

3439



BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION
APPLICATION FOR LICENSE FOR MAJOR PROJECT
SUSITNA HYDROELECTRIC PROJECT

VOLUME 15

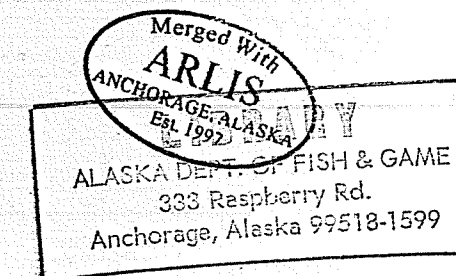
D R A F T

EXHIBIT F
PROJECT DESIGN PLATES

HARZA-EBASCO
SUSITNA JOINT VENTURE

OVR-HD
TK
1425
.S8
F471
no. 3439

Alaska Power Authority

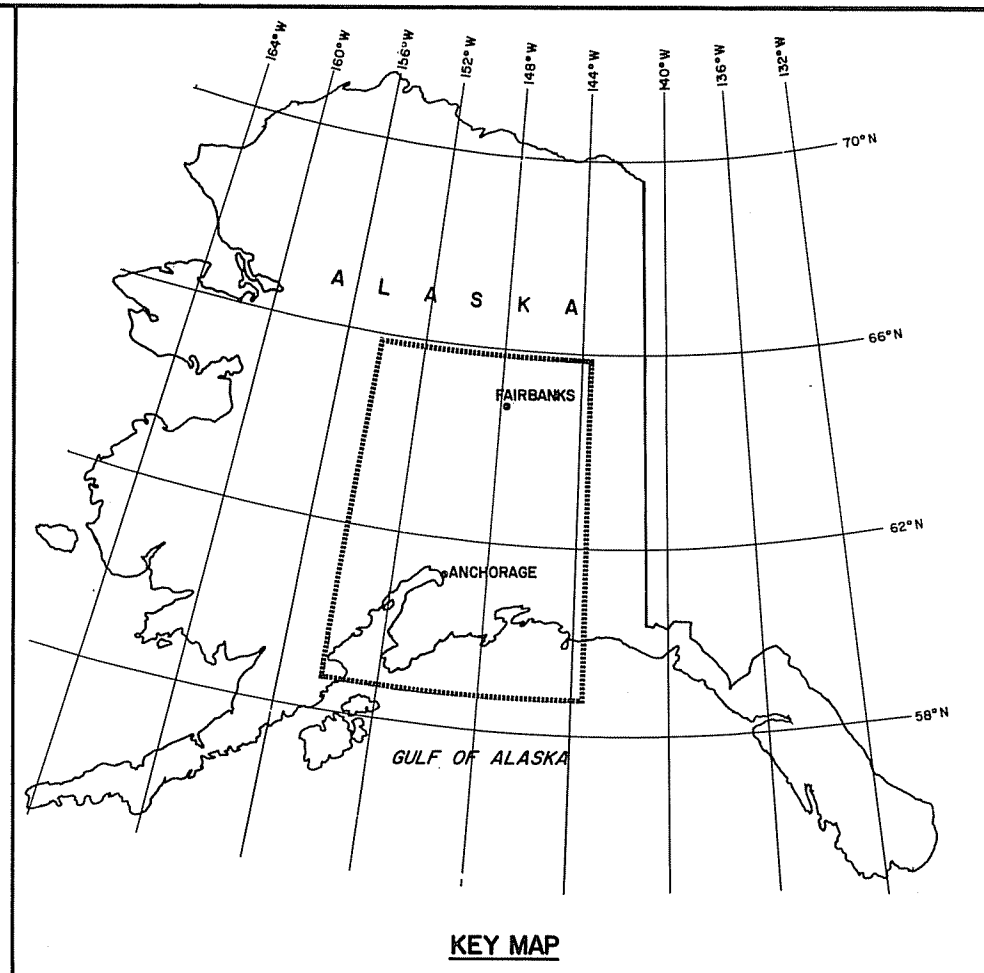
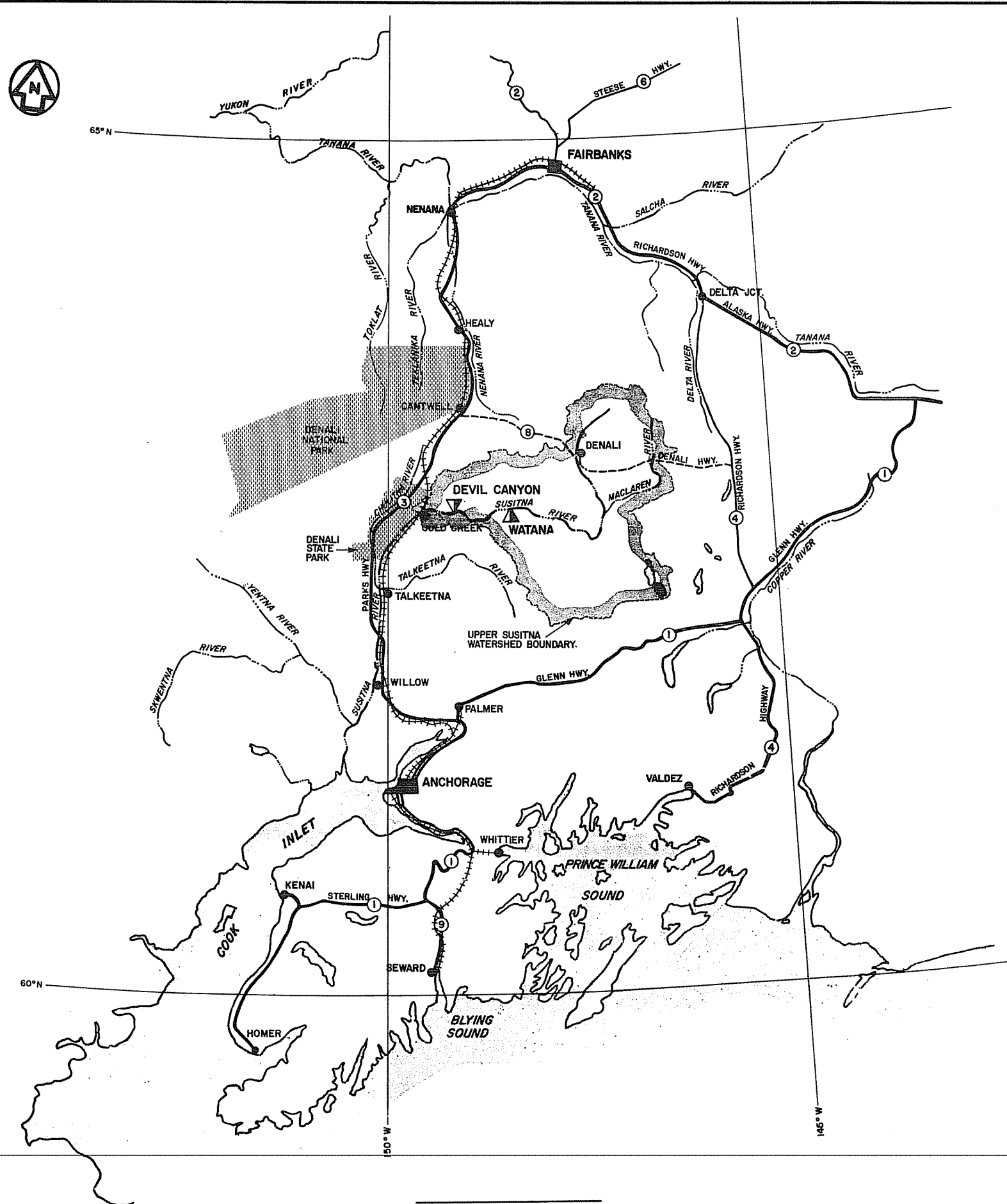


ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
PLATE INDEX

OUR-HD
TK
1425
.58
F471
no.3439

GENERAL		STAGE II (DEVIL CANYON)		STAGE III (WATANA)	
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		F63	POWERHOUSE - PLANS		
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		F73	CONSTRUCTION VILLAGE		

GENERAL



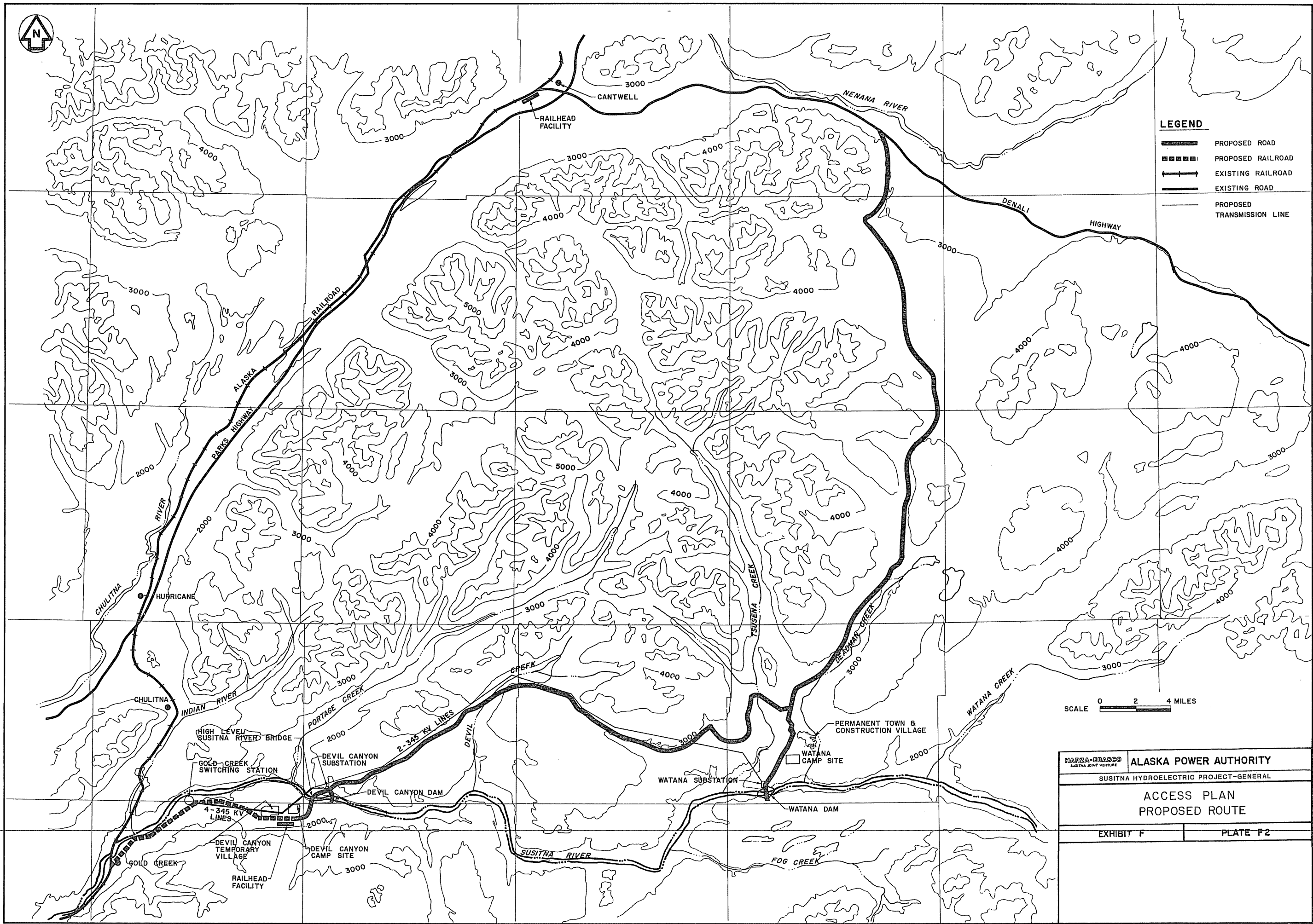
LEGEND

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

SCALE 0 20 40 MILES

MARZA-BEASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-GENERAL		
RAILBELT AREA		
EXHIBIT F		PLATE FI

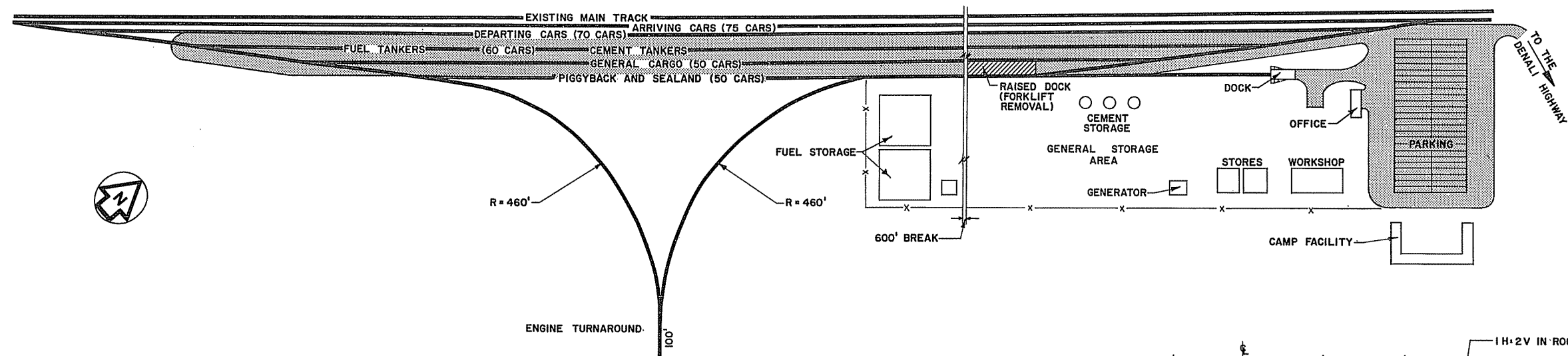
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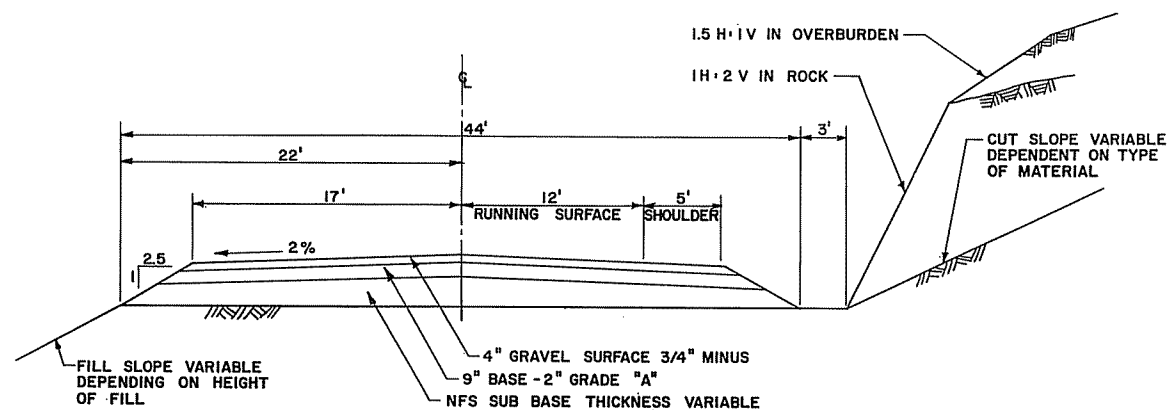
- LEGEND**
- PROPOSED ROAD
 - PROPOSED RAILROAD
 - EXISTING RAILROAD
 - EXISTING ROAD
 - PROPOSED TRANSMISSION LINE

SCALE 0 2 4 MILES

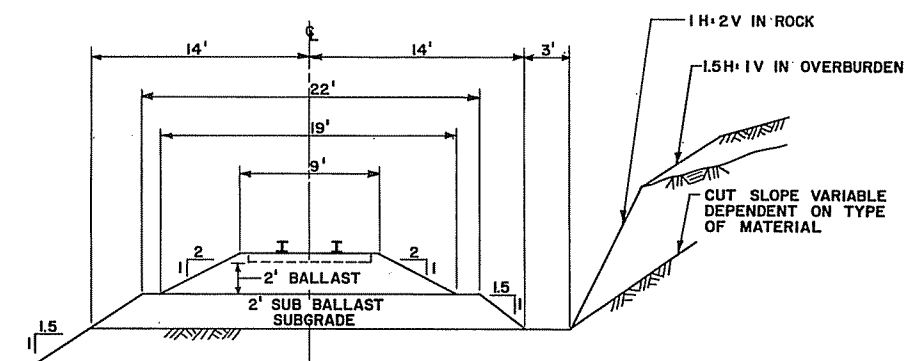
HARZA-EDASCO SUSITNA JOINT VENTURE		ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-GENERAL			
ACCESS PLAN PROPOSED ROUTE			
EXHIBIT F		PLATE F2	



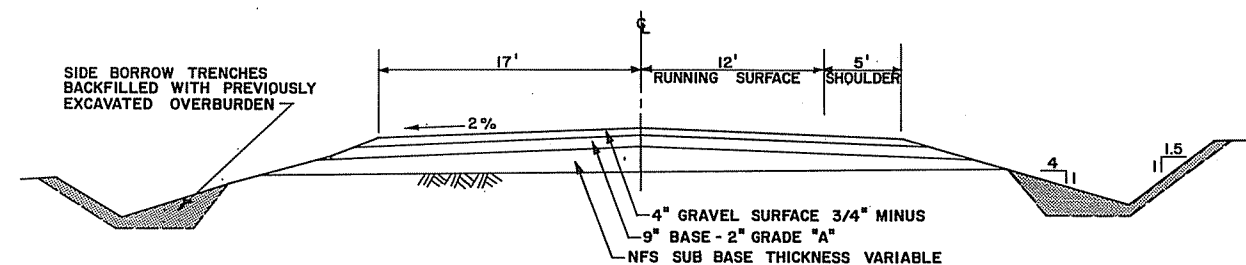
RAILHEAD FACILITY AT CANTWELL - PLAN
SCALE A



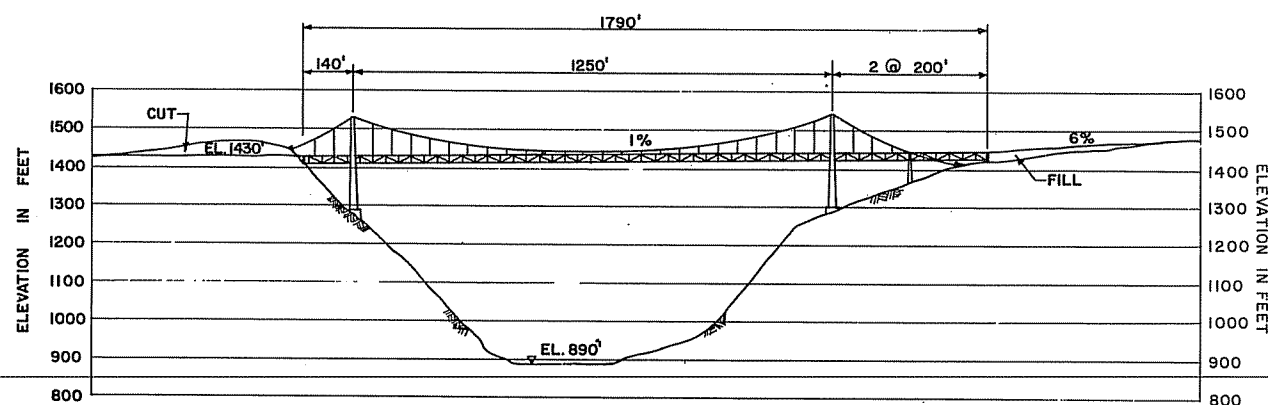
TYPICAL 'SIDEHILL CUT' SECTION
SCALE B



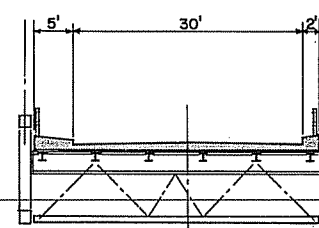
TYPICAL RAILROAD CROSS SECTION
SCALE B



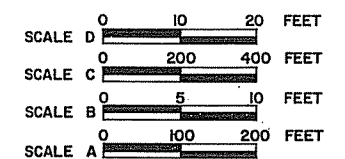
TYPICAL 'SIDE BORROW' SECTION
SCALE B



HIGH LEVEL SUSITNA RIVER BRIDGE
SCALE C

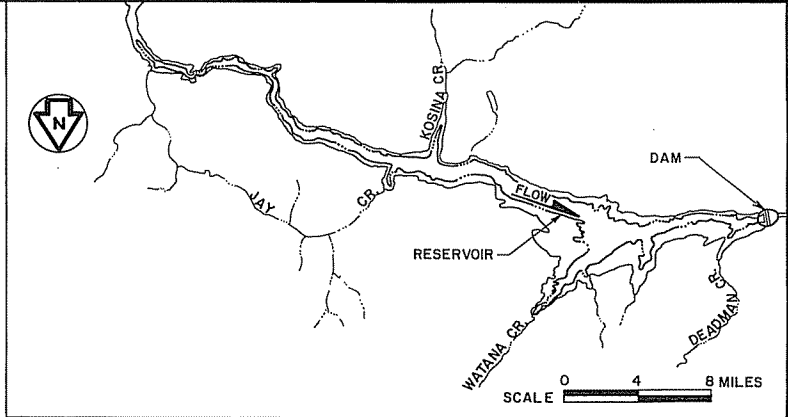
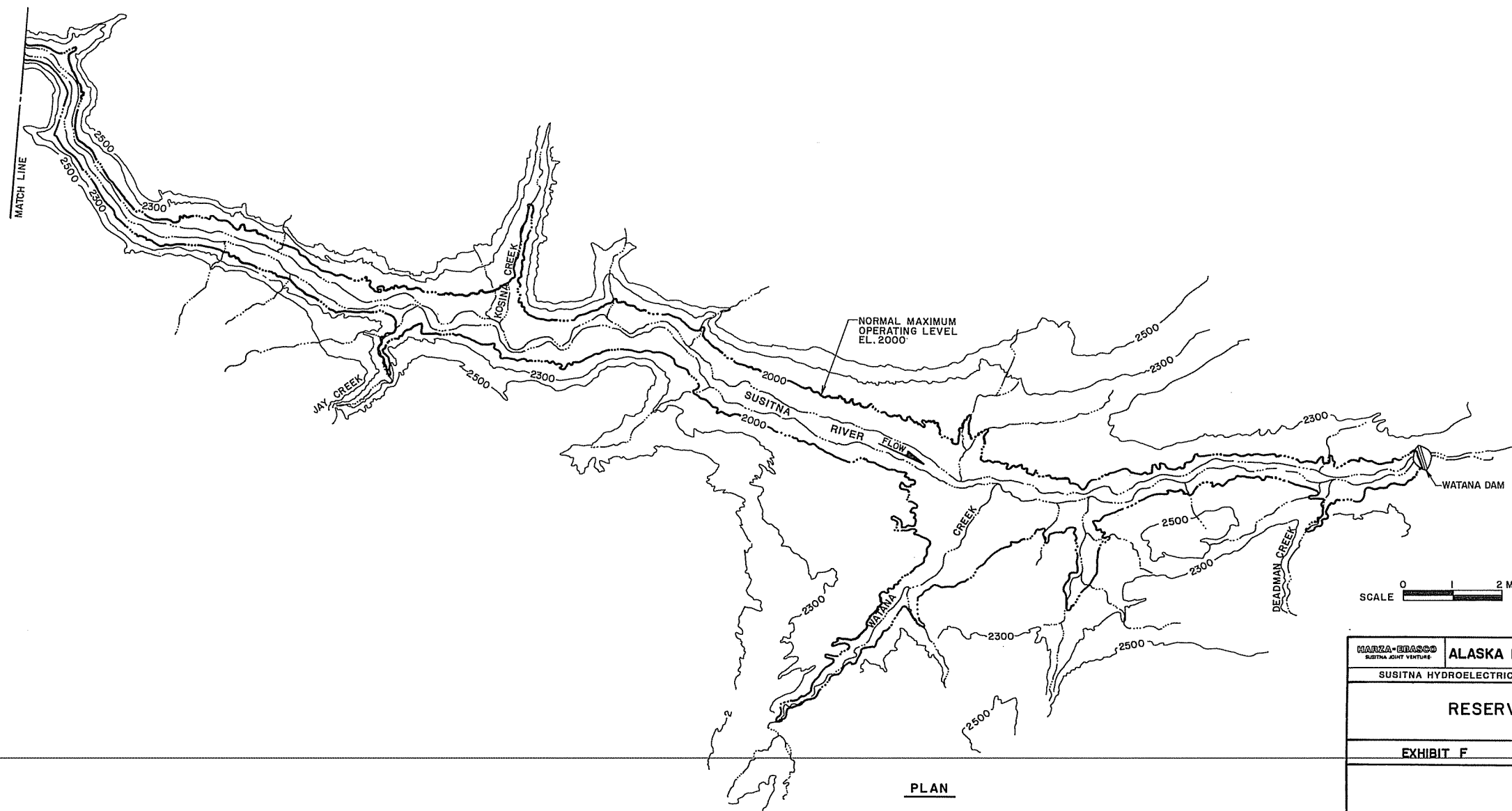
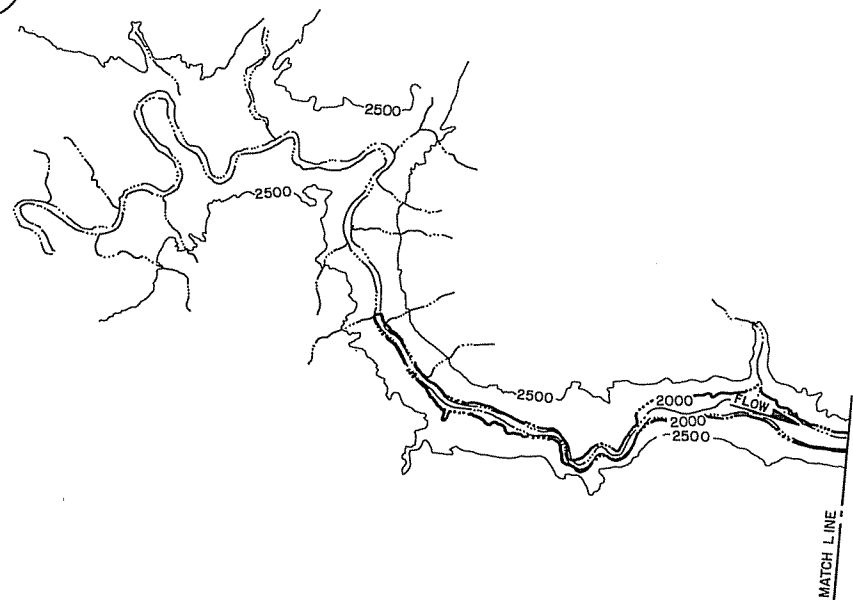


TYPICAL CROSS SECTION
HIGH LEVEL SUSITNA RIVER BRIDGE
SCALE D



MARZA-BEASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-GENERAL	
ACCESS PLAN TYPICAL DETAILS	
EXHIBIT F	PLATE F-3

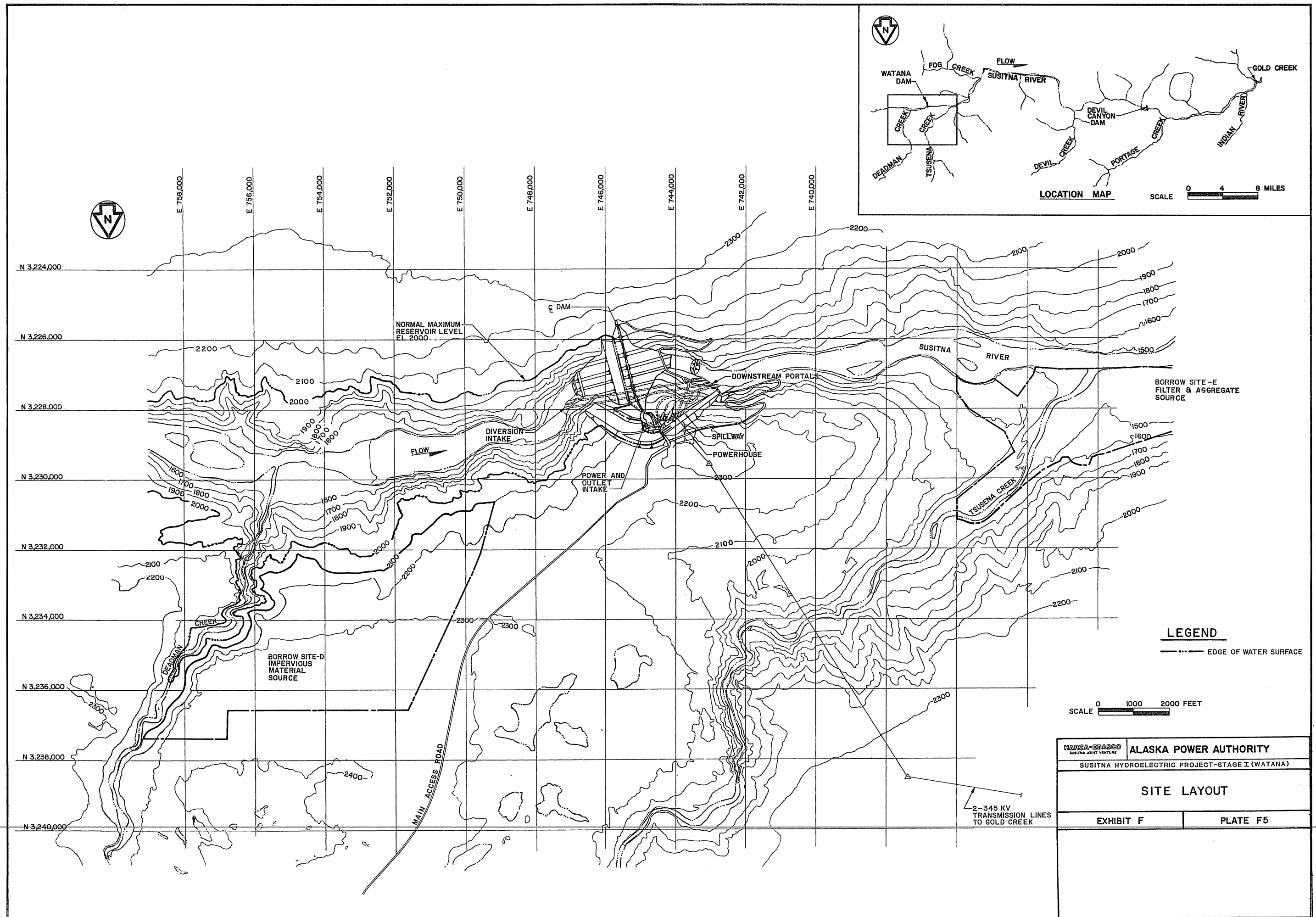
STAGE I (WATANA)



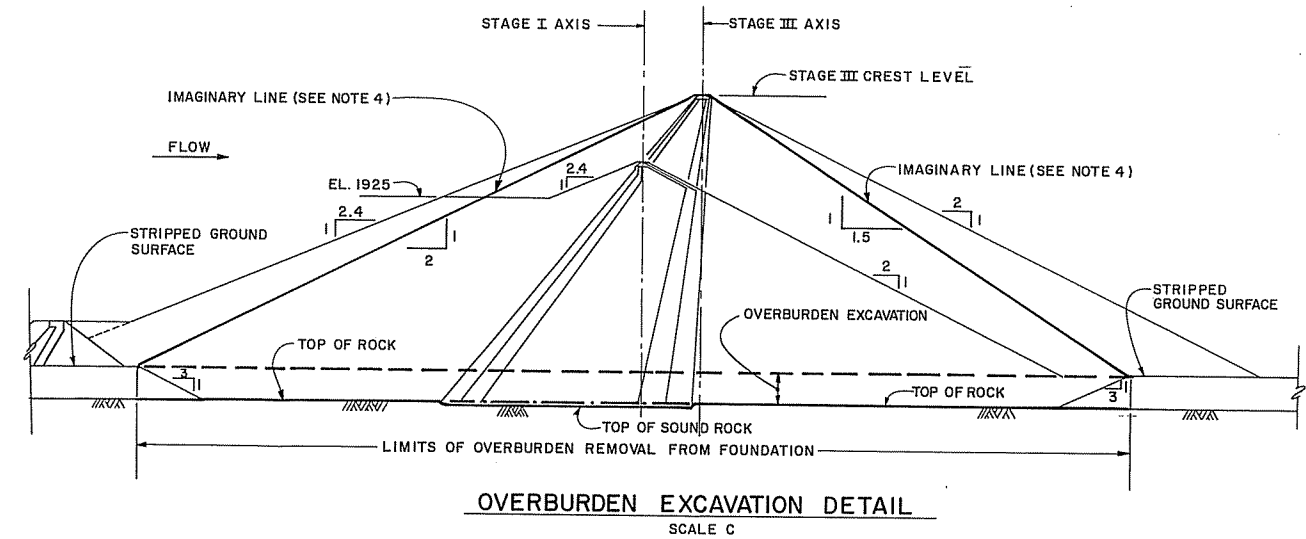
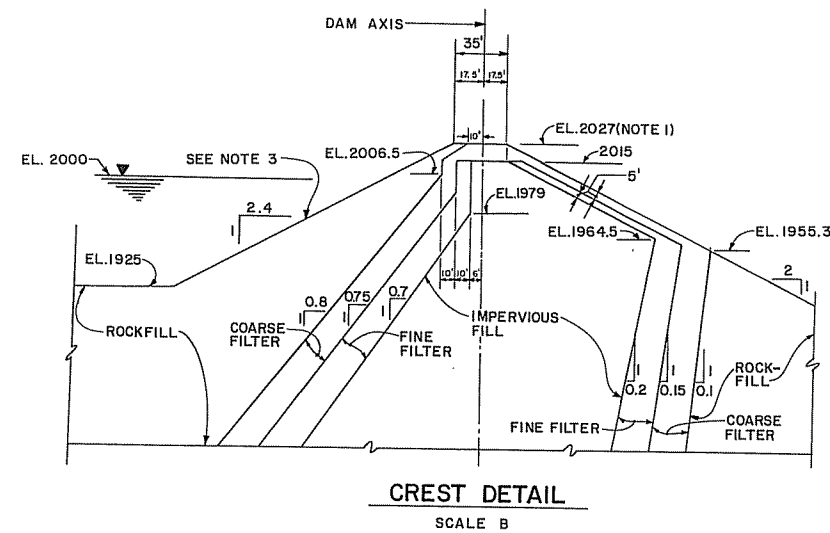
LOCATION MAP



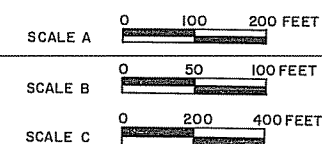
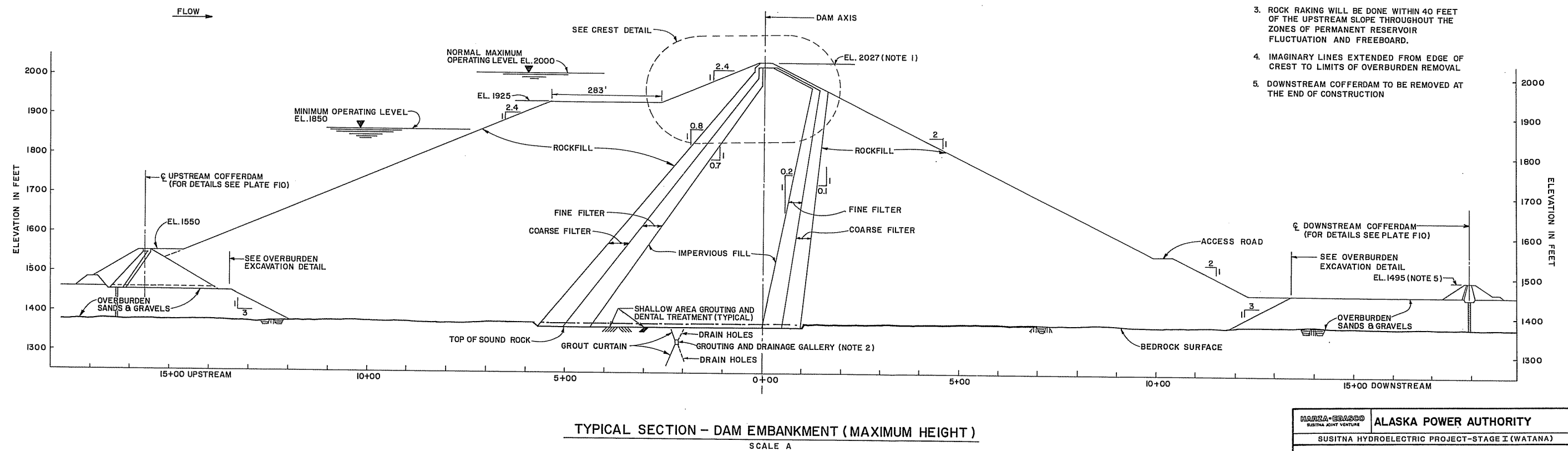
HARZA-EDMCO SUSITNA JOINT VENTURE		ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)			
RESERVOIR PLAN			
EXHIBIT F		PLATE F4	

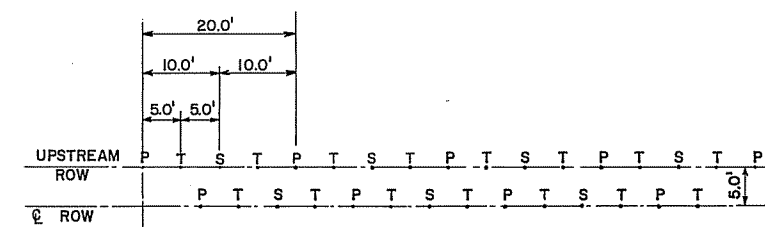
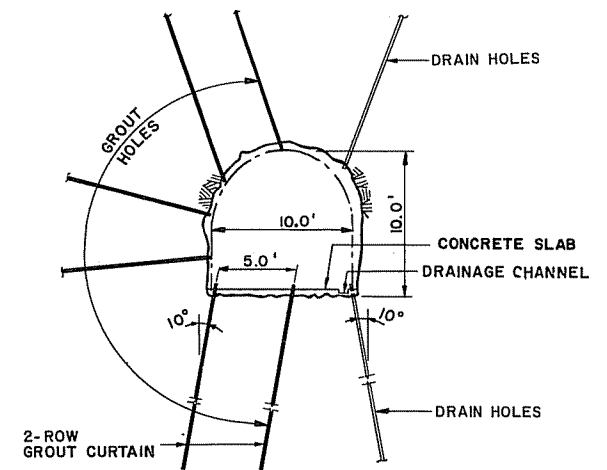
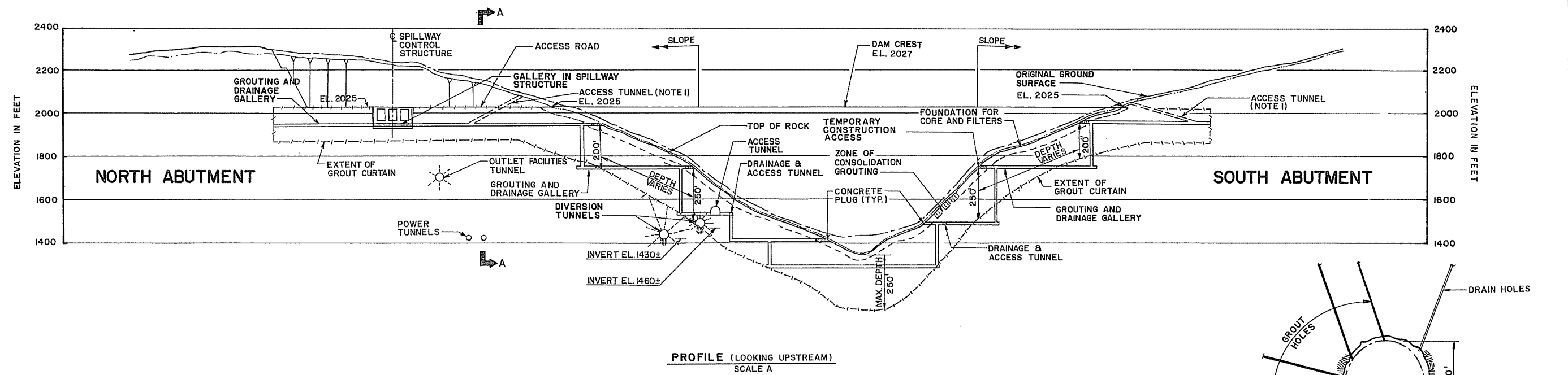






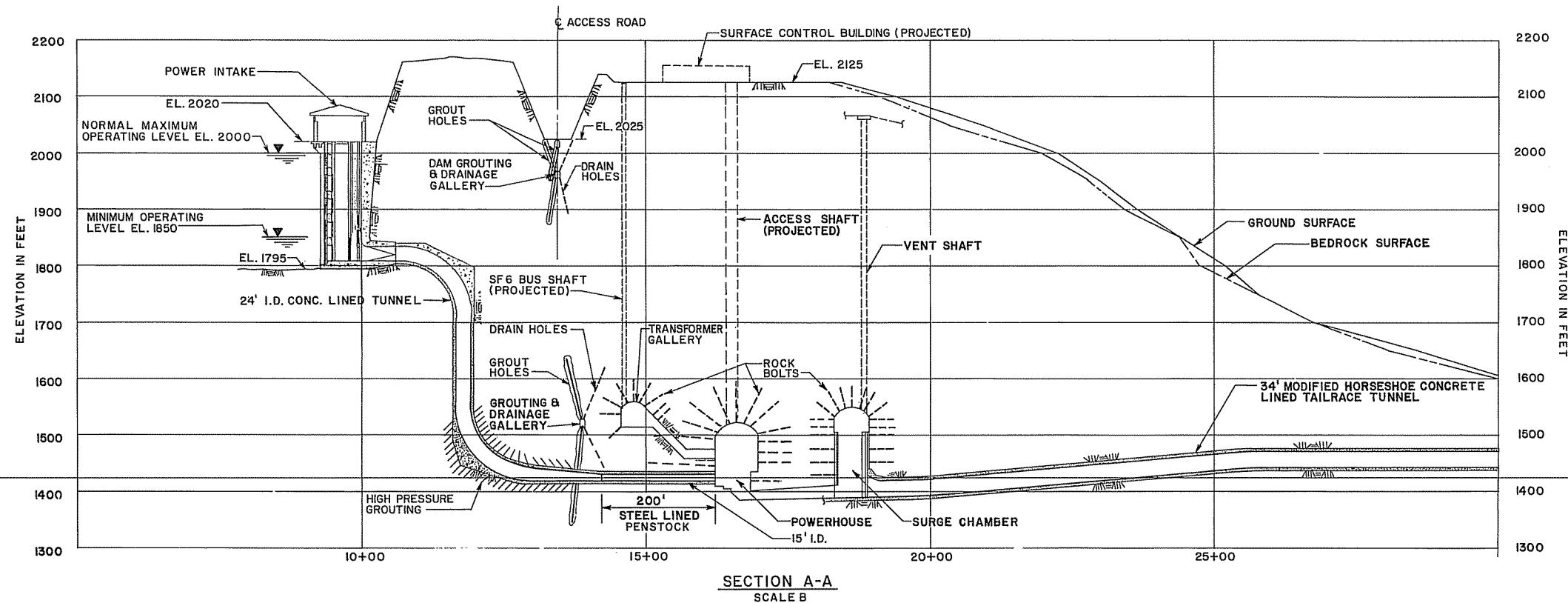
- NOTES:
1. INCLUDES 2' SETTLEMENT OVERBUILD.
 2. DRAINAGE AND GROUTING DETAILS SHOWN ON PLATE F8.
 3. ROCK RAKING WILL BE DONE WITHIN 40 FEET OF THE UPSTREAM SLOPE THROUGHOUT THE ZONES OF PERMANENT RESERVOIR FLUCTUATION AND FREEBOARD.
 4. IMAGINARY LINES EXTENDED FROM EDGE OF CREST TO LIMITS OF OVERBURDEN REMOVAL
 5. DOWNSTREAM COFFERDAM TO BE REMOVED AT THE END OF CONSTRUCTION



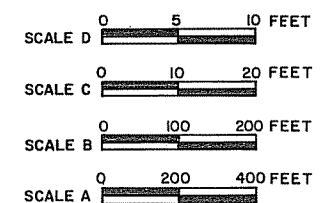


LEGEND

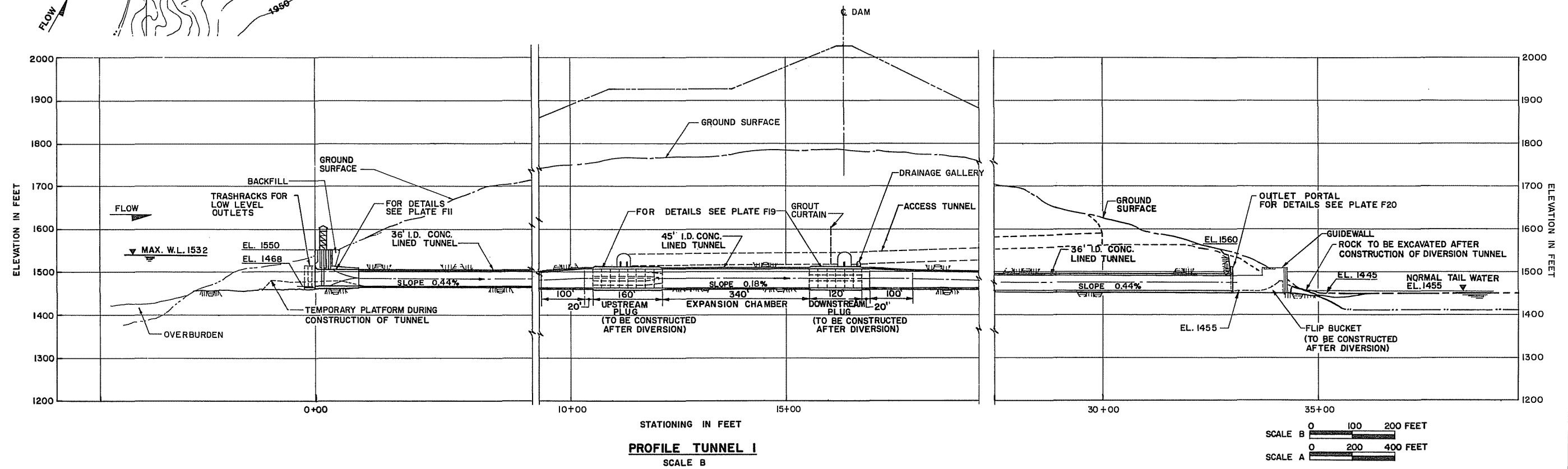
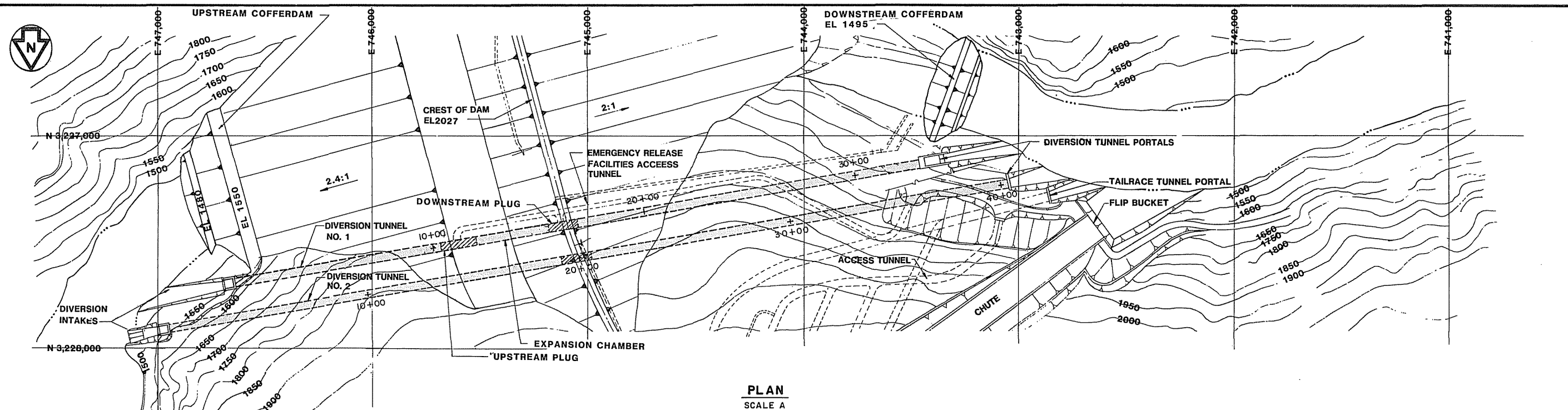
P = PRIMARY GROUT HOLE
S = SECONDARY GROUT HOLE
T = TERTIARY GROUT HOLE



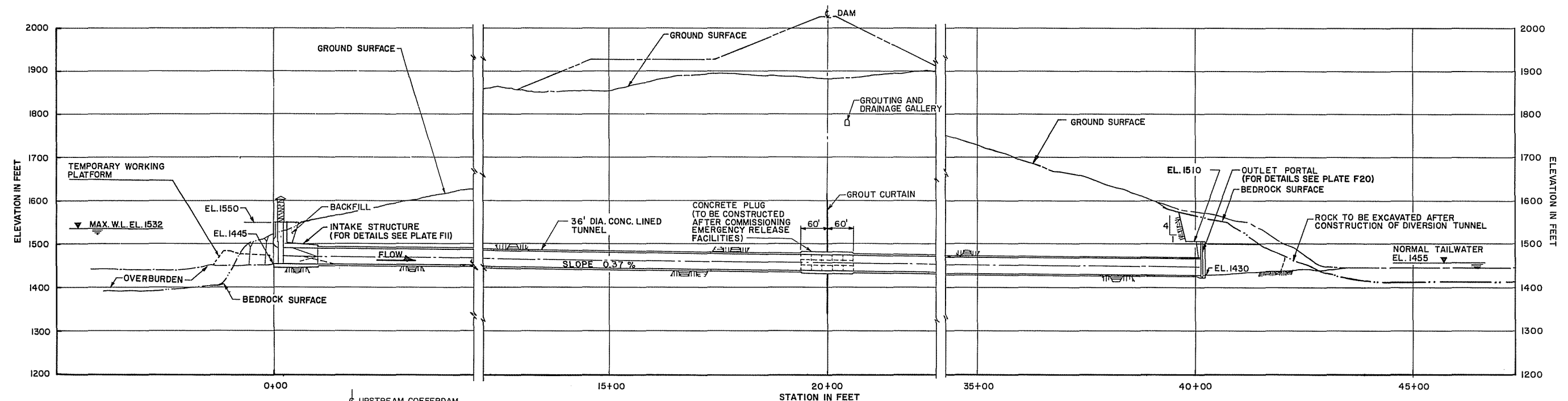
- NOTES
1. ACCESS WOULD BE FROM THE DOWNSTREAM SIDE OF THE DAM.
 2. WORK THIS DRAWING WITH PLATE F6.



