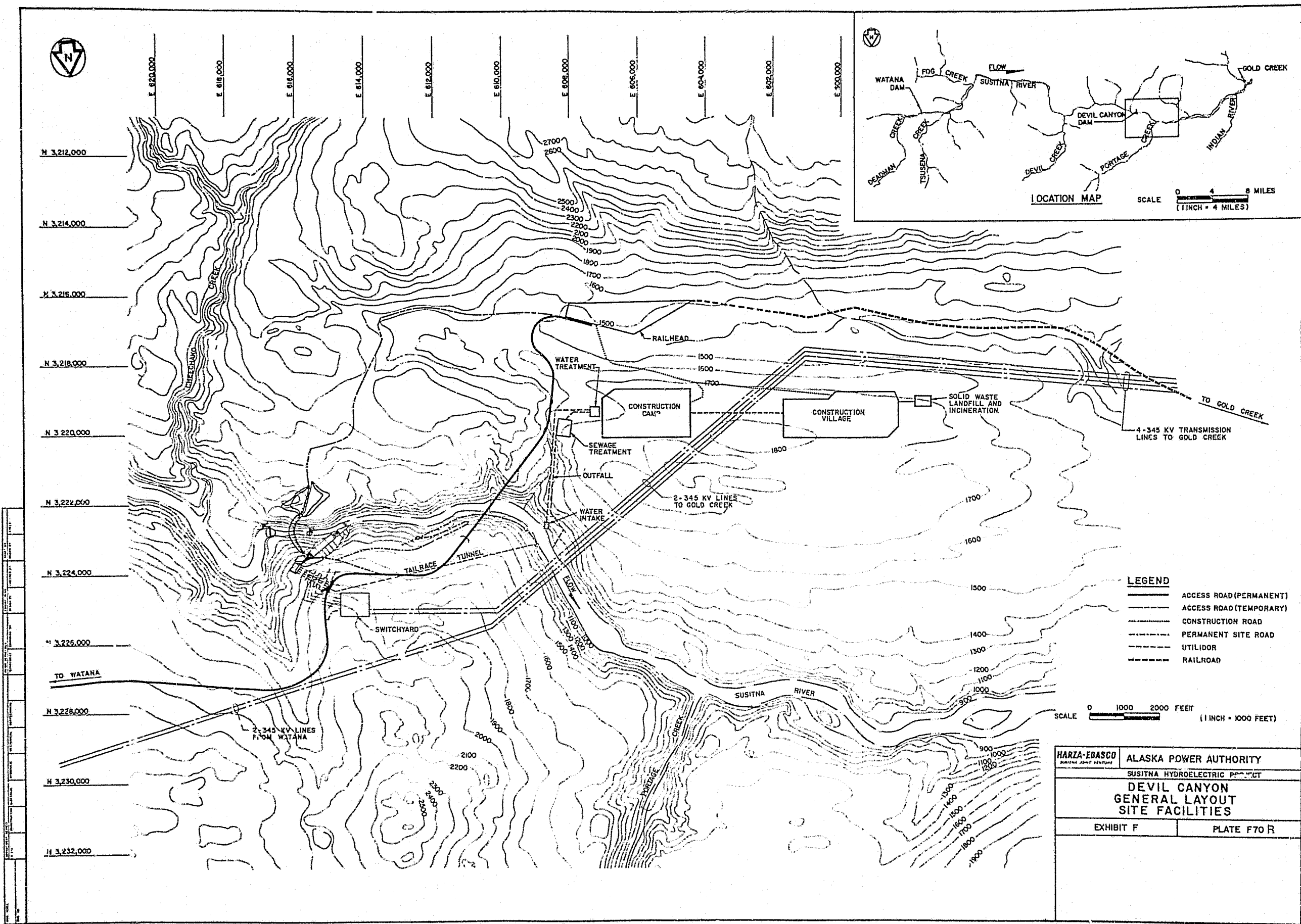
FEED

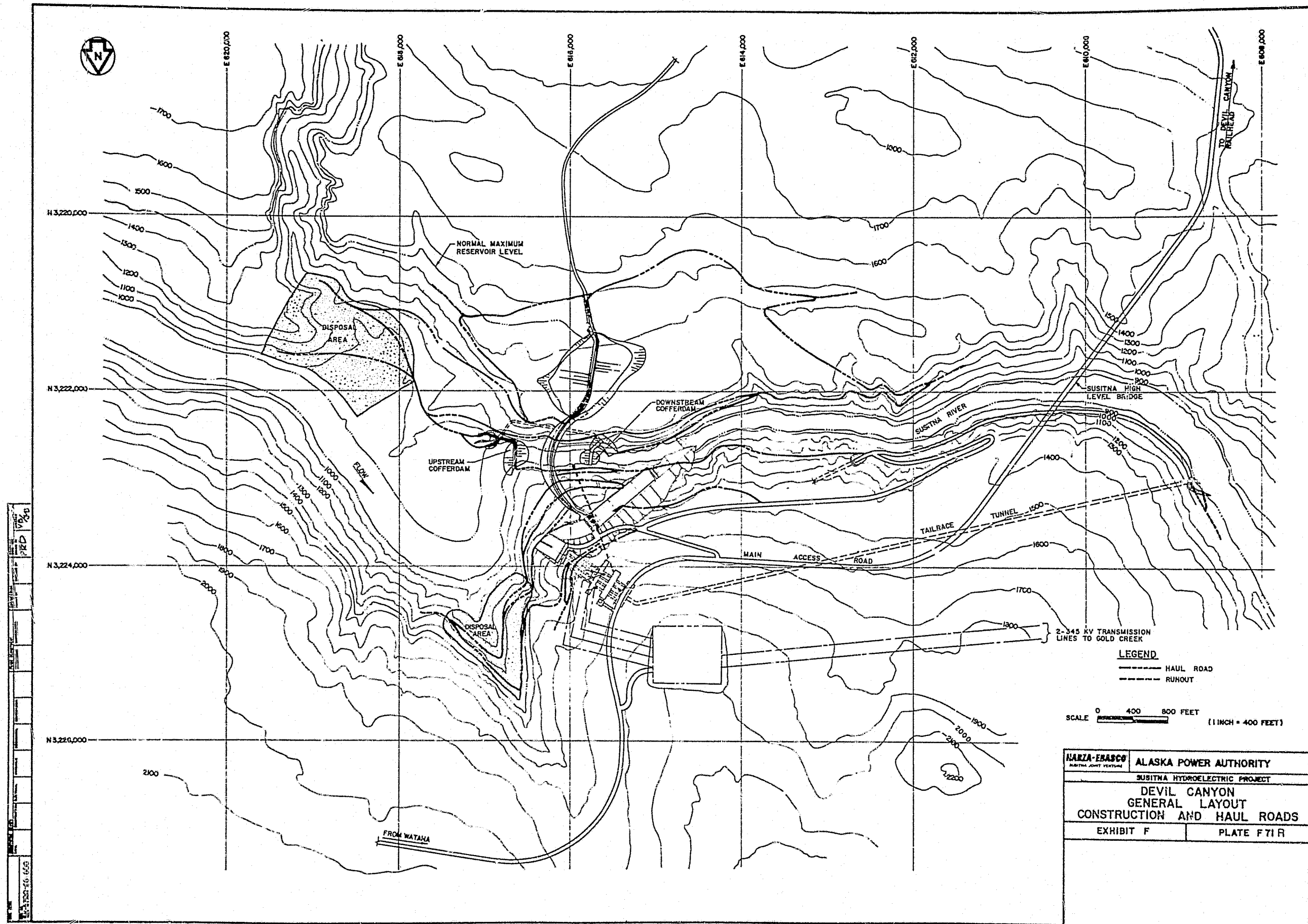


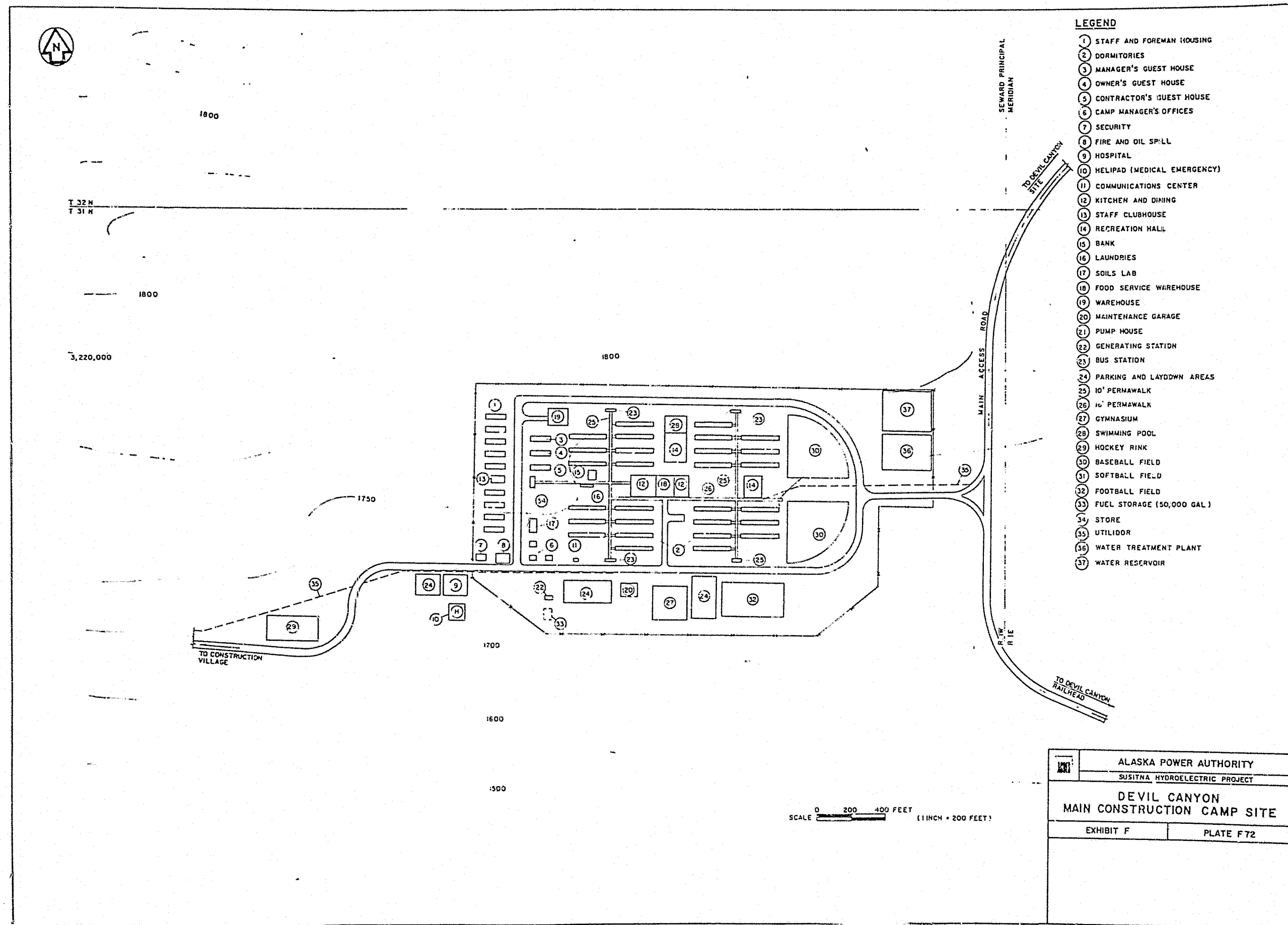
SINGLE LINE DIAGRAM

SWITCHYARD PLAN
SCALE ASCALE A 0 100 200 FEET
(1 INCH = 100 FEET)

ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON SWITCHYARD	
SINGLE LINE DIAGRAM AND PLAN	
EXHIBIT F	PLATE F69









LEGEND

- TEMPORARY HOUSING/UTILITIES FURNISHED BY OWNER.
- PARKING AREAS

VILLAGE HOUSING - 320 UNITS

- FAMILY HOUSING - 2 B.R. - 16 UNITS (24' x 50')
- FAMILY HOUSING - 3 B.R. - 16 UNITS (24' x 50')
- FAMILY HOUSING - 4 B.R. - 16 UNITS (28' x 50')
- FAMILY HOUSING - 3 B.R. - 72 UNITS (14' x 60')
- FAMILY HOUSING - 3 B.R. - 200 UNITS (14' x 60')
- (06) SCHOOL - 30' x 35' (12 UNITS)
- (07) GYM - 100' x 100'
- (08) SWIMMING POOL - 100' x 100'
- (09) RECREATION CENTER 80' x 100'
- (10) STORE - 100' x 160'
- (11) FIRE STATION - 30' x 40'
- (12) GENERATING STATION - 20' x 30' (2 UNITS)
- (13) UTILIDOR
- (14) SEWER PUMPING STATION - 50' x 60'

3,220,000

1700

1750

1800

1750

1700

1600

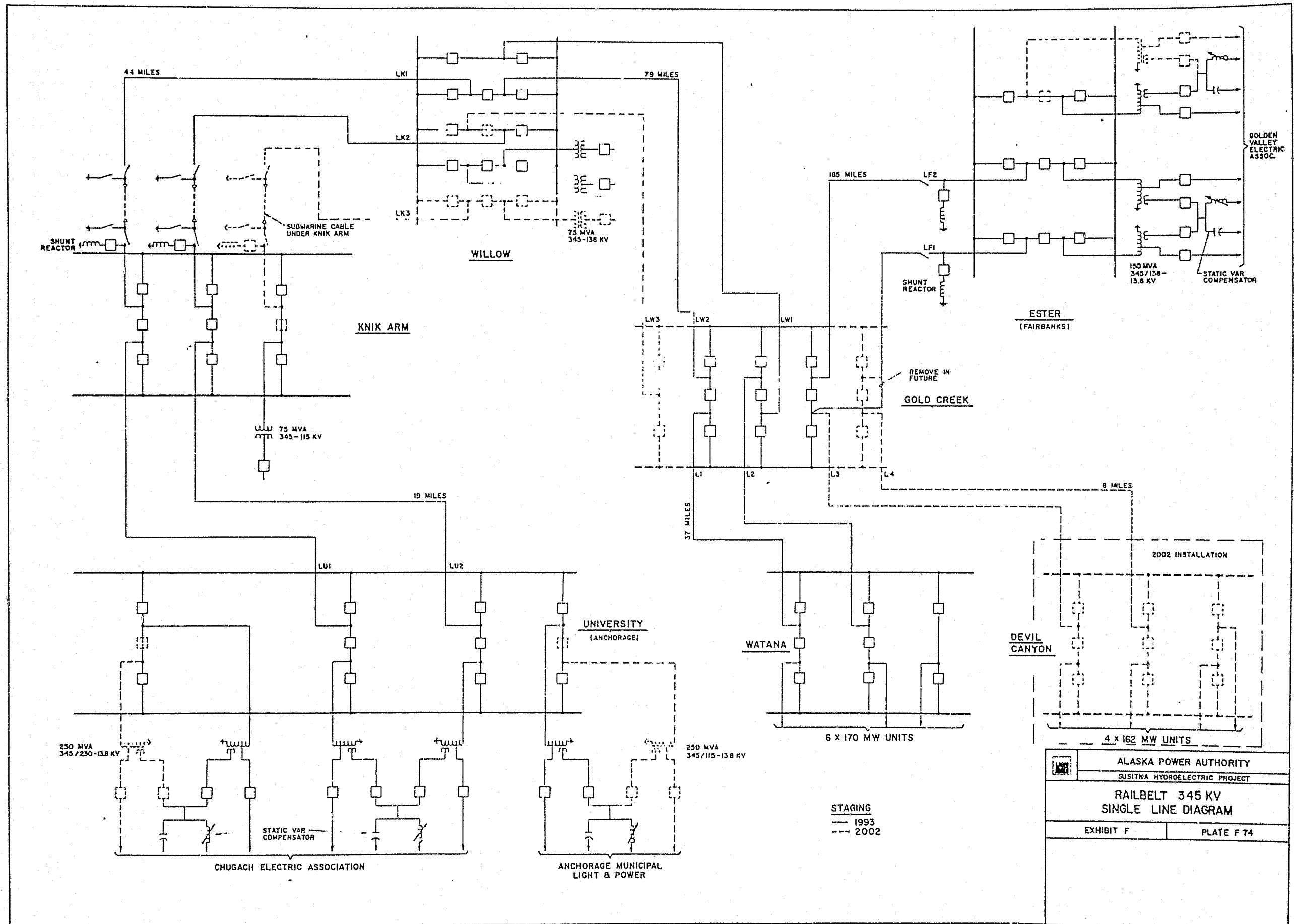
1500

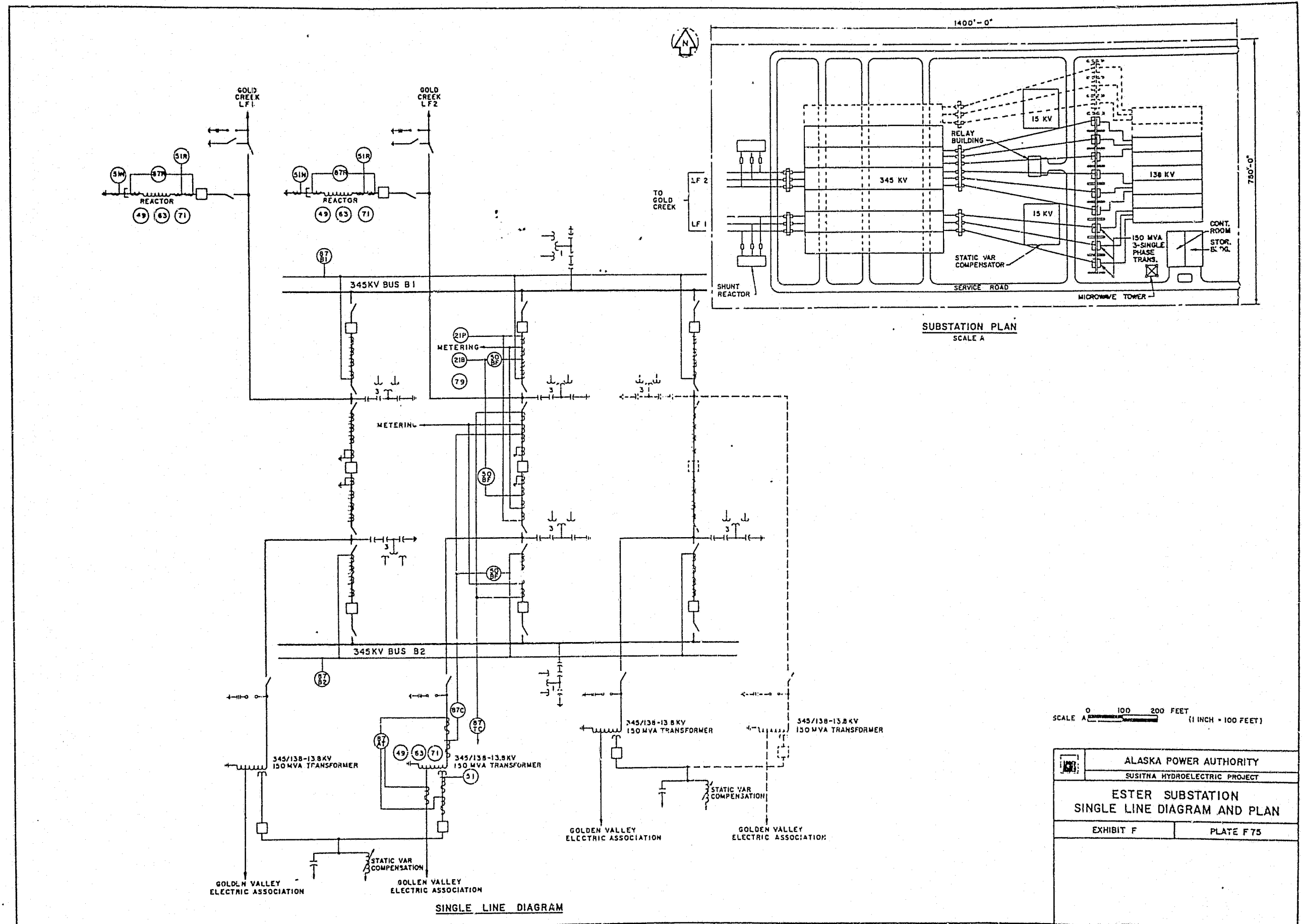