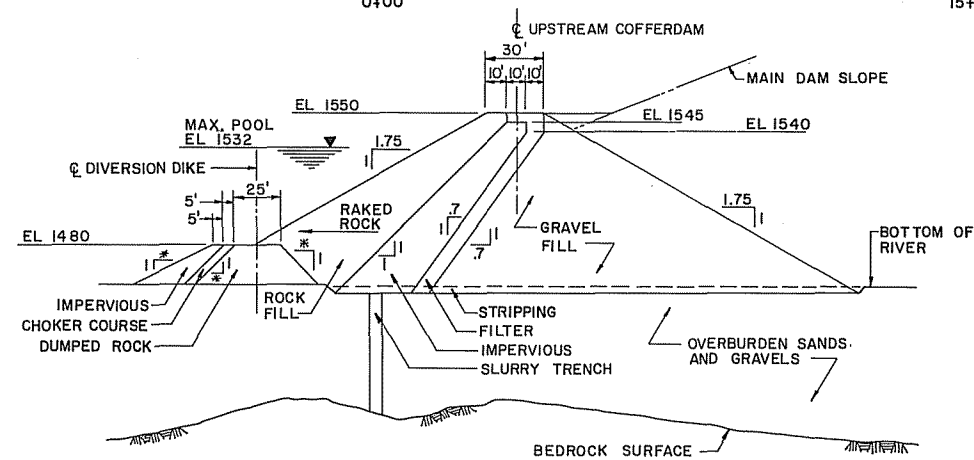
HARZA • ERASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)	
DAM GROUTING & DRAINAGE	
EXHIBIT F	PLATE F8



MARZA-BIACCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)
DIVERSION GENERAL ARRANGEMENT EXHIBIT F PLATE F9	

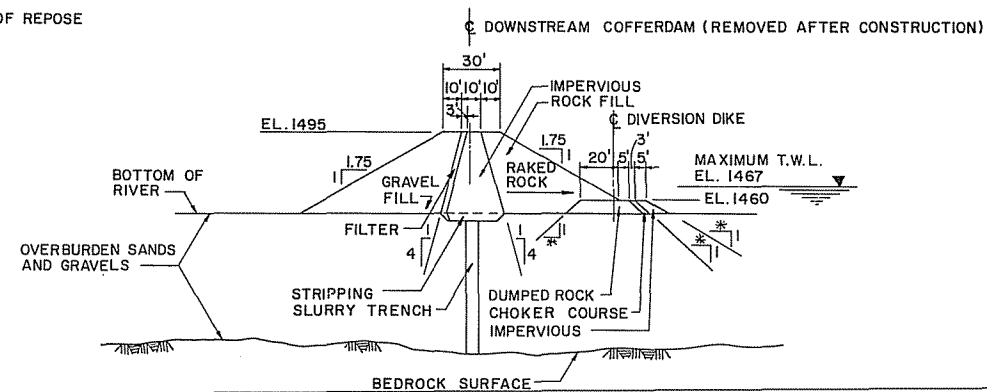


PROFILE - TUNNEL 2
SCALE A

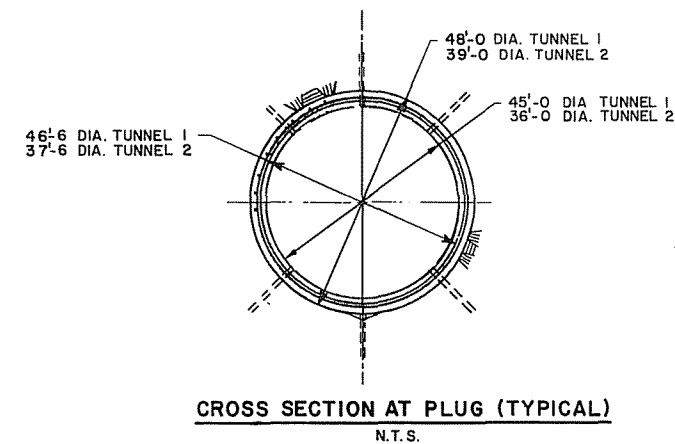


TYPICAL SECTION UPSTREAM COFFERDAM
SCALE B

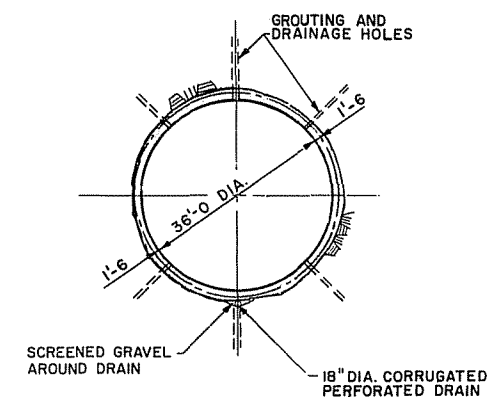
* ANGLE OF REPOSE



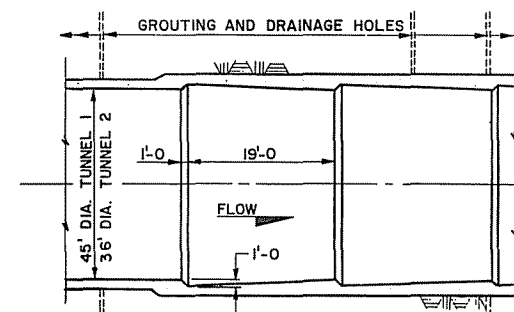
TYPICAL SECTION DOWNSTREAM COFFERDAM
SCALE B



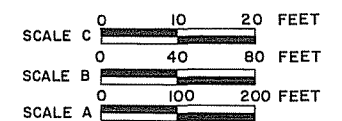
CROSS SECTION AT PLUG (TYPICAL)
N.T.S.



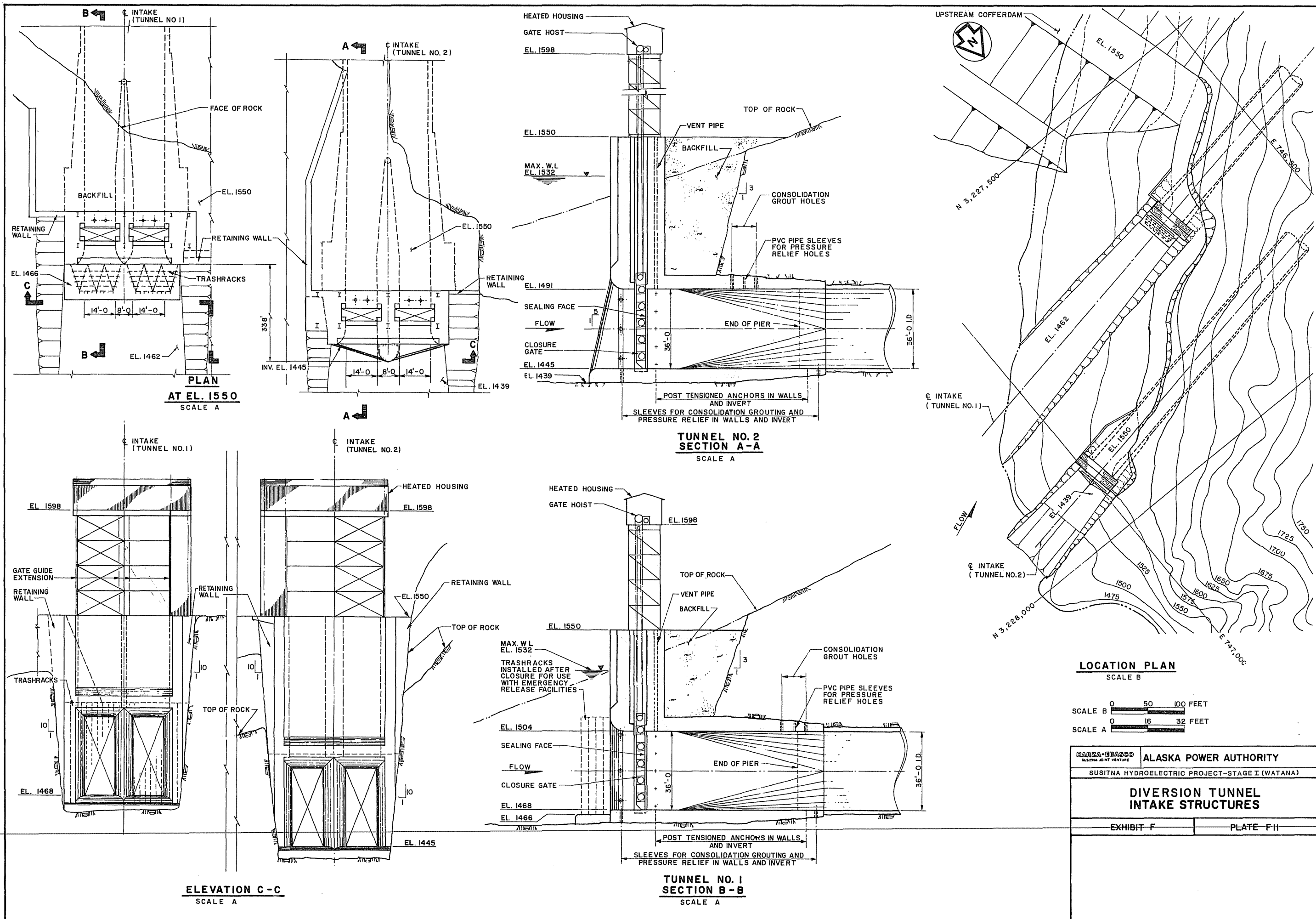
TYPICAL TUNNEL CROSS SECTION
N.T.S.

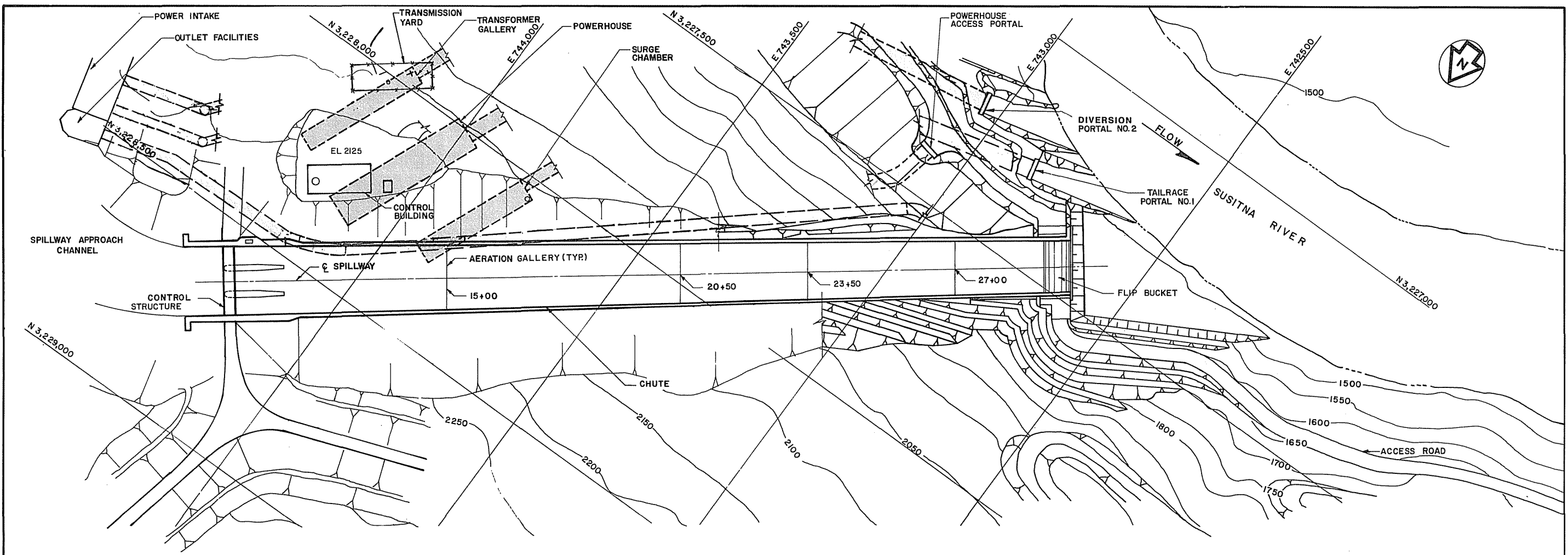


SECTION ALONG C OF TUNNEL AT PLUG LOCATION
SCALE C

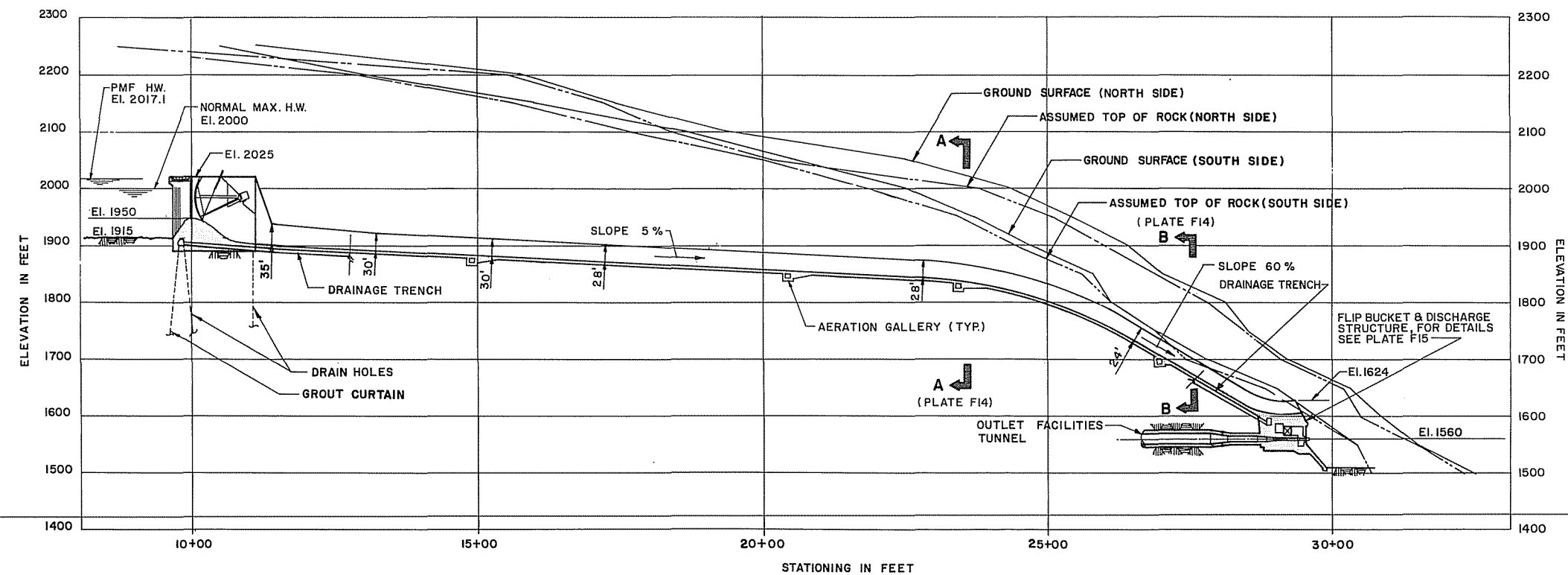


MARZA-EDASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)	
COFFERDAMS AND DIVERSION TUNNEL PROFILE AND SECTIONS	
EXHIBIT F	PLATE F-10





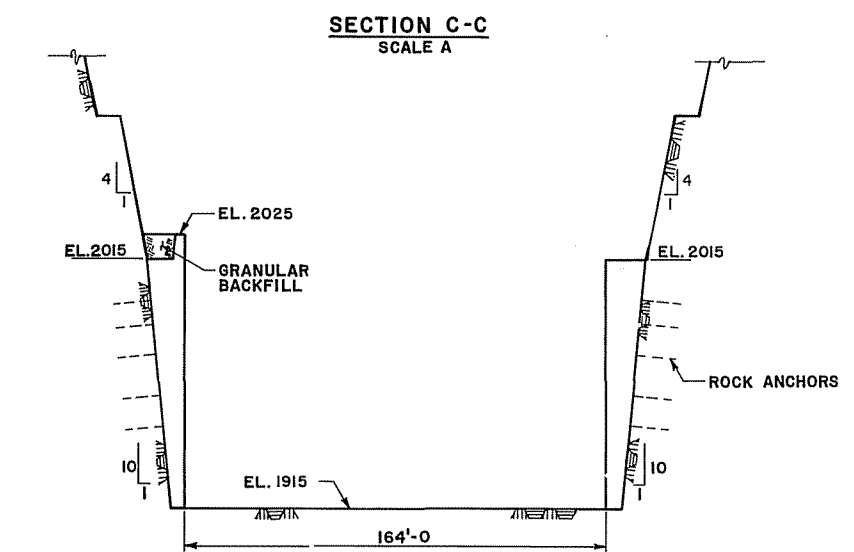
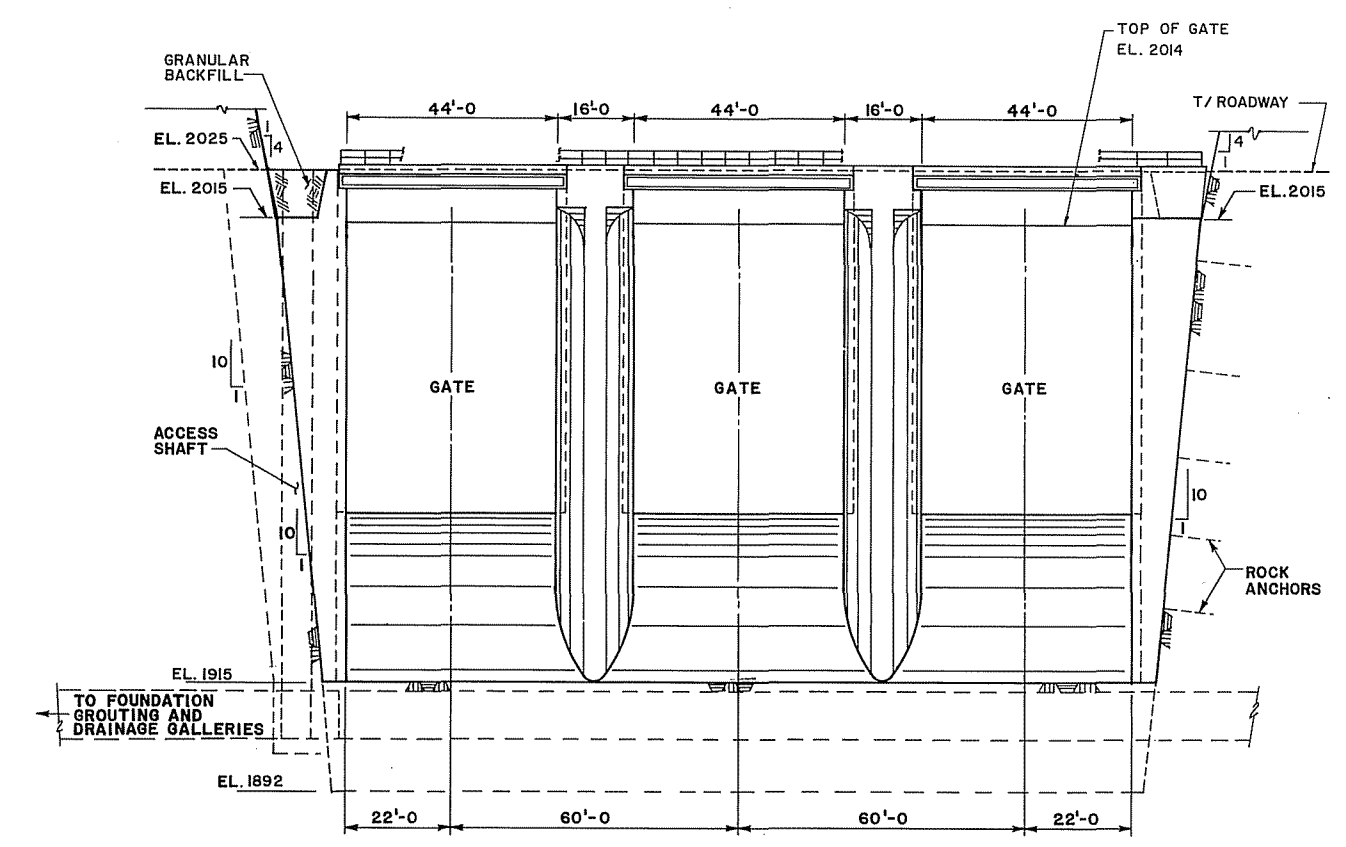
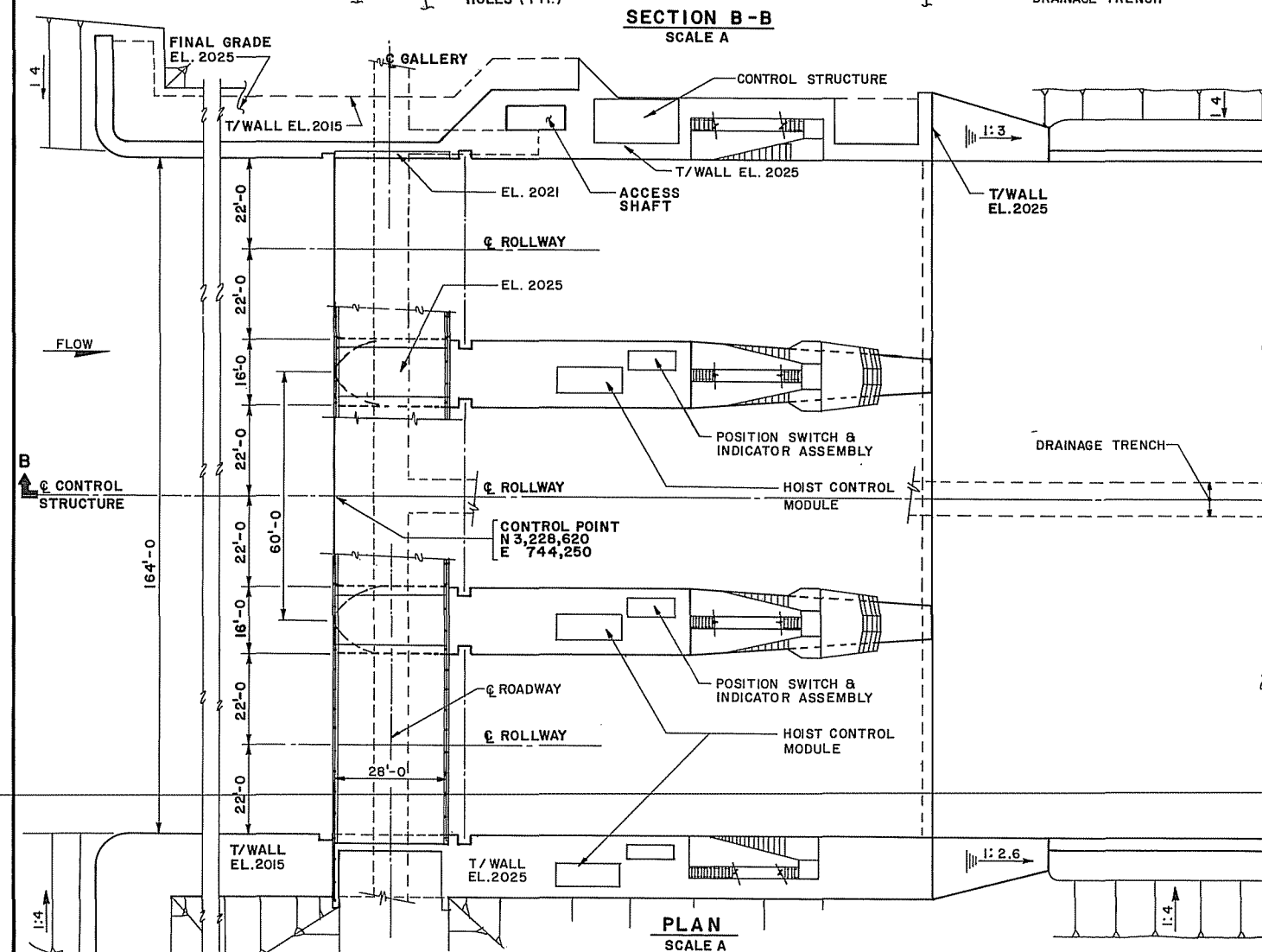
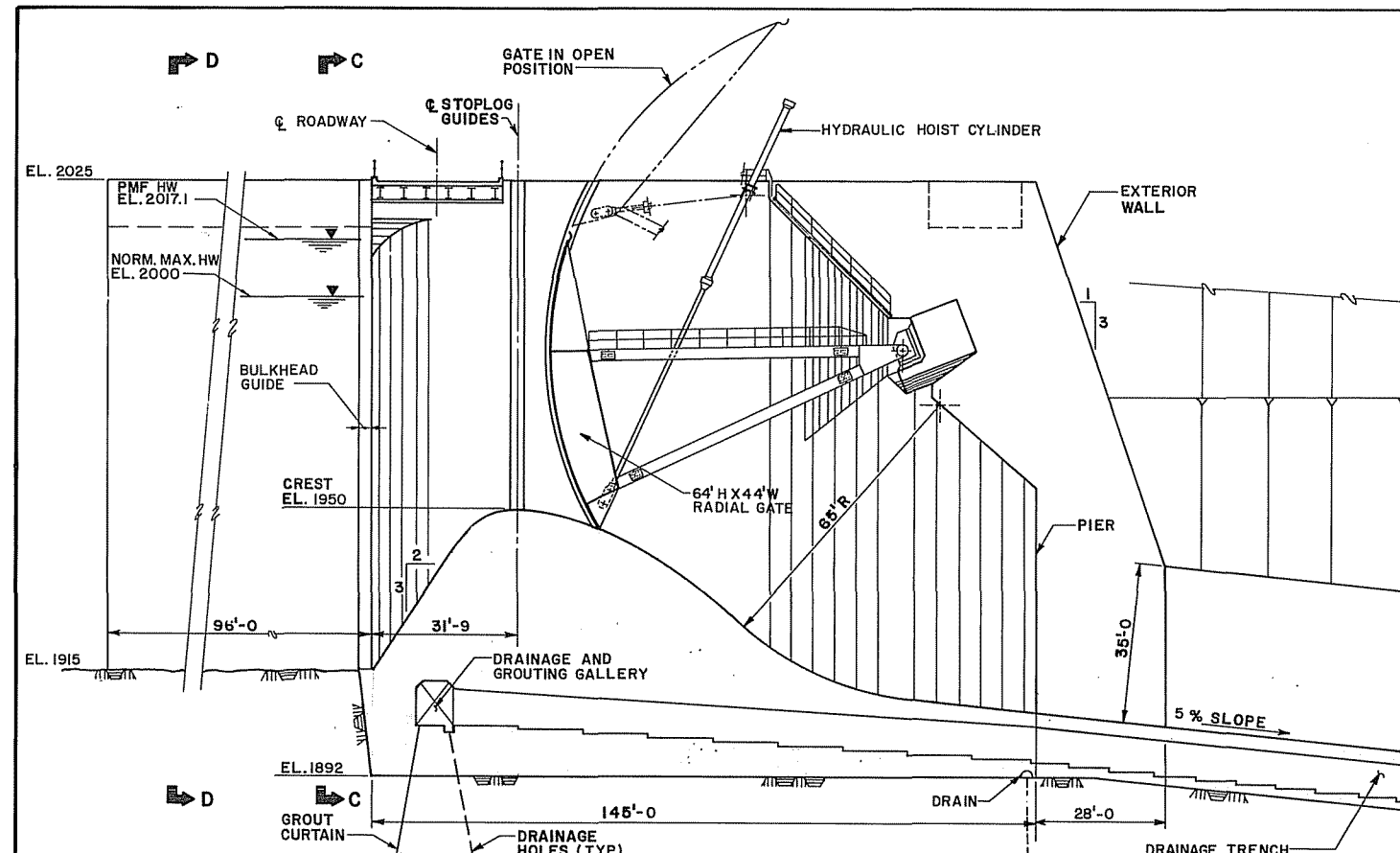
PLAN



PROFILE

SCALE 0 100 200 FEET

HATZA-BEASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)	
SPILLWAY GENERAL ARRANGEMENT	
EXHIBIT F	PLATE F12



SPILLWAY CONTROL STRUCTURE
SUMMARY OF STABILITY ANALYSES

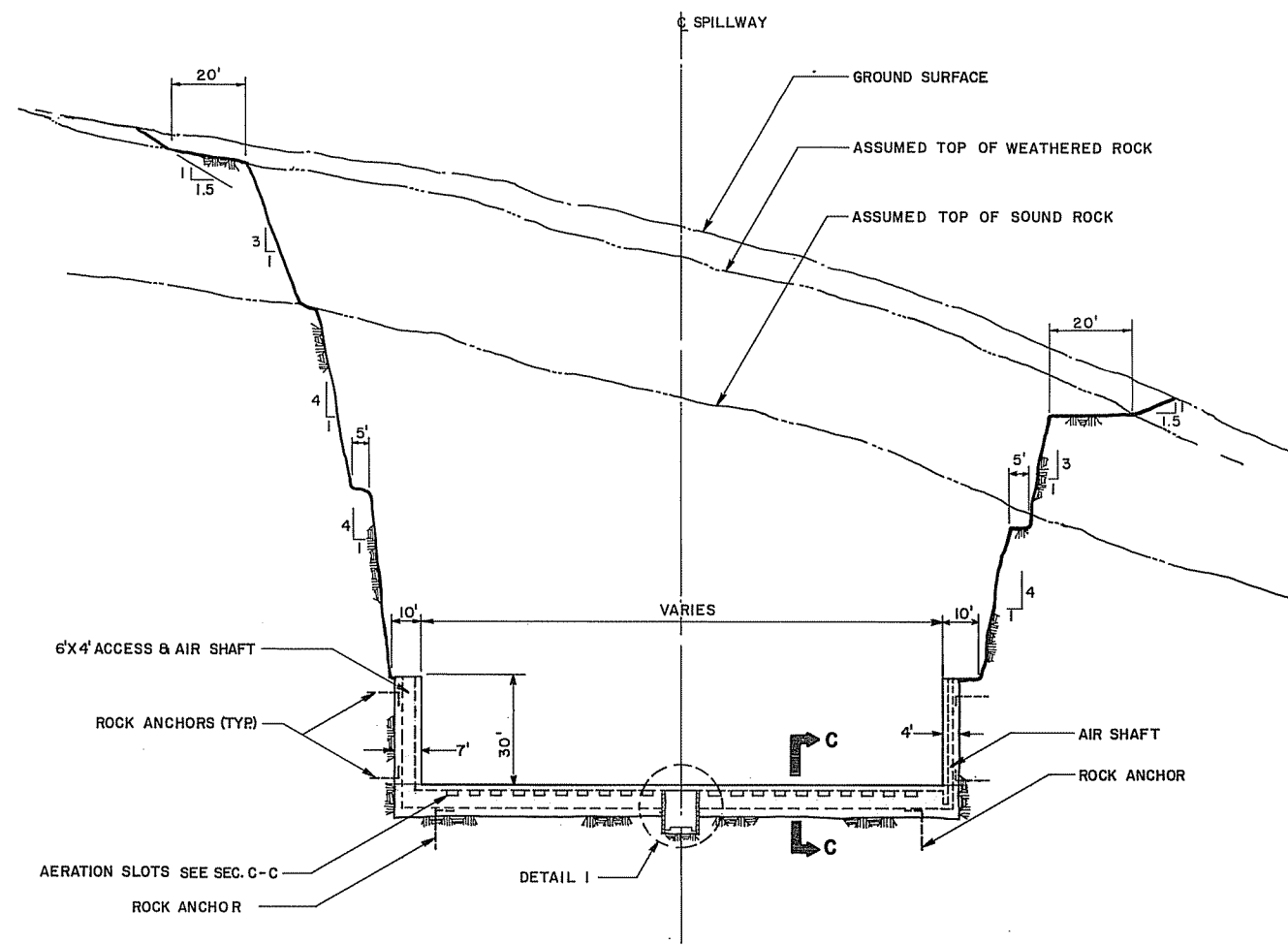
LOAD CONDITION	FOUNDATION STRESS U.S./D.S. (PSI)	X _{cg} (FT)	FACTORS OF SAFETY			
			SLIDING	SHEAR FRICTION	FLOATATION	OVERTURNING
NORMAL INCLUDES ICE LOADS	47.6 / 53.8	1.5	N.A.	10.8	5.4	2.9
UNUSUAL 1:100/110 YR. EARTHQUAKE	25.8 / 75.5	11.9	N.A.	6.2	5.4	2.2
UNUSUAL DRAIN PLUGGED PMF	17.2 / 56.9	12.9	N.A.	8.2	2.4	1.6
EXTREME EARTHQUAKE	-18.4 / 119.7	32.9	N.A.	3.4	5.4	1.6

PHYSICAL PARAMETERS
φ = 41°
c = 150 PSI

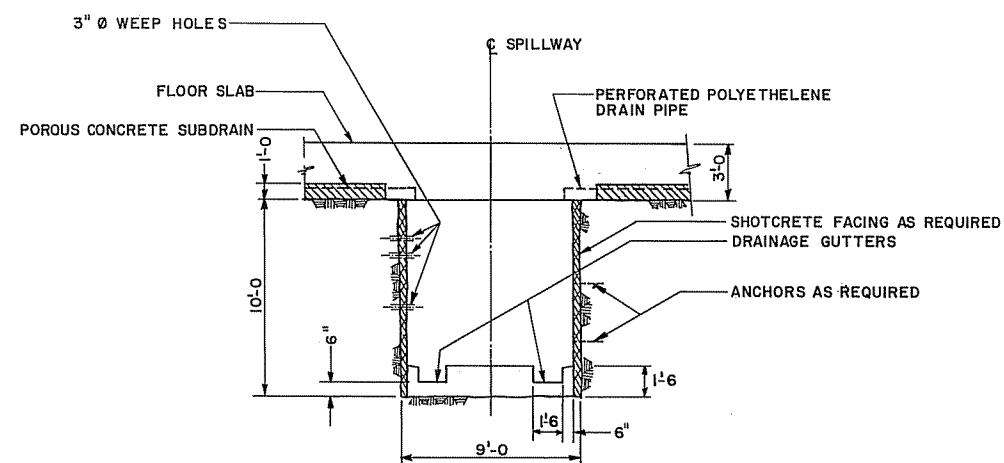
0 30 60 FEET
SCALE B

0 16 32 FEET
SCALE A

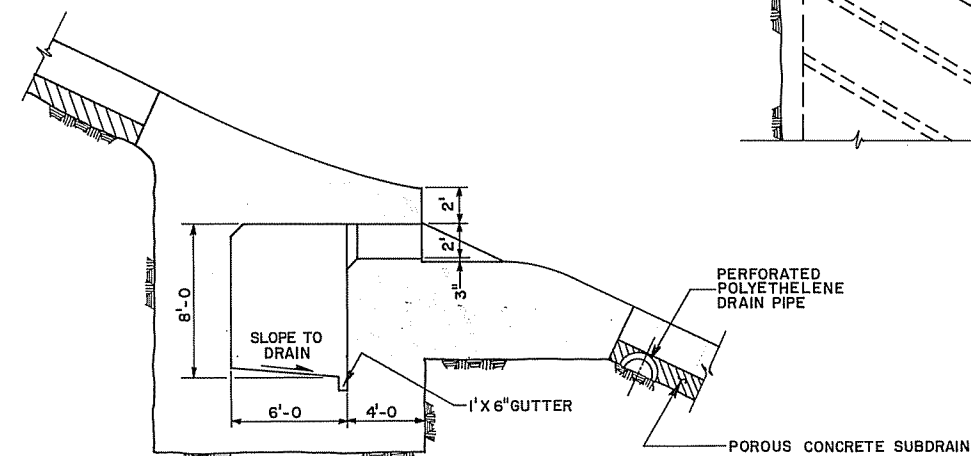
HANZA-EDASCO SUSITNA JOINT VENTURE	
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)	
SPILLWAY CONTROL STRUCTURE	
EXHIBIT F	PLATE F-13



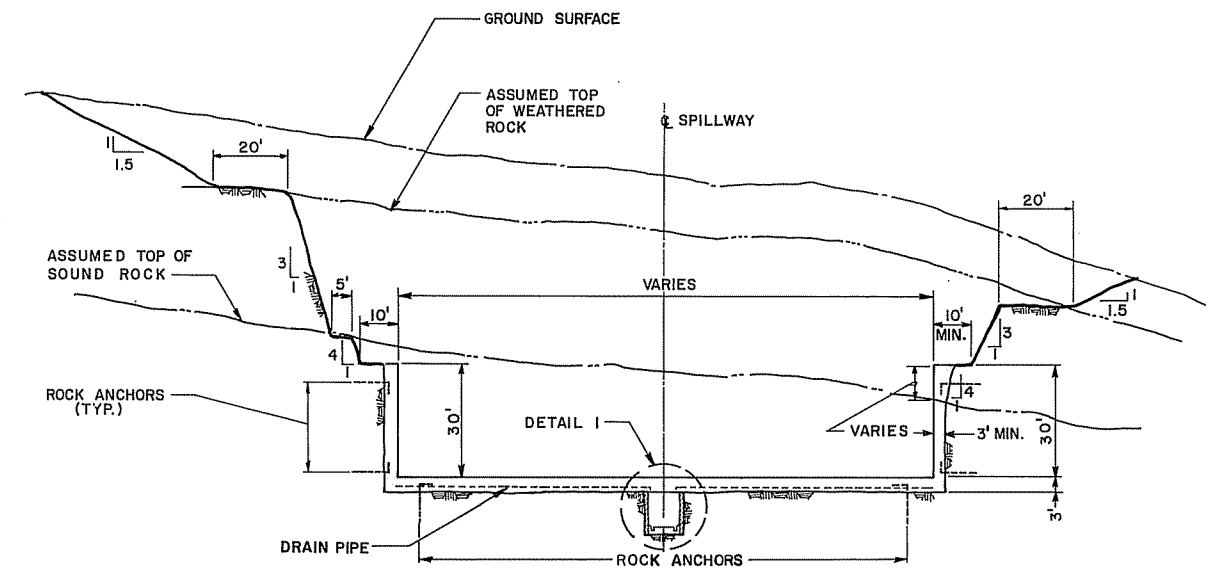
AERATION GALLERY
SECTION A-A (PLATE F12)
SCALE B'



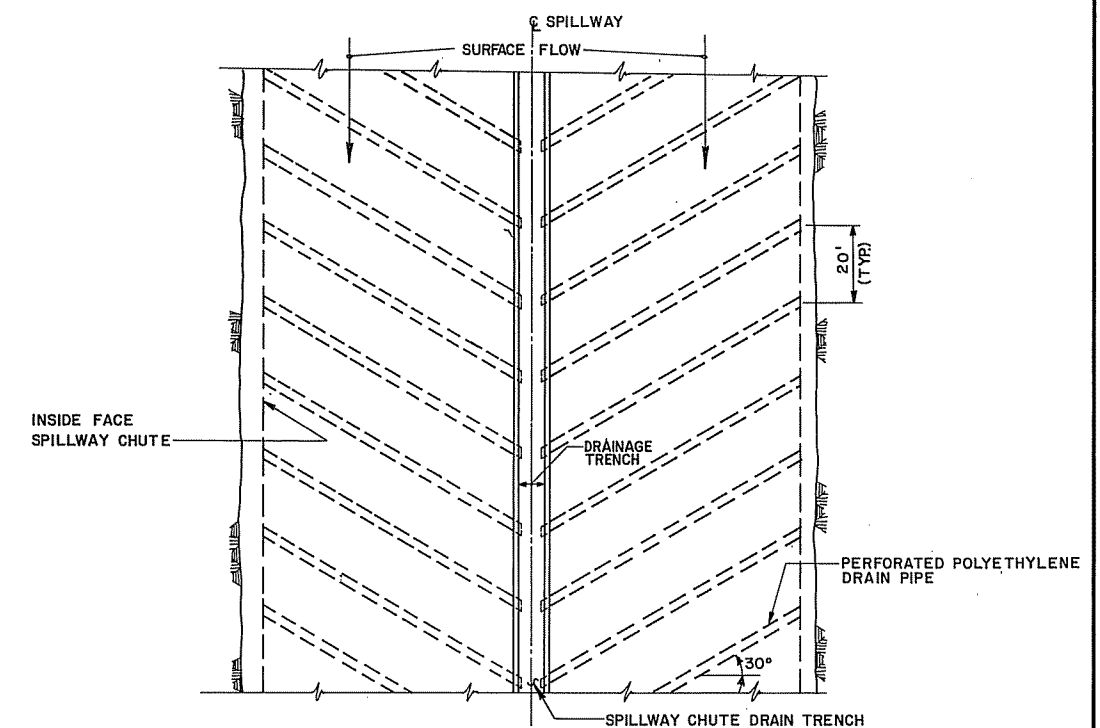
SPILLWAY CHUTE DRAINAGE TRENCH (TYPICAL)
DETAIL I
SCALE C



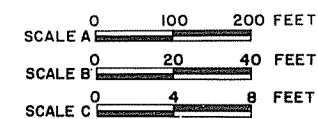
AERATION GALLERY
SECTION C-C
SCALE C



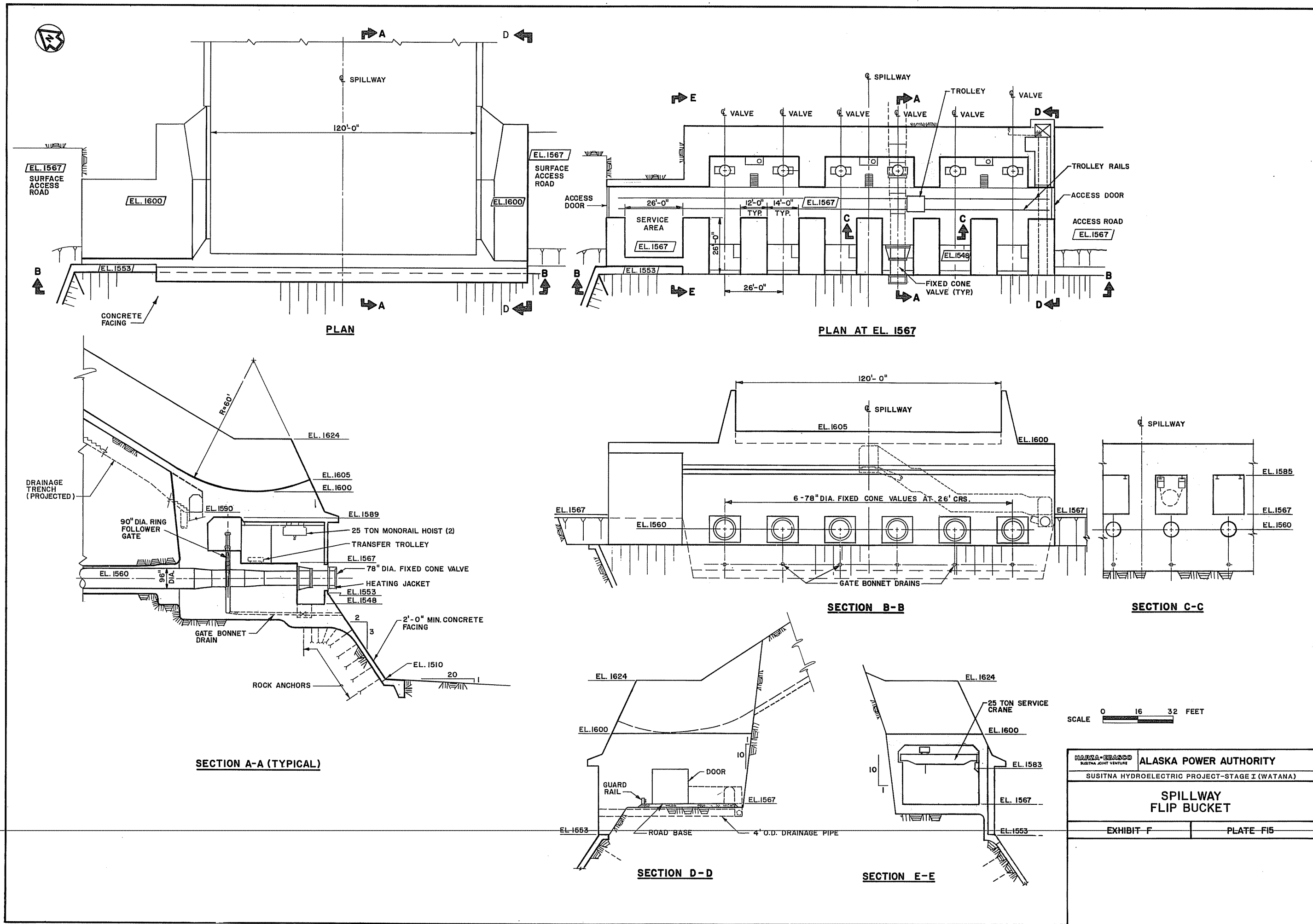
TYPICAL SPILLWAY CHUTE
SECTION B-B (PLATE F12)
SCALE B

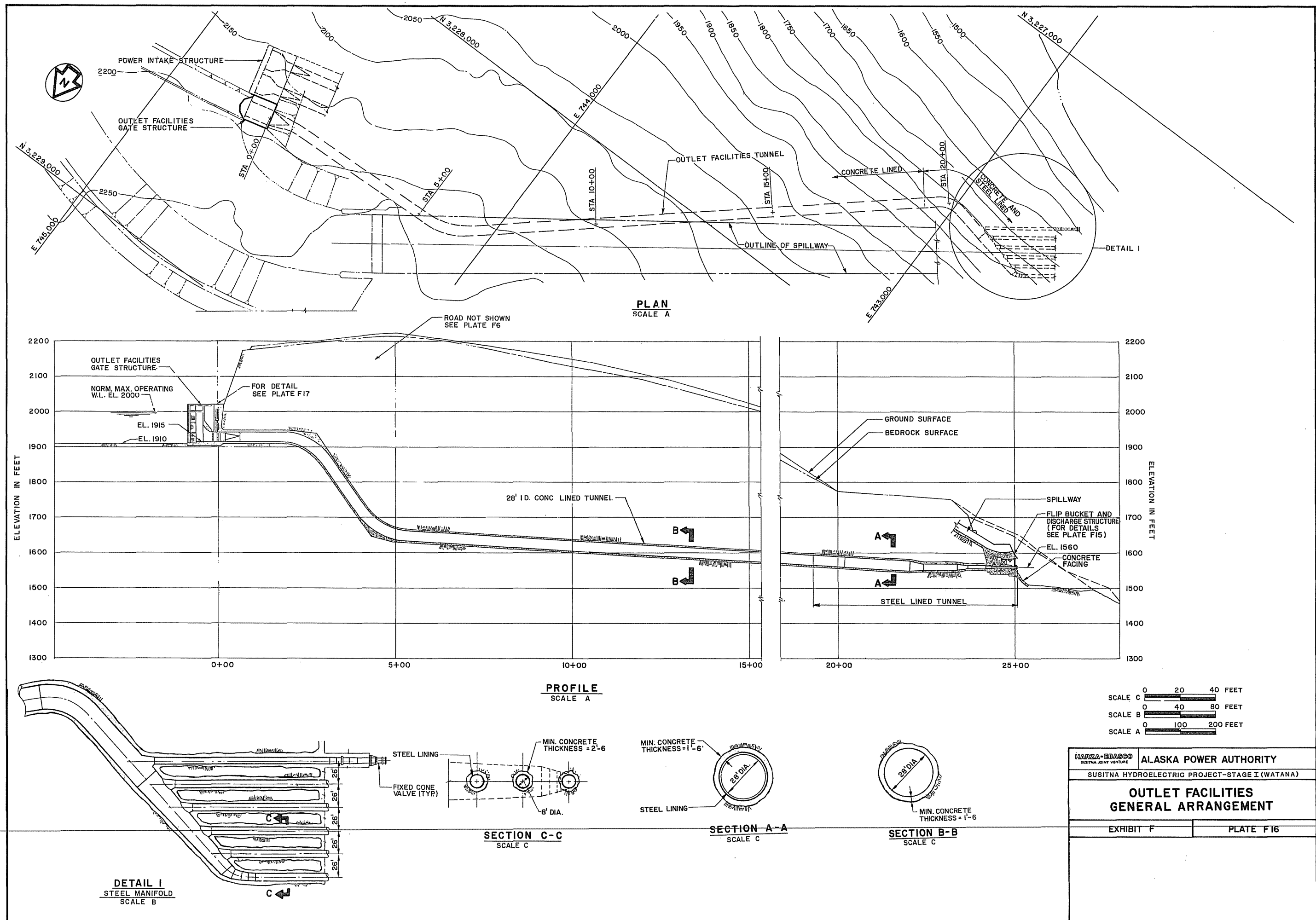


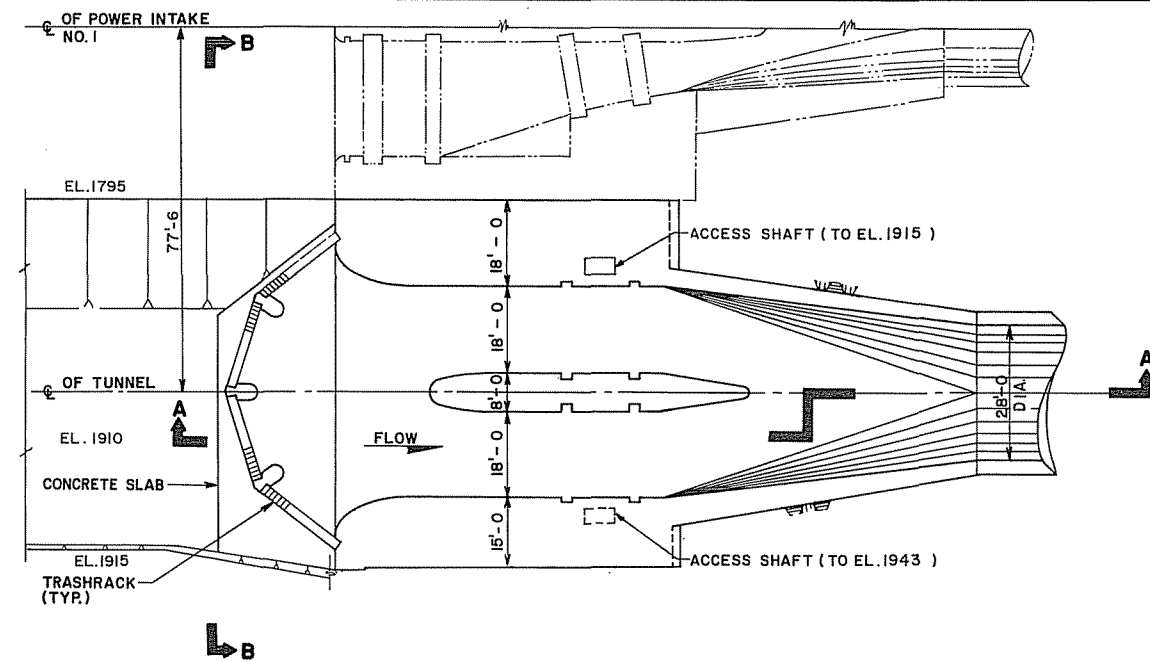
DRAIN PLAN
SCALE B



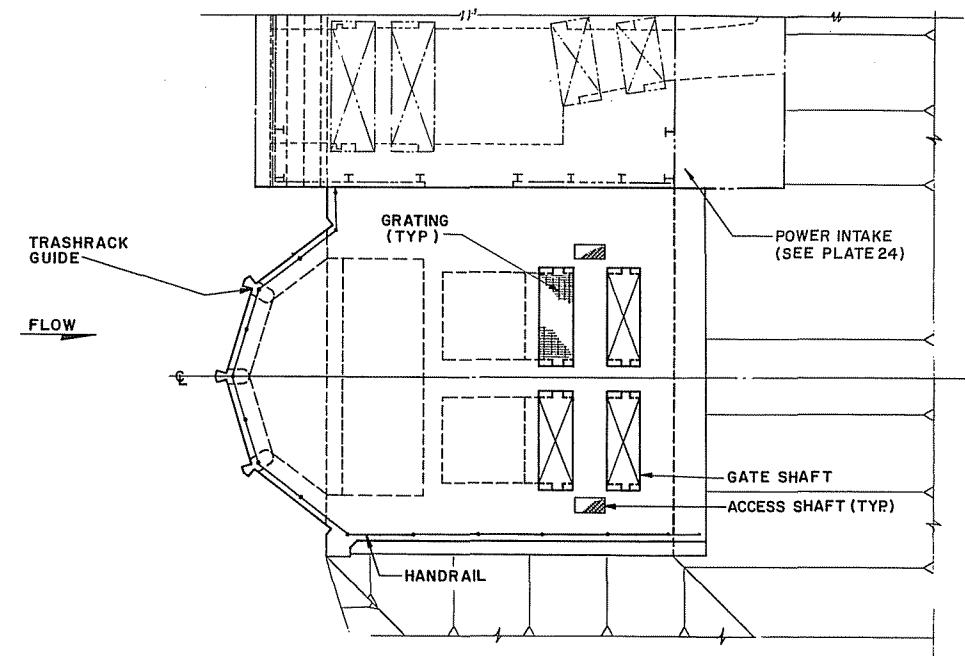
HARZA-ERASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)	
SPILLWAY PROFILE SECTIONS & DRAINAGE FEATURES	
EXHIBIT F	PLATE F 14



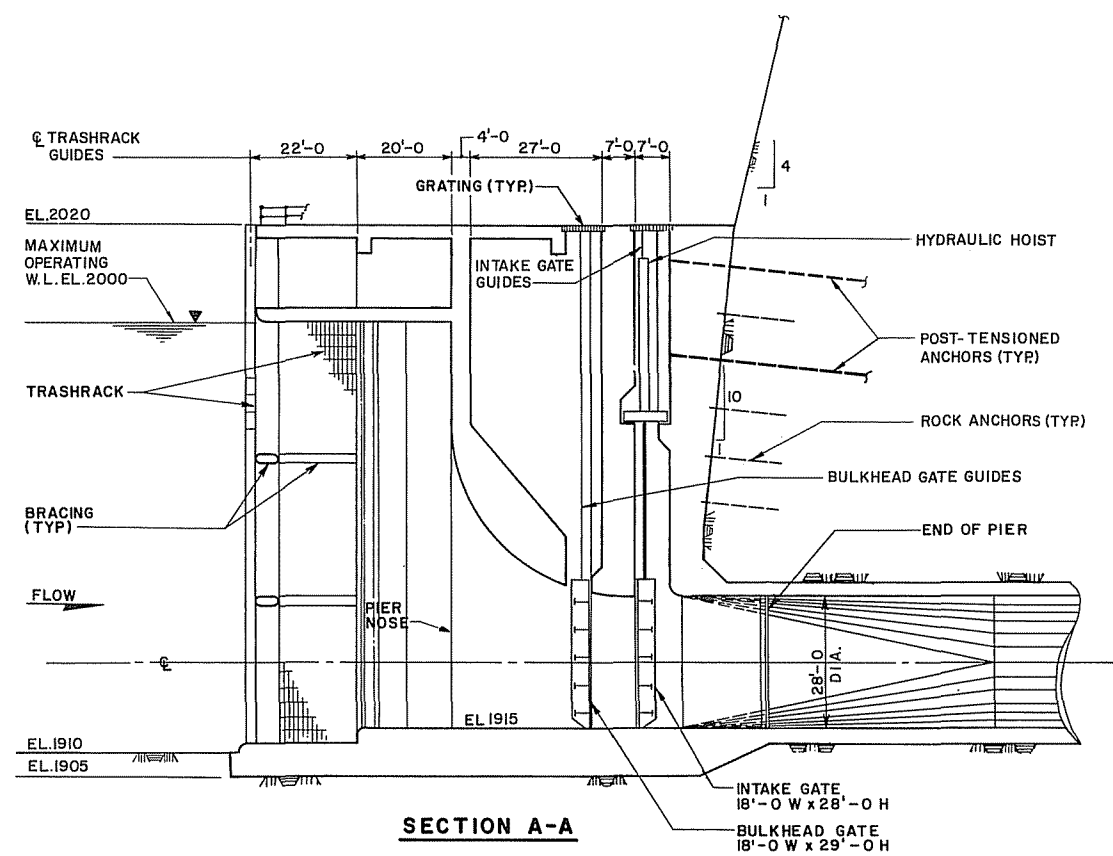




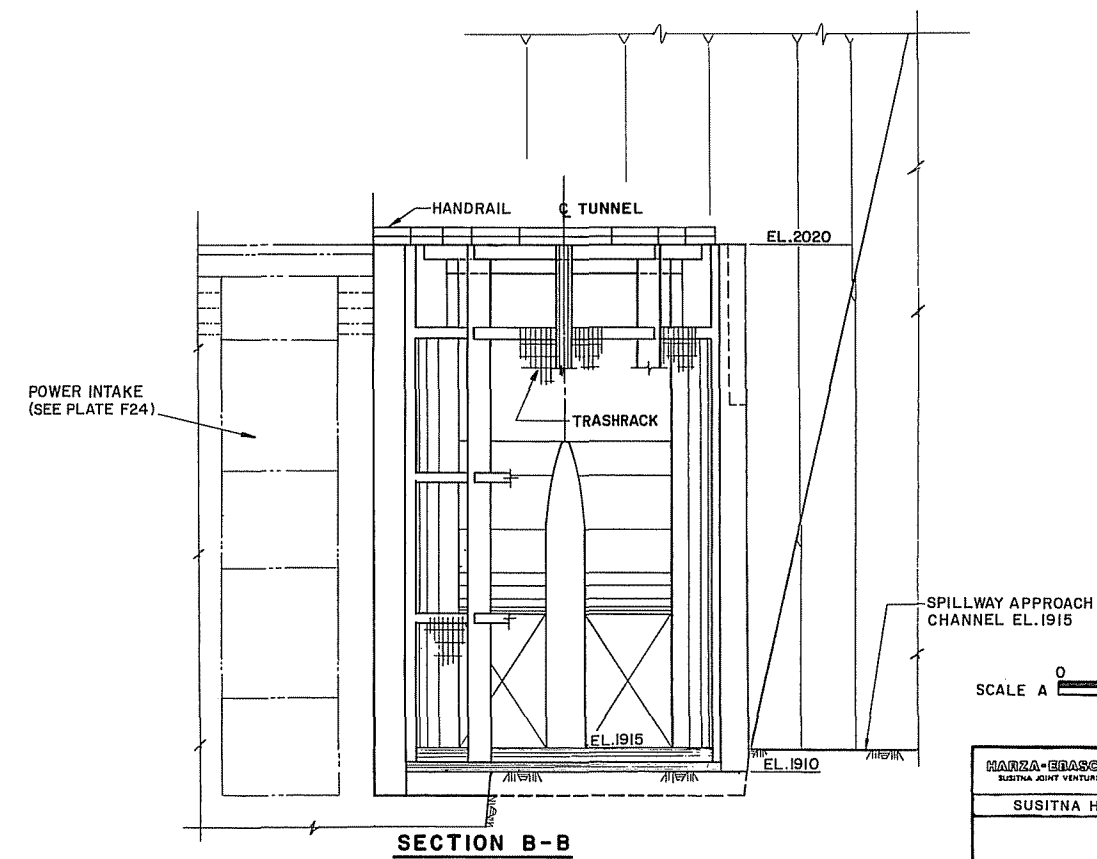
PLAN AT $\bar{C}$ TUNNEL



PLAN AT EL. 2020



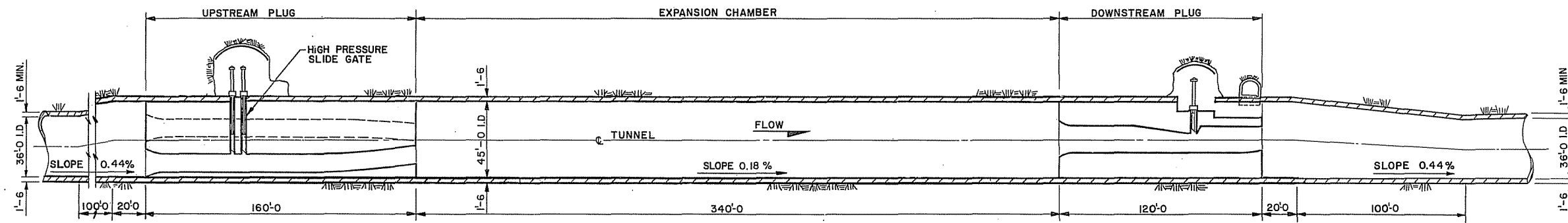
SECTION A-A



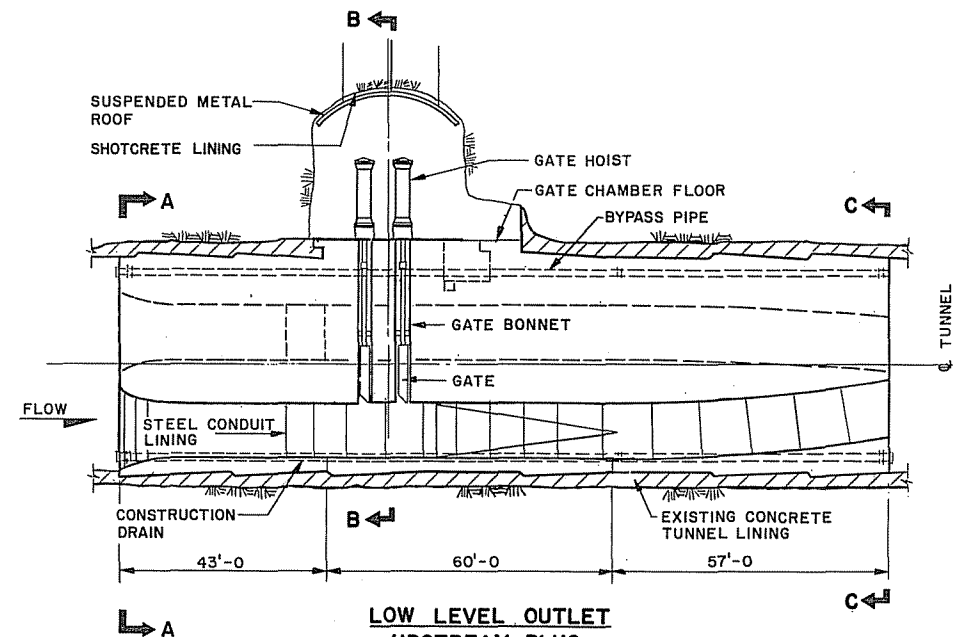
SECTION B-B

SCALE A 0 16 32 FEET

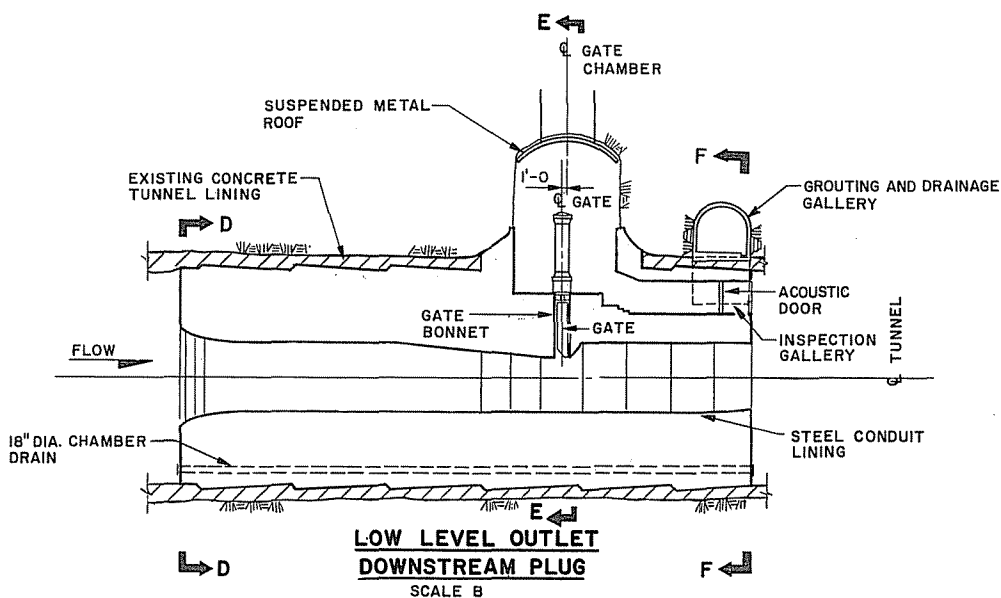
MARZA-BRASC SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)	
OUTLET FACILITIES GATE STRUCTURE	
EXHIBIT F	PLATE F-17



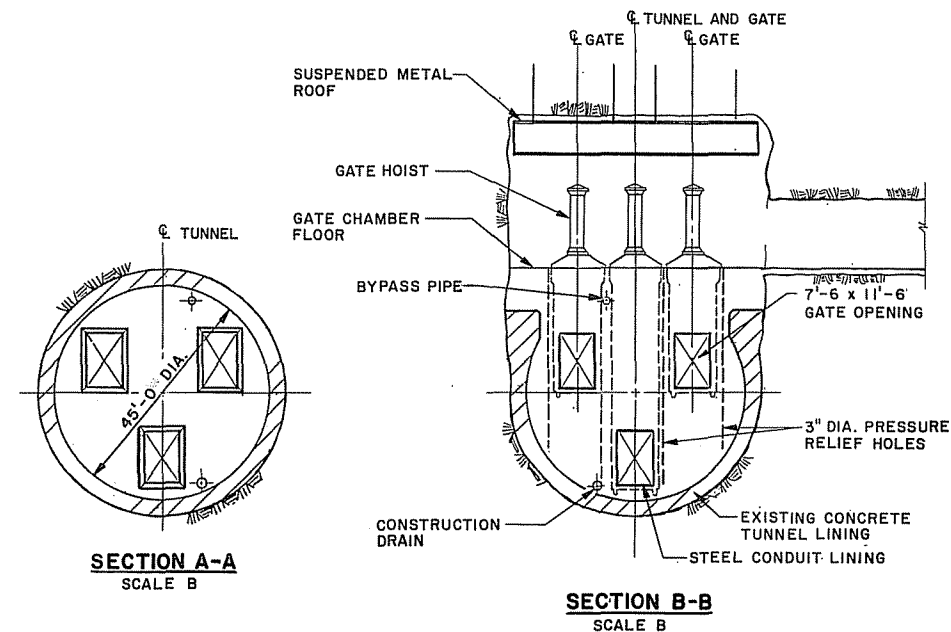
SECTION ALONG C OF TUNNEL NO. 1
SCALE A



LOW LEVEL OUTLET
UPSTREAM PLUG
SCALE B

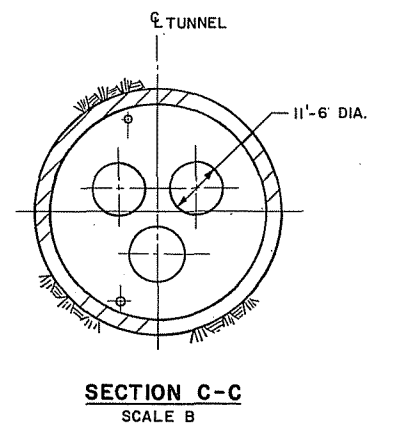


LOW LEVEL OUTLET
DOWNSTREAM PLUG
SCALE B

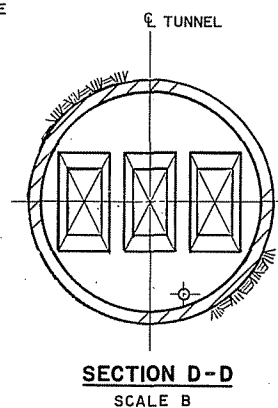


SECTION A-A
SCALE B

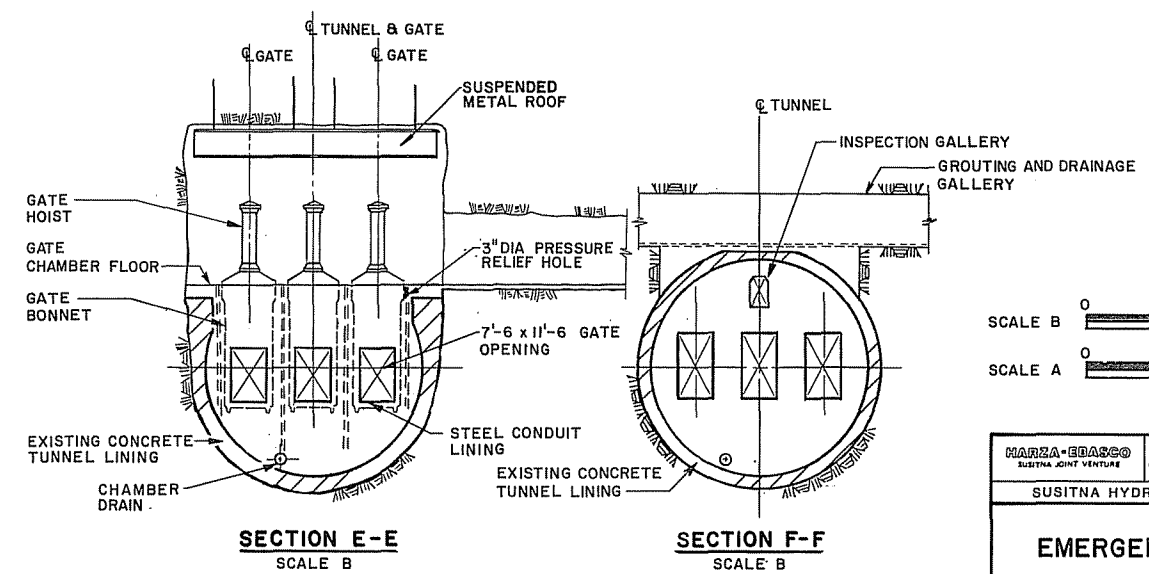
SECTION B-B
SCALE B



SECTION C-C
SCALE B

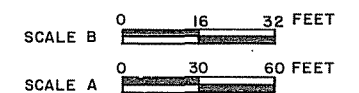


SECTION D-D
SCALE B

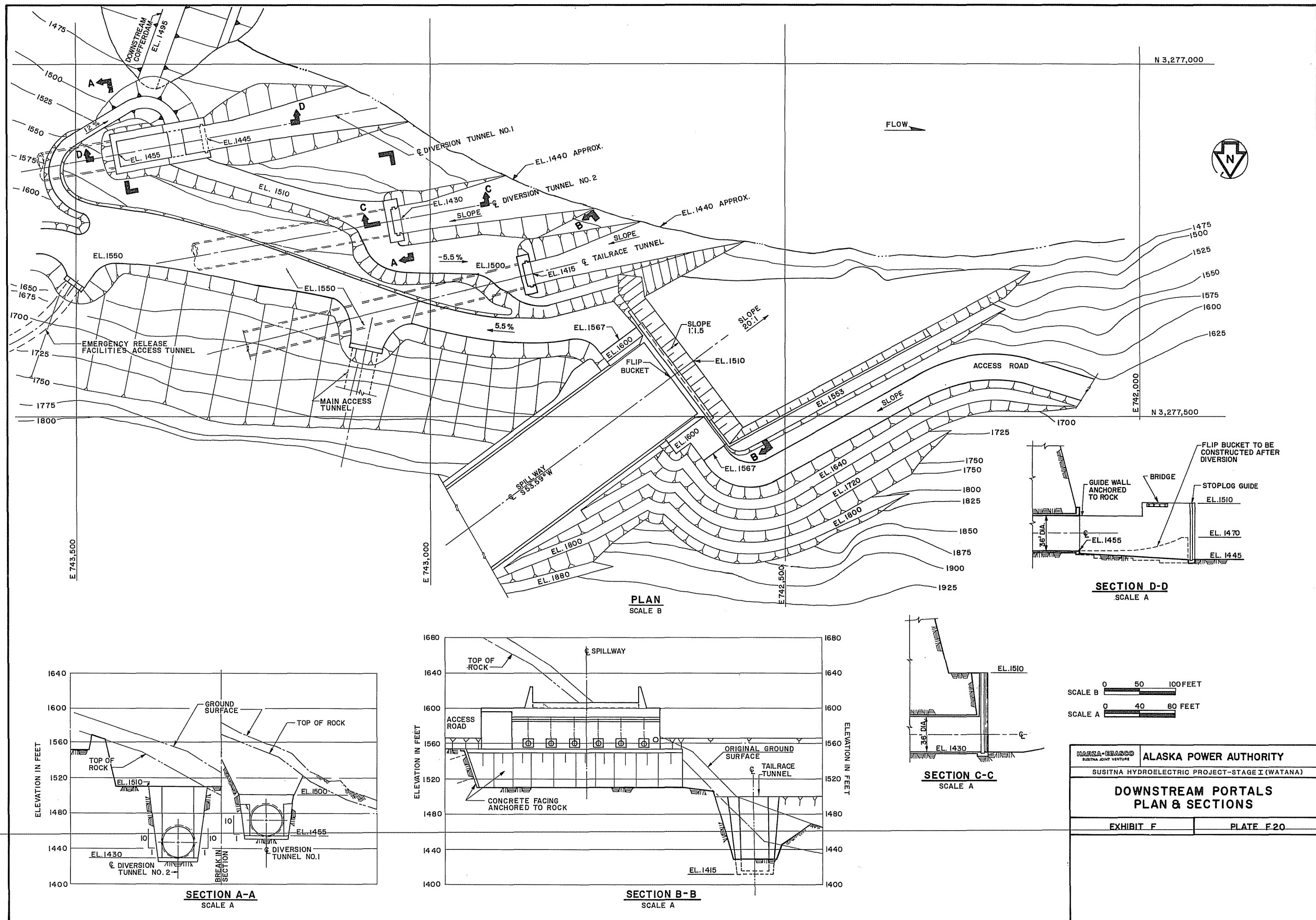


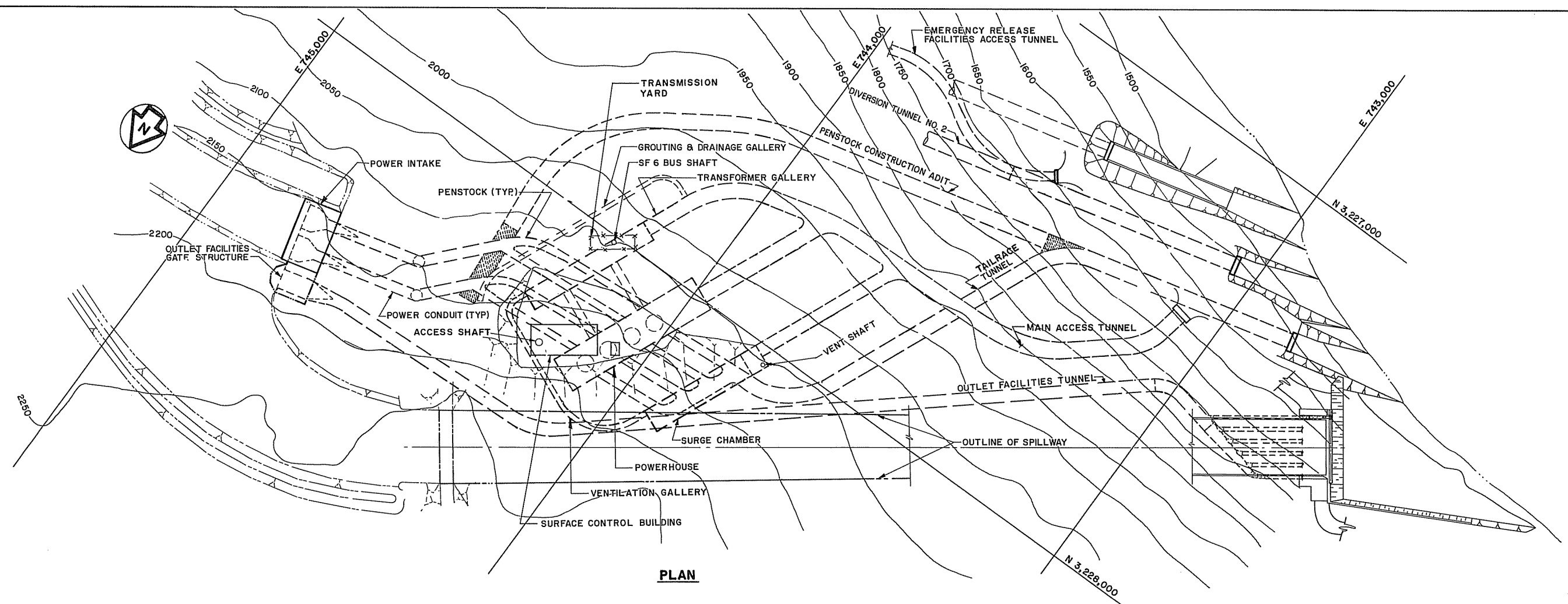
SECTION E-E
SCALE B

SECTION F-F
SCALE B

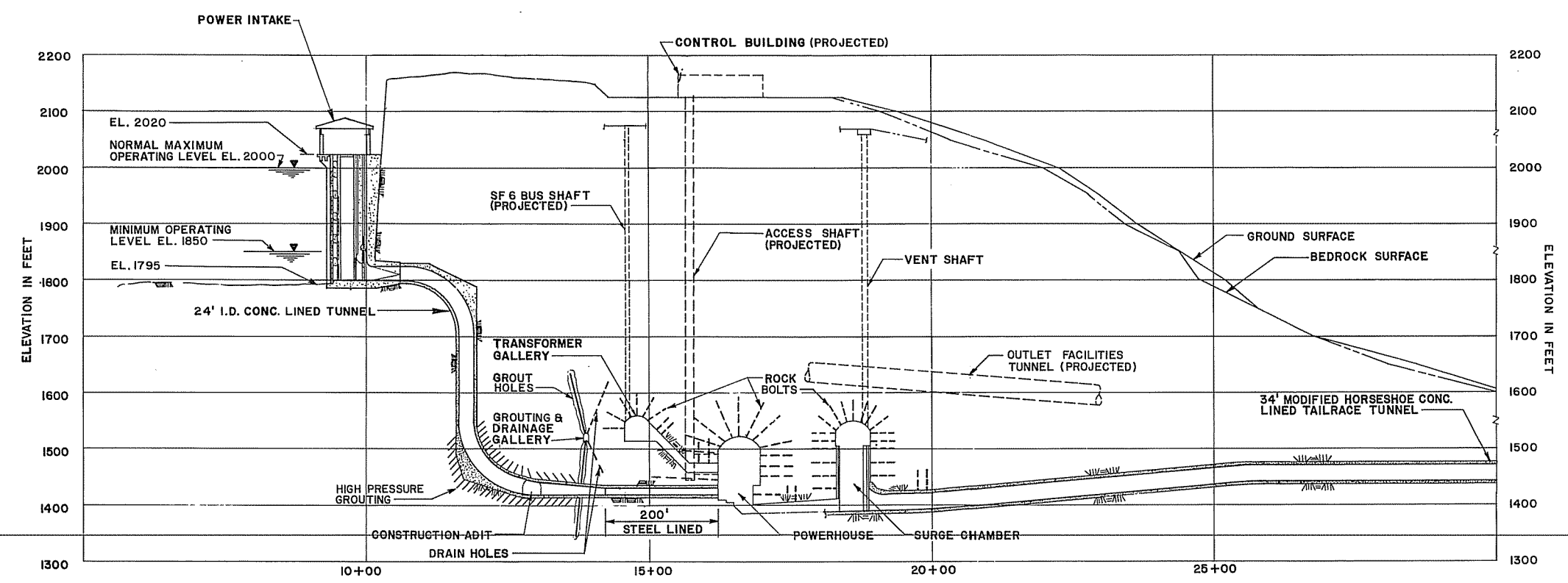


HARZA-EDASCO SUSITNA JOINT VENTURE		ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)			
EMERGENCY RELEASE FACILITIES SECTIONS			
EXHIBIT F		PLATE F-19	

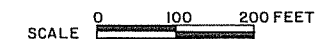




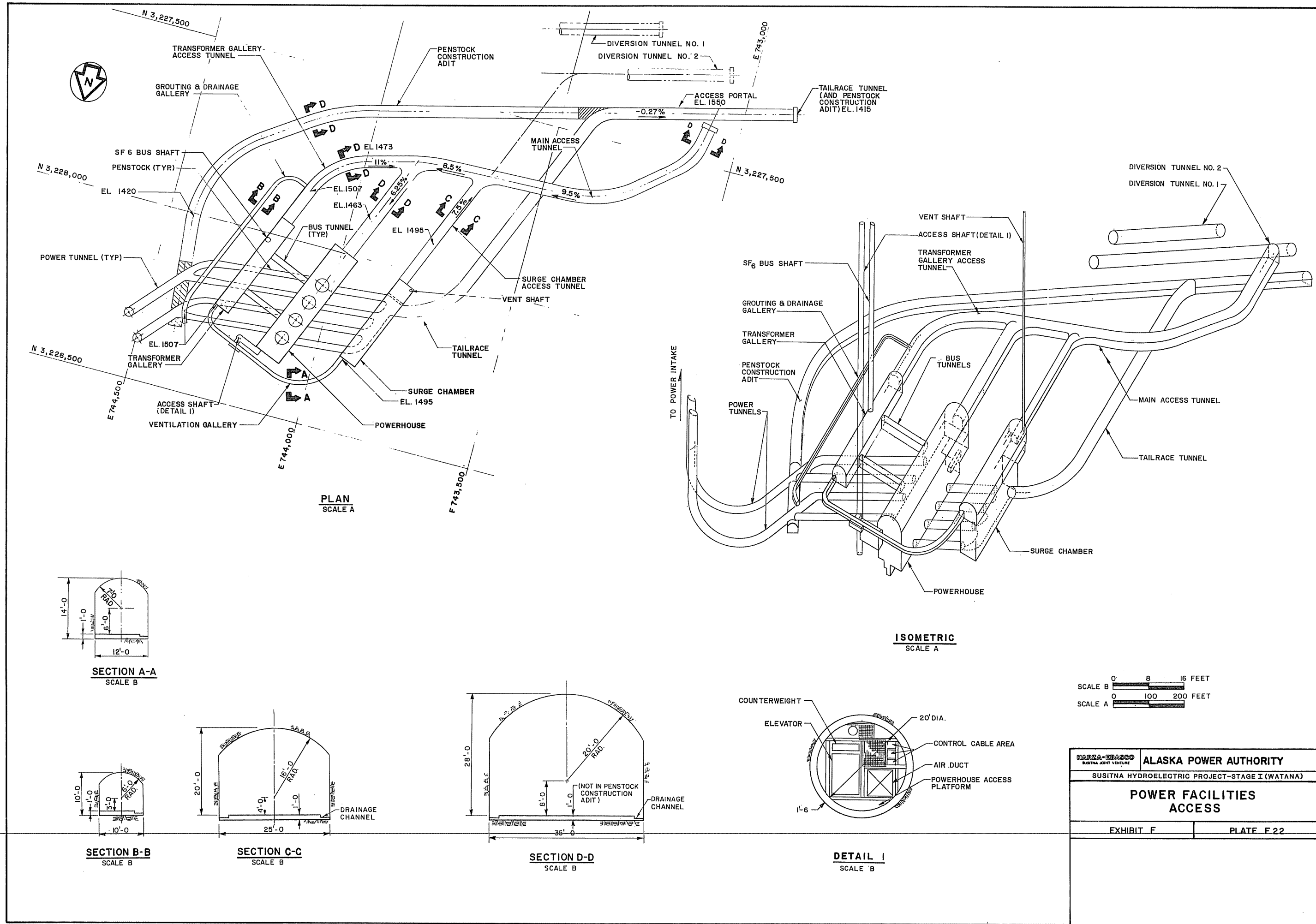
PLAN

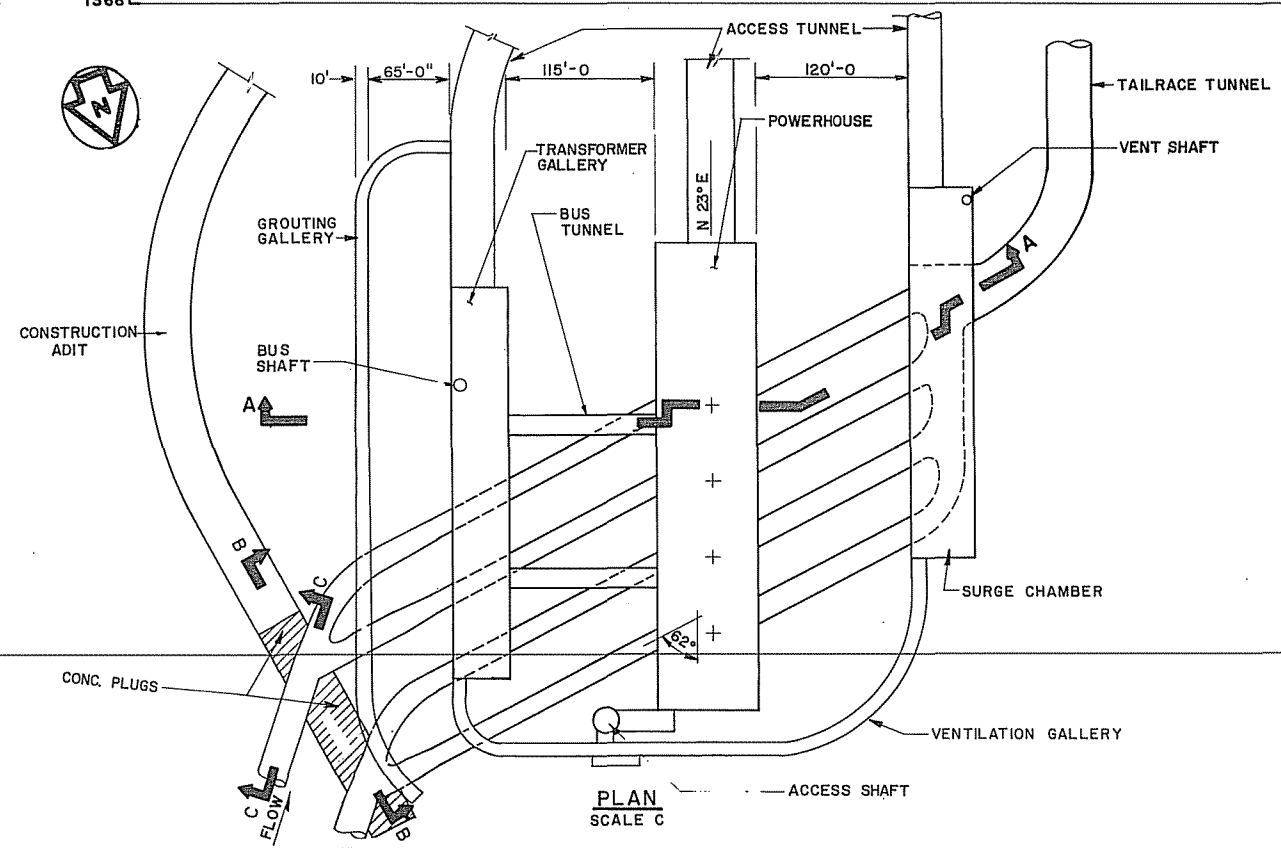
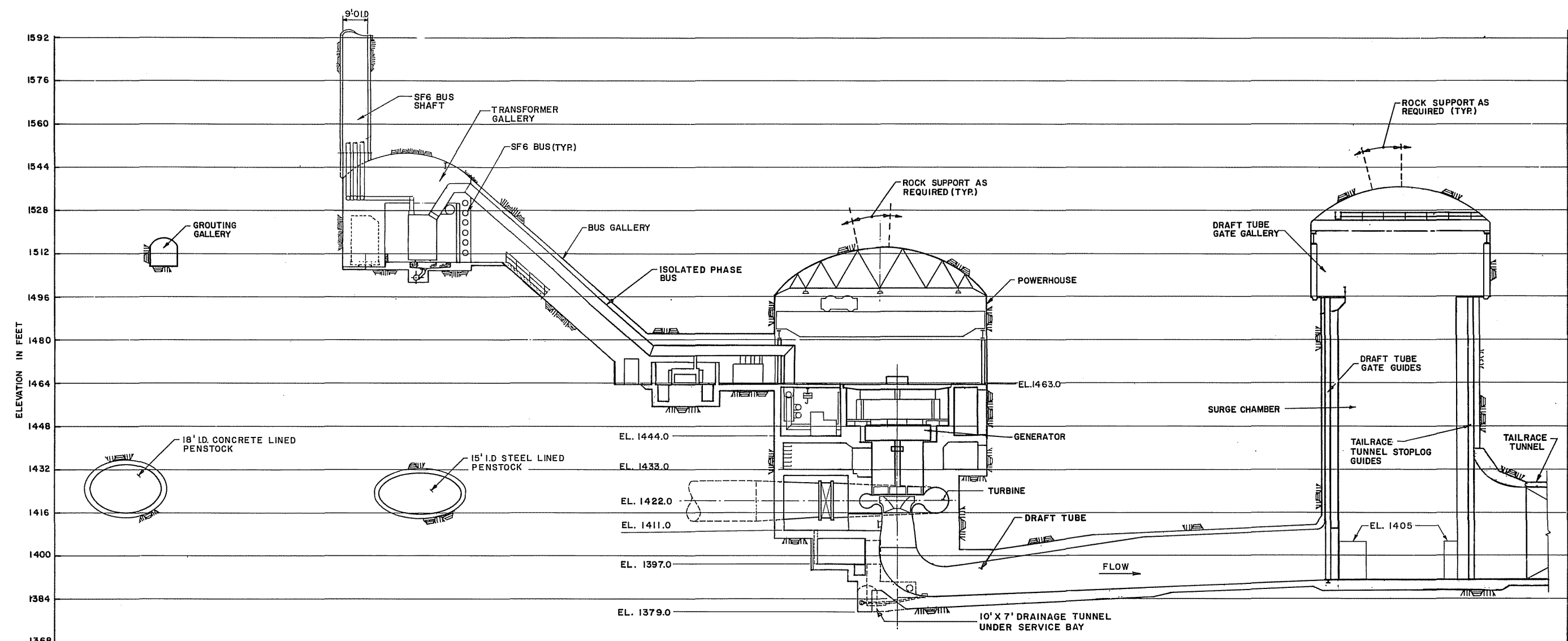


PROFILE

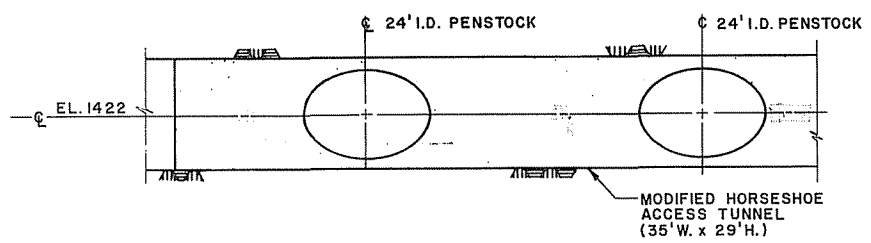


HANZA-EDASCO® SUSITNA JOINT VENTURE		ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)			
POWER FACILITIES GENERAL ARRANGEMENT			
EXHIBIT F		PLATE F-21	