TO CONSTRUCTION CAMP
AND DEVIL CANYON SITE

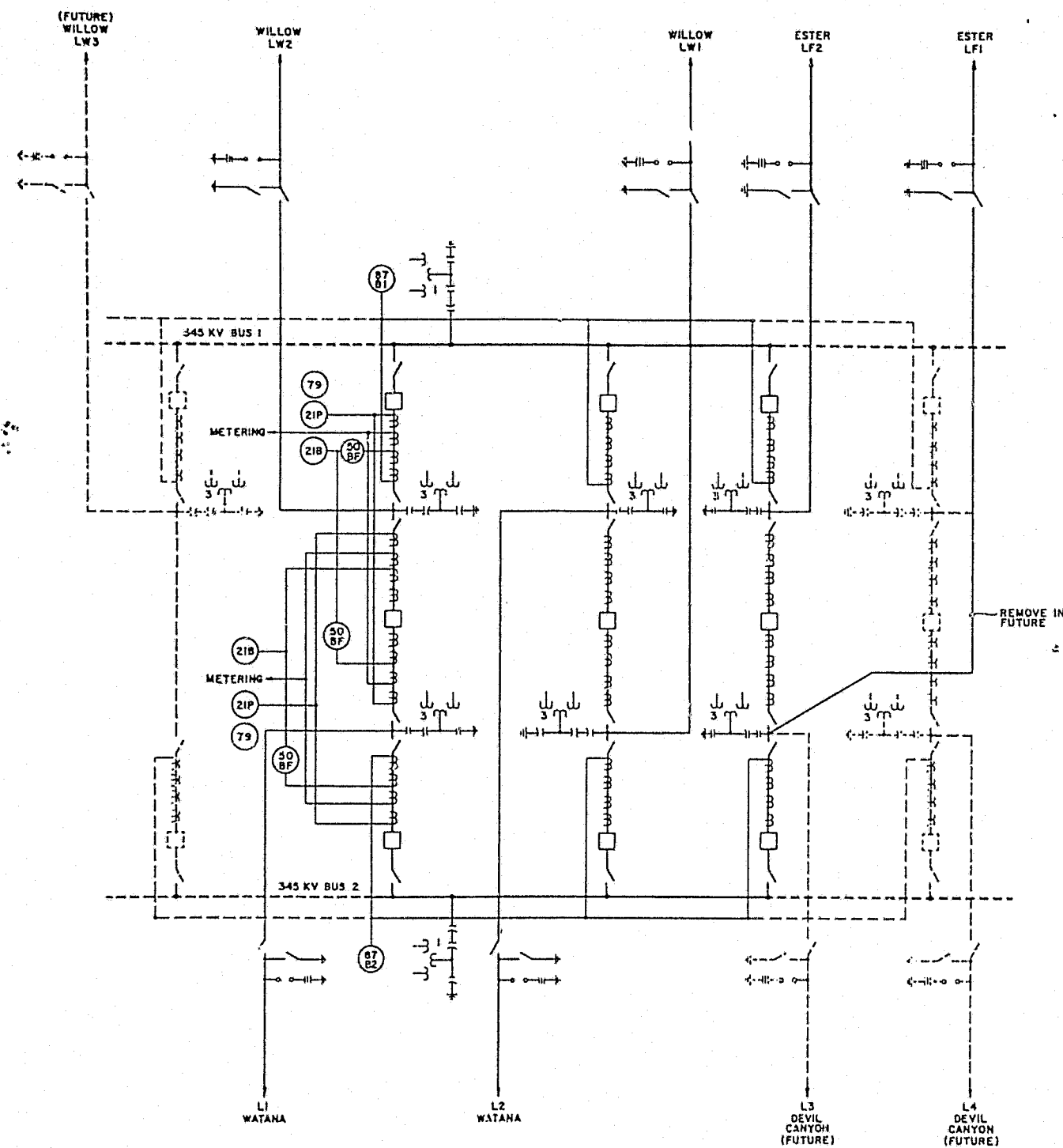
6,000,000

SCALE 0 200 400 FEET (1 INCH = 200 FEET)

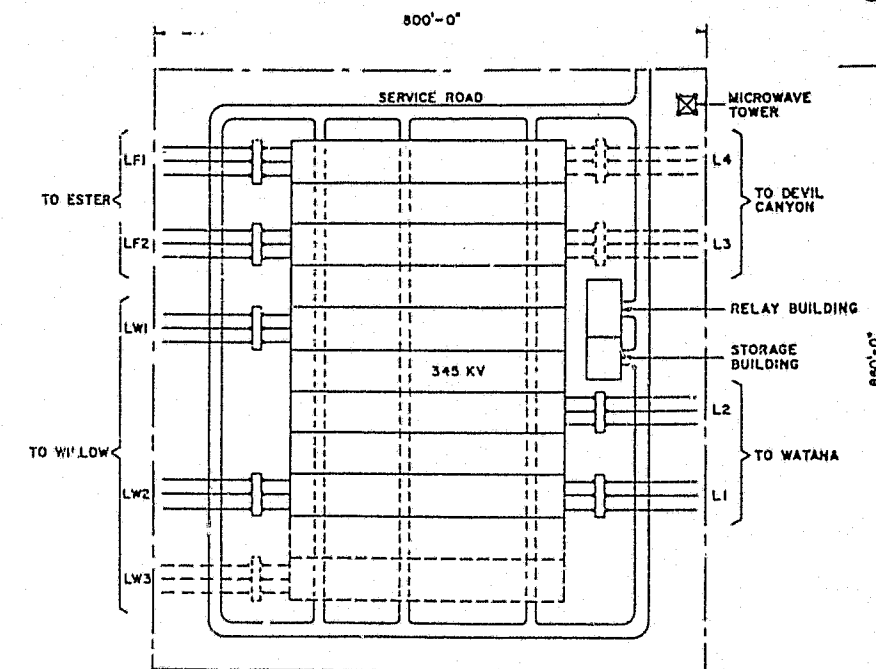
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON TEMPORARY VILLAGE	
EXHIBIT F	PLATE F 73