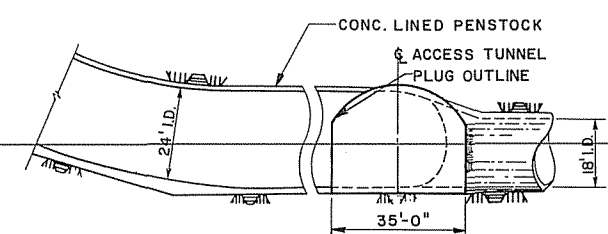




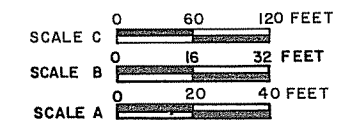
SECTION THRU CENTERLINE OF UNIT
SECTION A-A
SCALE B



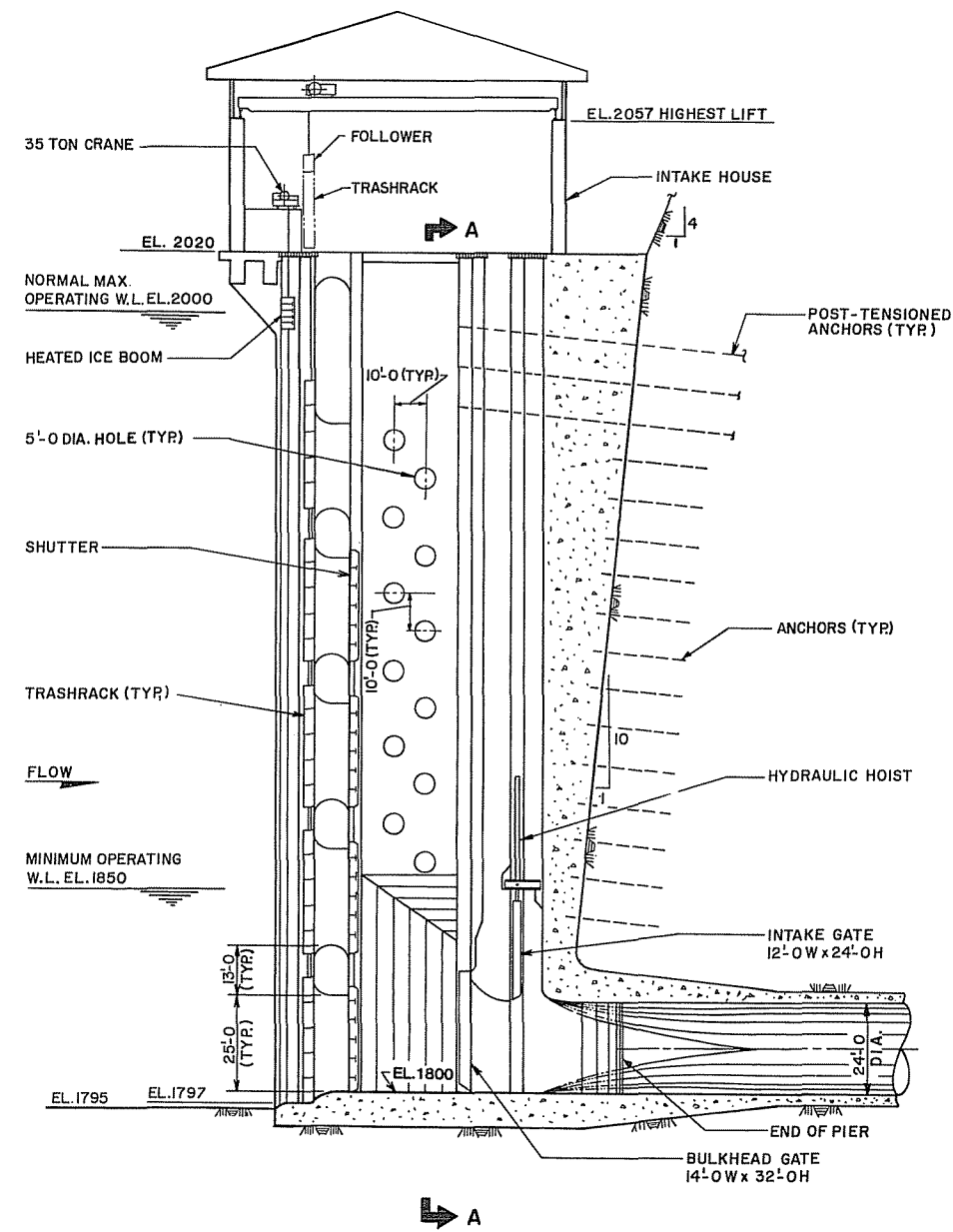
SECTION B-B
SCALE A



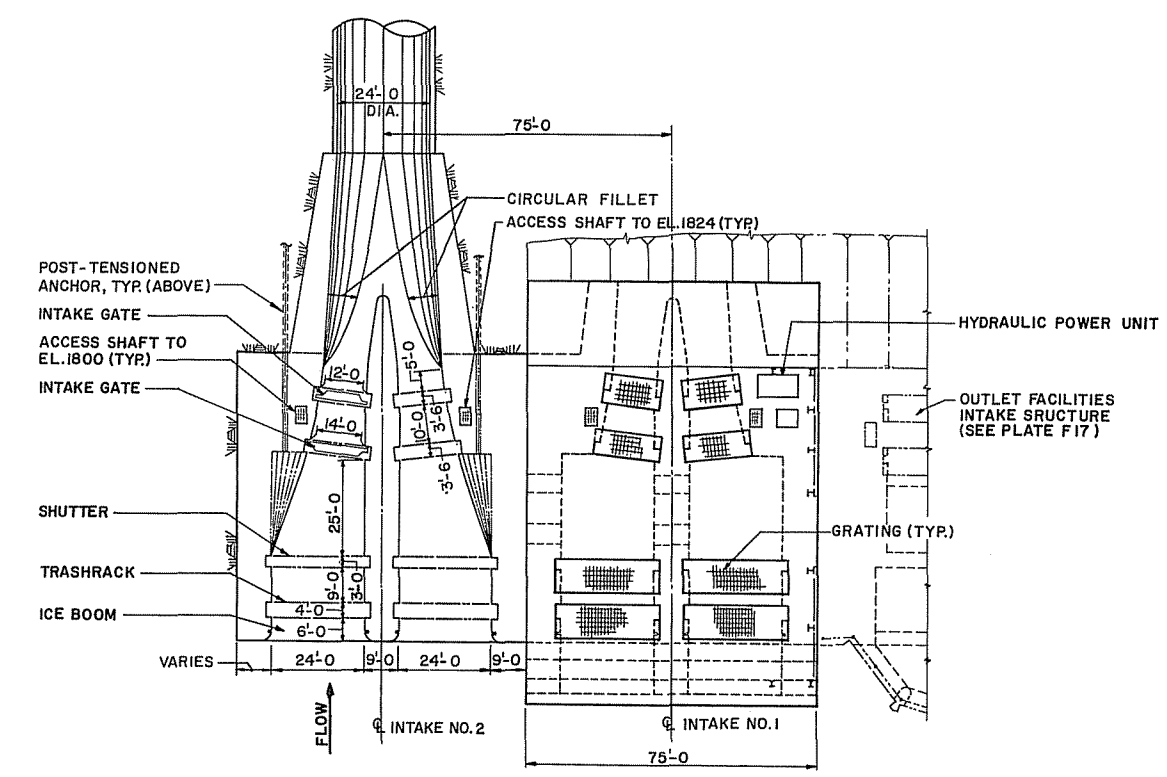
SECTION C-C
SCALE A



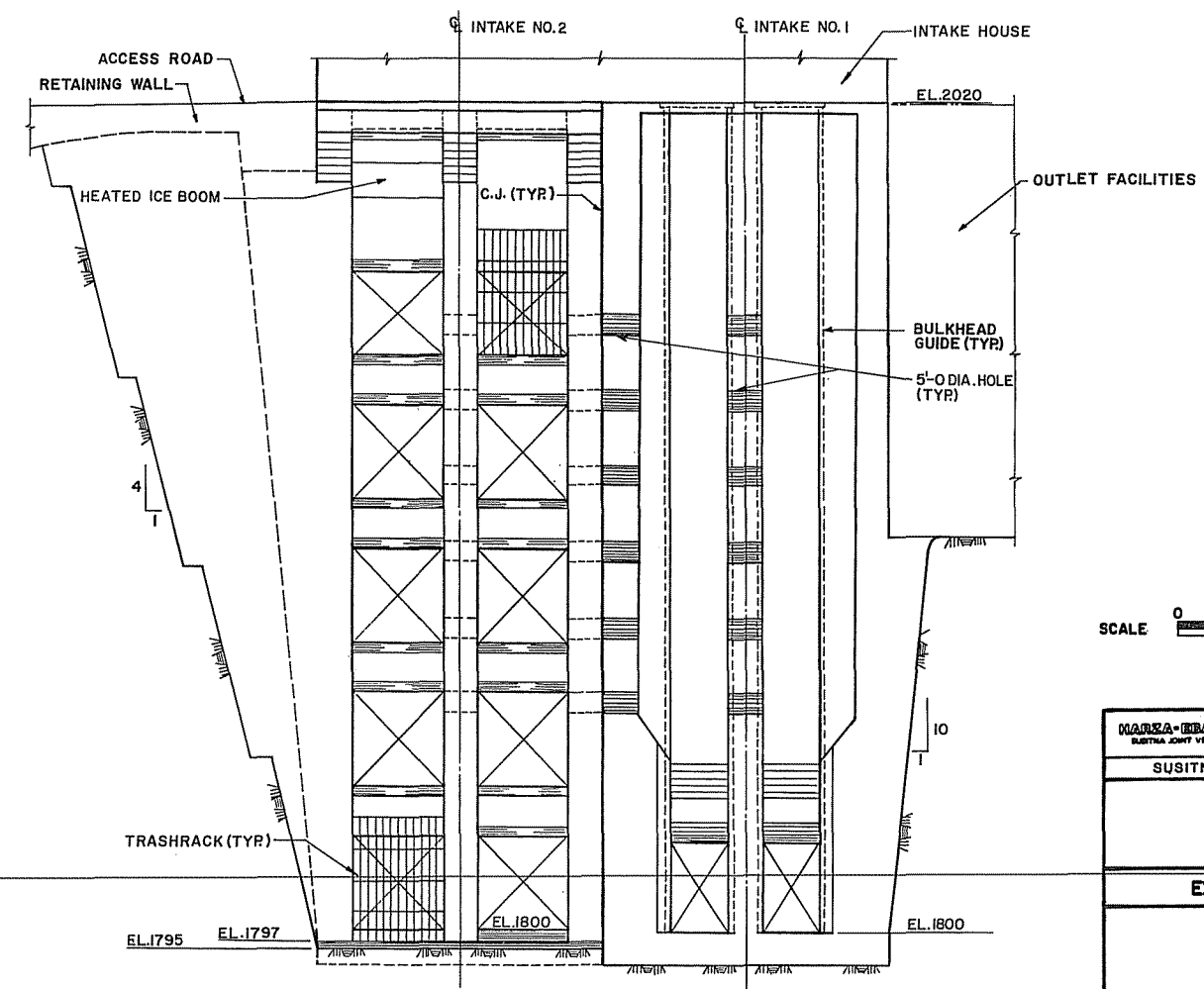
HANZA-GRACE® SUSITNA JOINT VENTURE		ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)			
POWER FACILITIES PLAN & SECTIONS			
EXHIBIT F		PLATE F 23	



SECTION THROUGH POWER INTAKE



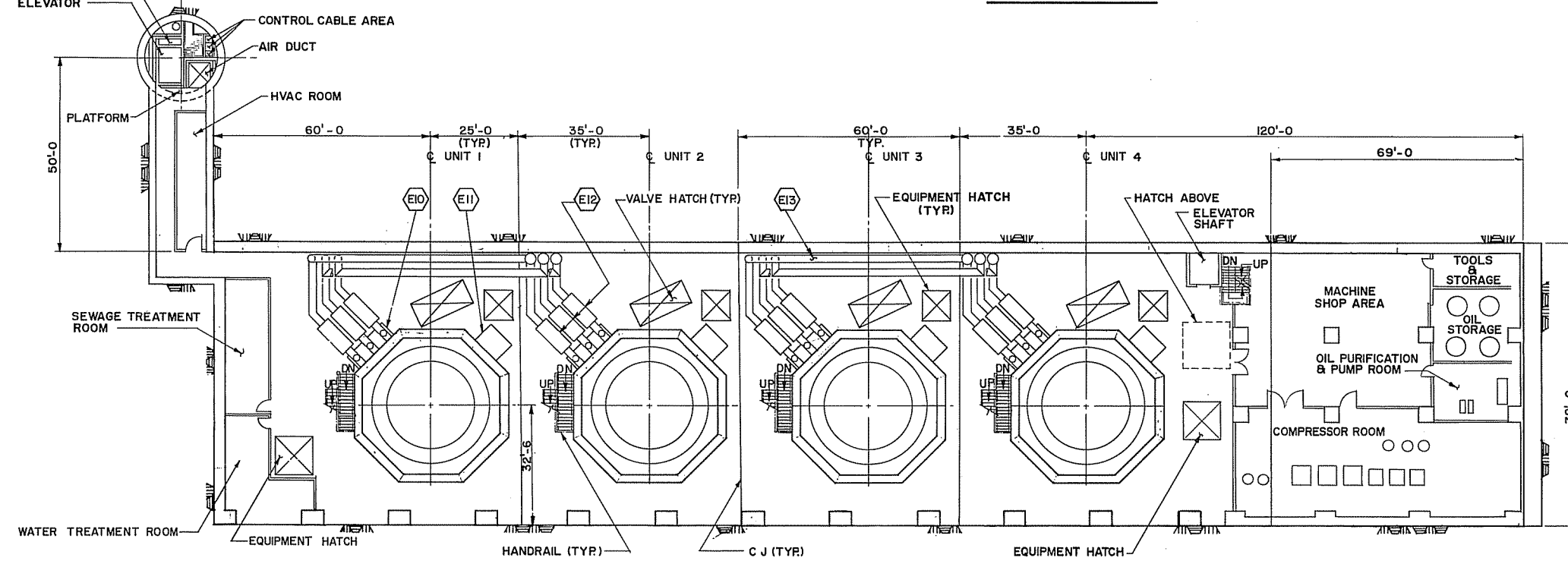
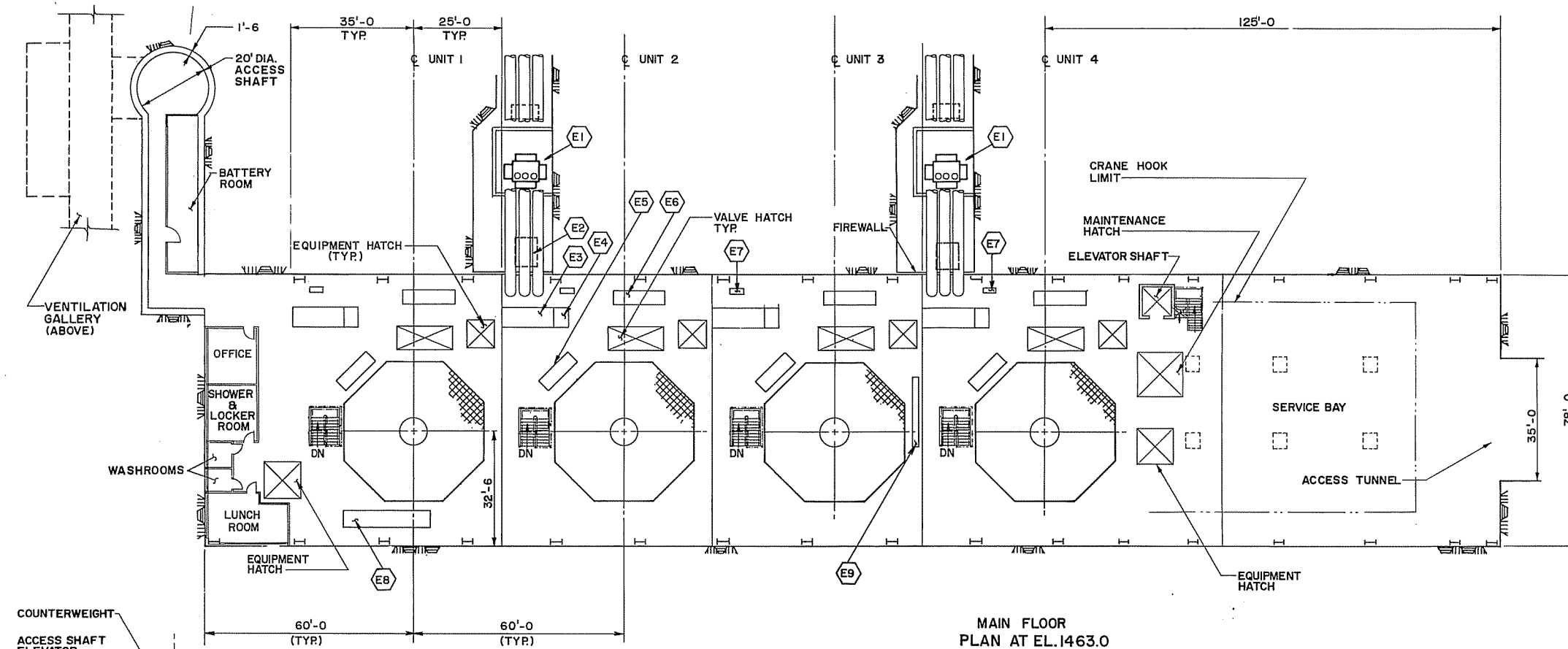
PLAN AT EL. 1812 PLAN AT EL. 2020



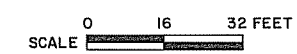
ELEVATION SECTION A-A

SCALE 0 20 40 FEET

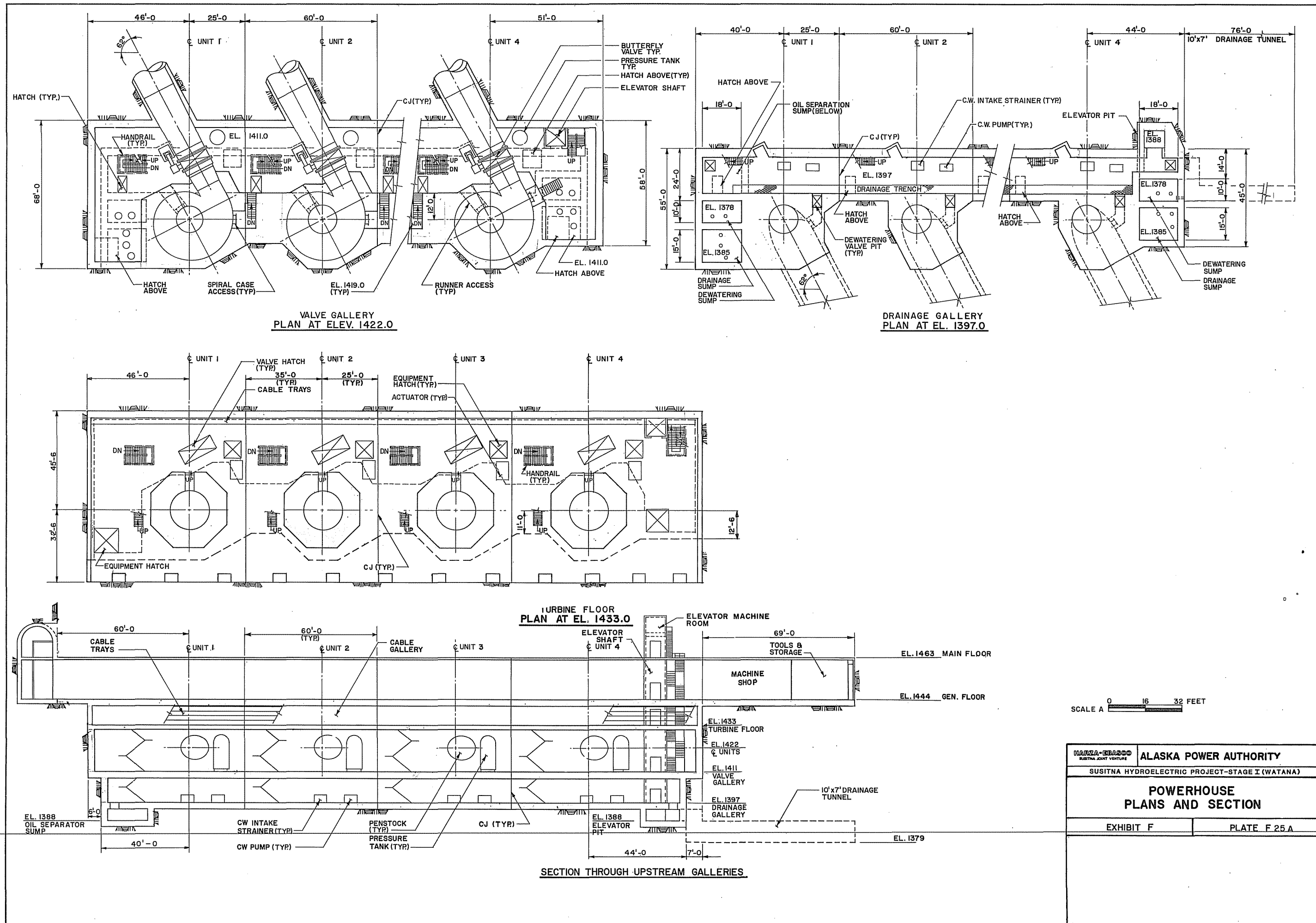
MARZA-TRASSCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)	
POWER INTAKE SECTIONS	
EXHIBIT F	PLATE F24

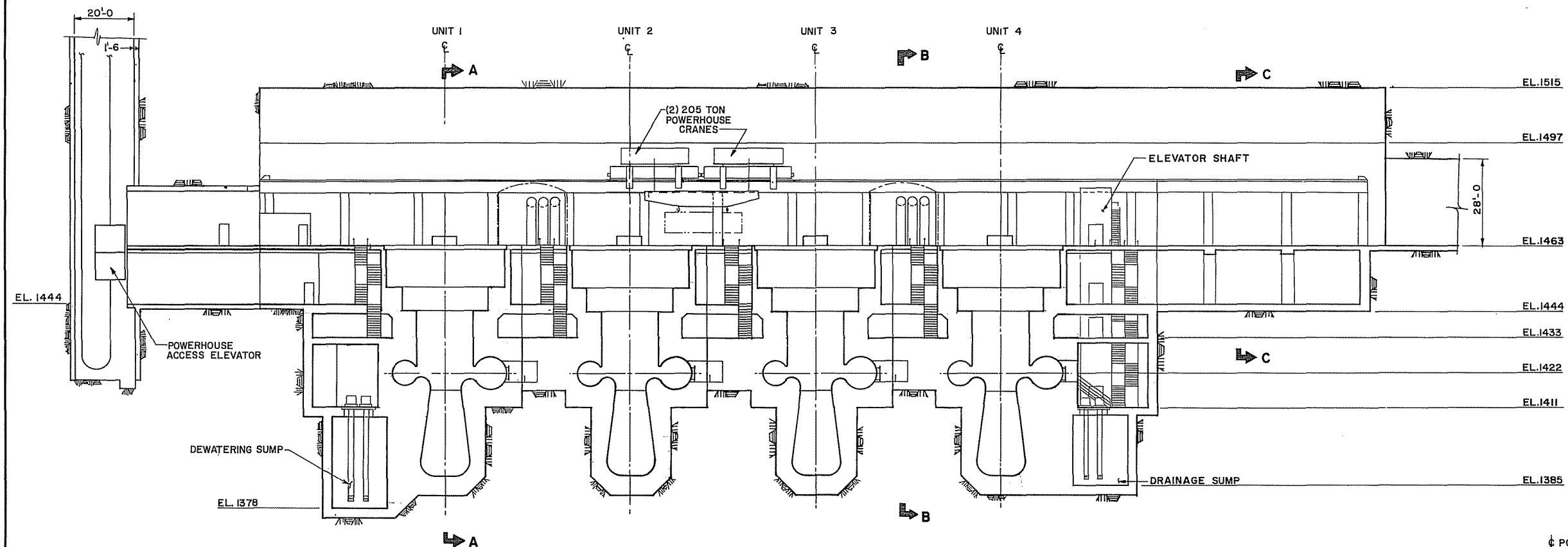


- LEGEND**
- E1 AUXILIARY SERVICE TRANSFORMER 7.5/10MVA
 - E2 AUXILIARY SERVICE TRANSFORMER 2 MVA (TYP)
 - E3 UNIT CONTROL SWITCH BOARD (TYP)
 - E4 GOVERNOR-ELECT CUBICLE (TYP)
 - E5 EXCITATION TRANSFORMER (TYP)
 - E6 EXCITATION CUBICLES (TYP)
 - E7 480V PDP (TYP)
 - E8 STATION SERVICE SWITCHGEAR (480V)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

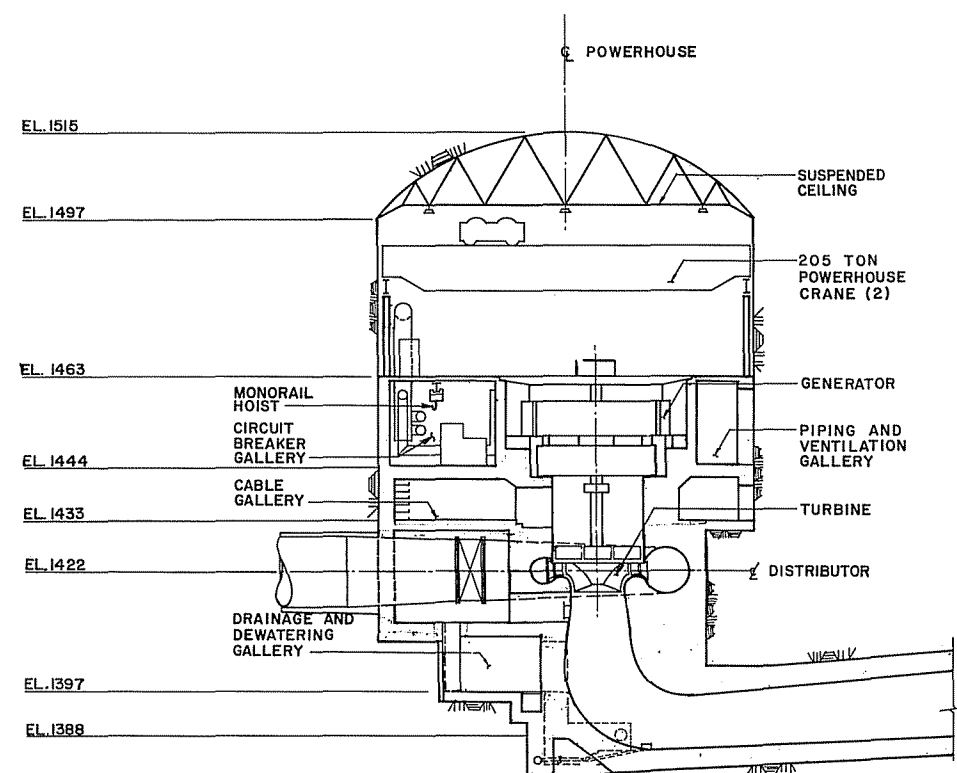


HARZA-ENESCO SUSITNA JOINT VENTURE		ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)			
POWERHOUSE PLANS			
EXHIBIT F		PLATE F 25	

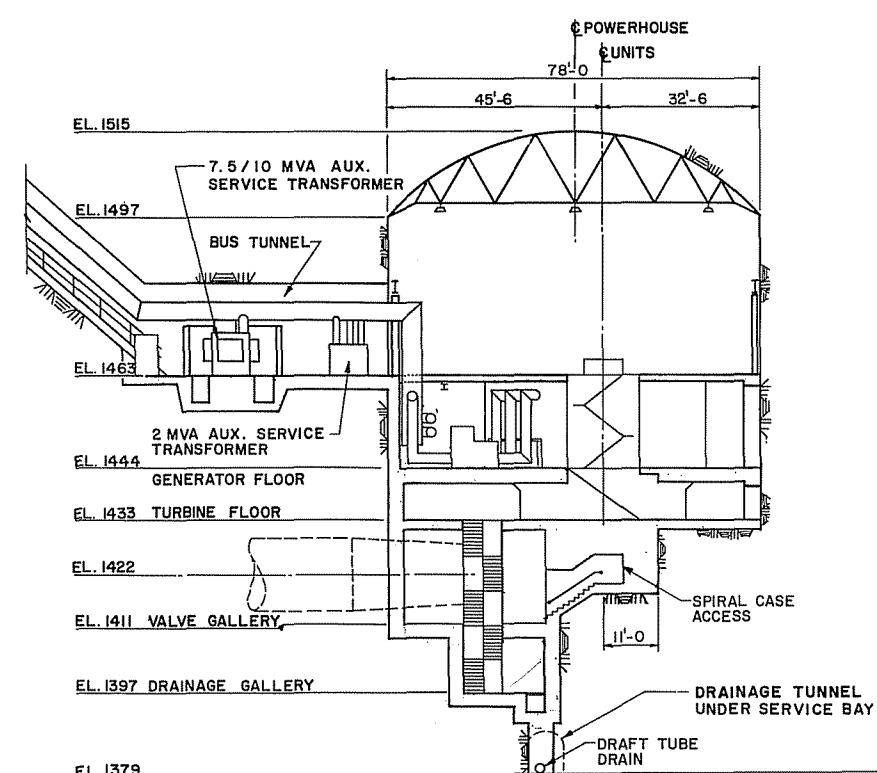




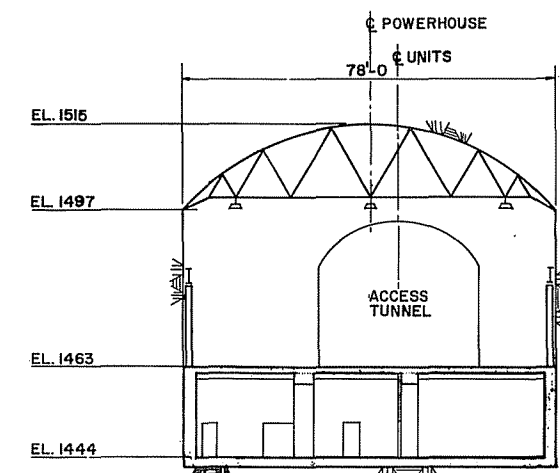
LONGITUDINAL SECTION (THRU CENTERLINE OF UNITS, UNITS NOT SHOWN)



SECTION A-A (SECTION THRU CENTERLINE OF UNIT)



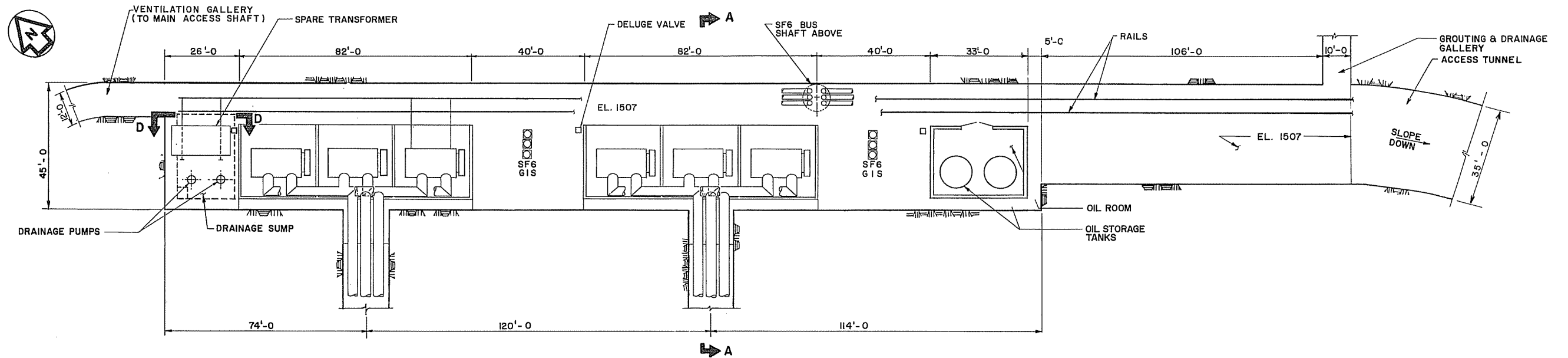
SECTION B-B (SECTION THRU BUS TUNNEL)



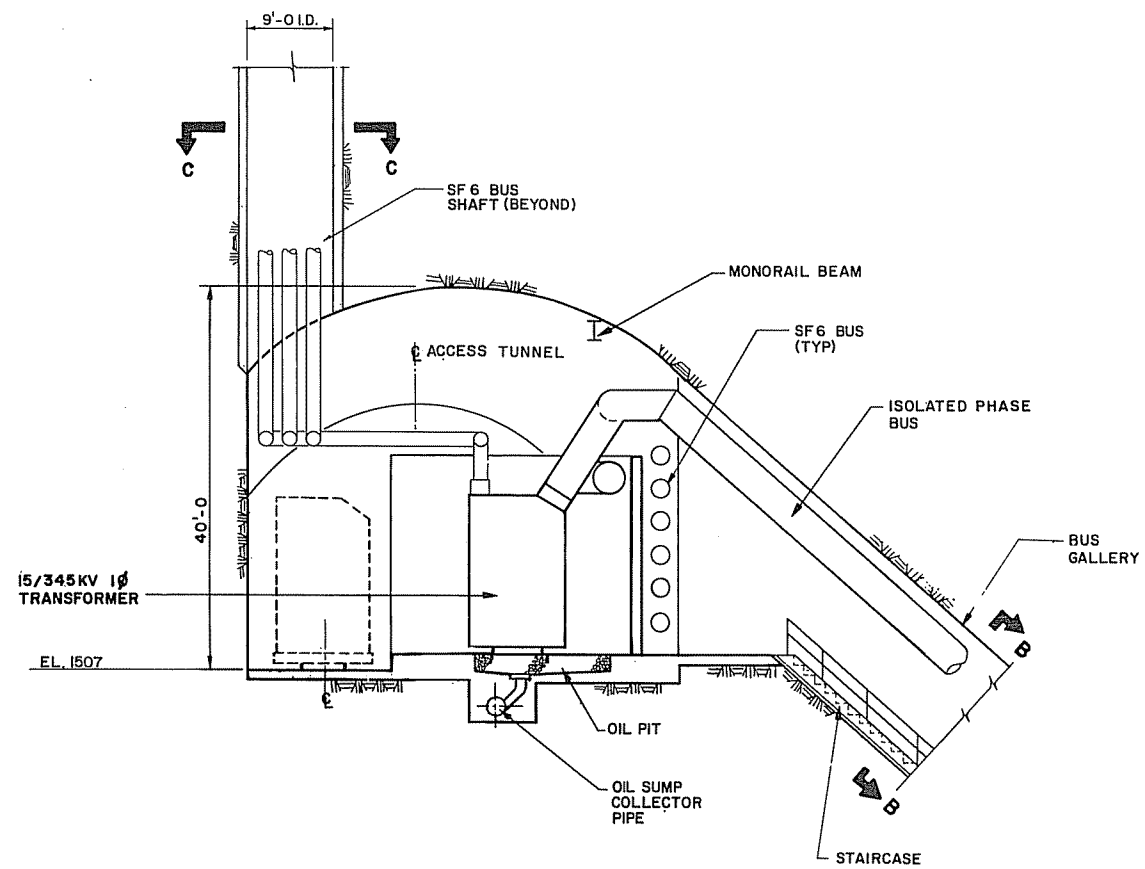
SECTION C-C
SECTION THRU SERVICE BAY

SCALE 0 16 32 FEET

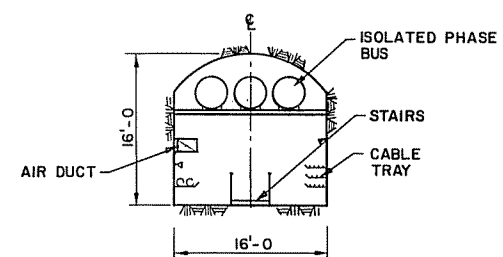
HARZA-EDSCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)	
POWERHOUSE SECTIONS	
EXHIBIT F	PLATE F 26



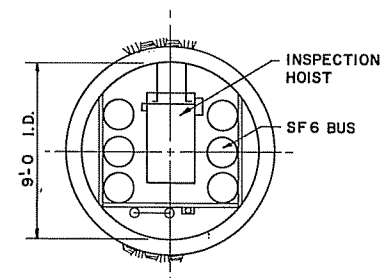
PLAN
SCALE A



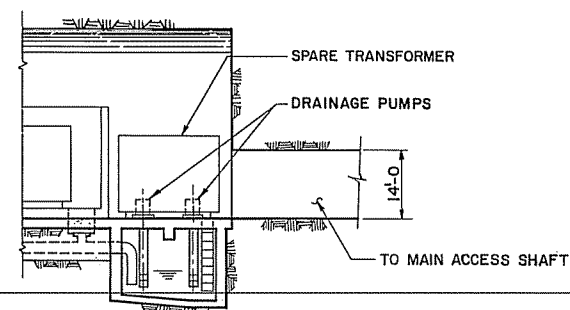
SECTION A-A
SCALE B



SECTION B-B
THROUGH BUS GALLERY
SCALE B



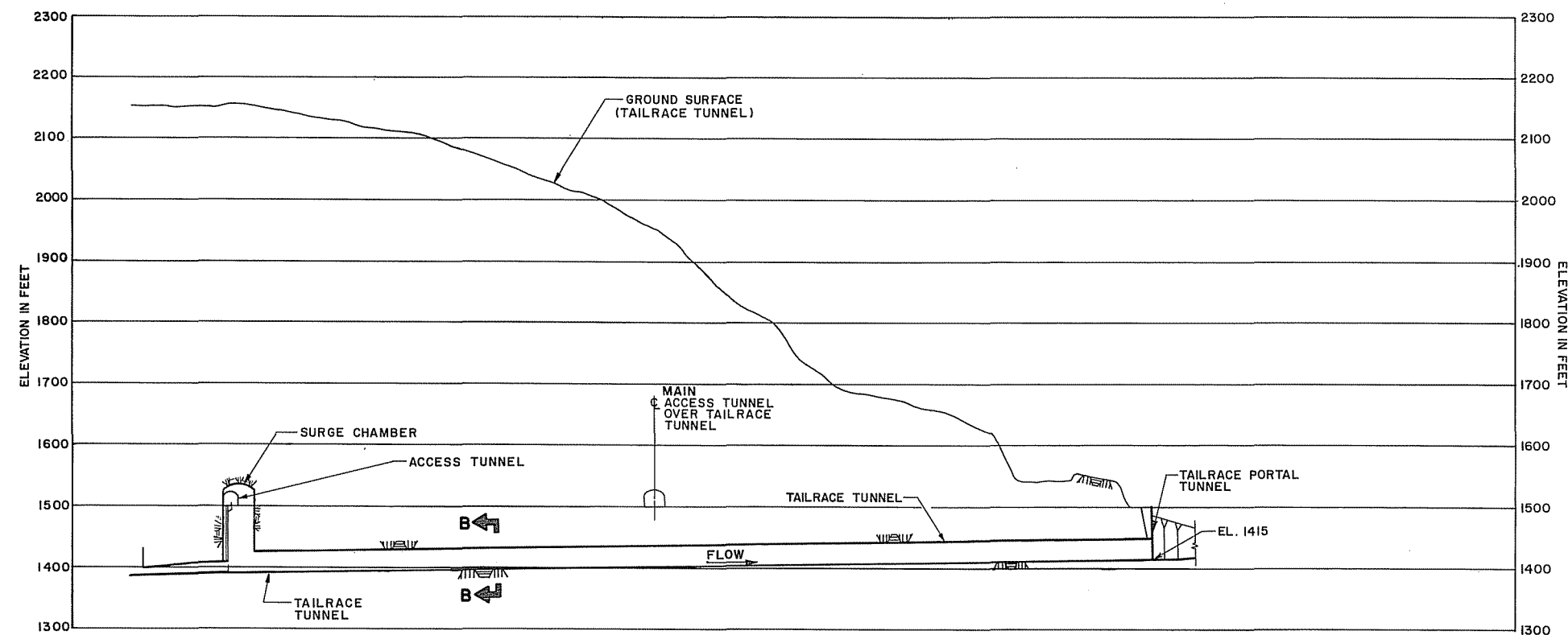
SECTION C-C
THROUGH BUS SHAFT
SCALE C



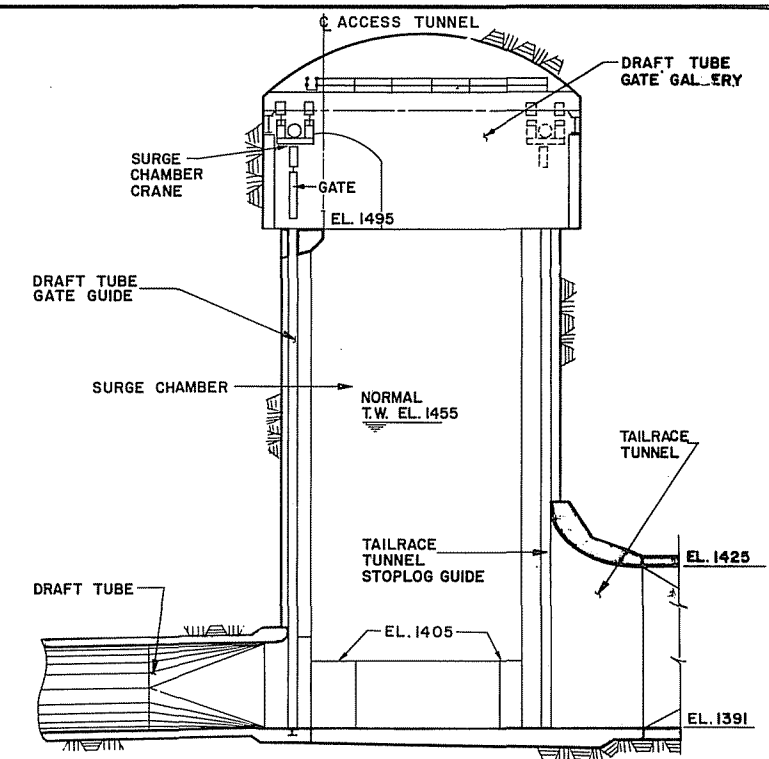
SECTION D-D
THROUGH SUMP
SCALE A

SCALE C 0 4 8 FEET
SCALE B 0 8 16 FEET
SCALE A 0 16 32 FEET

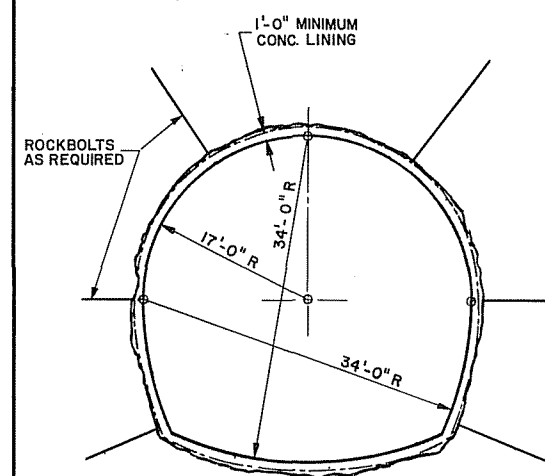
HANZA-ELASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)	
TRANSFORMER GALLERY PLAN & SECTIONS	
EXHIBIT F	PLATE F-27



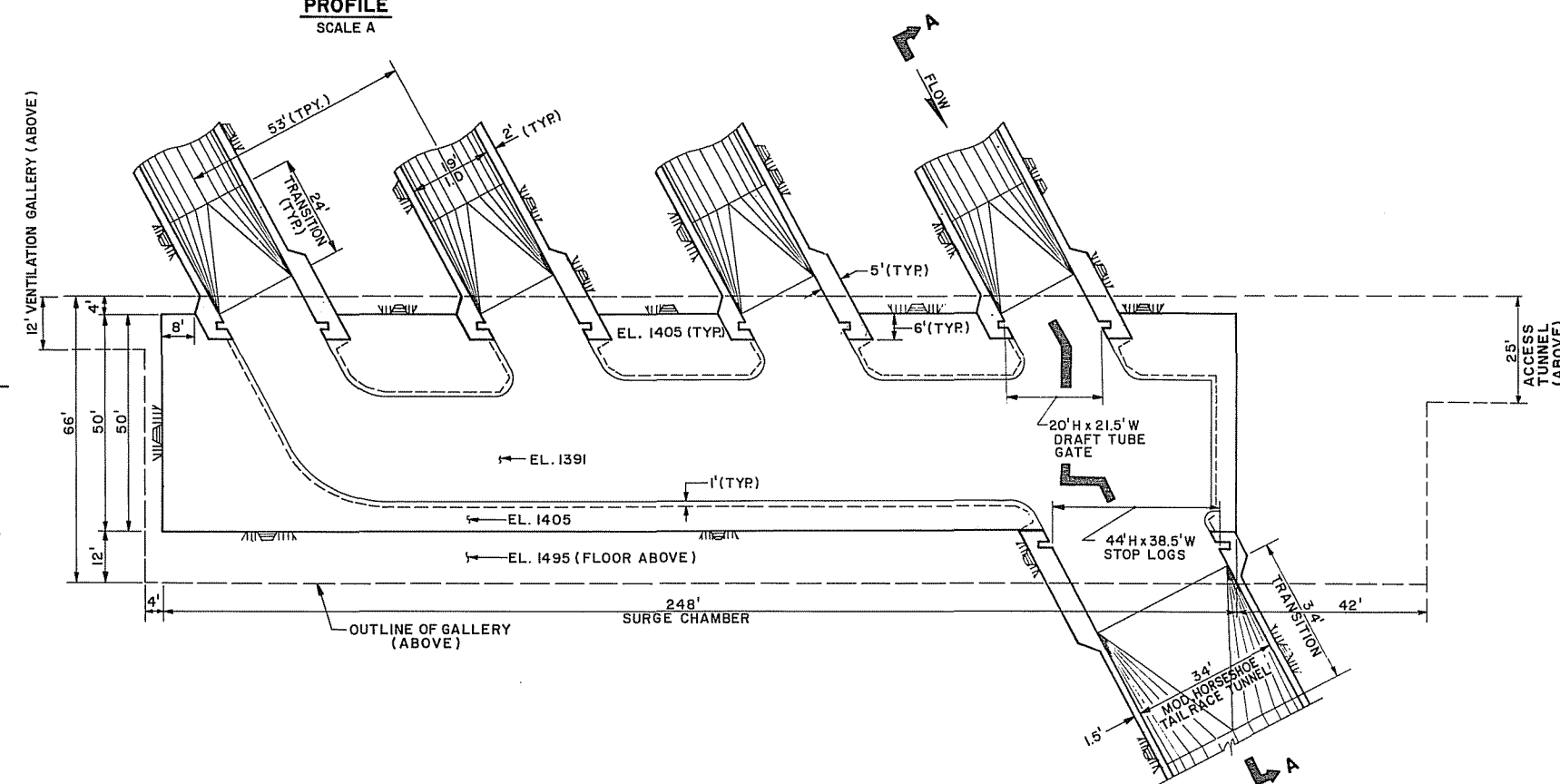
PROFILE
SCALE A



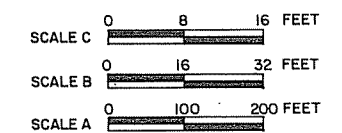
SECTION A-A
SCALE B



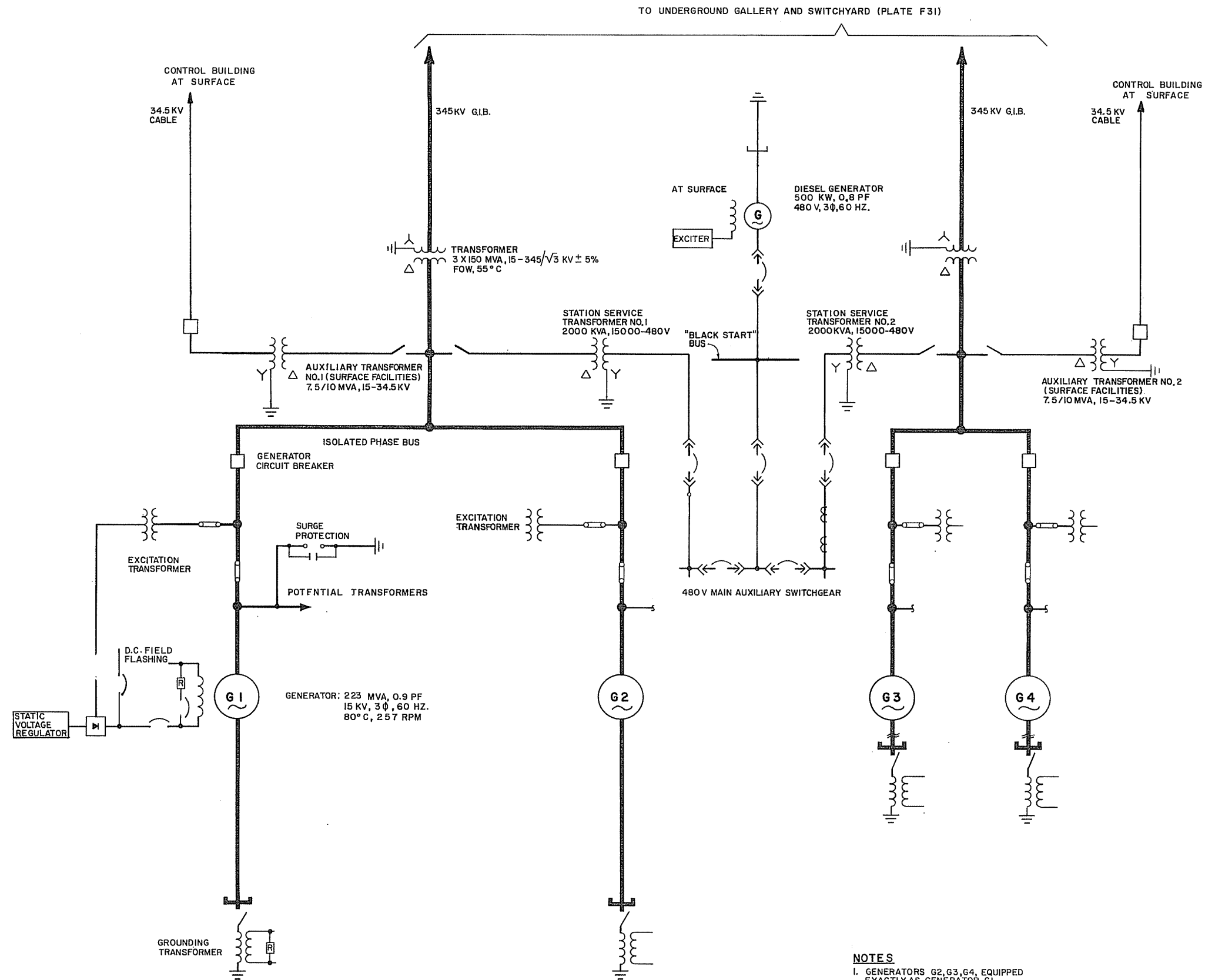
SECTION B-B
CONCRETE LINED TAILRACE TUNNEL
SCALE C