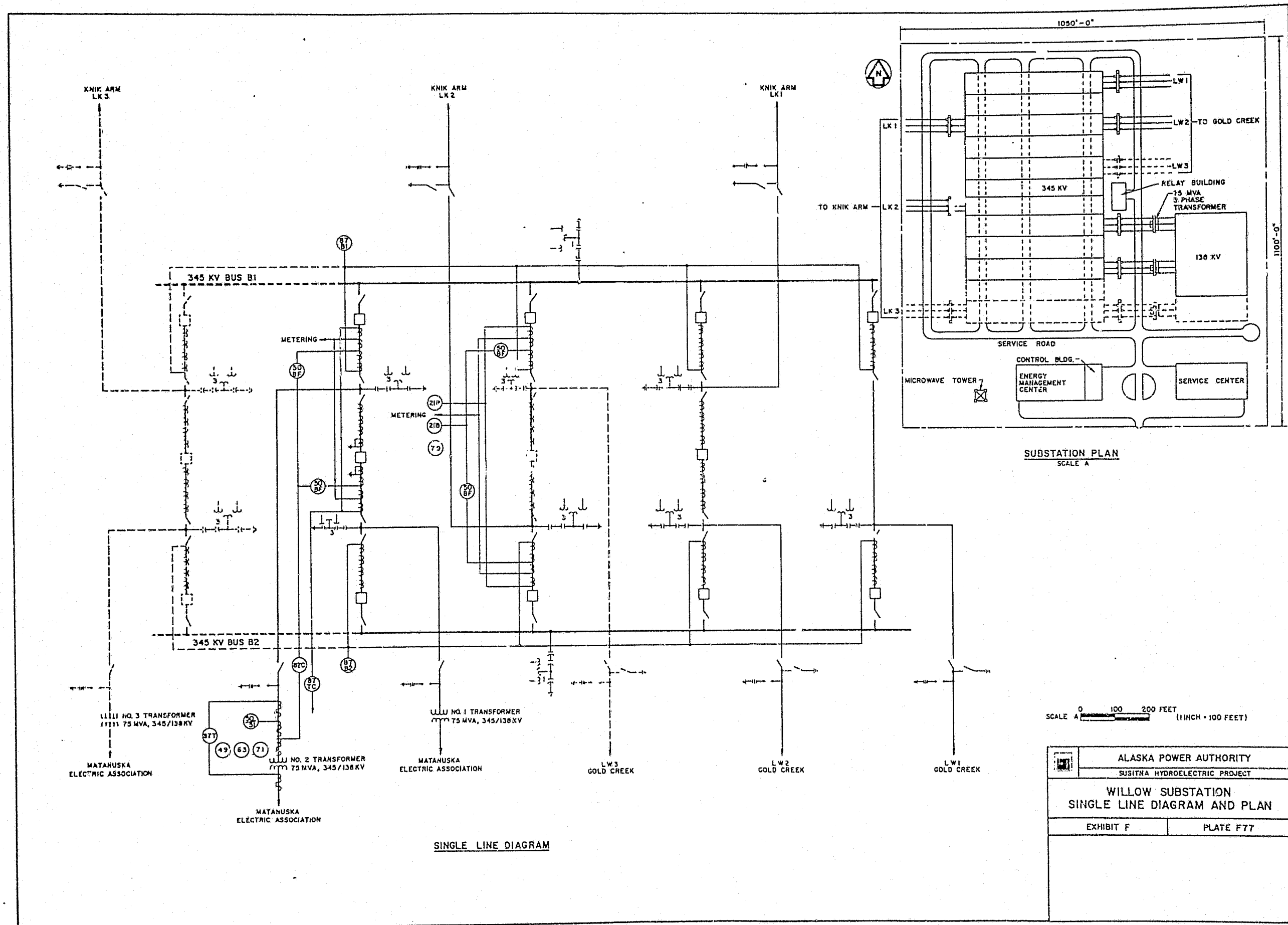


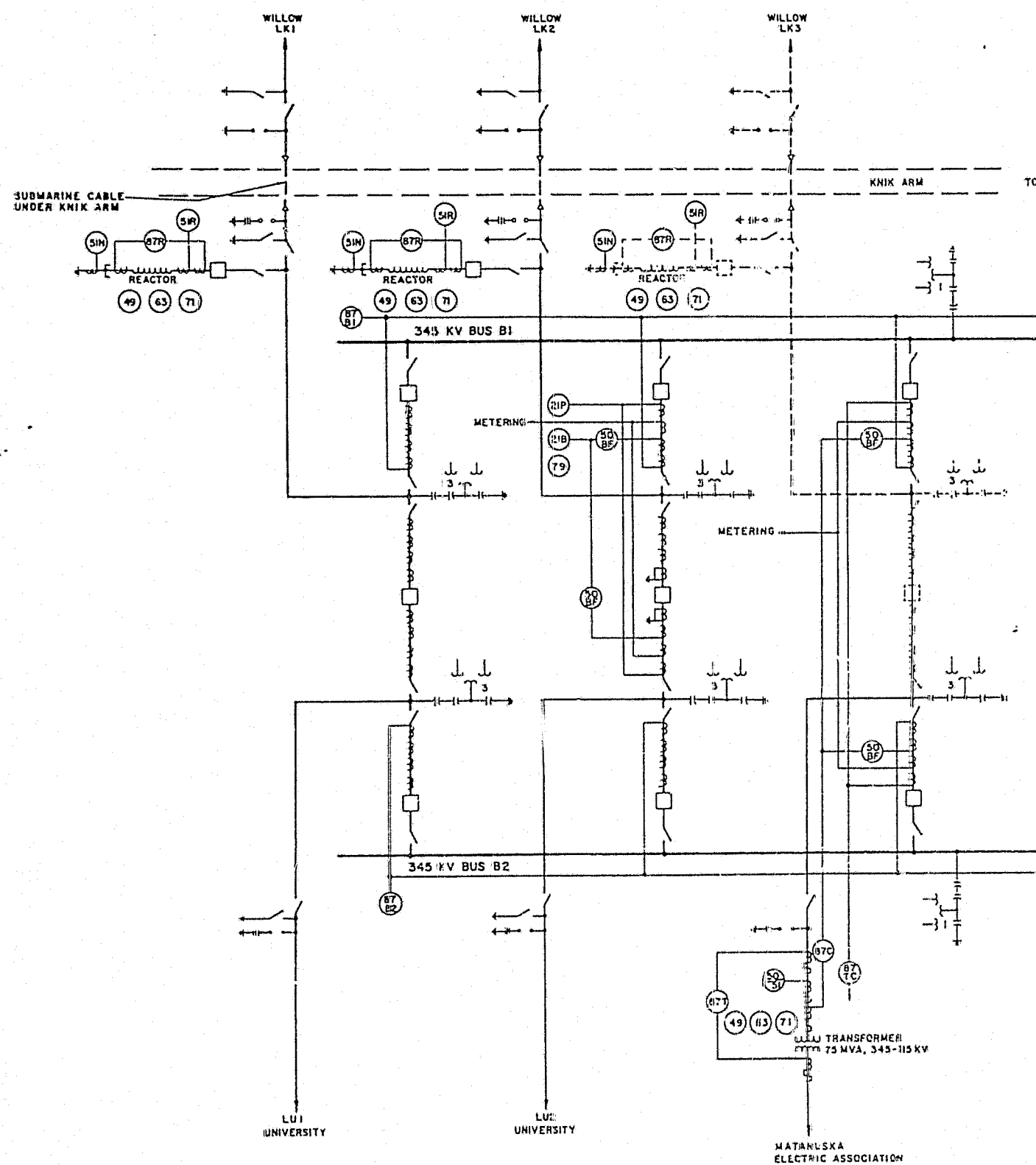


SINGLE LINE DIAGRAM

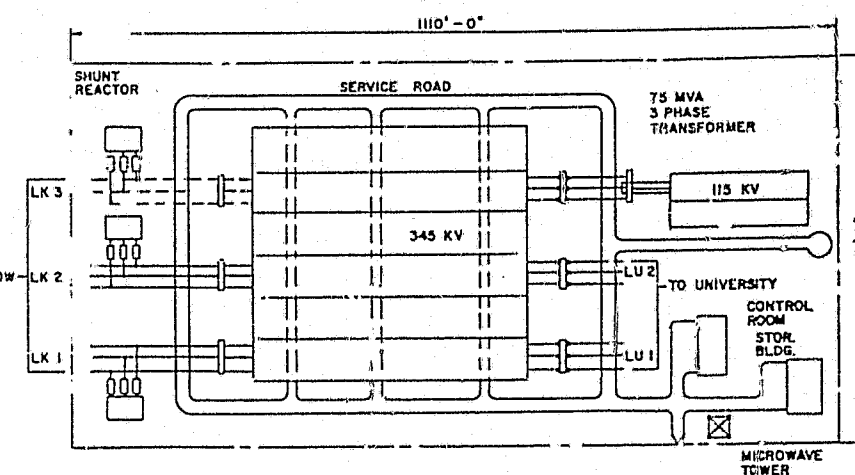
SWITCHYARD PLAN
SCALE ASCALE A 0 100 200 FEET
(1 INCH = 100 FEET)

ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
GOLD CREEK SWITCHYARD	
SINGLE LINE DIAGRAM AND PLAN	
EXHIBIT F	PLATE F 76





SINGLE LINE DIAGRAM



SUBSTATION PLAN
SCALE A

0 100 200 FEET
SCALE A (1 INCH = 100 FEET)