SECTIONAL PLAN
SCALE B

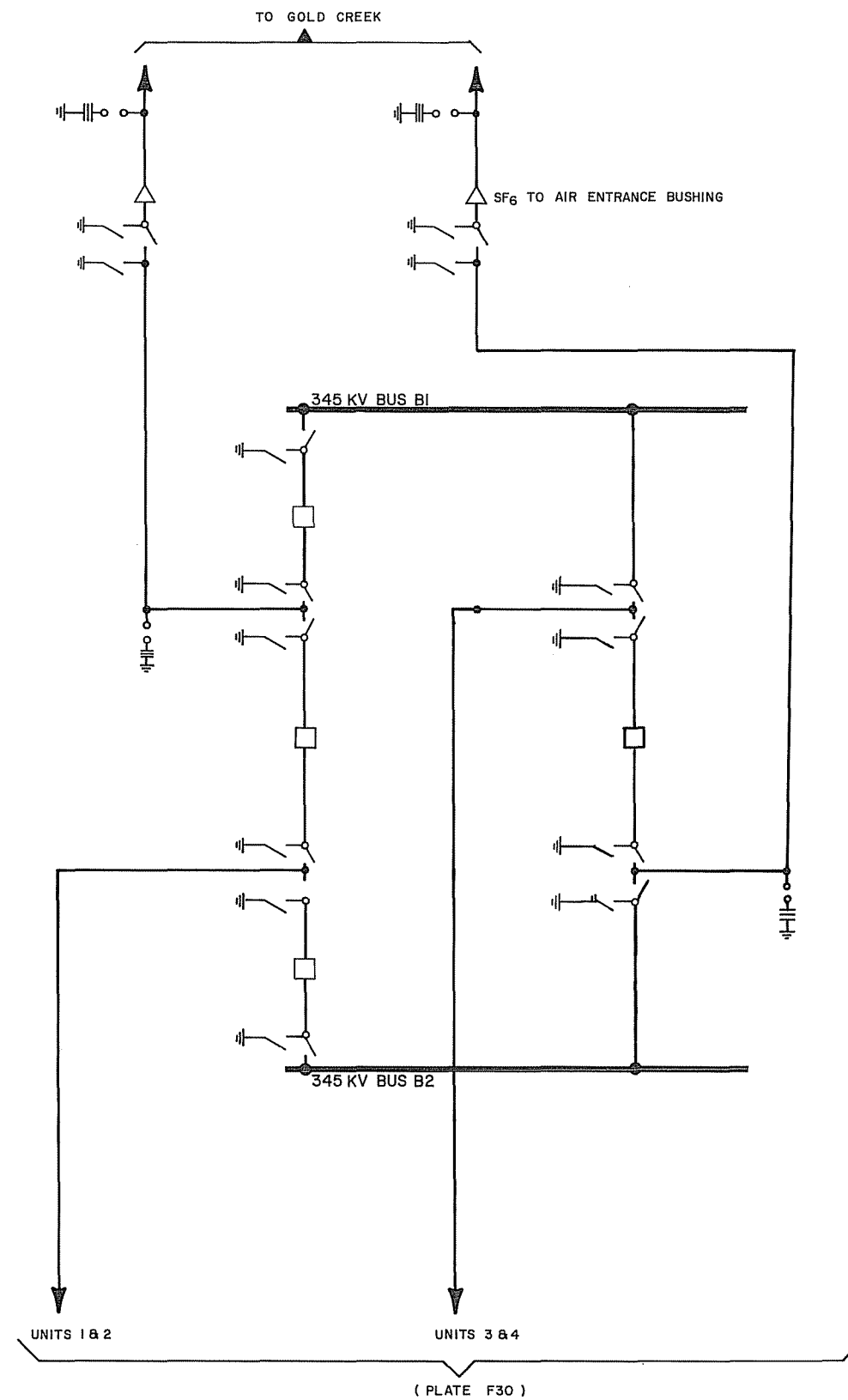


HARZA-EDASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)	
SURGE CHAMBER AND TAILRACE SECTIONS	
EXHIBIT F	PLATE F-28



- NOTES**
1. GENERATORS G2, G3, G4, EQUIPPED EXACTLY AS GENERATOR G1.
 2. SYMBOLS SHOWN ON F31

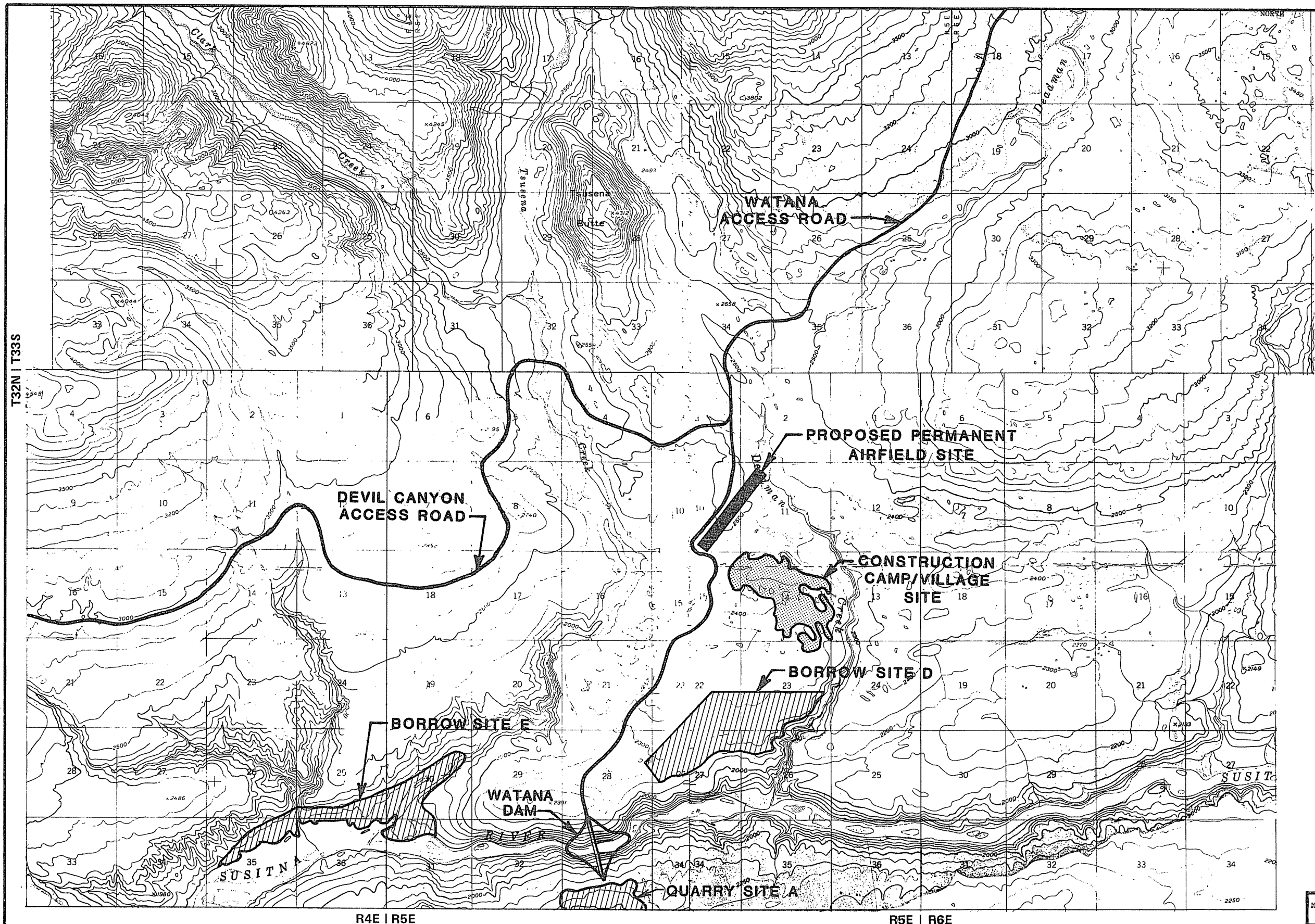
HARZA-EBASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)	
POWERHOUSE SINGLE LINE DIAGRAM	
EXHIBIT F	PLATE F30



LEGEND

	AC GENERATOR, 3 PHASE, 60 HZ, 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
	PROTECTIVE RELAY 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
	COUPLING CAPACITOR VOLTAGE TRANSFORMER
	RECTIFIER
G.I.S.	GAS-INSULATED SWITCHGEAR
G.I.B.	GAS-INSULATED BUS

MANZA-ERASSO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)	
345 KV UNDERGROUND SWITCHYARD SINGLE LINE DIAGRAM	
EXHIBIT F	PLATE F 31



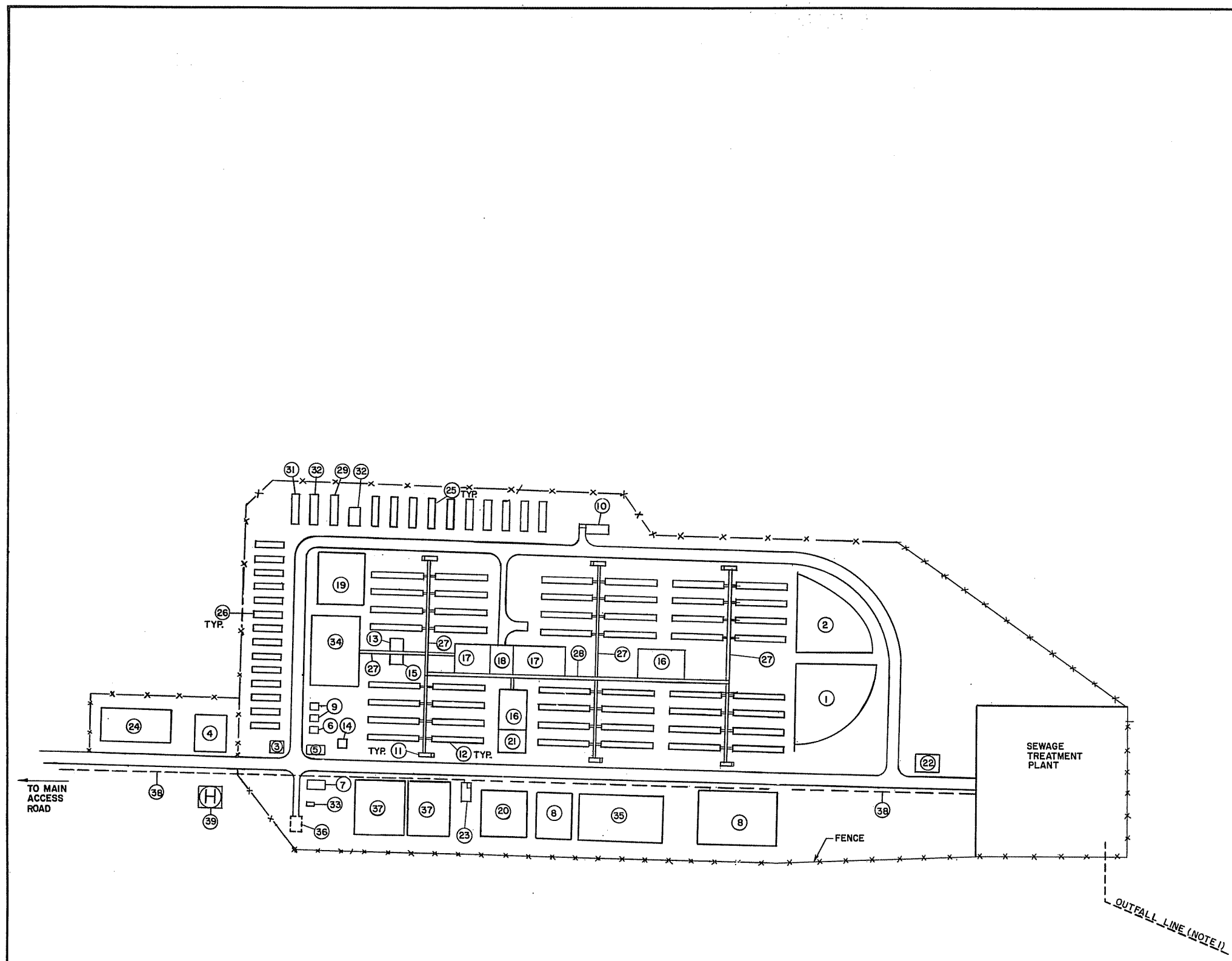
LEGEND

-  CAMP/VILLAGE
-  AIRFIELD
-  ACCESS ROAD
-  BORROW AREAS

MANZA-ERASSO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)	
GENERAL LAYOUT SITE FACILITIES	
EXHIBIT F	PLATE F 34



Scale 1 0 1 Mile

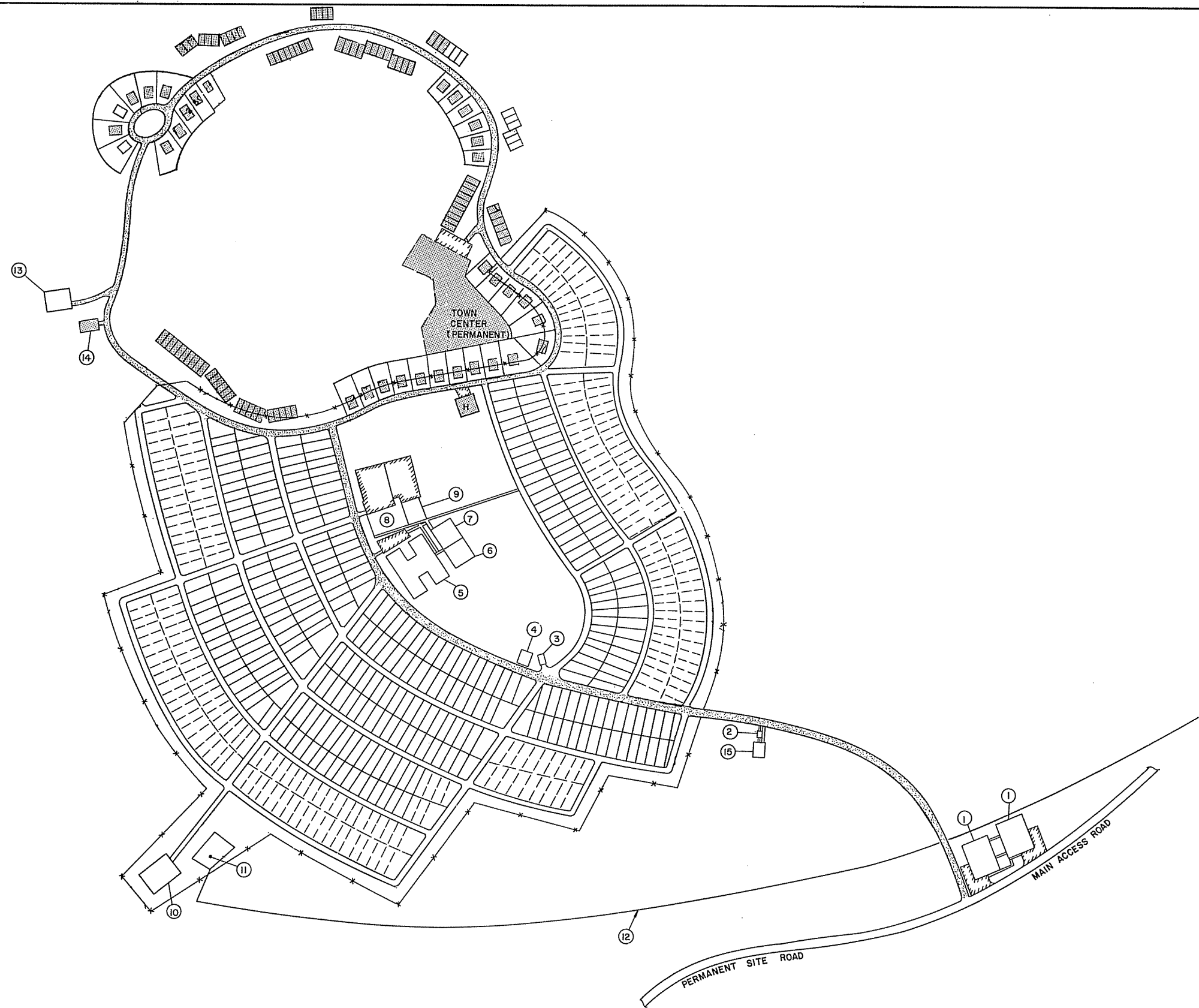


- LEGEND**
- ① BASEBALL
 - ② SOFTBALL
 - ③ SECURITY
 - ④ HOSPITAL
 - ⑤ FIRE & OIL SPILL
 - ⑥ CAMP MANAGER'S OFFICE
 - ⑦ SOILS LAB
 - ⑧ PARKING AREAS
 - ⑨ ADMINISTRATION OFFICES
 - ⑩ STORE
 - ⑪ BUS SHELTERS
 - ⑫ DORMITORIES
 - ⑬ LAUNDRY
 - ⑭ COMMUNICATIONS CTR.
 - ⑮ BANK
 - ⑯ RECREATION HALL
 - ⑰ KITCHEN & DINING
 - ⑱ FOOD SERVICE WAREHOUSE
 - ⑲ WAREHOUSE
 - ⑳ GYMNASIUM
 - ㉑ SWIMMING POOL
 - ㉒ MAINTENANCE GARAGE
 - ㉓ PUMP HOUSE (WATER)
 - ㉔ HOCKEY RINK
 - ㉕ BACHELOR DORMS MGMT. TYPE A
 - ㉖ BACHELOR DORMS MGMT. TYPE B
 - ㉗ 10' PERMAWALK
 - ㉘ 16' PERMAWALK
 - ㉙ MANAGER'S GUEST HOUSE
 - ㉚ OWNER'S GUEST HOUSE
 - ㉛ CONTRACTOR'S GUEST HOUSE
 - ㉜ STAFF CLUBHOUSE
 - ㉝ GENERATING STATION
 - ㉞ RELOCATED CAMP HOUSING (160 SPACES)
 - ㉟ FOOTBALL FIELD
 - ㊱ FUEL STORAGE TANK
 - ㊲ WATER RESERVOIR
 - ㊳ UTILIDOR
 - ㊴ HELIPAD

NOTE
 I. OUTFALL LINE LOCATION AND ORIENTATION WOULD BE SITUATED DOWNSLOPE AND DEPEND UPON TOPOGRAPHY

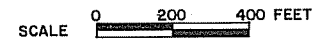
SCALE 0 200 400 FEET

HANZA-ELASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)	
CONSTRUCTION CAMP GENERAL PLAN	
EXHIBIT F	PLATE F36

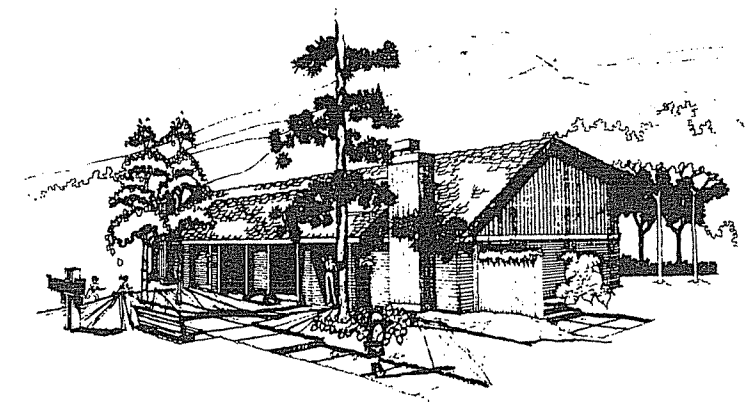
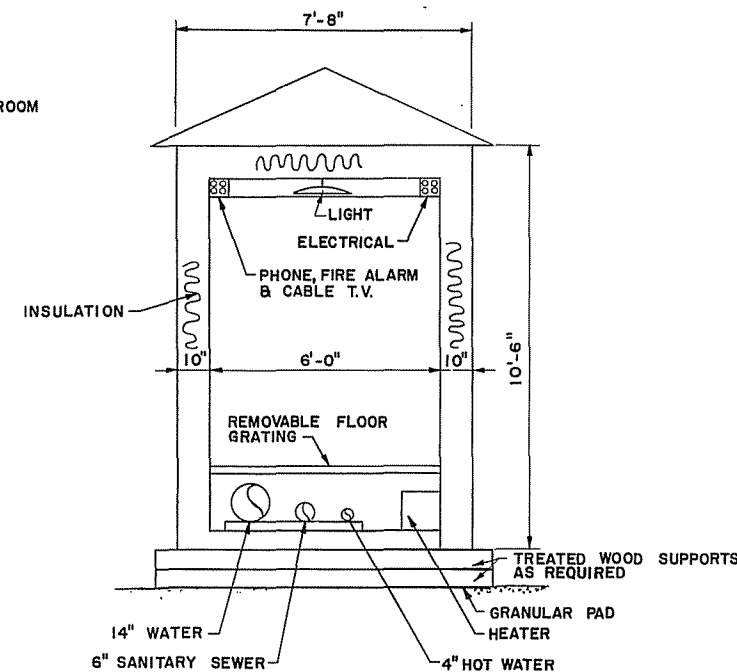
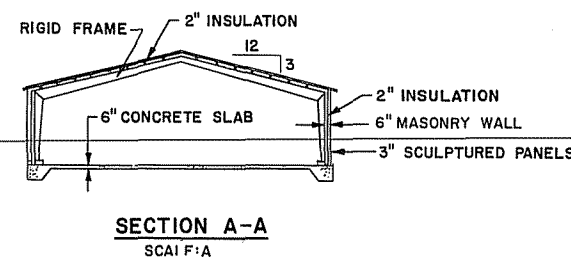
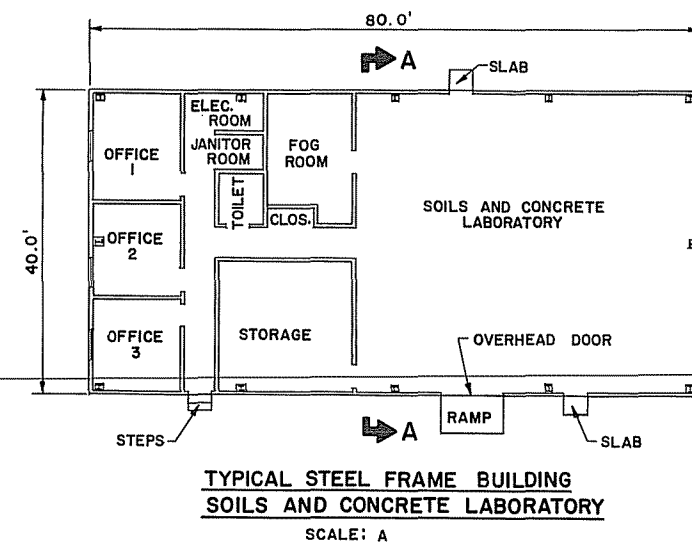
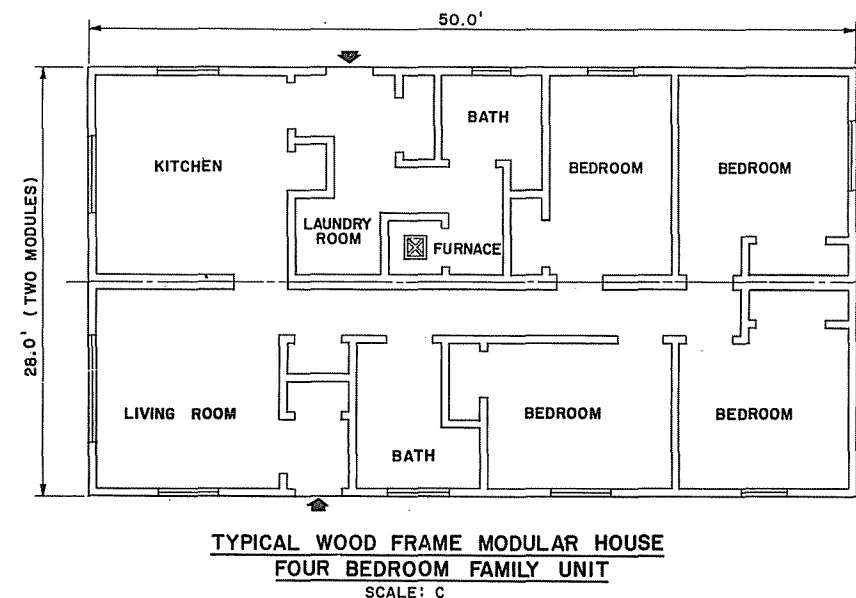
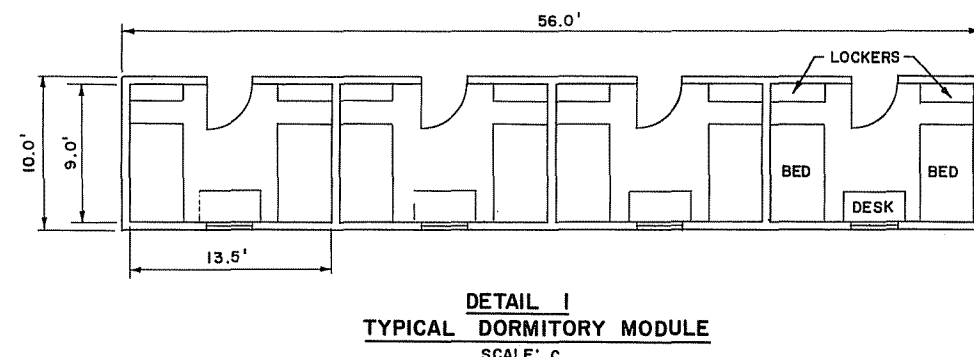
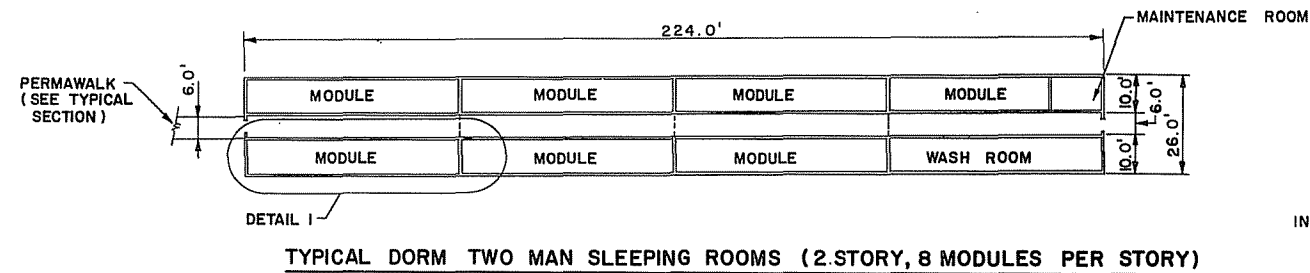


LEGEND

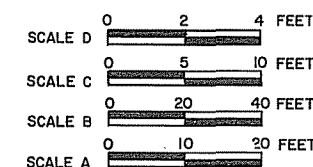
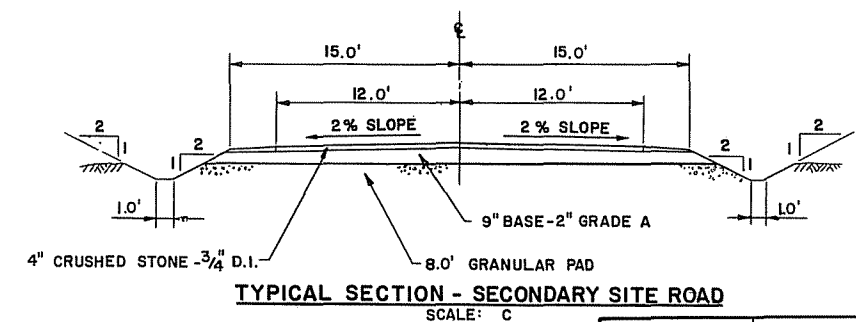
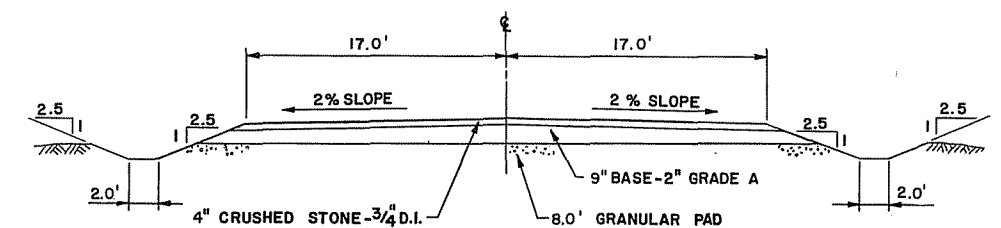
- PERMANENT NON-RESIDENTIAL BLDG.
- PERMANENT ROAD
- PERMANENT MULTIFAMILY DWELLINGS
72 UNITS FURNISHED BY YEAR 1992
16 UNITS " " " 2001
- PERMANENT SINGLE FAMILY DWELLINGS
21 UNITS FURNISHED BY YEAR 1992
6 UNITS " " " 2001
- PERMANENT HOSPITAL
- TEMPORARY HOUSING/UTILITIES FURNISHED BY OWNER
16 EA. - 4 BEDROOMS UNITS 28' x 50'
16 EA. - 2 " " " 24' x 50'
16 EA. - 3 " " " " "
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)



MARZA-EDASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)	
VILLAGE AND TOWN GENERAL PLAN	
EXHIBIT F	PLATE F.37

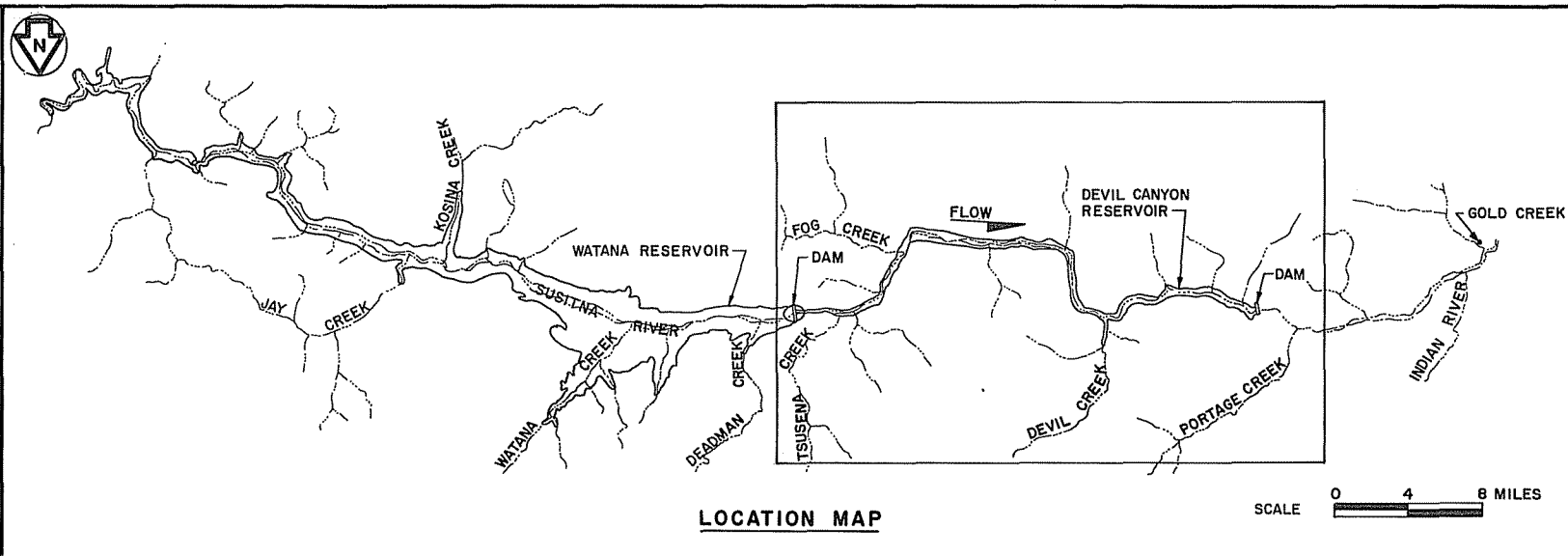


PERMANENT VILLAGE HOUSING



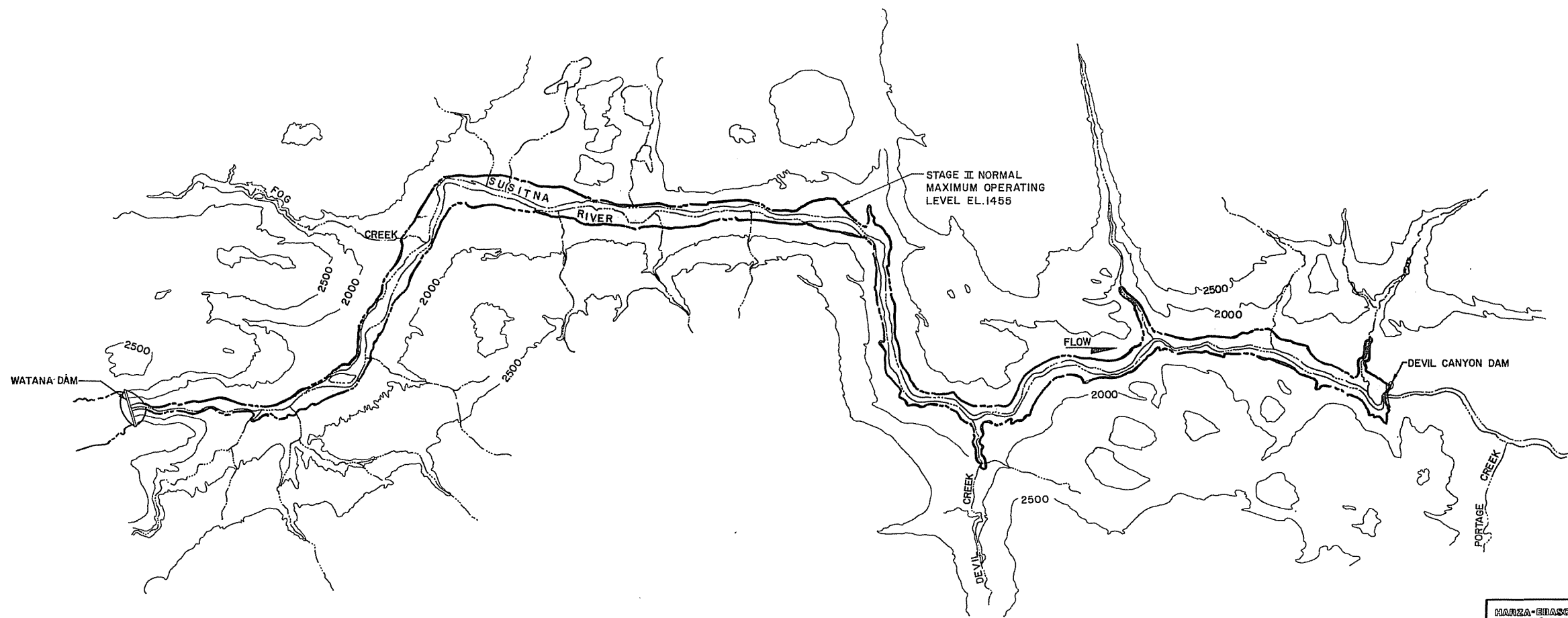
MARZA-BRISCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY		
SUSITNA HYDROELECTRIC PROJECT-STAGE I (WATANA)			
WATANA AND DEVIL CANYON CONSTRUCTION CAMP DETAILS			
EXHIBIT F		PLATE F38	

STAGE II (DEVIL CANYON)



LOCATION MAP

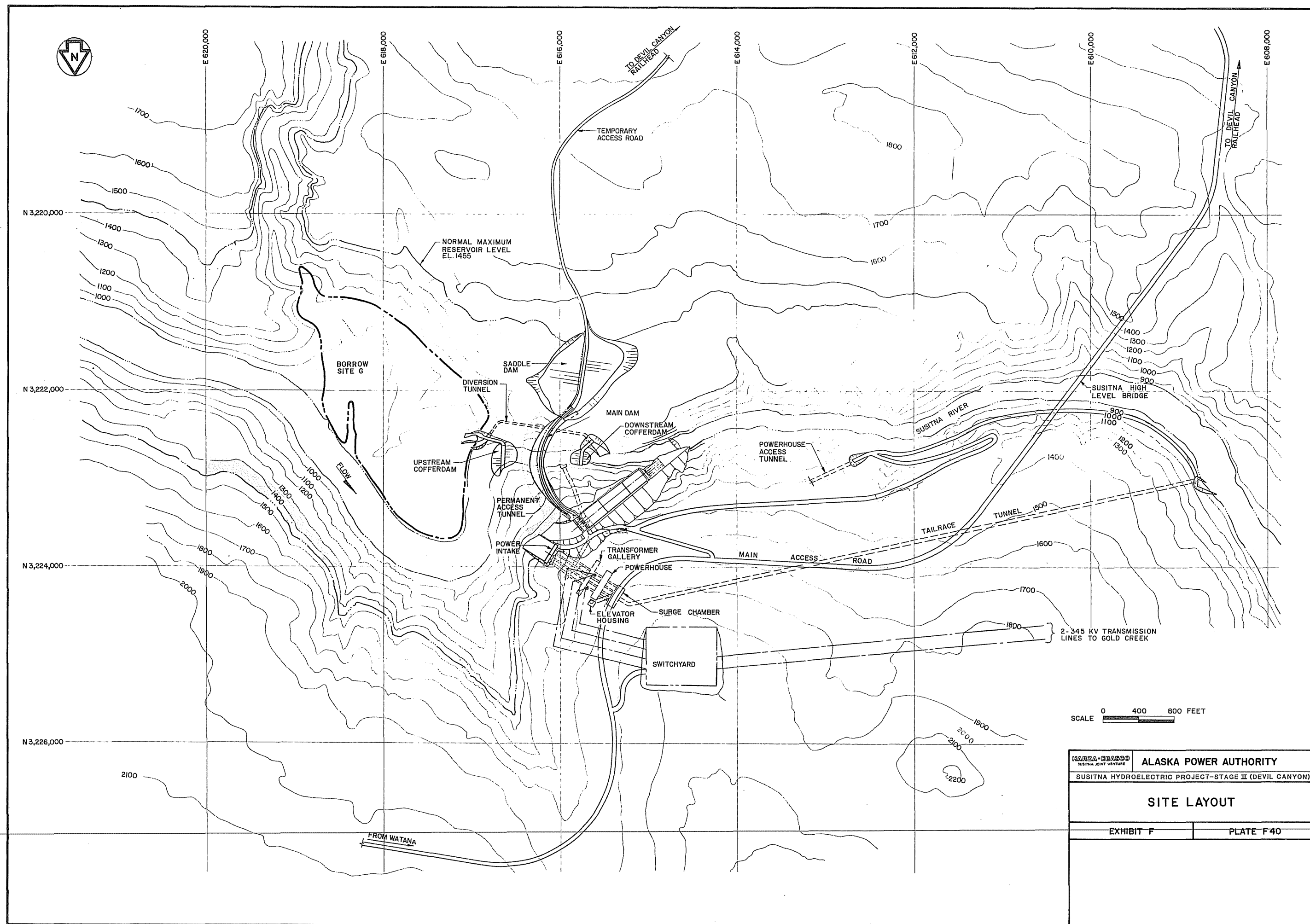
SCALE 0 4 8 MILES



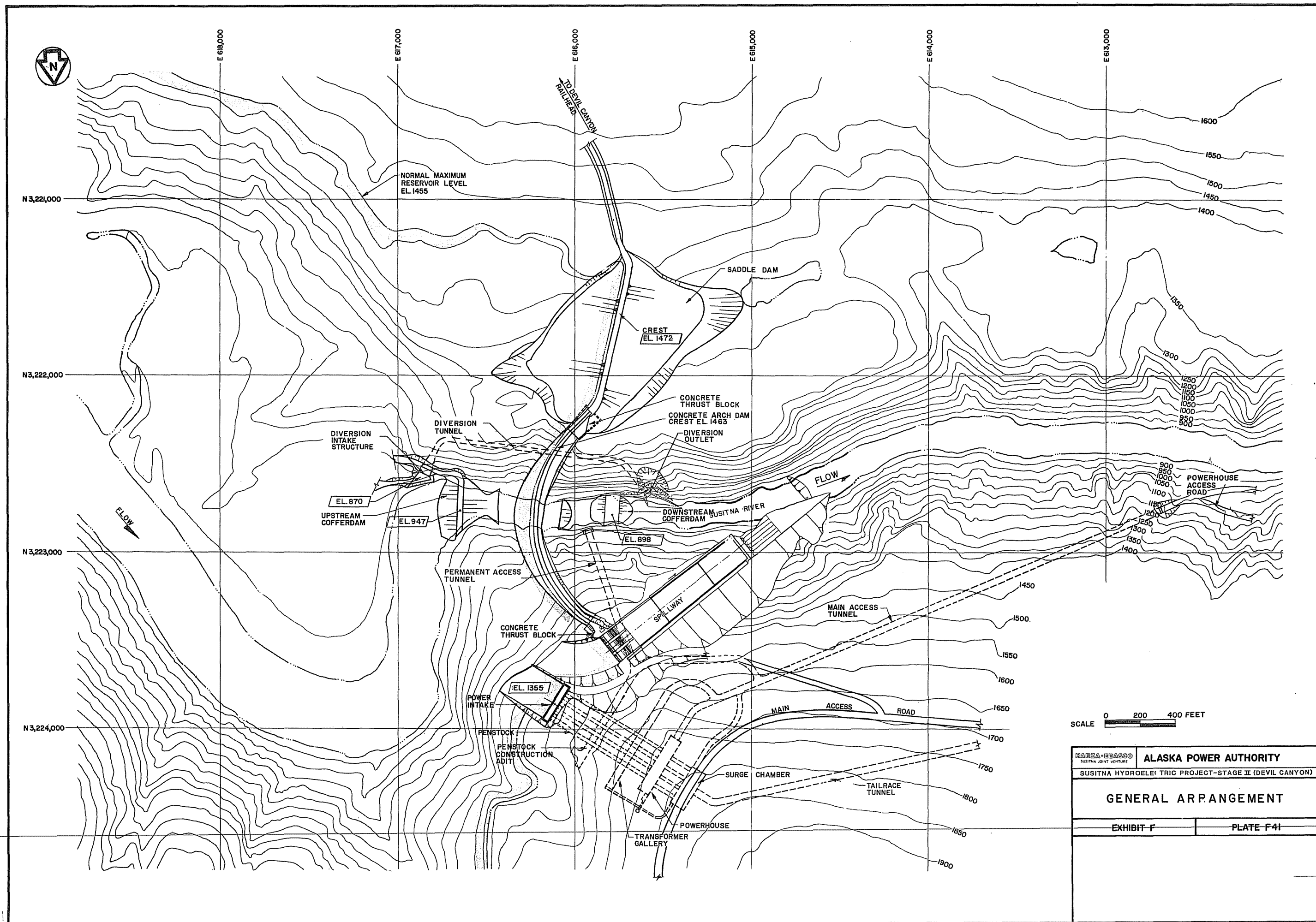
PLAN

SCALE 0 1 2 MILES

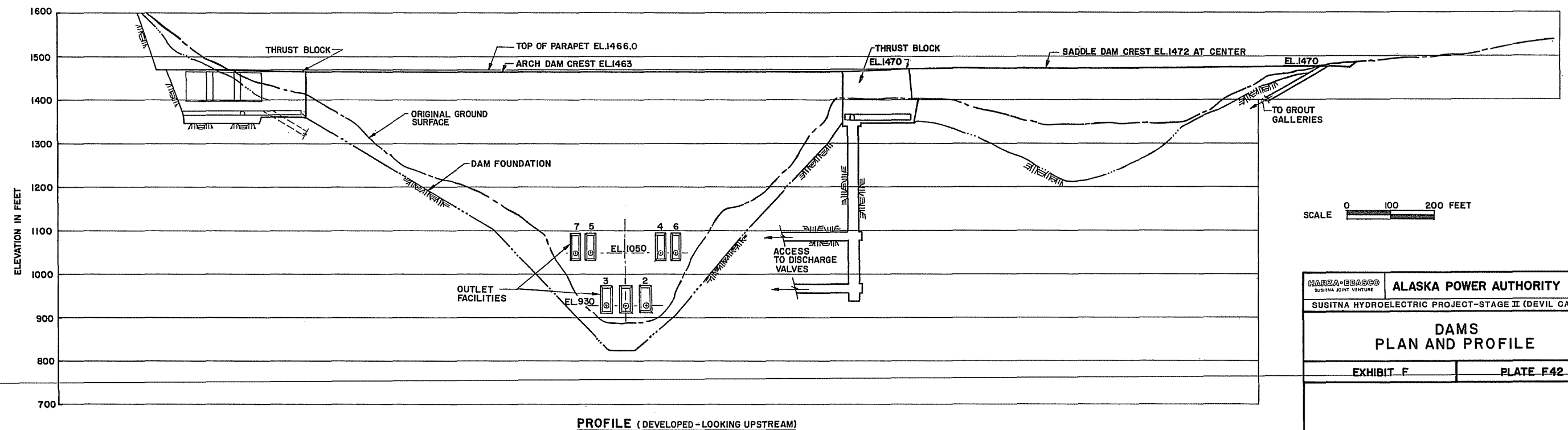
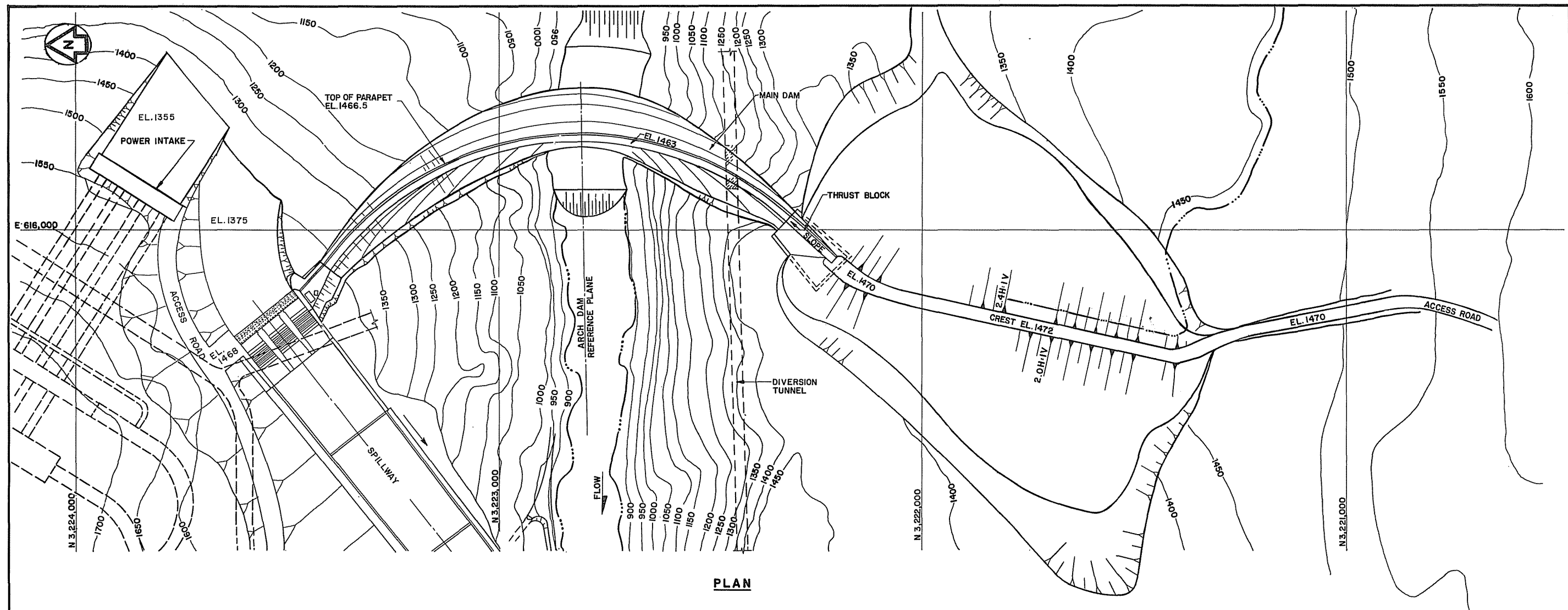
HAIZA-EDASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
RESERVOIR PLAN	
EXHIBIT F	PLATE F 39



MARZA-EBASCO SUSITNA JOINT VENTURE		ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)			
SITE LAYOUT			
EXHIBIT F		PLATE F40	



MARZA-EDASCO SUSITNA JOINT VENTURE ALASKA POWER AUTHORITY SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
GENERAL ARRANGEMENT	
EXHIBIT F	PLATE F-41



HARZA-EDASCO SUSITNA JOINT VENTURE	
ALASKA POWER AUTHORITY SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
DAMS PLAN AND PROFILE	
EXHIBIT F	PLATE F42

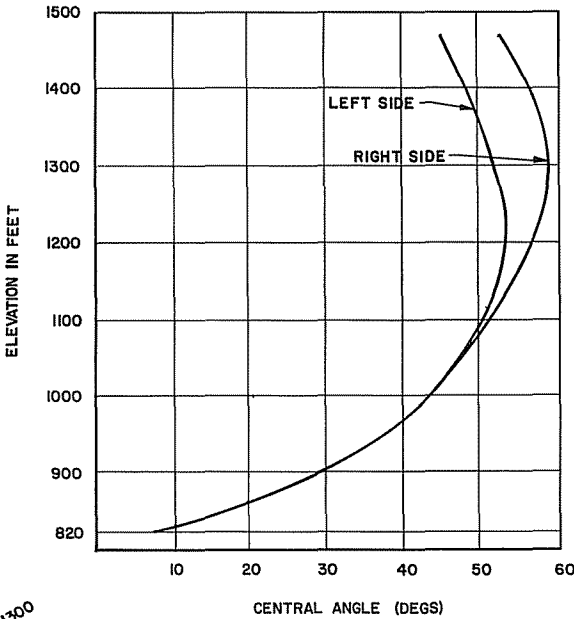
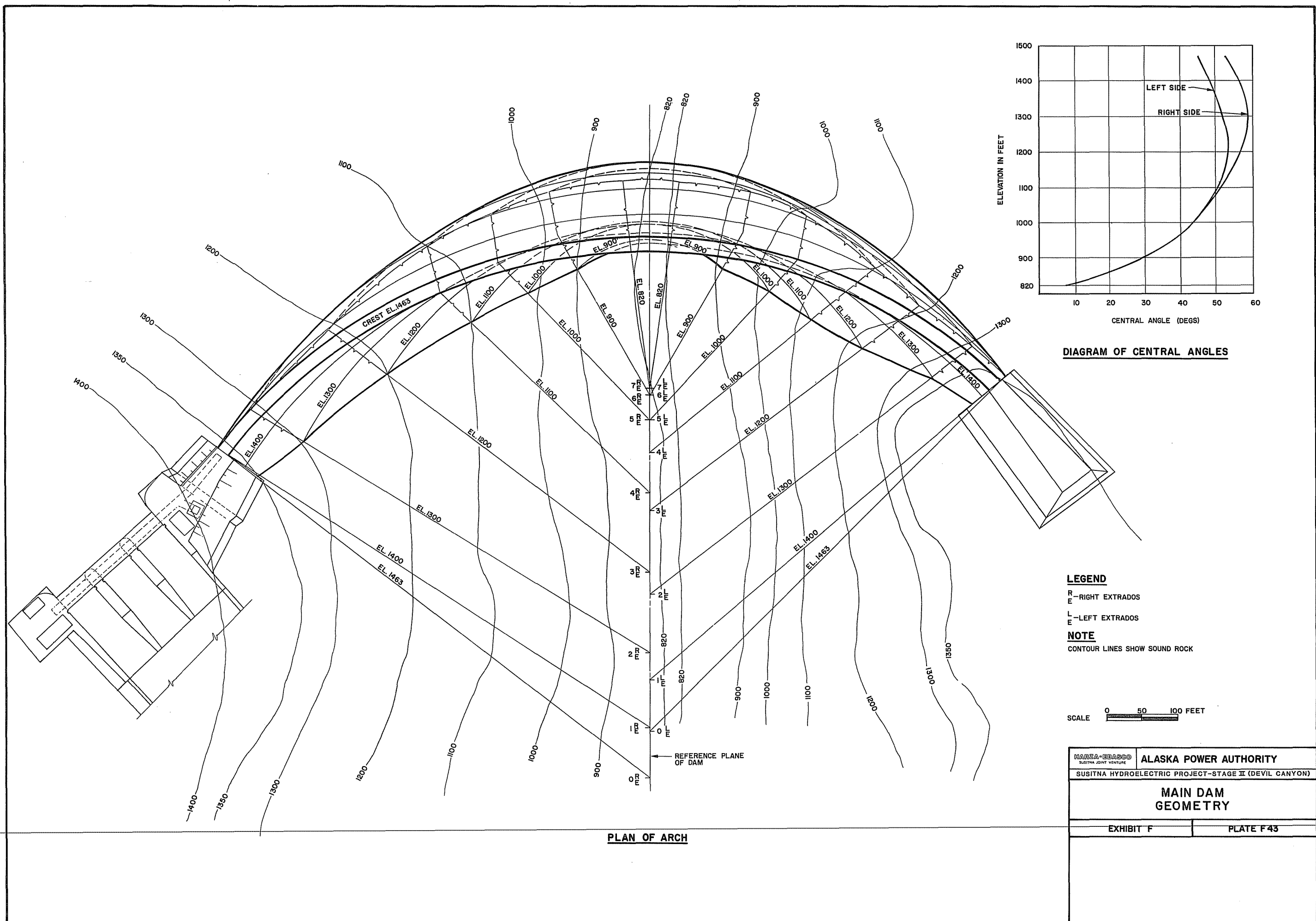


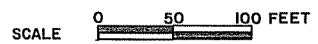
DIAGRAM OF CENTRAL ANGLES

LEGEND

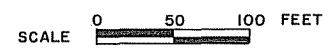
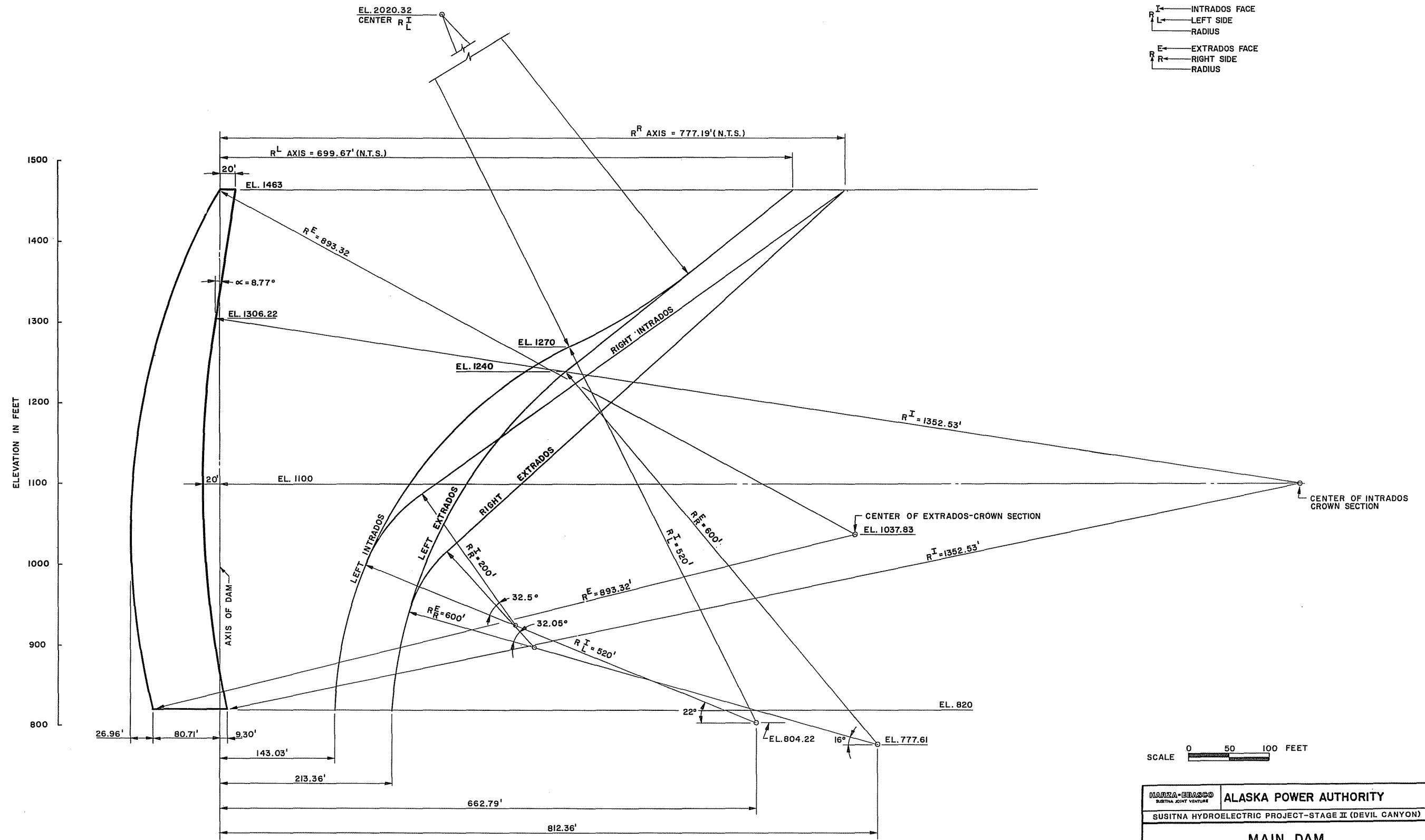
- R - RIGHT EXTRADOS
- L - LEFT EXTRADOS

NOTE

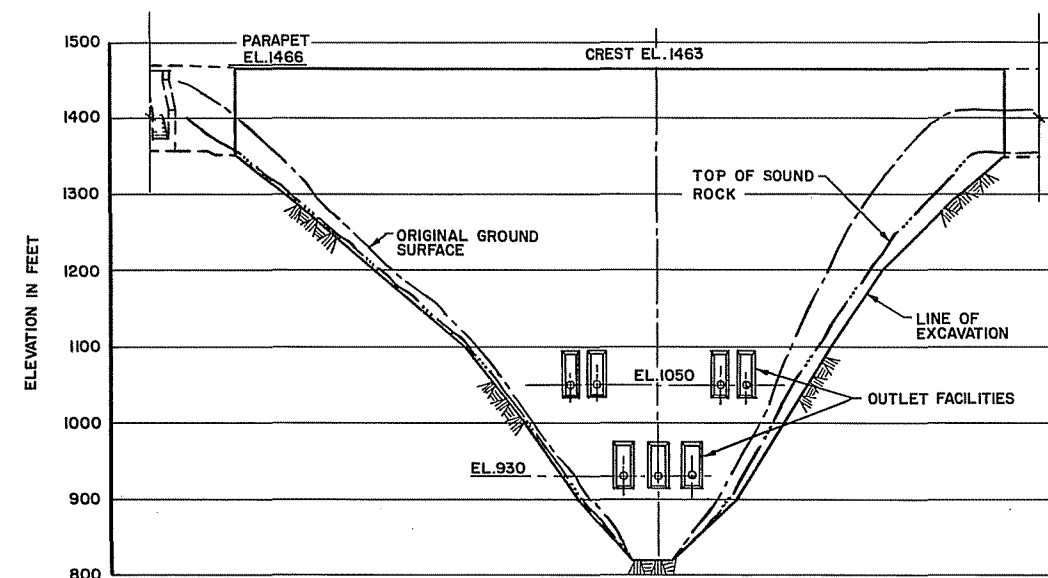
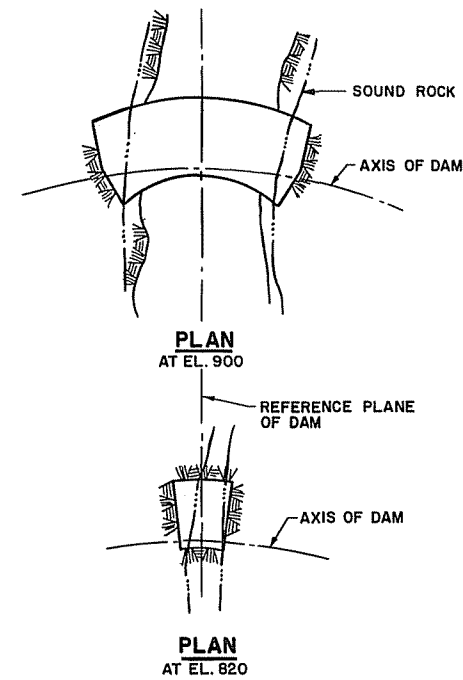
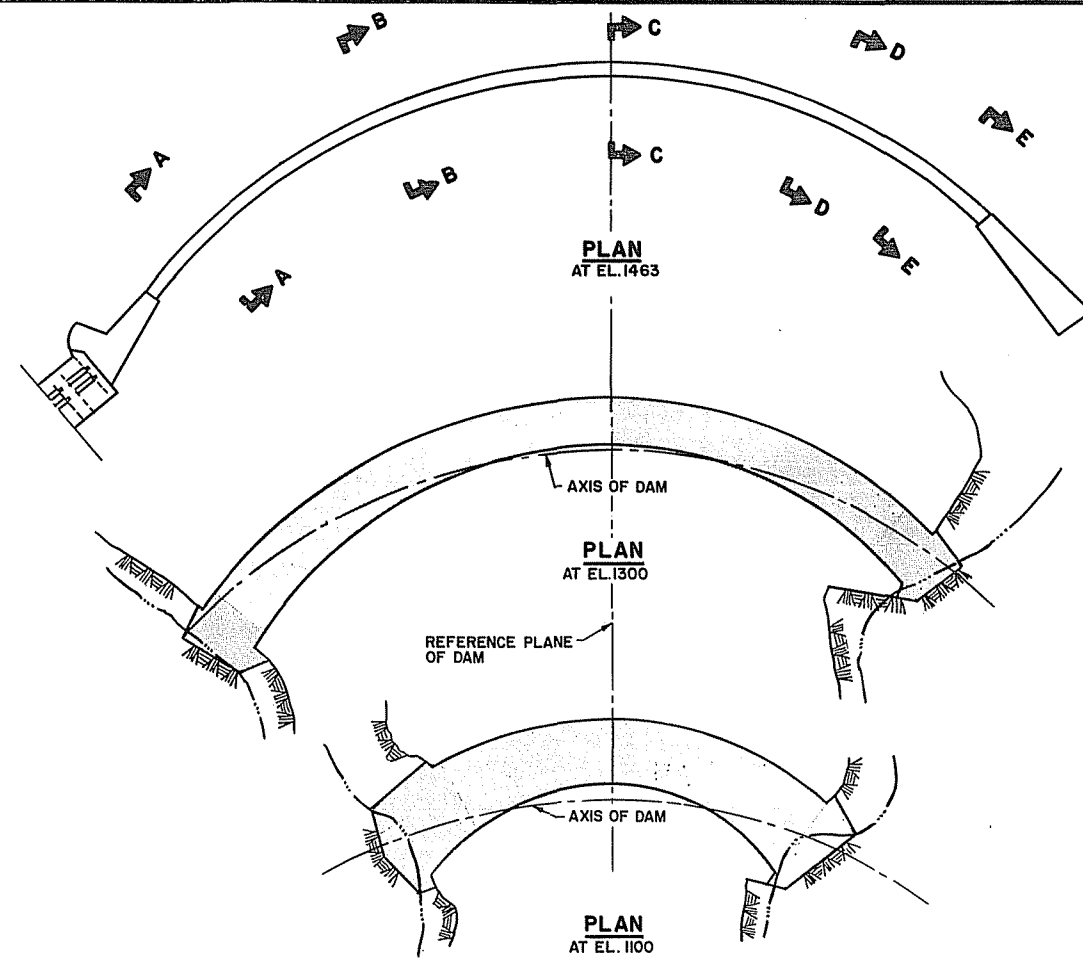
CONTOUR LINES SHOW SOUND ROCK



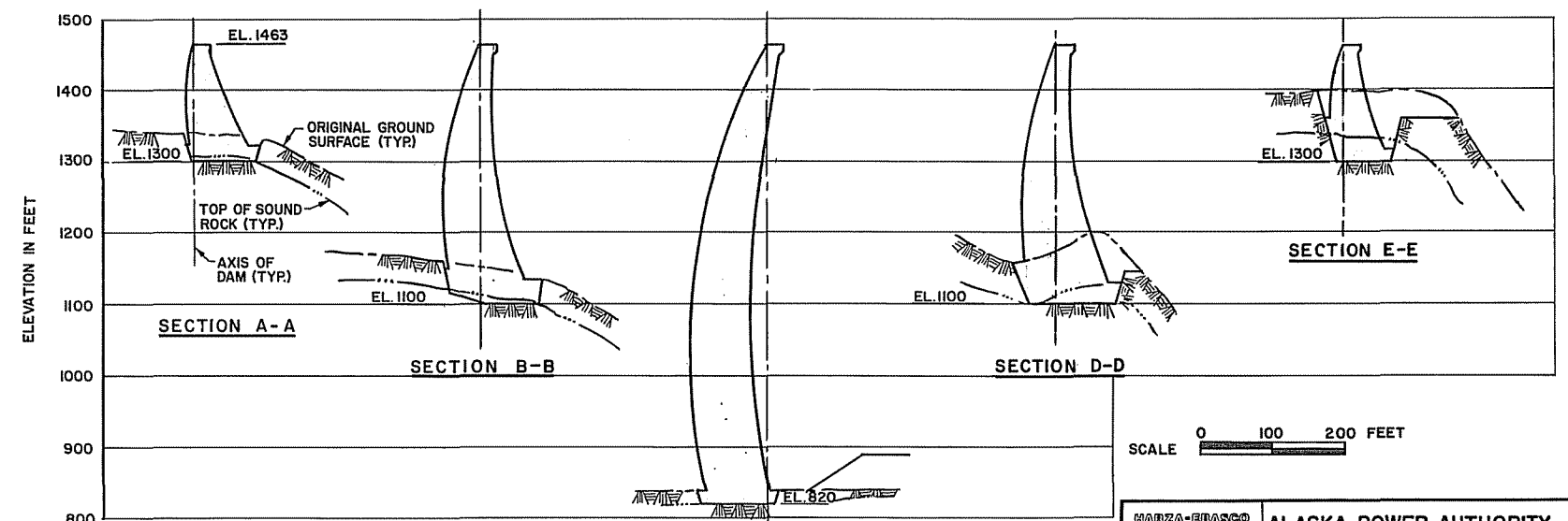
HARZA-EBASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
MAIN DAM GEOMETRY	
EXHIBIT F	PLATE F 43



MARZA-BIASCIO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
MAIN DAM CROWN SECTION	
EXHIBIT F	PLATE F44



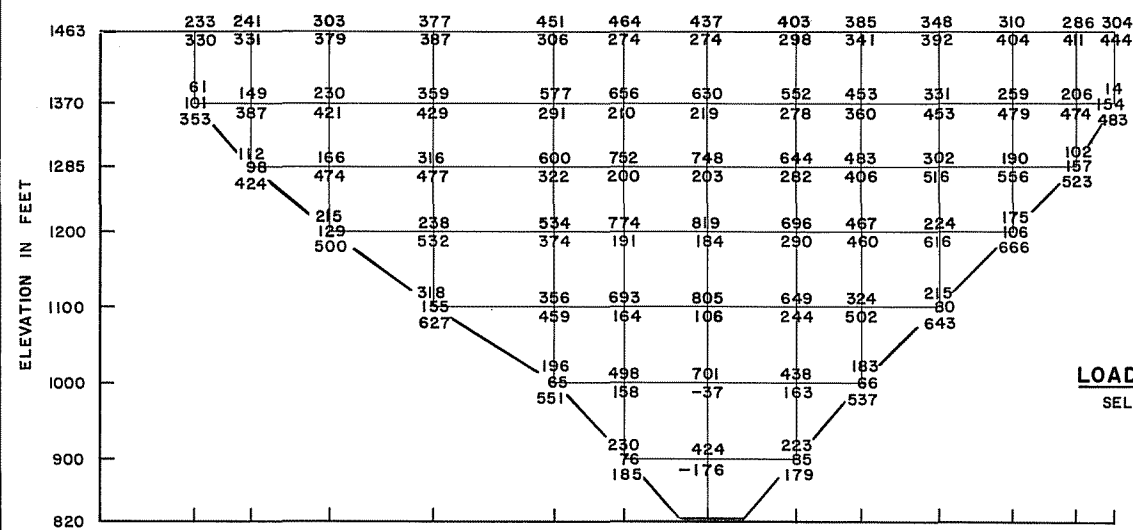
DAM PROFILE



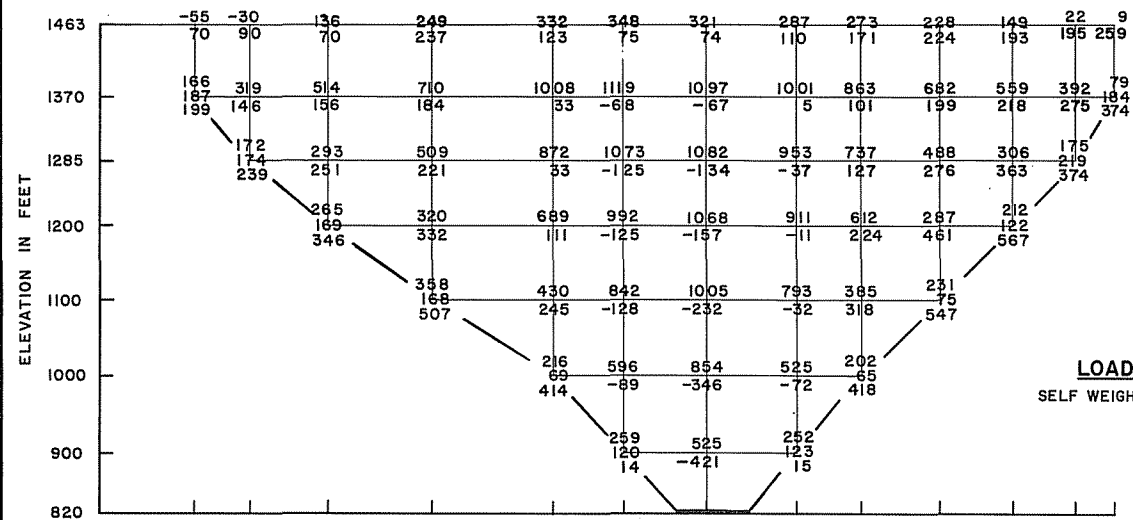
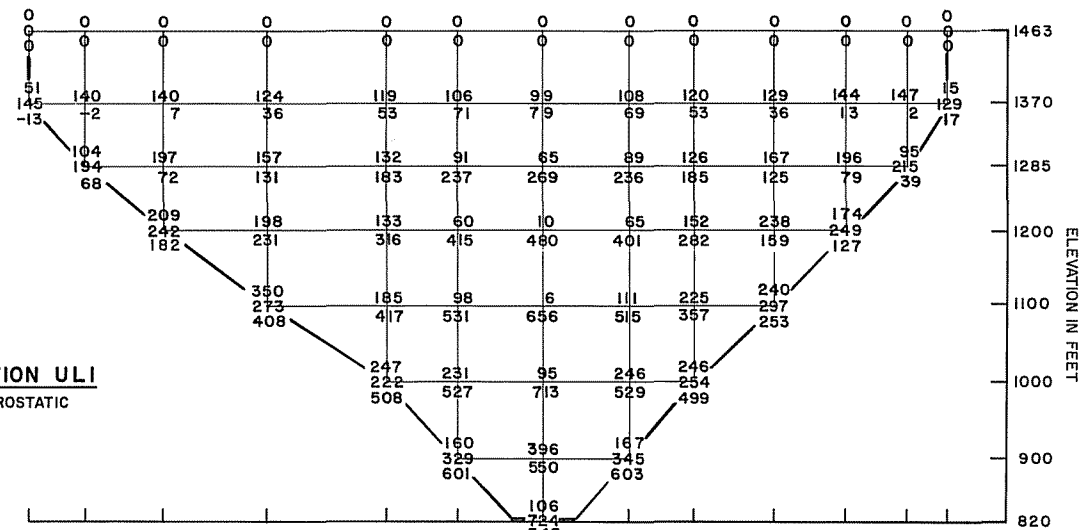
DAM SECTIONS
(PARAPET NOT SHOWN)

SCALE 0 100 200 FEET

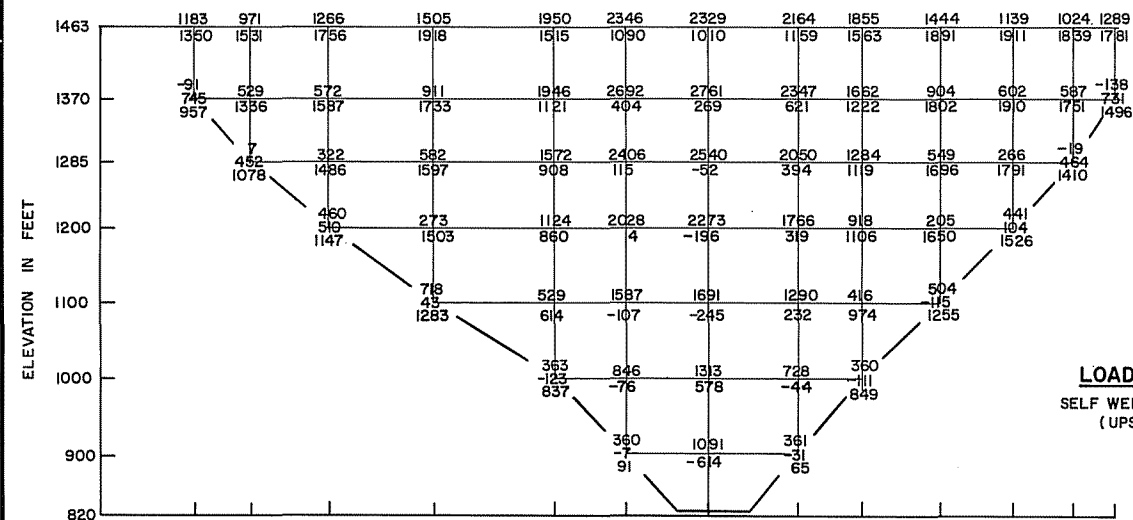
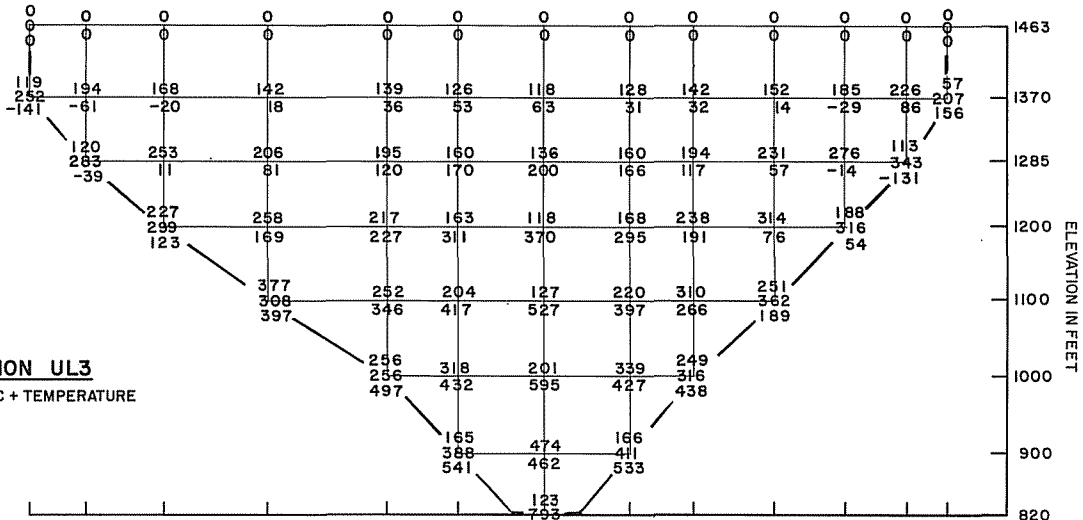
MARZA-BLASC® SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
MAIN DAM SECTIONS	
EXHIBIT F	PLATE F45



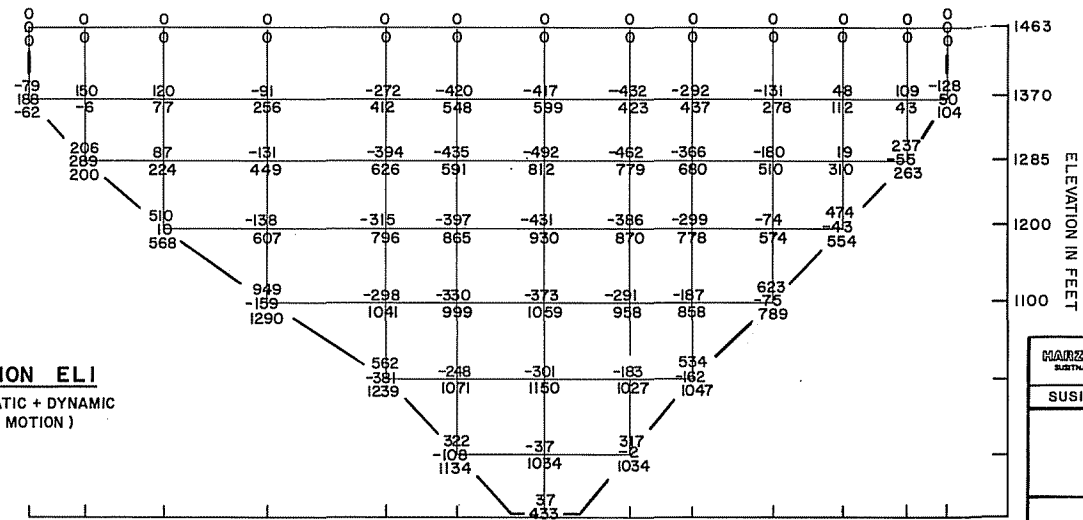
LOAD COMBINATION ULI
SELF WEIGHT + HYDROSTATIC



LOAD COMBINATION UL3
SELF WEIGHT + HYDROSTATIC + TEMPERATURE



LOAD COMBINATION ELI
SELF WEIGHT + HYDROSTATIC + DYNAMIC
(UPSTREAM GROUND MOTION)



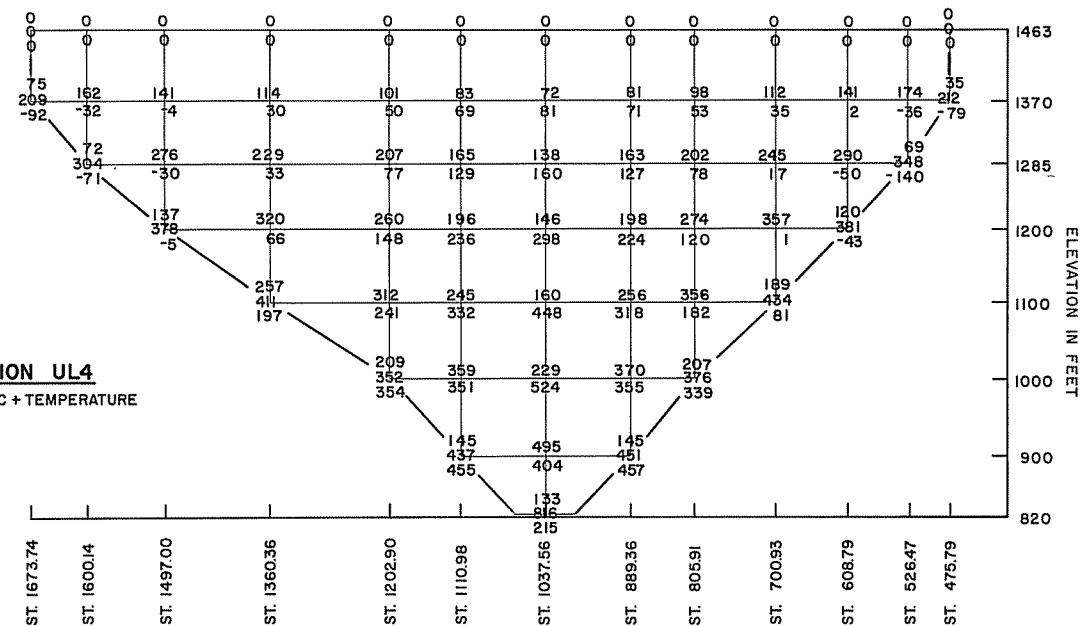
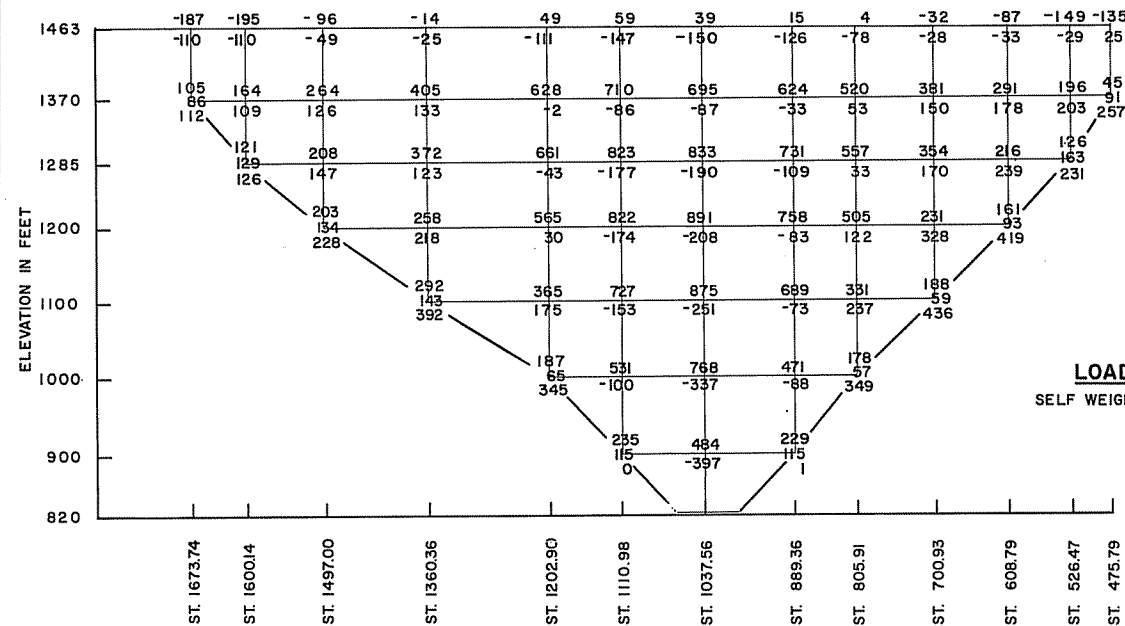
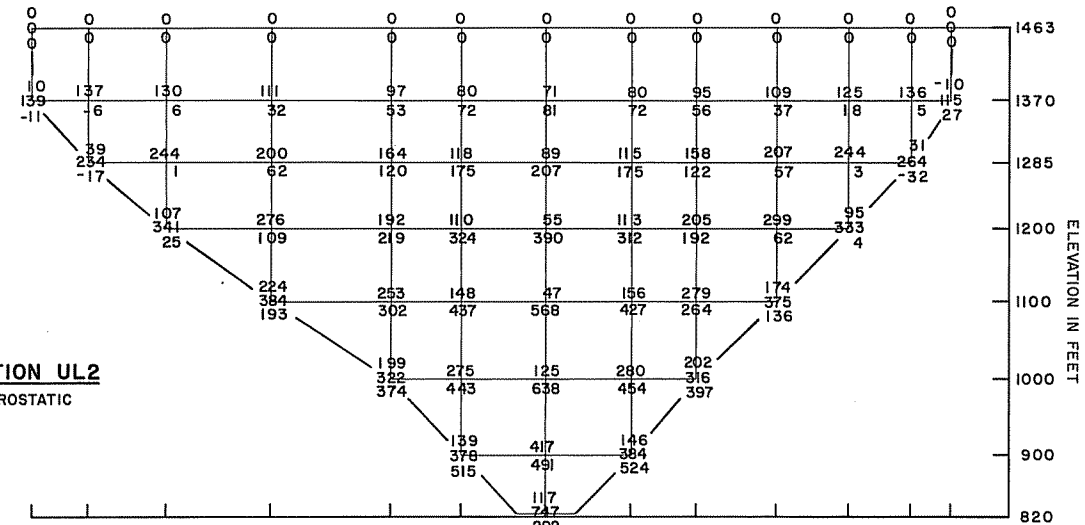
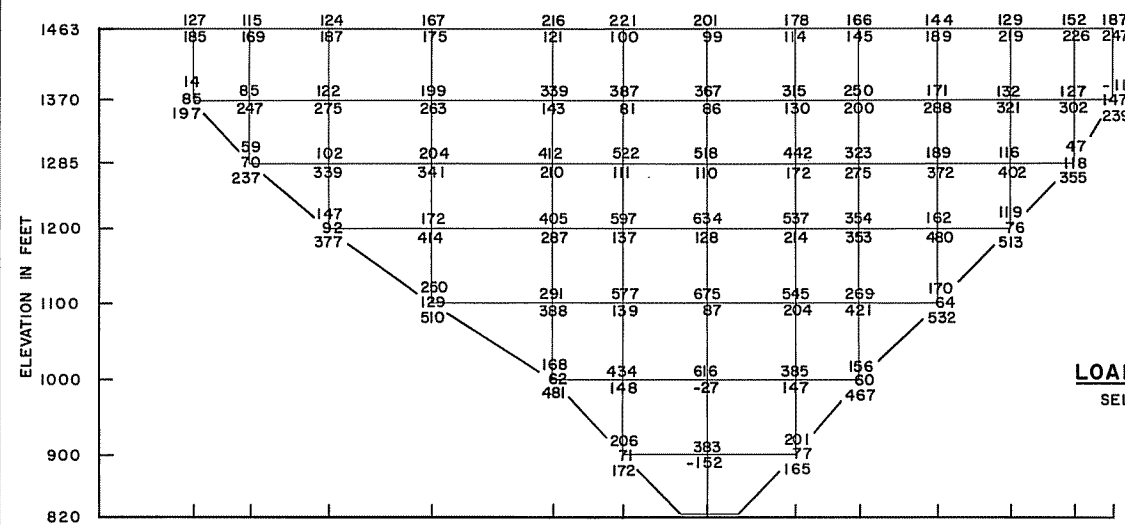
LEGEND

- (MINUS) INDICATES TENSION
- SHEAR STRESS IN P.S.I. WHERE SHOWN
- STRESS AT UPSTREAM OR EXTRADOS FACE
- STRESS AT DOWNSTREAM OR INTRADOS FACE

ARCH STRESSES (PARALLEL TO THE FACE OF THE DAM LOOKING UPSTREAM)

CANTILEVER STRESSES (PARALLEL TO THE FACE OF THE DAM LOOKING UPSTREAM)

MARZA-EDASSO SUSITNA JOINT VENTURE		ALASKA POWER AUTHORITY SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)
ARCH DAM STRESSES RESERVOIR AT EL.1455		
EXHIBIT F		PLATE F45A



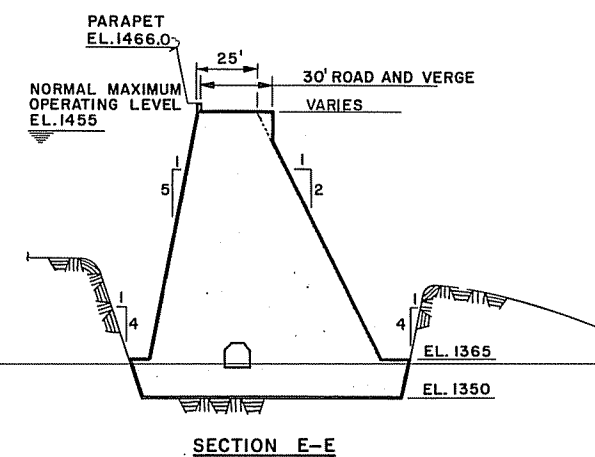
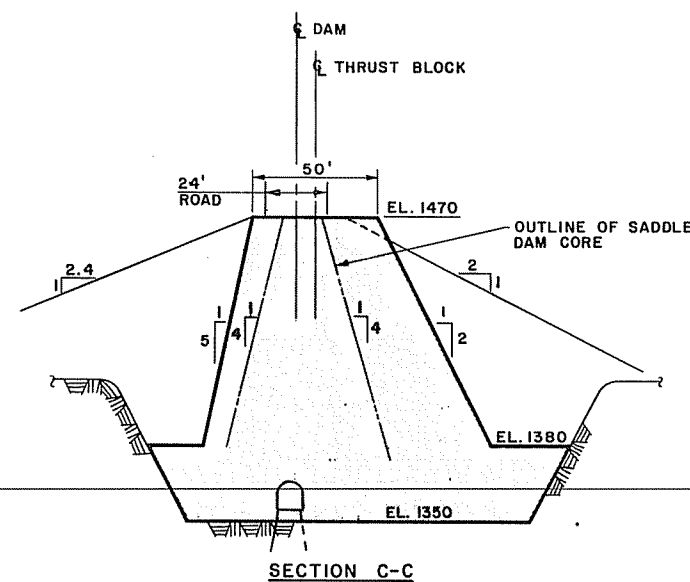
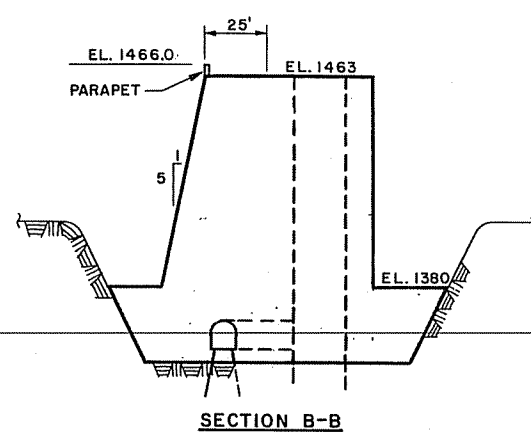
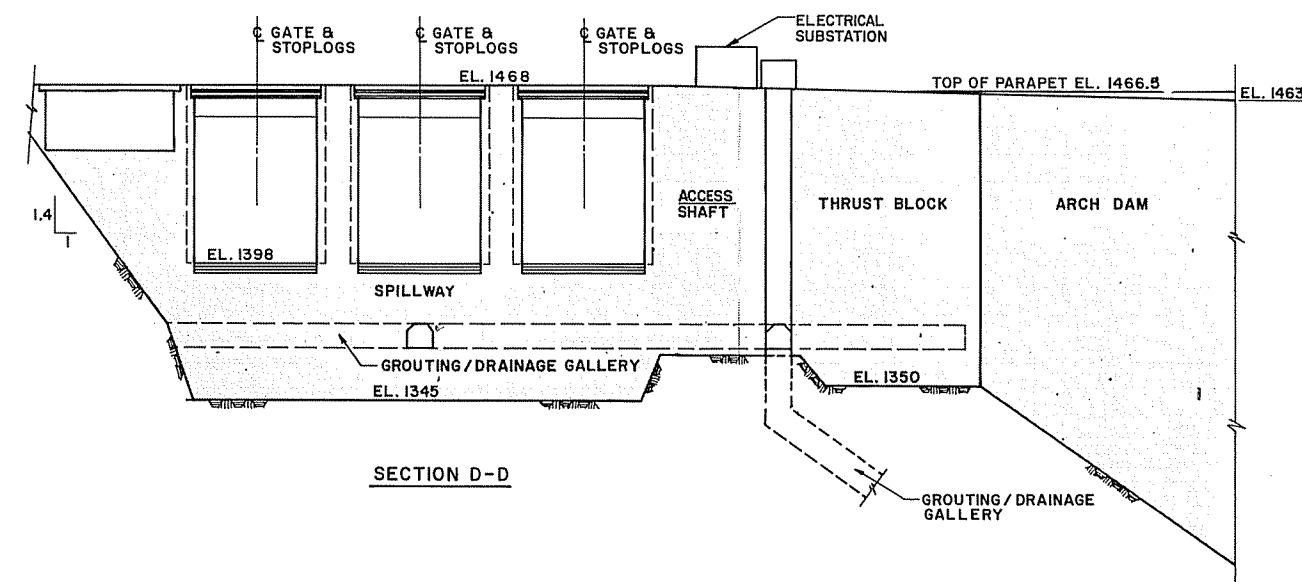
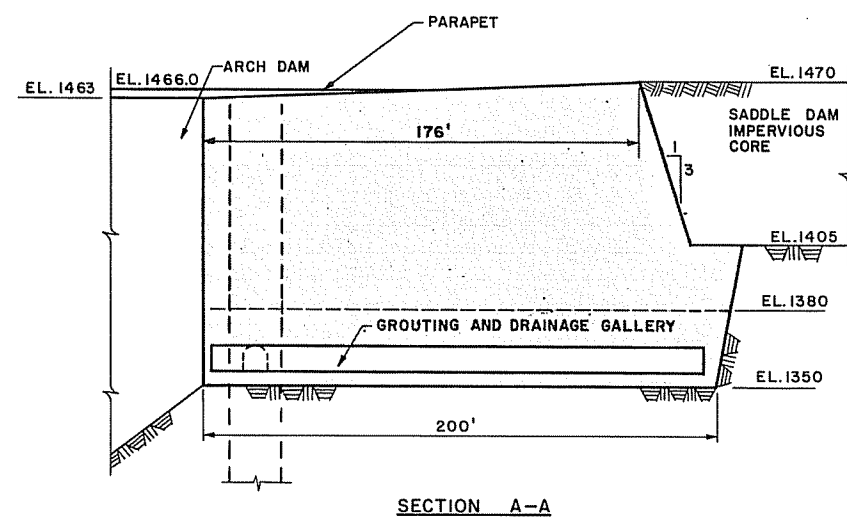
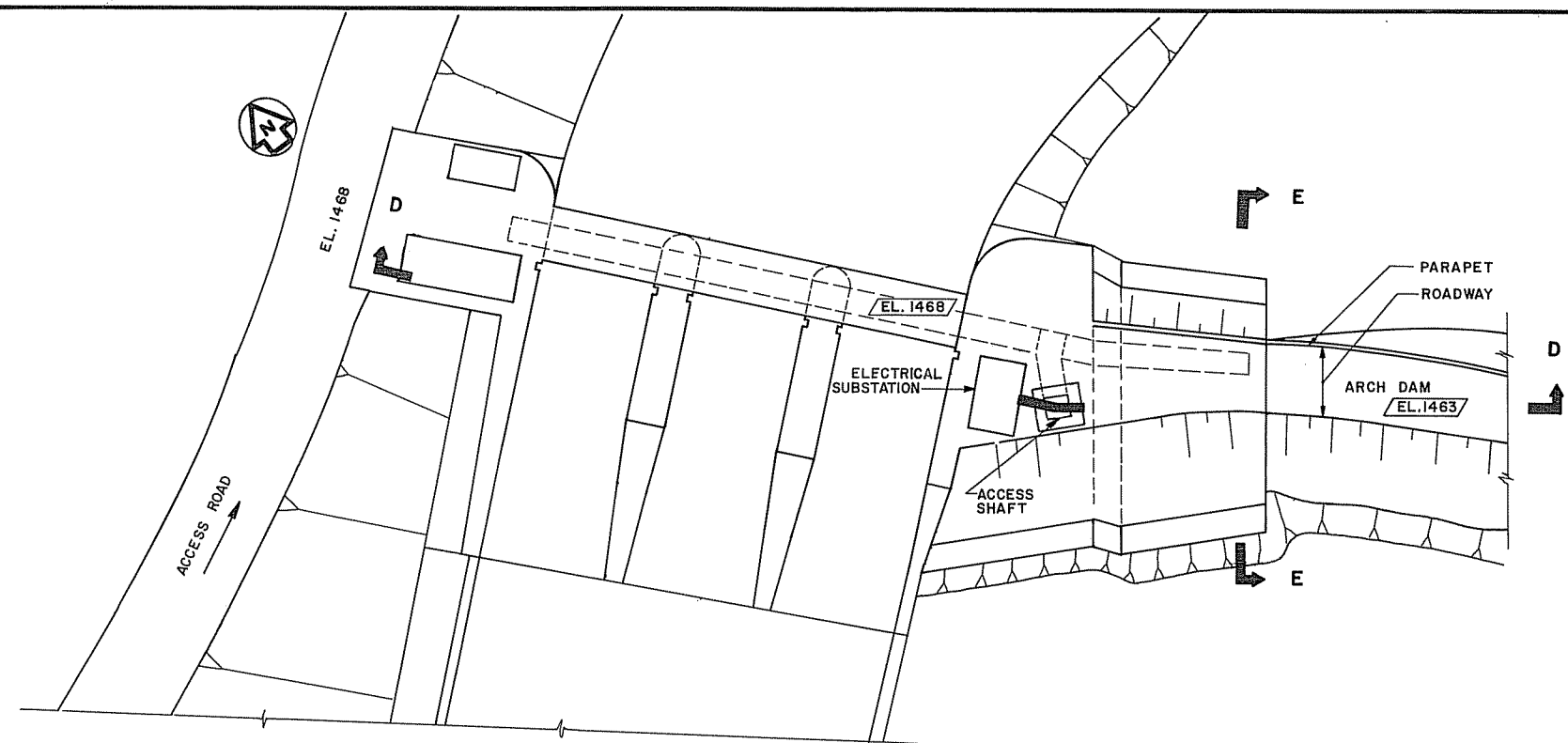
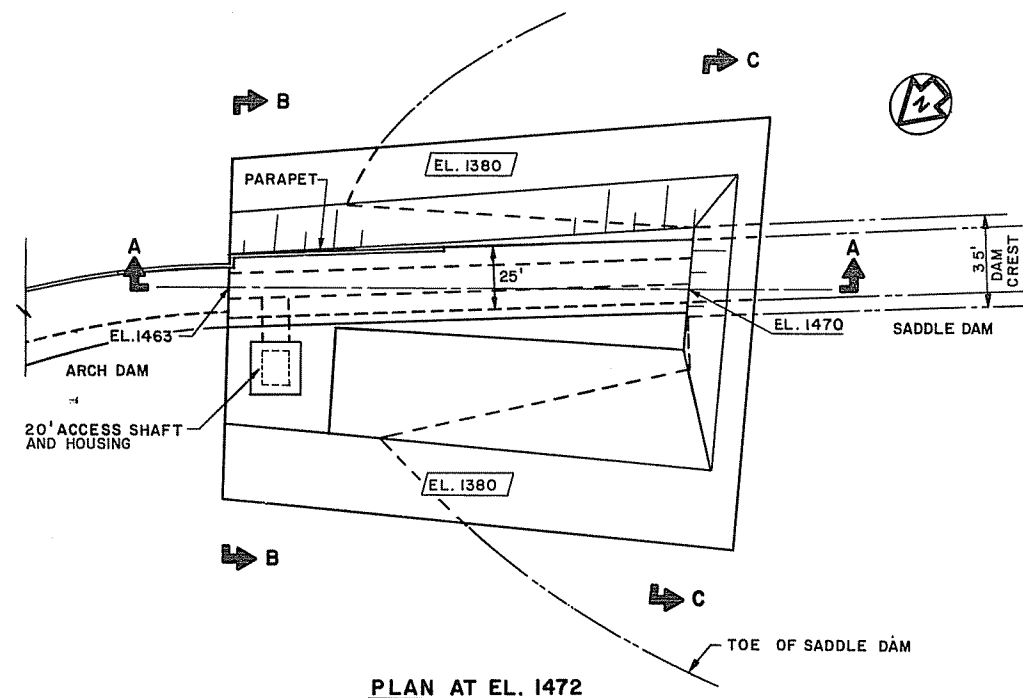
ARCH STRESSES (PARALLEL TO THE FACE OF THE DAM LOOKING UPSTREAM)