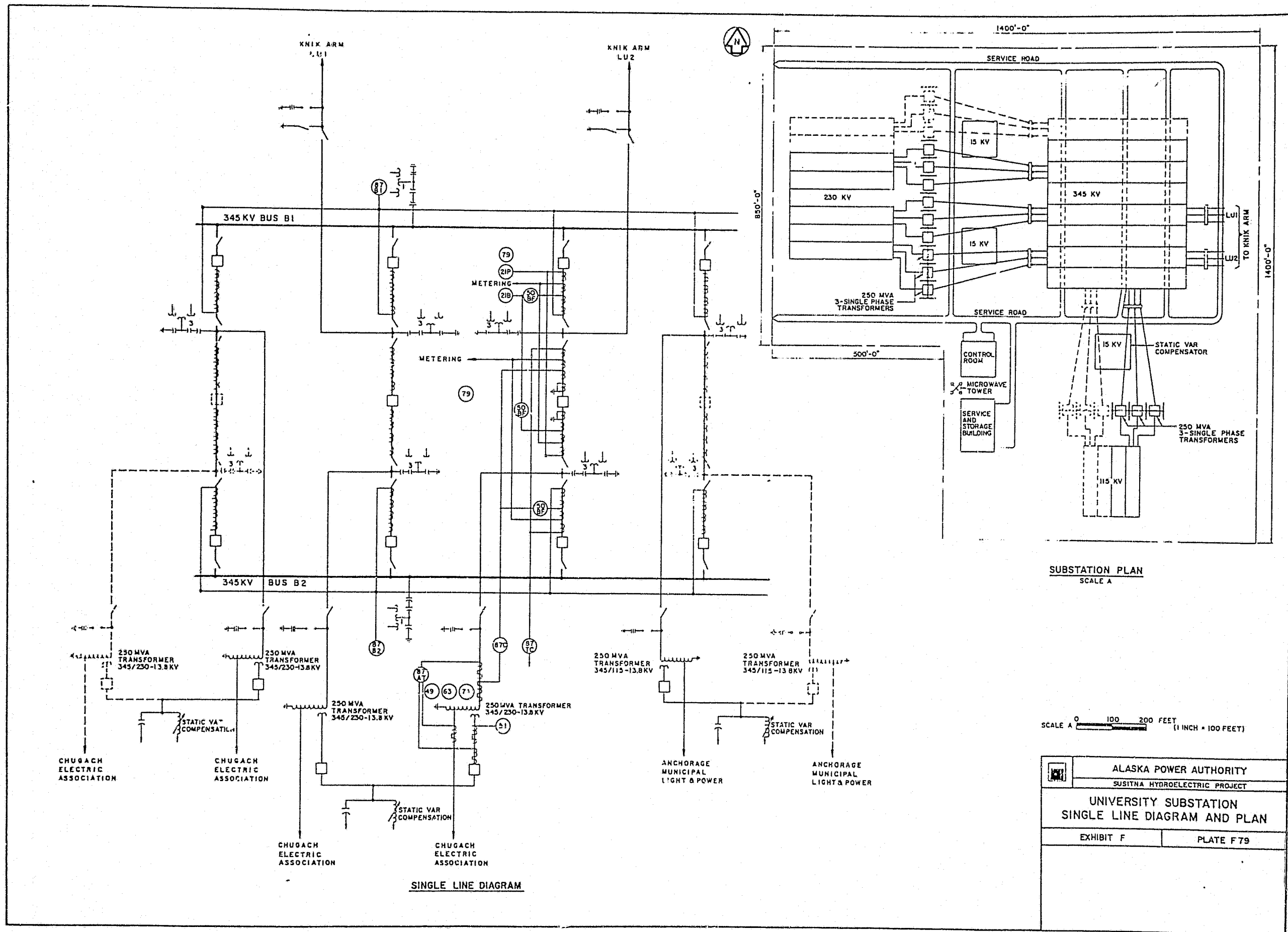
	ALASKA POWER AUTHORITY
	SJSITNA HYDROELECTRIC PROJECT
KNIK ARM SUBSTATION SINGLE LINE DIAGRAM AND PLAN	
EXHIBIT F	PLATE F 78

FOLD
LENGT

AUTO

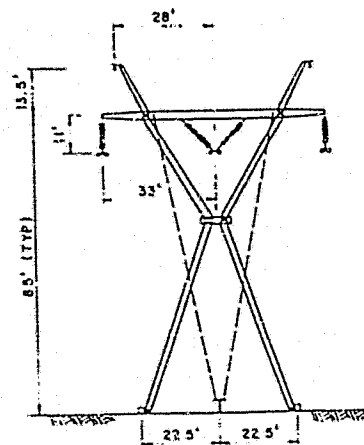
MANUA

FEED

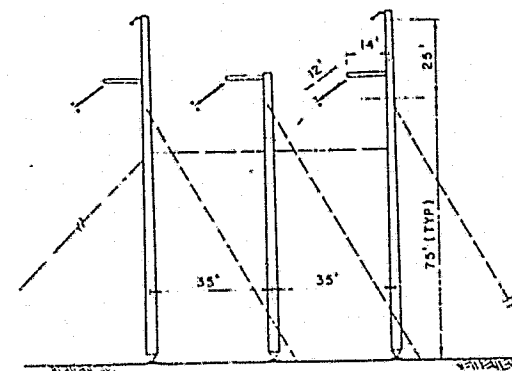


NOTES:

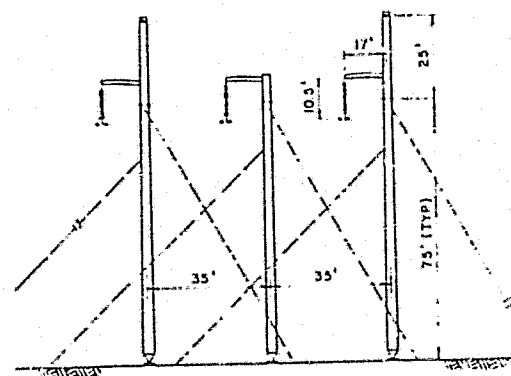
1. BASED ON PROPOSED STRUCTURES FOR INTERTIE PROJECT.
2. AVERAGE CONDUCTOR SAG - 37 FEET.
3. AVERAGE TOWER SPACING - 1400 FEET.