CANTILEVER STRESSES (PARALLEL TO THE FACE OF THE DAM LOOKING UPSTREAM)

LEGEND

- (MINUS) INDICATES TENSION
- SHEAR STRESS IN P.S.I. WHERE SHOWN
- STRESS AT UPSTREAM OR EXTRADOS FACE
- STRESS AT DOWNSTREAM OR INTRADOS FACE

HARZA-GEASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
ARCH DAM STRESSES RESERVOIR AT EL. 1405	
EXHIBIT F	PLATE F45 B

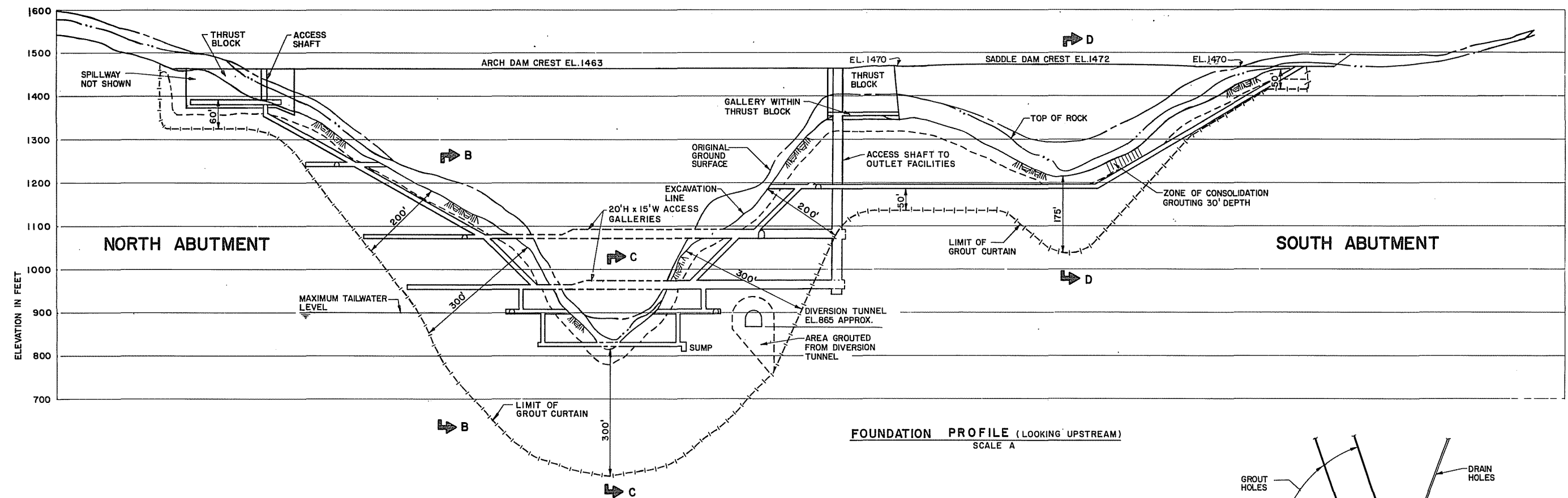


LEFT ABUTMENT THRUST BLOCK

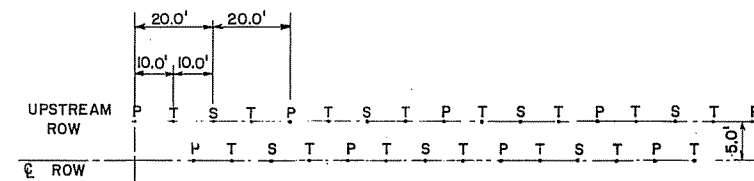
RIGHT ABUTMENT THRUST BLOCK

SCALE 0 30 60 FEET

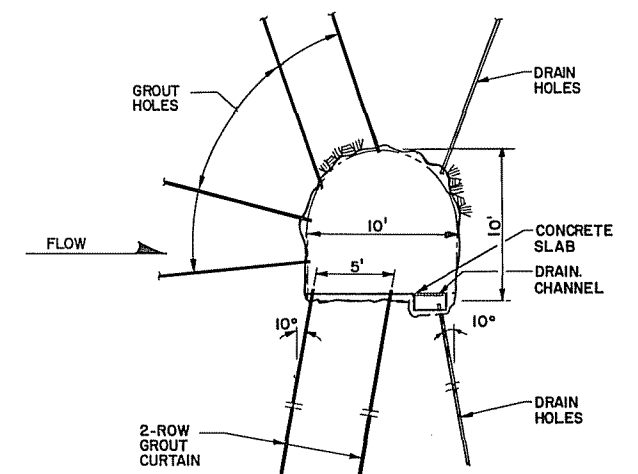
HARZA-ERASSO SUSITNA JOINT VENTURE	
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
MAIN DAM THRUST BLOCKS	
EXHIBIT F	PLATE F46



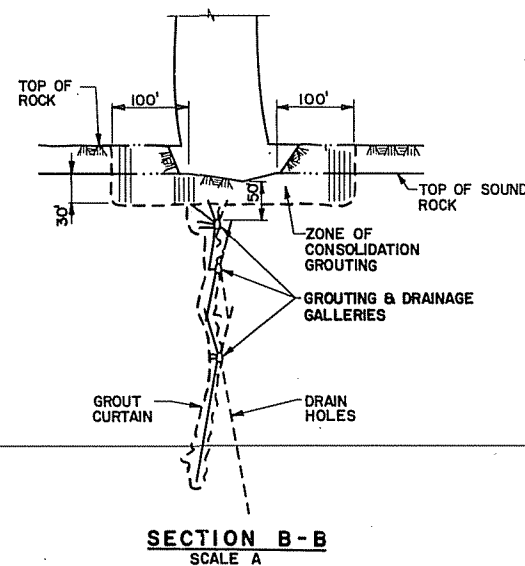
FOUNDATION PROFILE (LOOKING UPSTREAM)
SCALE A



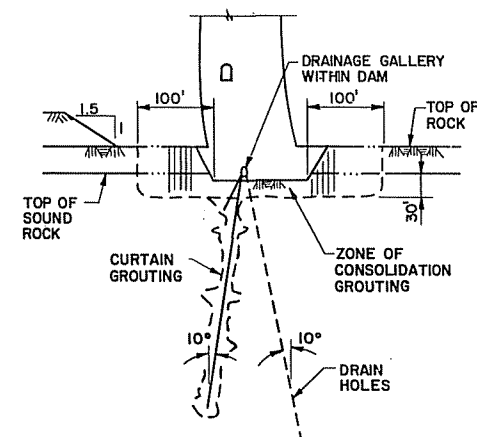
GROUT HOLE SPACING
SCALE C



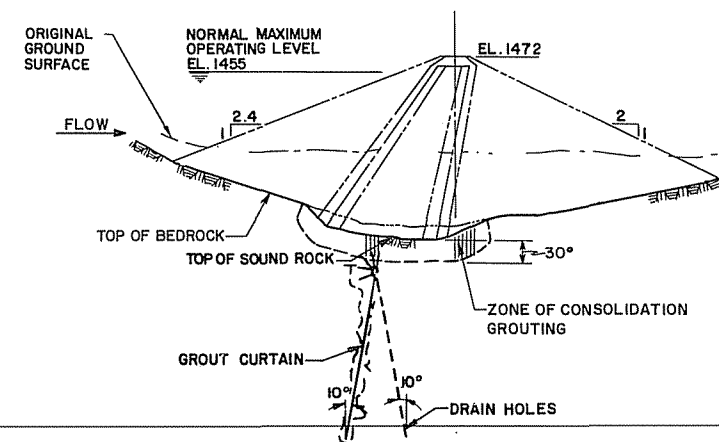
GALLERY DETAIL
SCALE B



SECTION B-B
SCALE A



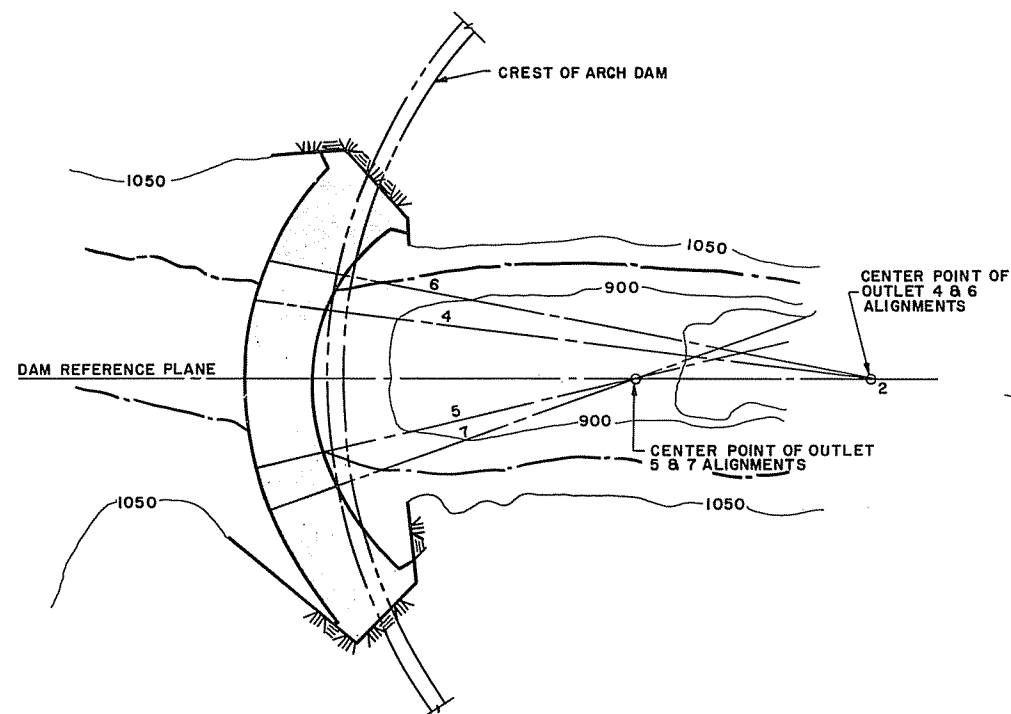
SECTION C-C
SCALE A



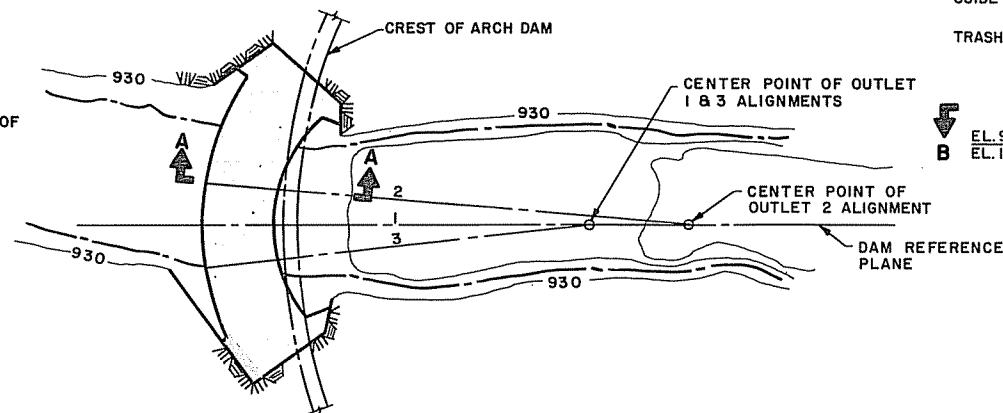
SECTION D-D
SCALE A



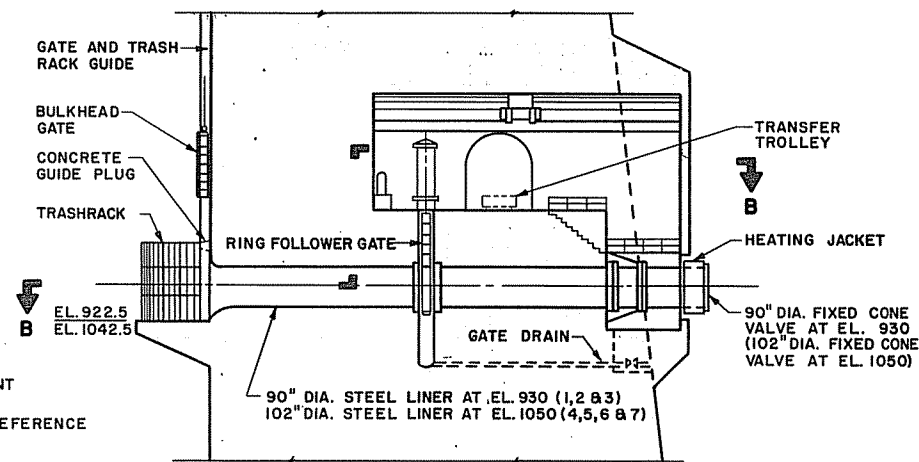
MANZA-ERASSO SUSITNA JOINT VENTURE		ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVEL. CANYON)			
MAIN DAM & SADDLE DAM GROUTING AND DRAINAGE			
EXHIBIT F		PLATE F47	



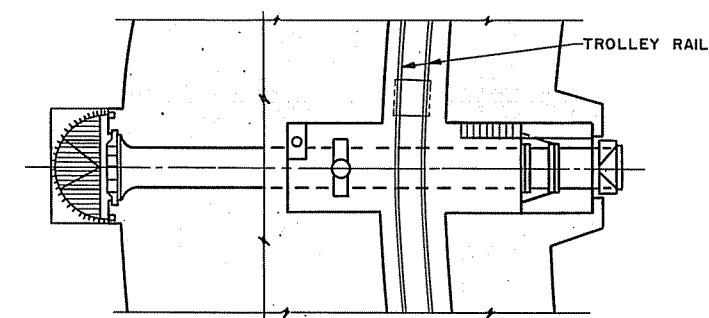
PLAN AT EL. 1050
SCALE A



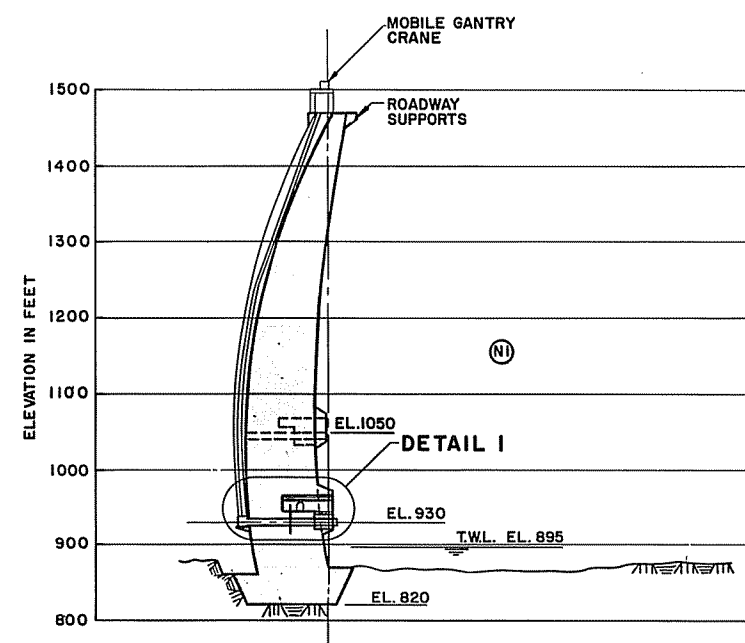
PLAN AT EL. 930
SCALE A



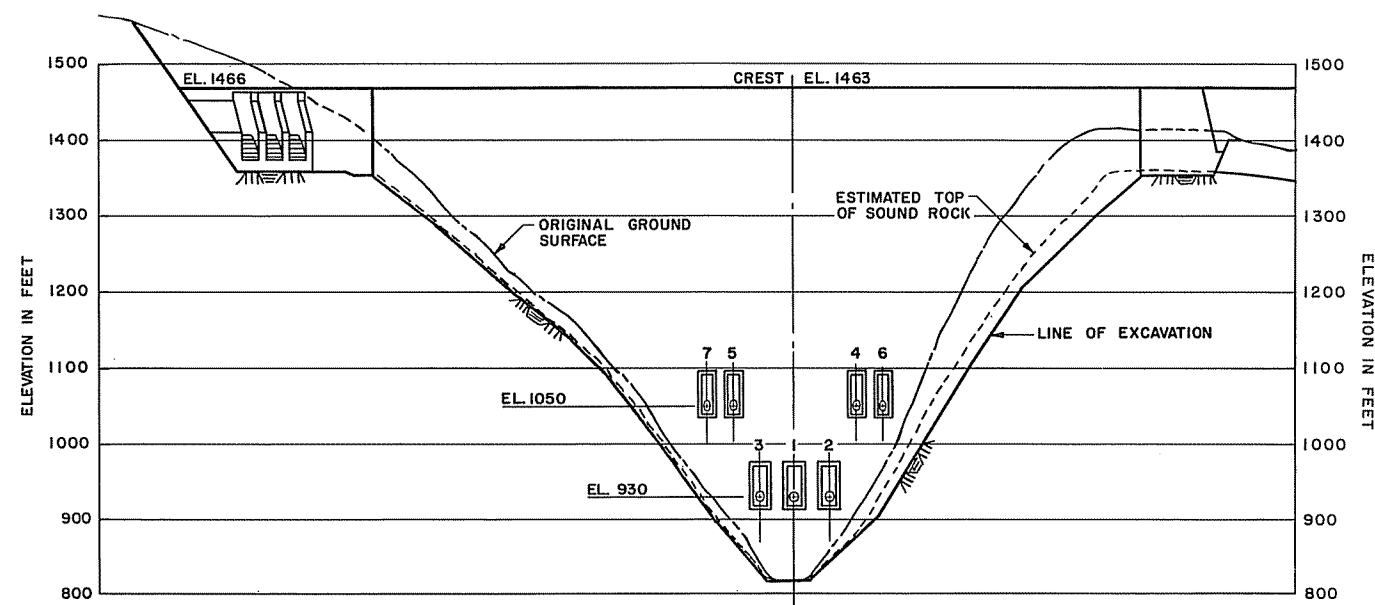
DETAIL I
SCALE B



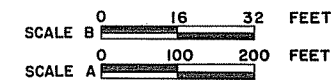
SECTION B-B
SCALE B



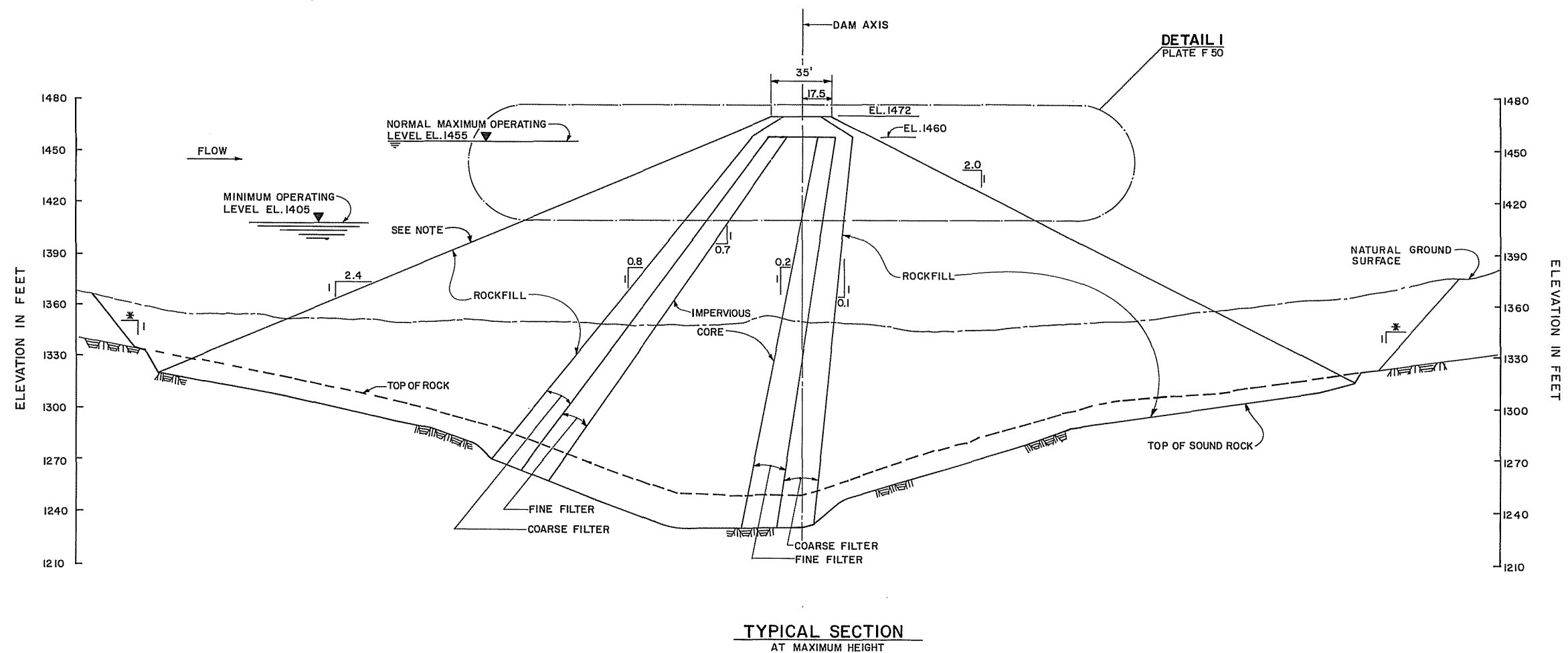
SECTION A-A (TYPICAL)
SCALE A



DAM PROFILE (PROJECTION-LOOKING UPSTREAM)
SCALE A



HARZA-BEACON SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
MAIN DAM OUTLET FACILITIES	
EXHIBIT F	PLATE F48

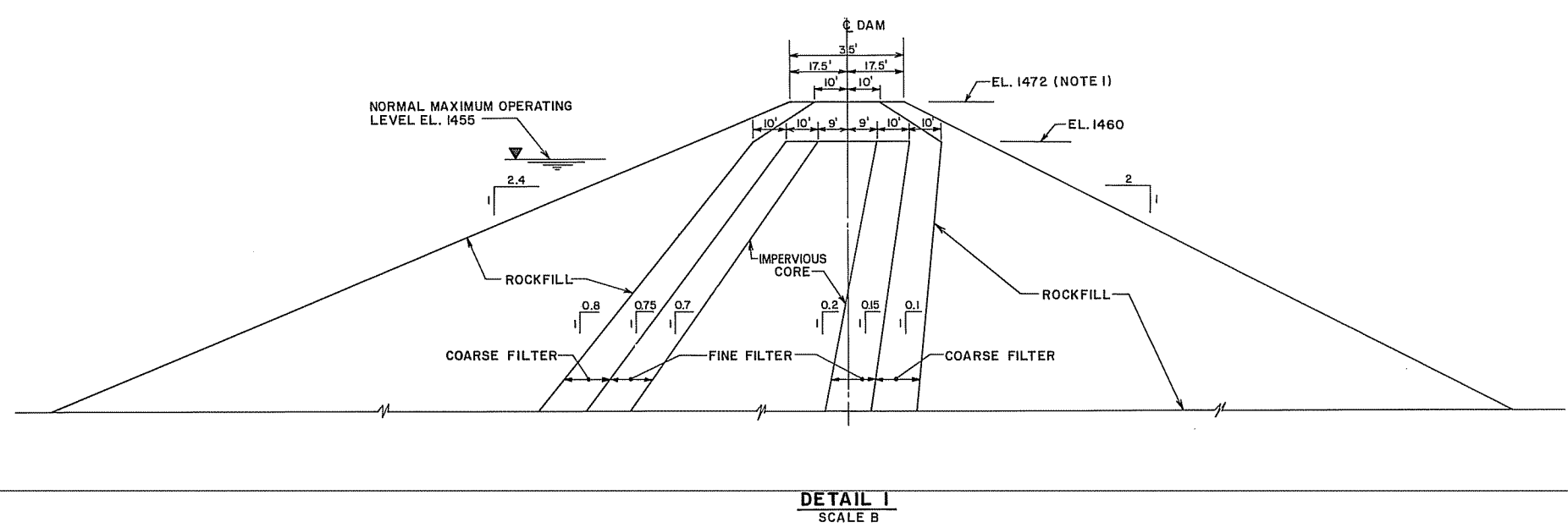
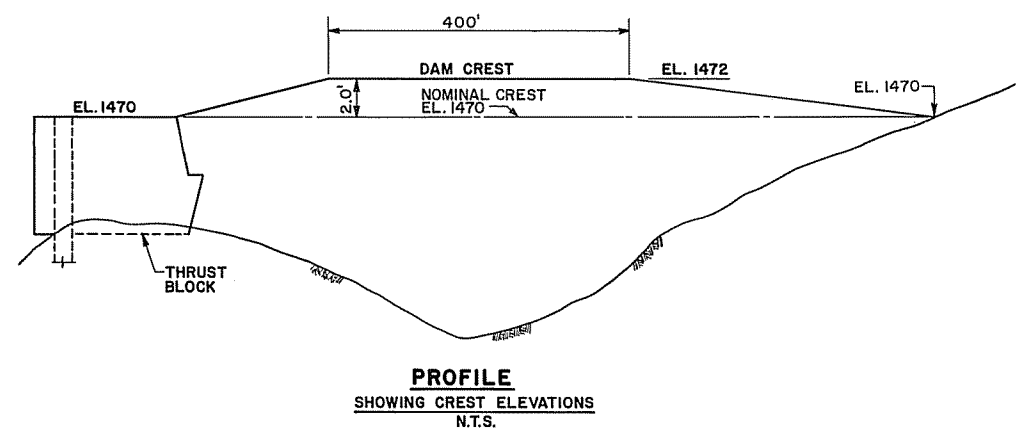
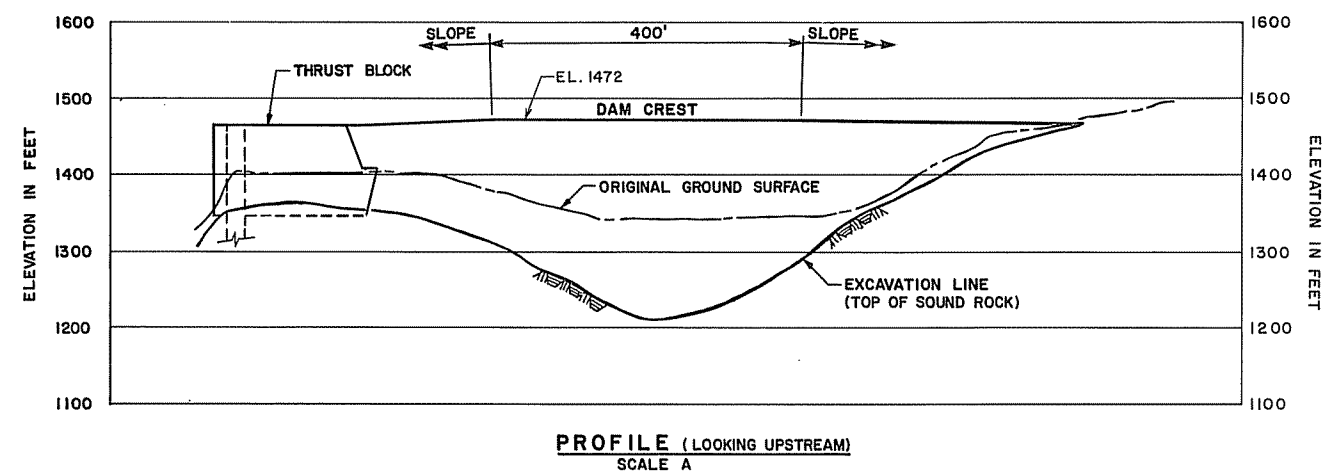


LEGEND
* STABLE

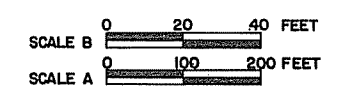
NOTE
ROCK RAKING WILL BE DONE WITHIN 40 FEET OF THE UPSTREAM SLOPE THROUGHOUT THE ZONES OF PERMANENT RESERVOIR FLUCTUATION AND FREEBOARD.

SCALE 0 30 60 FEET

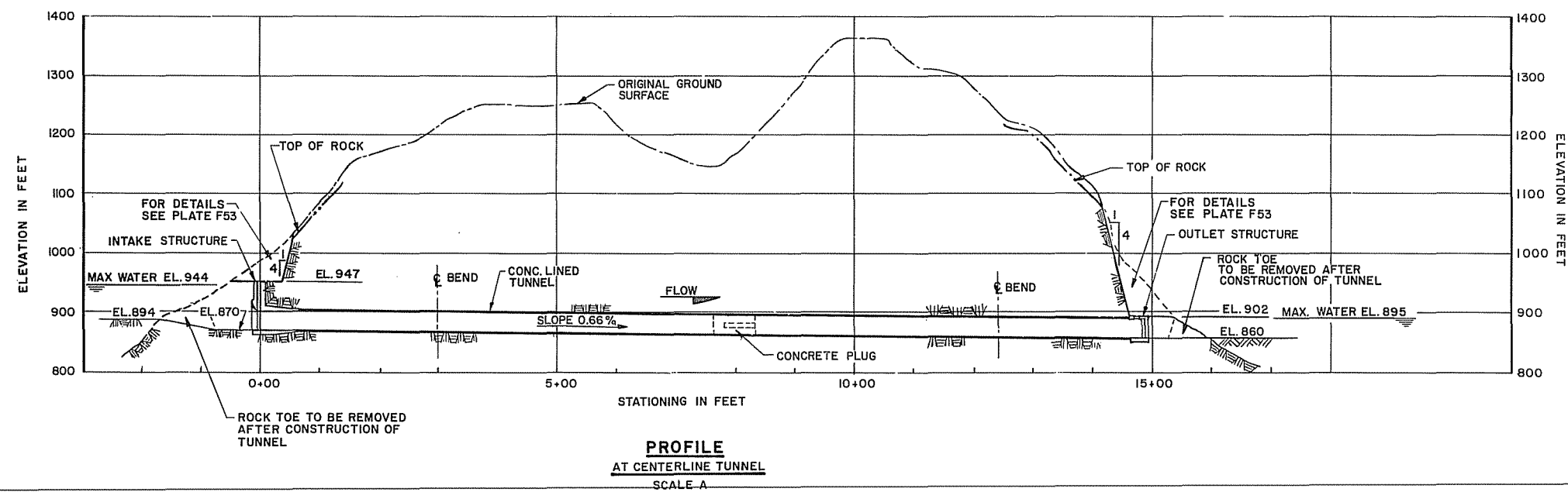
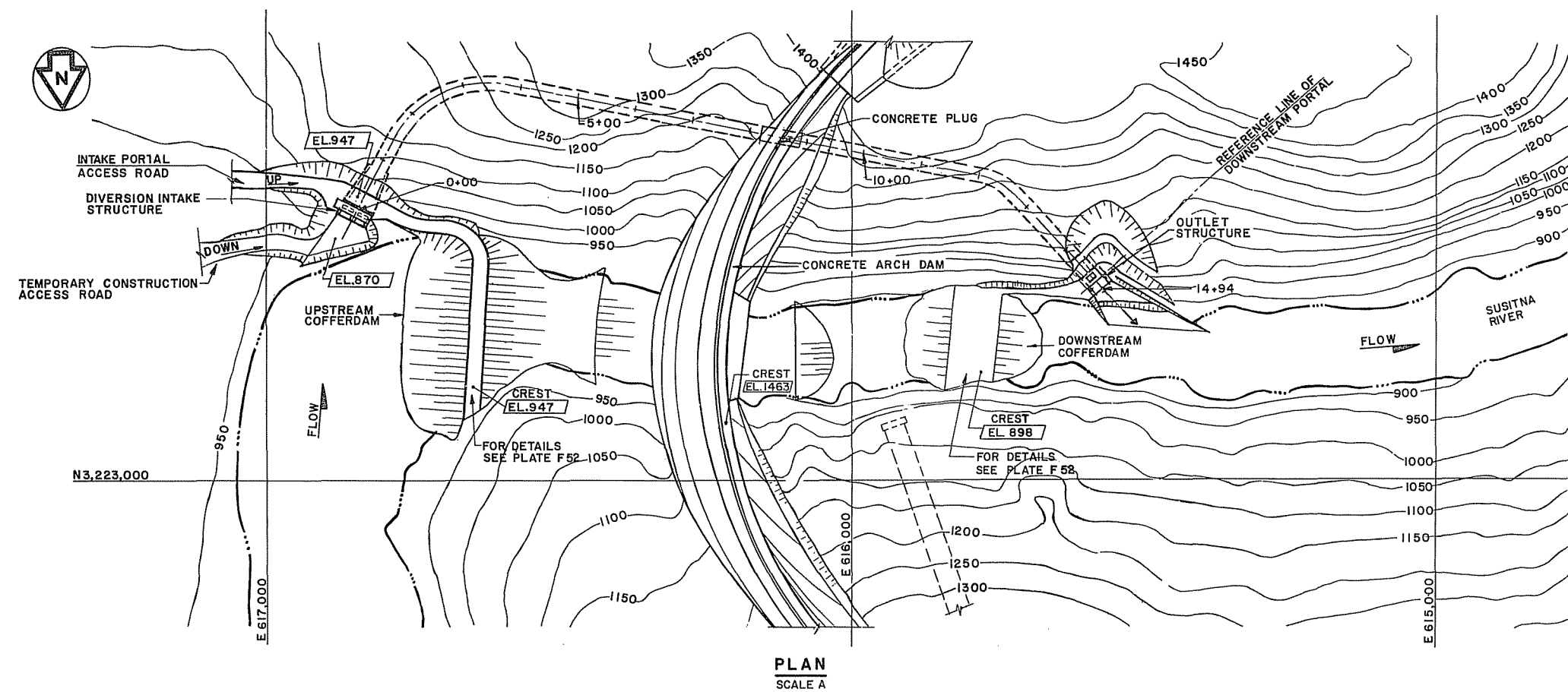
MARZA-EDASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
SADDLE DAM SECTION	
EXHIBIT F	PLATE F49



- NOTES:
1. INCLUDES 2' SETTLEMENT OVERBUILD
2. TYPICAL DAM SECTION SHOWN ON PLATE F49

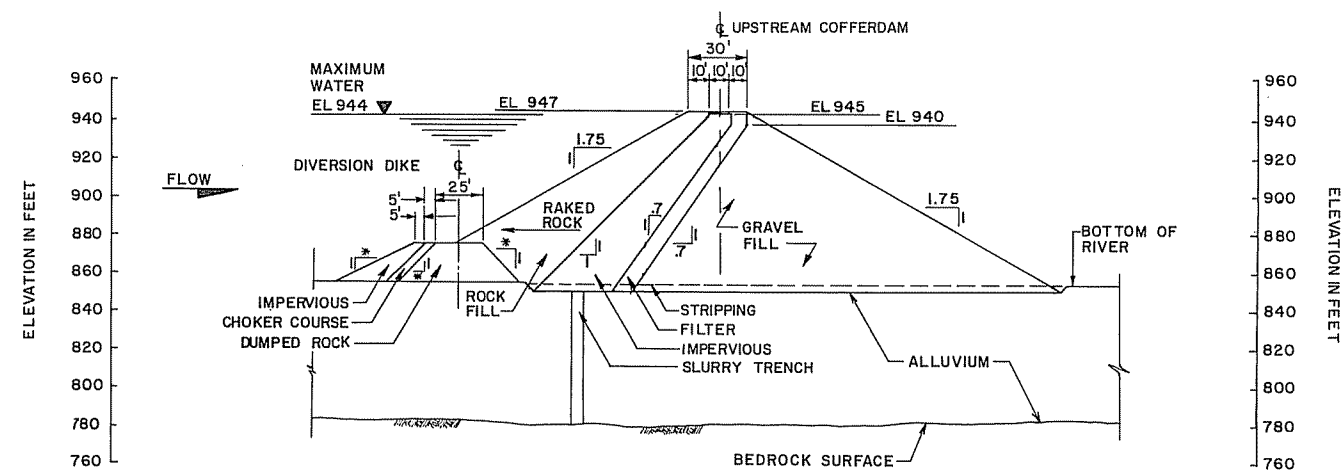


MARZA-EDASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
SADDLE DAM PROFILE AND CREST DETAIL	
EXHIBIT F	PLATE F50

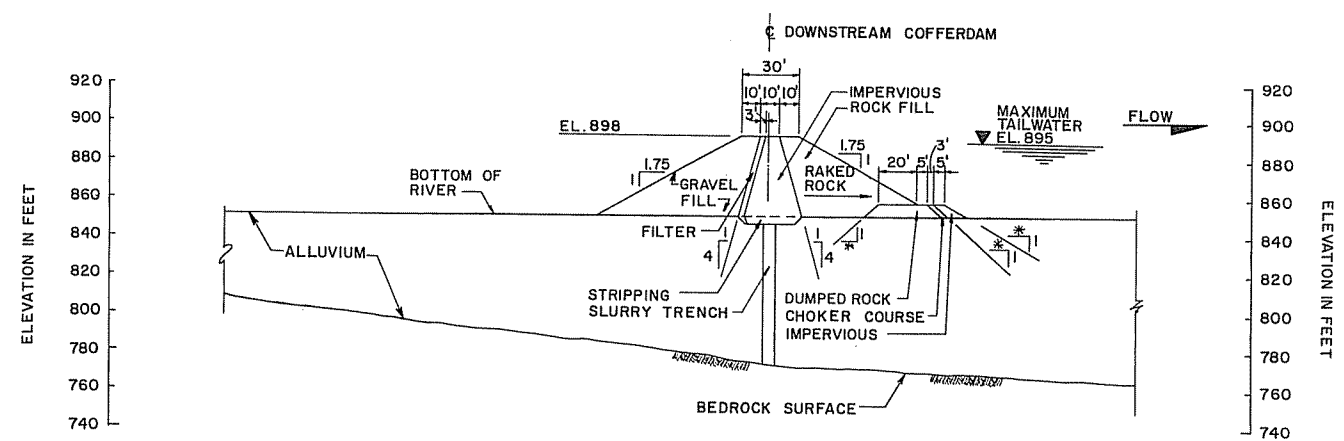


0 100 200 FEET
SCALE A

MARZA-BASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
DIVERSION GENERAL ARRANGEMENT	
EXHIBIT F	PLATE F 51



TYPICAL UPSTREAM COFFERDAM SECTION

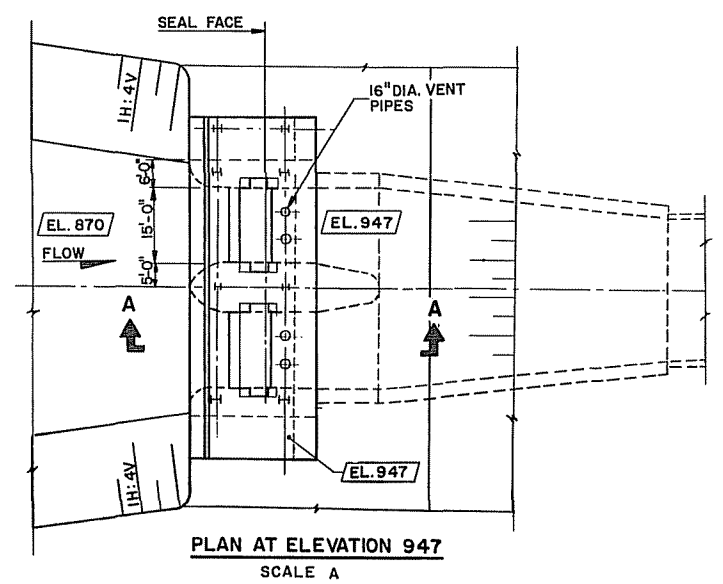
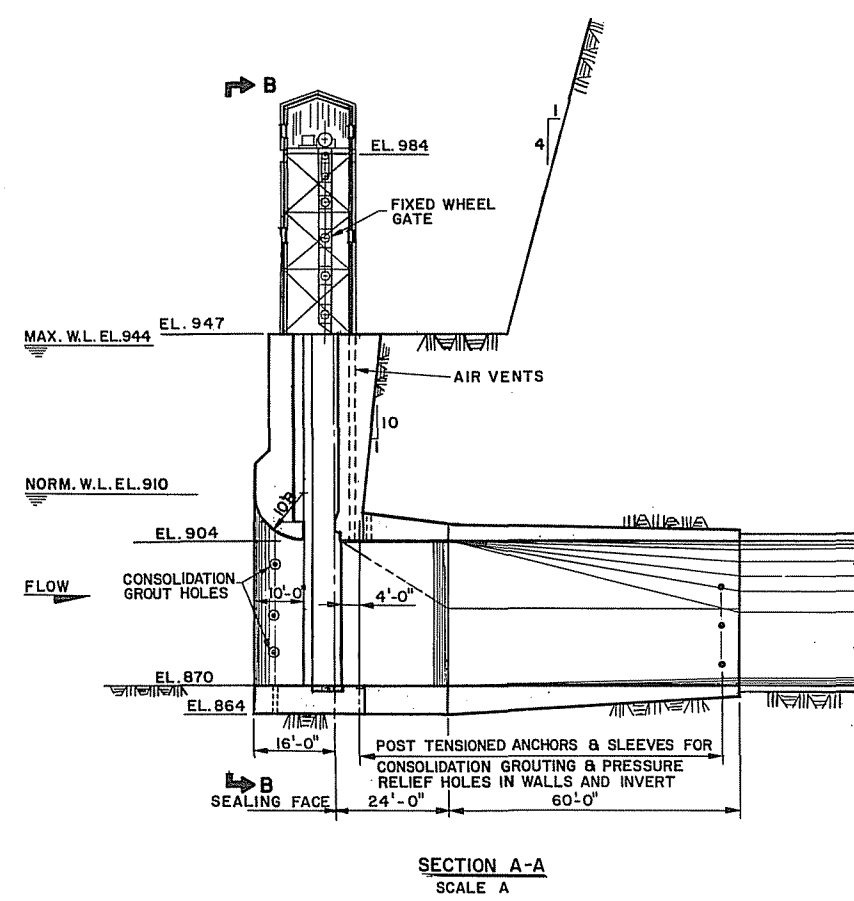