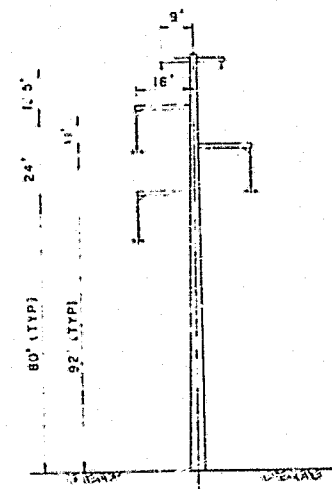
345 kV TANGENT OR LIGHT ANGLE STRUCTURE



345 kV MEDIUM ANGLE (8° - 30°) STRUCTURE



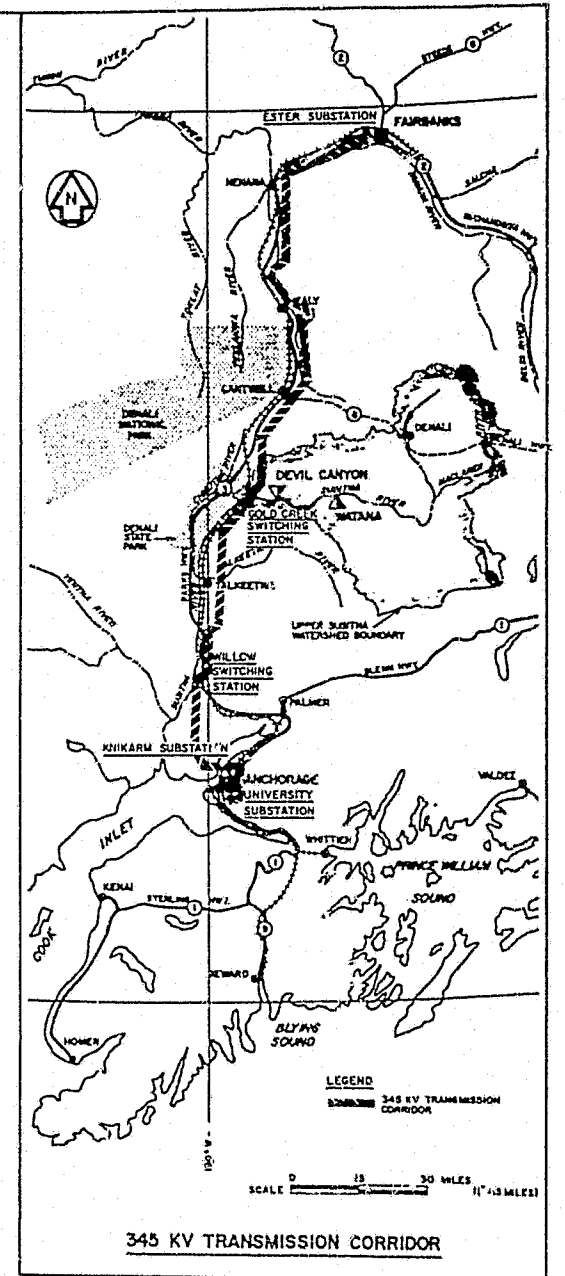
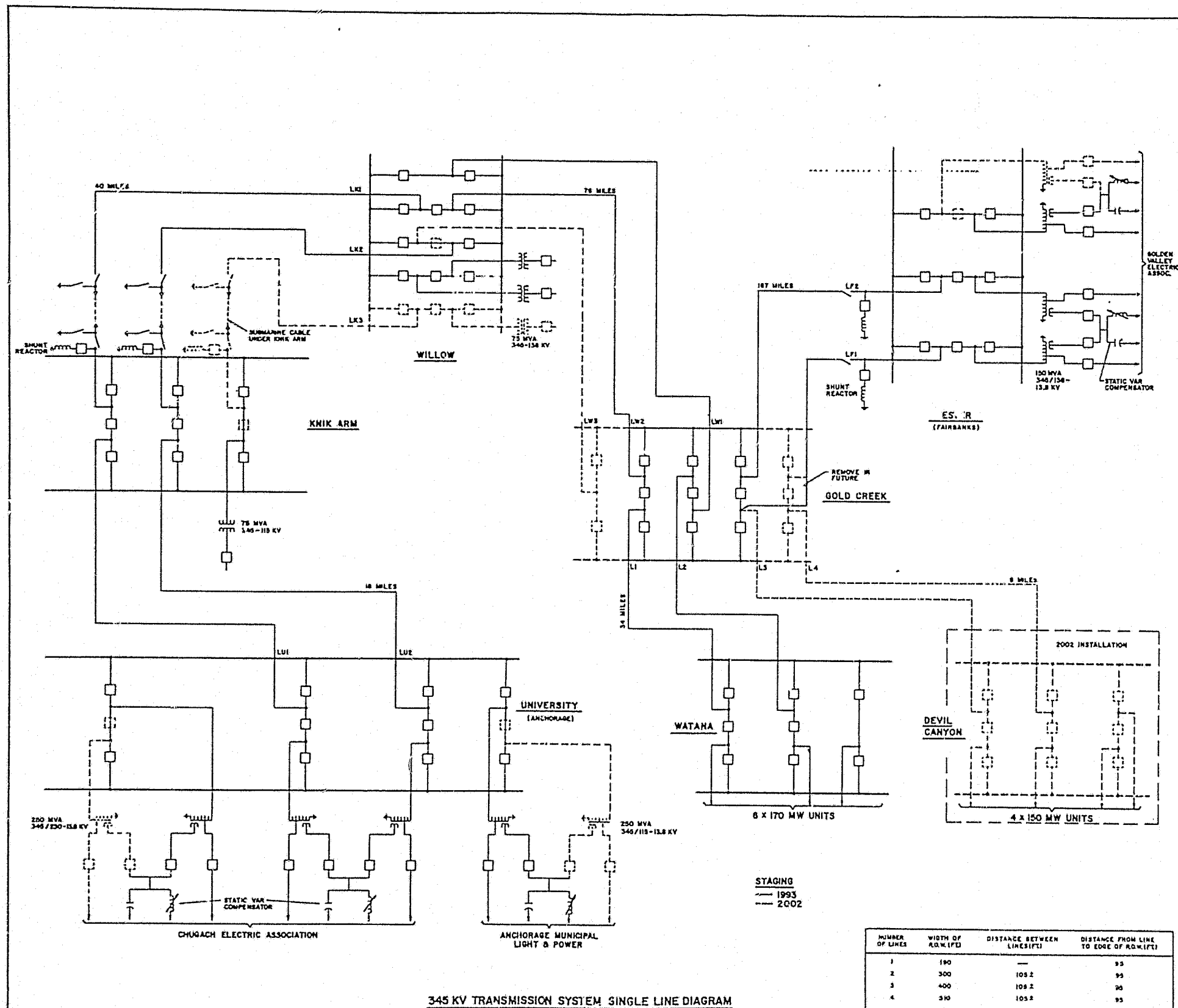
345 kV HEAVY ANGLE (8° - 50°) DEAD END STRUCTURE



345 kV SINGLE CIRCUIT TANGENT POLE

SCALE 0 20 40 FEET (1 INCH = 20 FEET)

ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
TYPICAL TRANSMISSION LINE STRUCTURES	
EXHIBIT F	PLATE F80



ALASKA POWER AUTHORITY	
JUSITNA HYDROELECTRIC PROJECT	
345 KV SYSTEM SINGLE LINE DIAGRAM AND TRANSMISSION CORRIDOR	
EXHIBIT F	PLATE F-81

NOTE:
1. ESTIMATED GROUND RESISTIVITY FOR DESIGN IS 50 OHMS.