TYPICAL SECTION DOWNSTREAM COFFERDAM

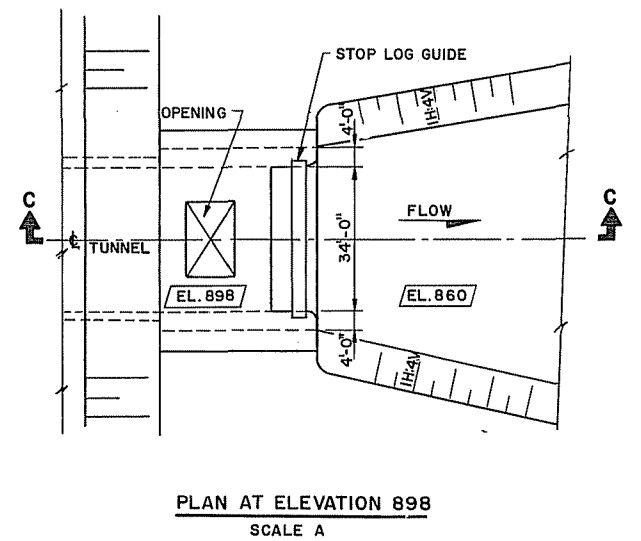
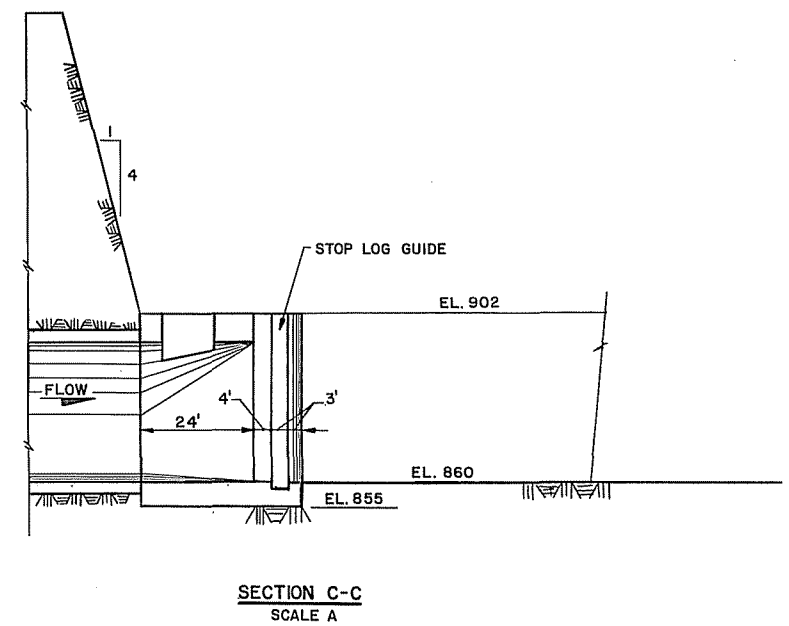
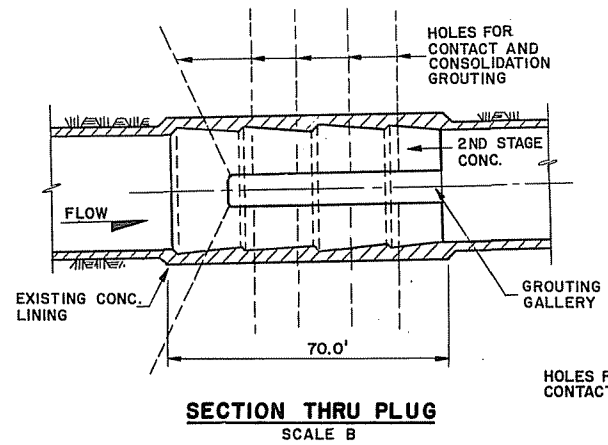
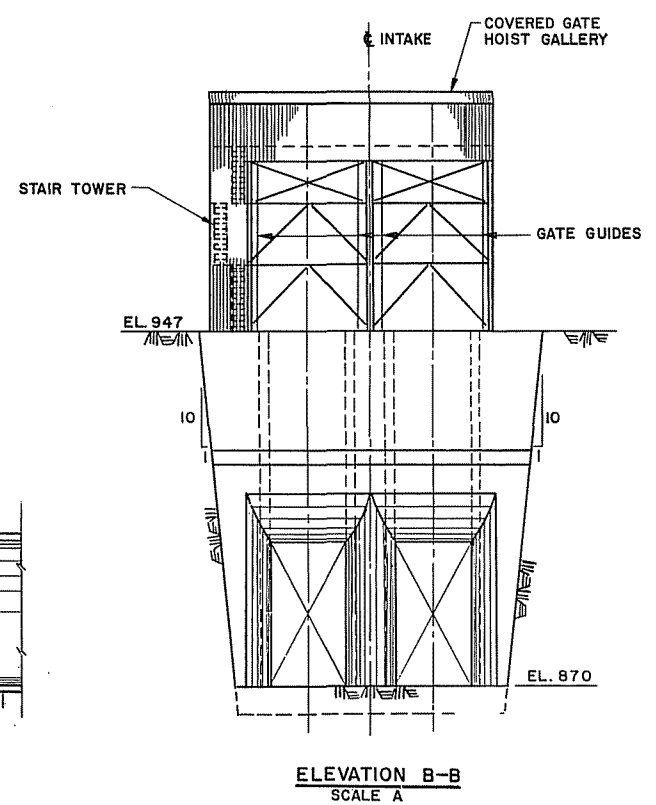
LEGEND
* ANGLE OF REPOSE

SCALE 0 40 80 FEET

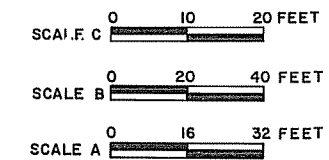
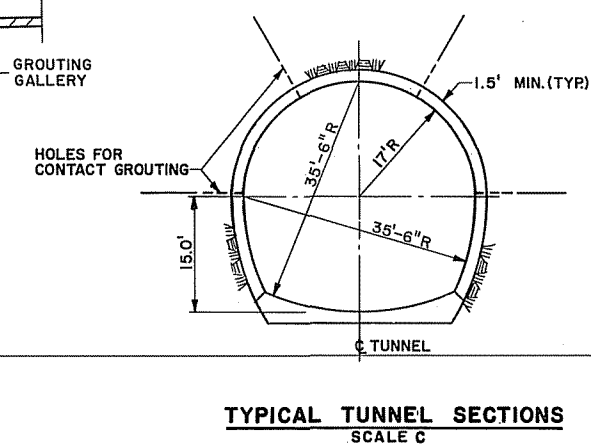
HARZA-ERASSO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
DIVERSION COFFERDAM SECTIONS	
EXHIBIT F	PLATE F52



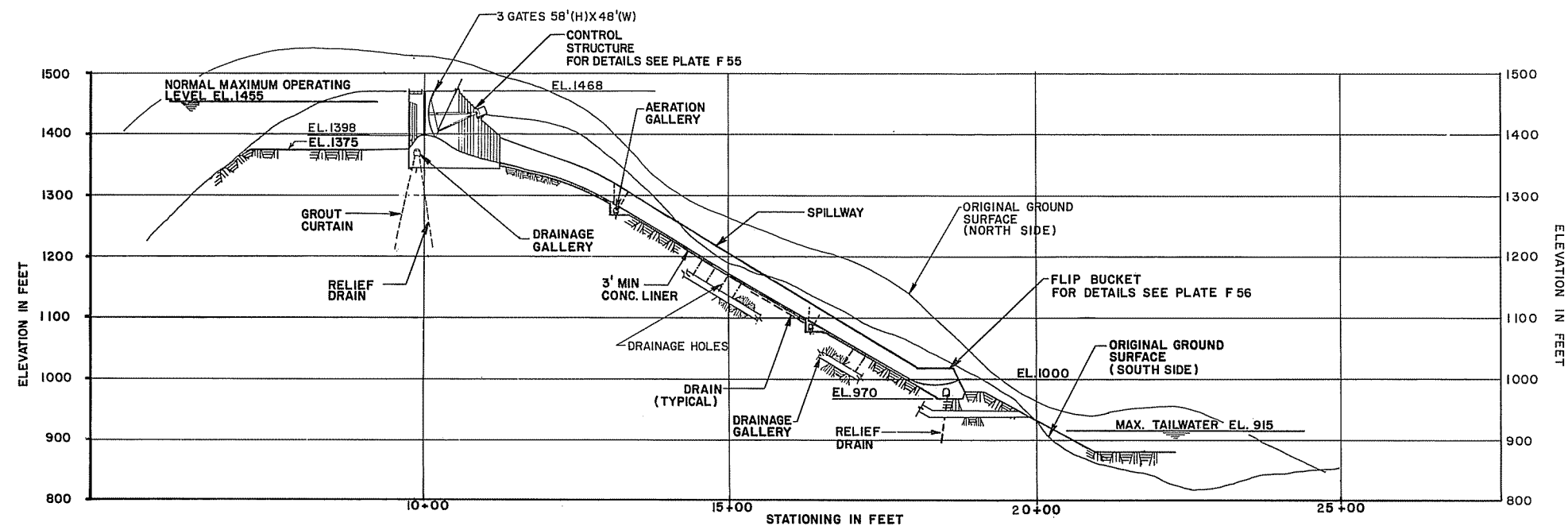
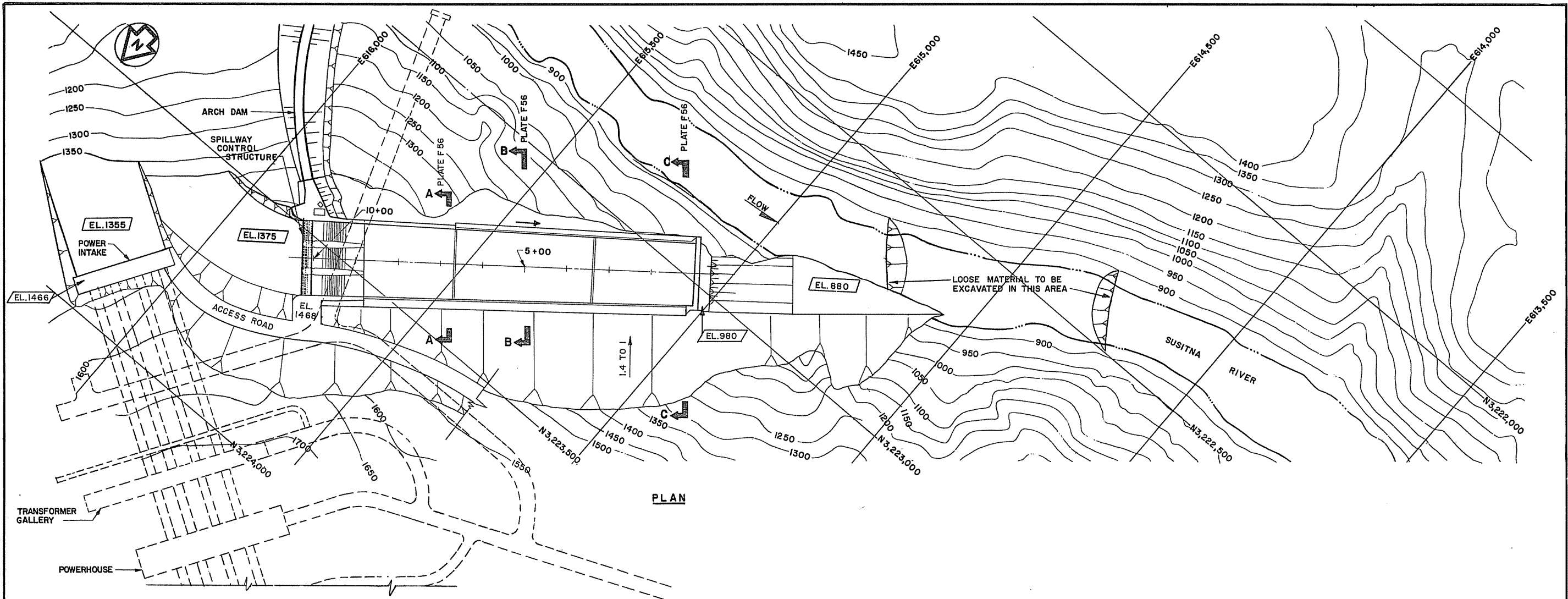
DIVERSION INTAKE STRUCTURE (PLATE F51)



DIVERSION OUTLET STRUCTURE (PLATE F51)



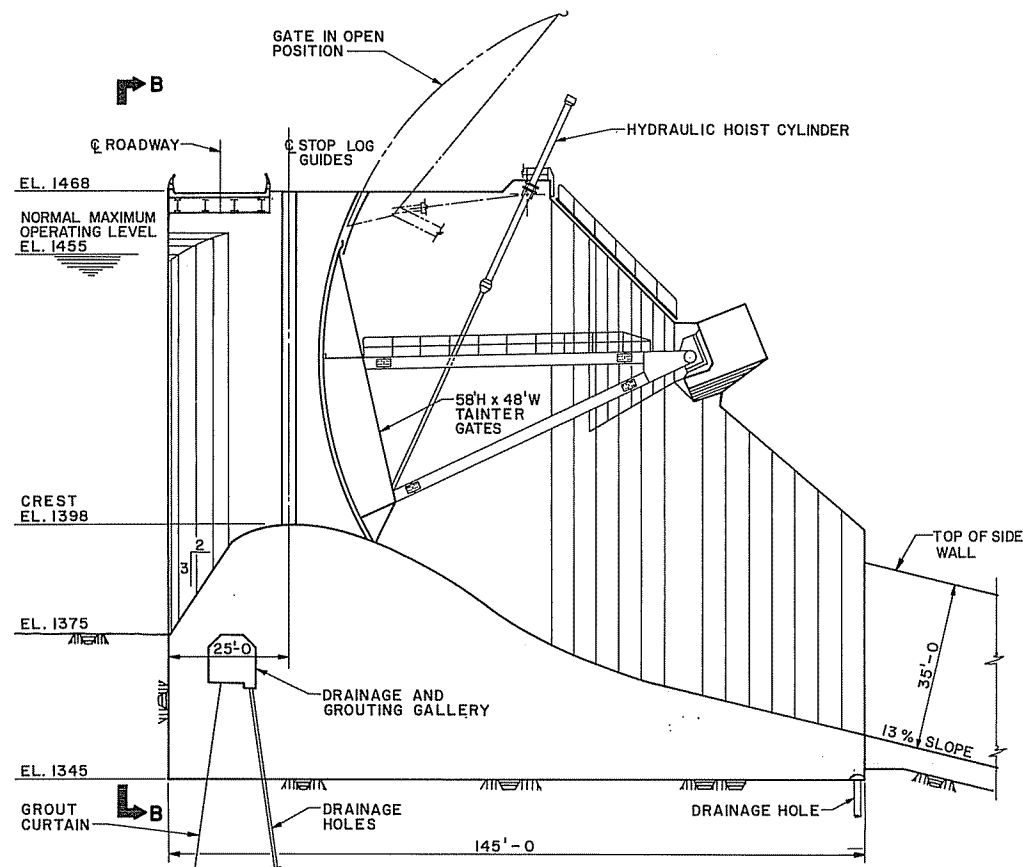
HANZA-EDASCO SUSITNA JOINT VENTURE		ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)			
DIVERSION TUNNEL SECTIONS			
EXHIBIT F		PLATE F53	



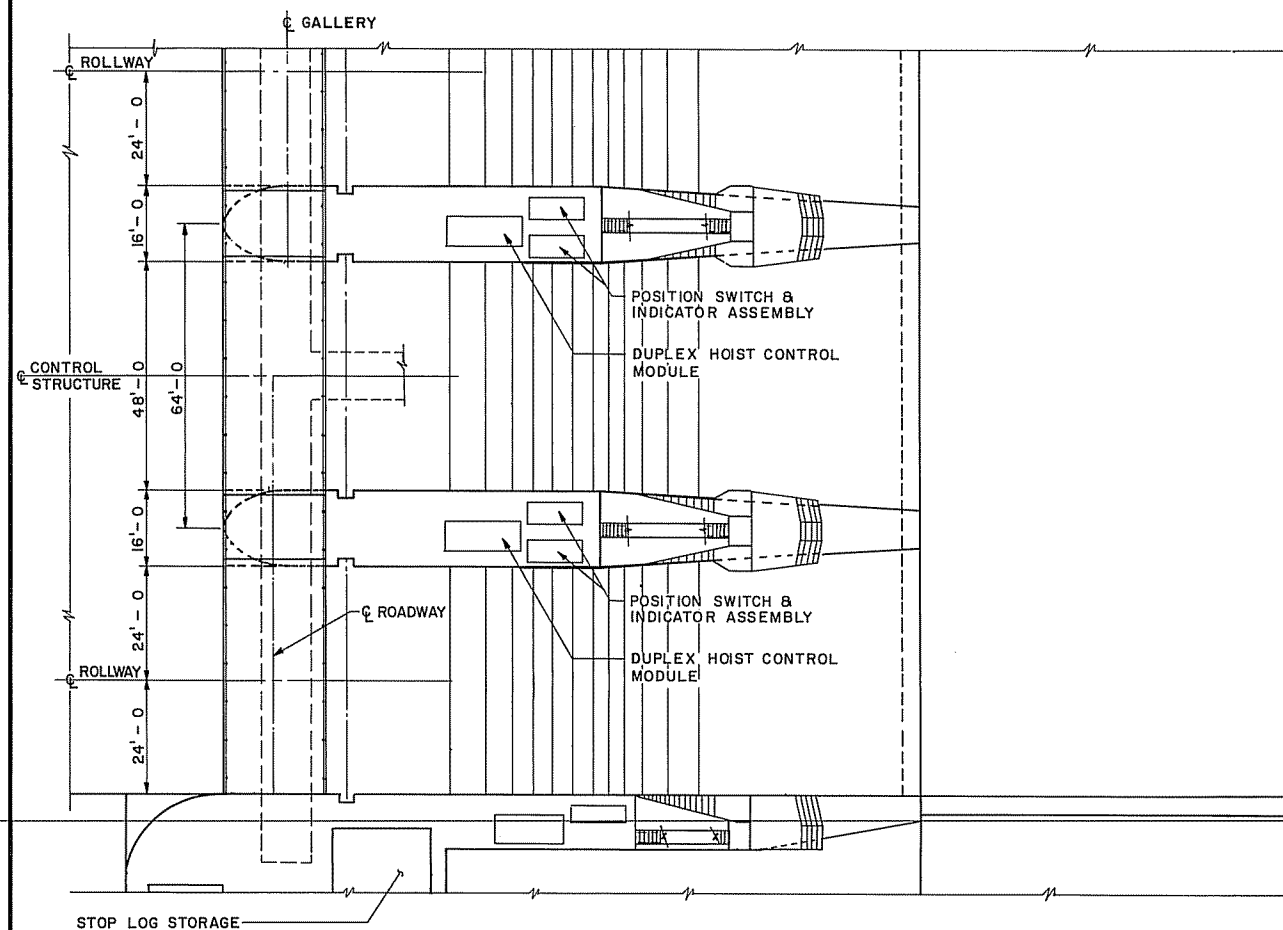
NOTE: FOR SECTIONS SEE PLATE F 56

SCALE 0 100 200 FEET

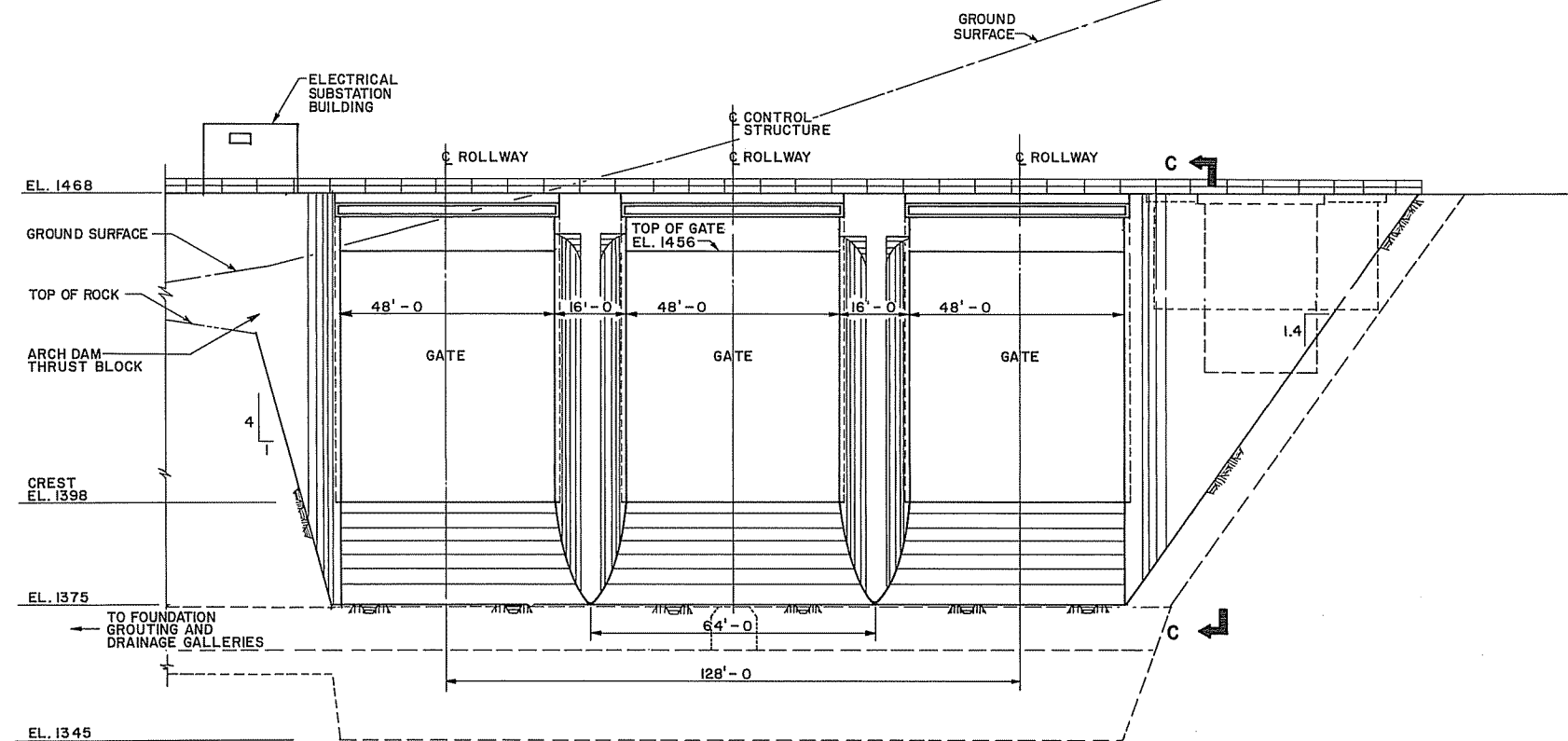
MARZA-BASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
SPILLWAY GENERAL ARRANGEMENT	
EXHIBIT F	PLATE F 54



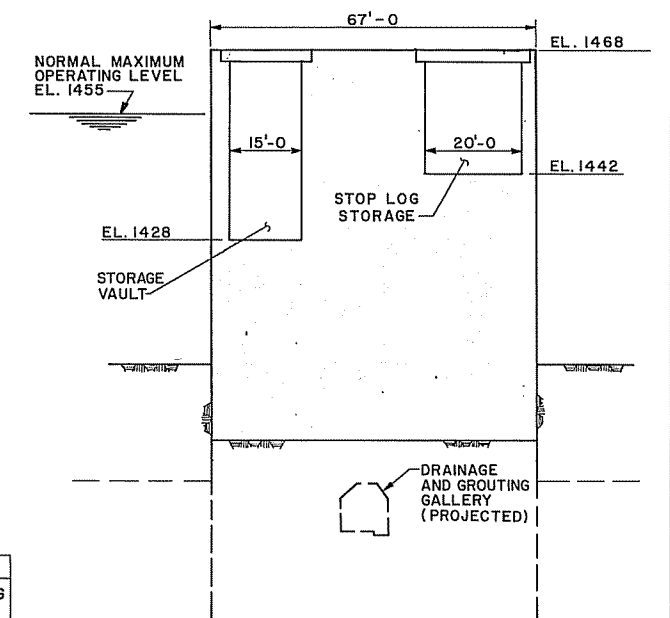
TYPICAL SECTION



PLAN



ELEVATION B-B



SECTION C-C

SPILLWAY CONTROL STRUCTURE
SUMMARY OF STABILITY ANALYSES

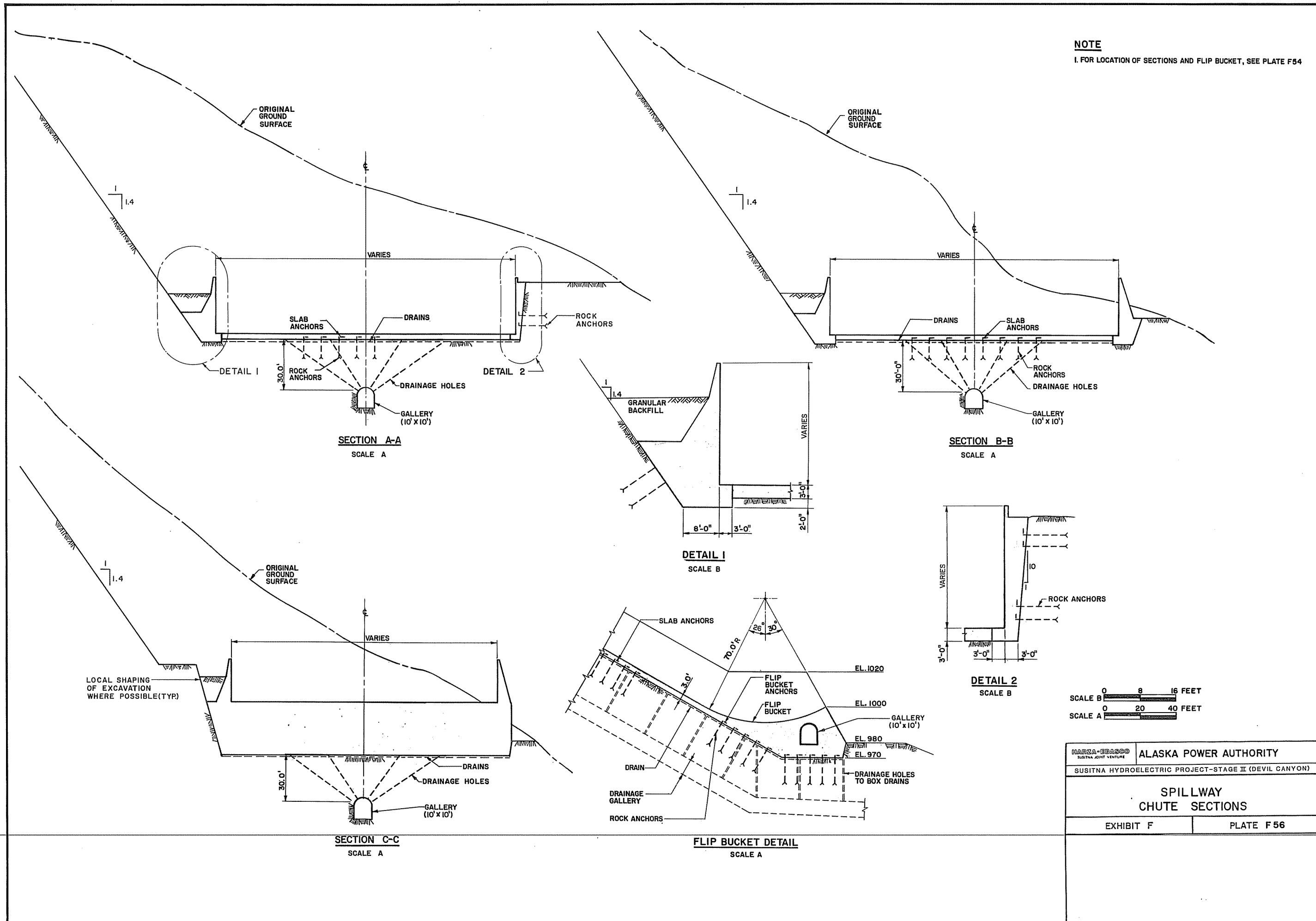
LOAD CONDITION	FOUNDATION STRESS U.S./D.S (PSI)	Xcg (FT)	FACTORS OF SAFETY			
			SLIDING	SHEAR FRICTION	FLOATATION	OVERTURNING
NORMAL INCLUDES ICE LOADS	41.5 / 49.6	2.1	N.A	3.3	5.2	2.7
UNUSUAL 1:100/110 YR. EARTHQUAKE (0.20g)	21.7 / 69.4	12.7	N.A	2.0	5.2	2.1
UNUSUAL DRAINS PLUGGED, PMF	21.1 / 44.2	8.6	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

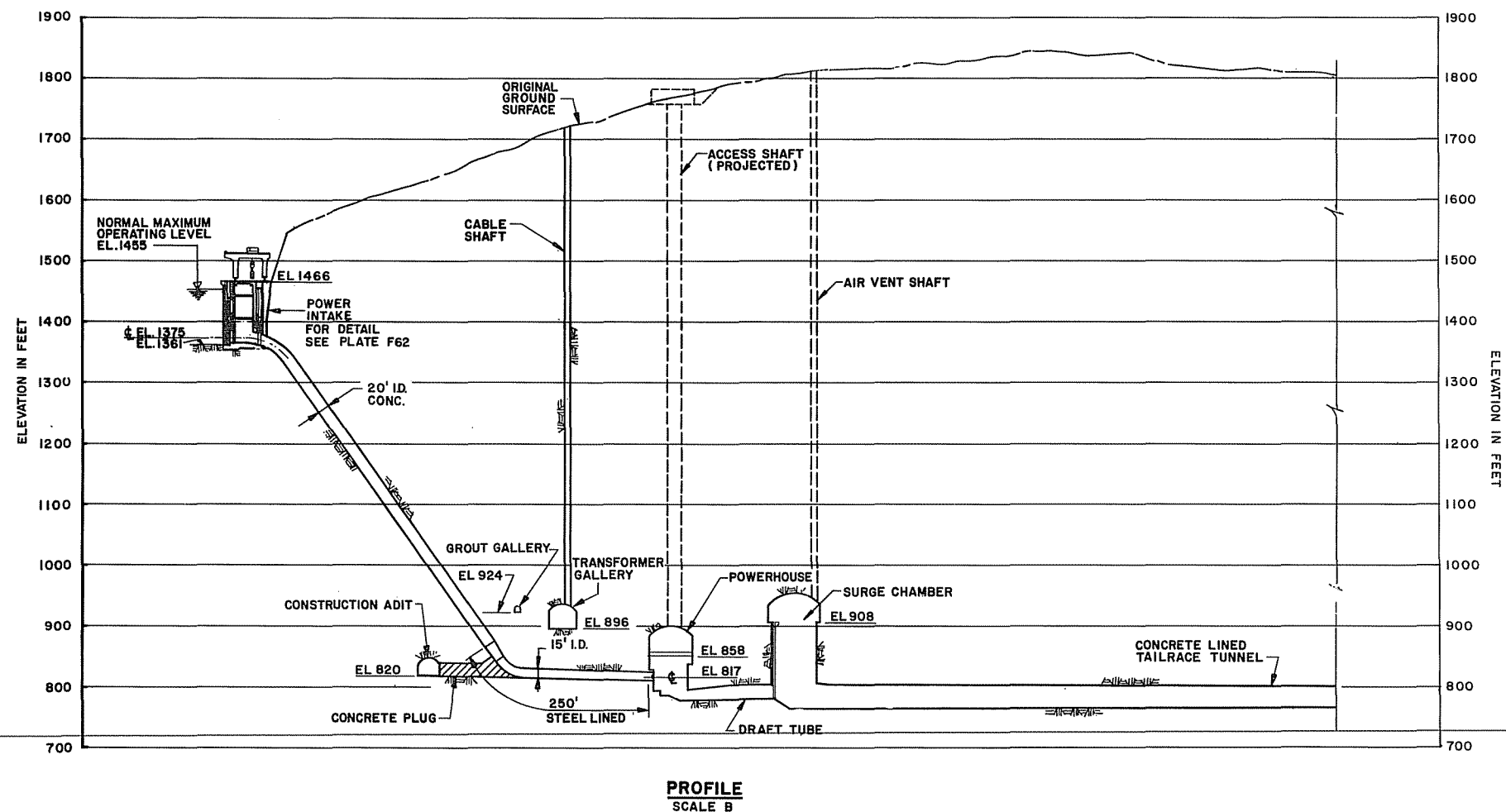
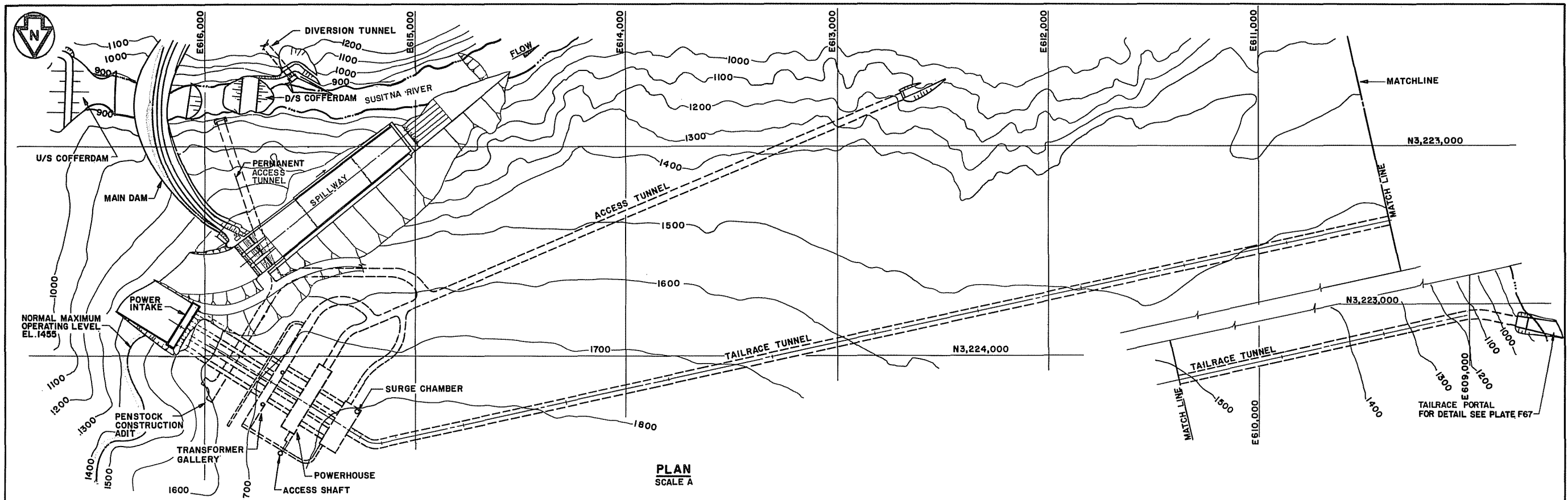
PHYSICAL PARAMETERS
φ = 35°
c = 30 PSI

SCALE 0 16 32 FEET

HARZA-EBASCO
SUSITNA JOINT VENTURE
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)
SPILLWAY CONTROL STRUCTURE
EXHIBIT F PLATE F55

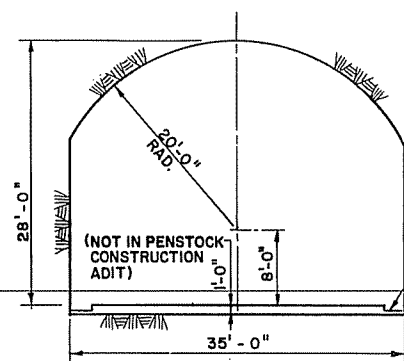
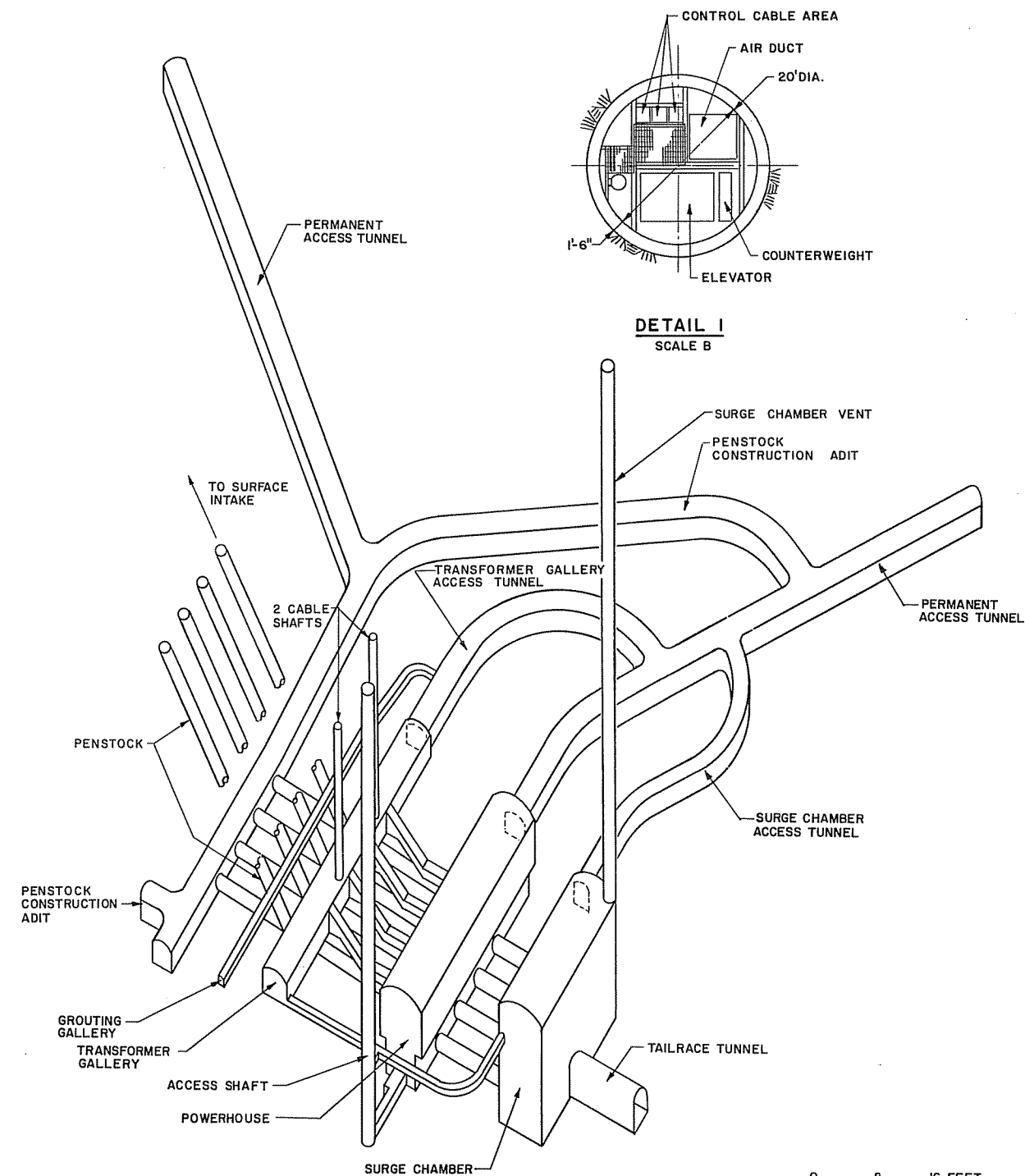
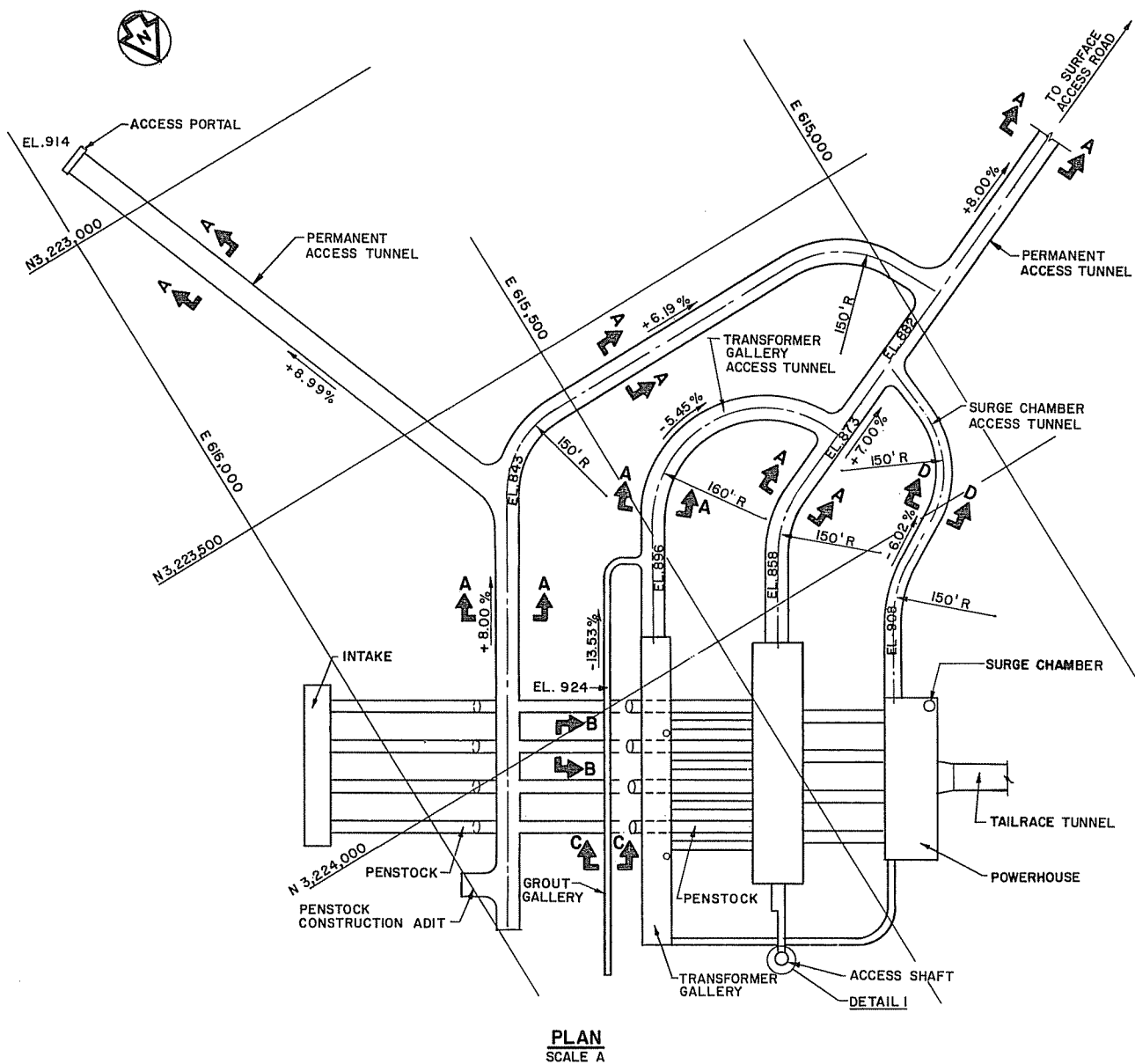
NOTE
 I. FOR LOCATION OF SECTIONS AND FLIP BUCKET, SEE PLATE F54



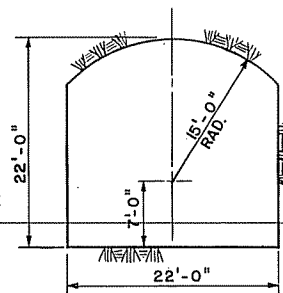


SCALE B 0 100 200 FEET
SCALE A 0 200 400 FEET

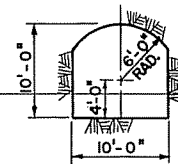
HARVEY-BRASSCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
POWER FACILITIES GENERAL ARRANGEMENT	
EXHIBIT F	PLATE F59



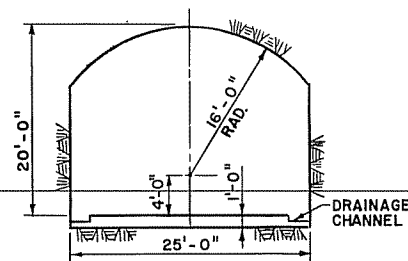
SECTION A-A
SCALE B



SECTION B-B
SCALE B



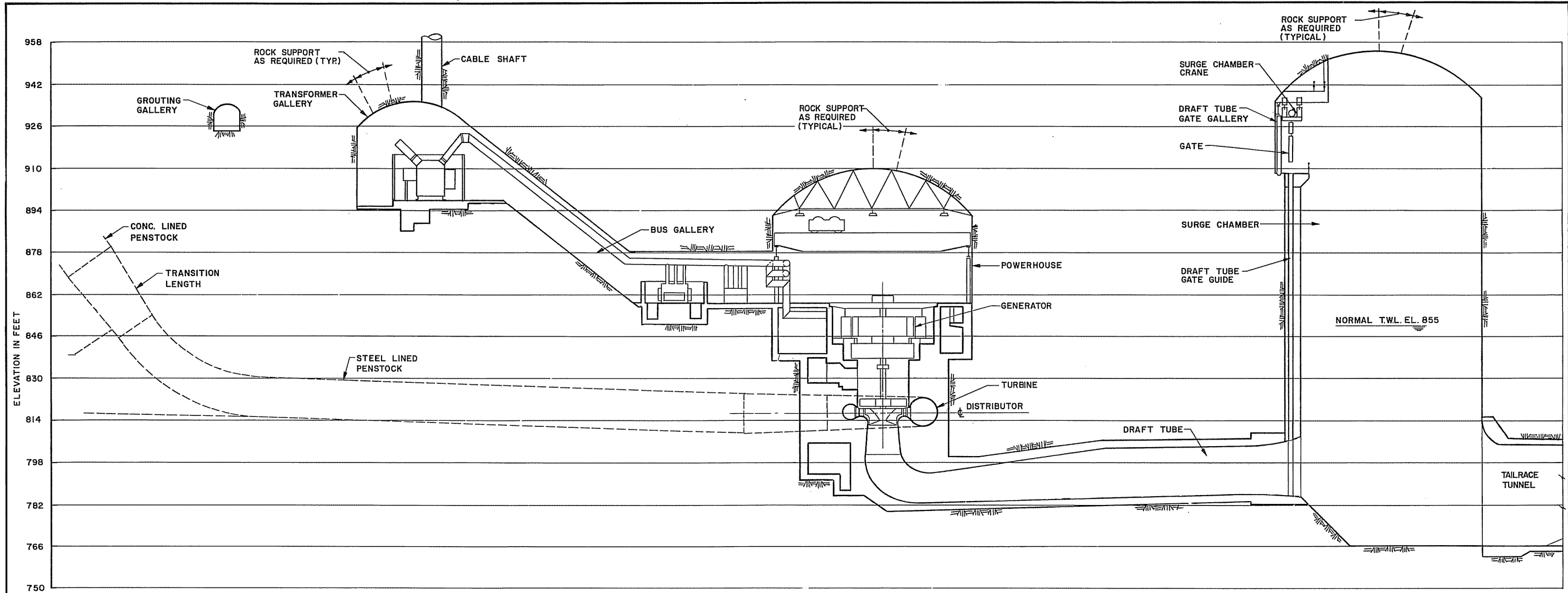
SECTION C-C
SCALE B



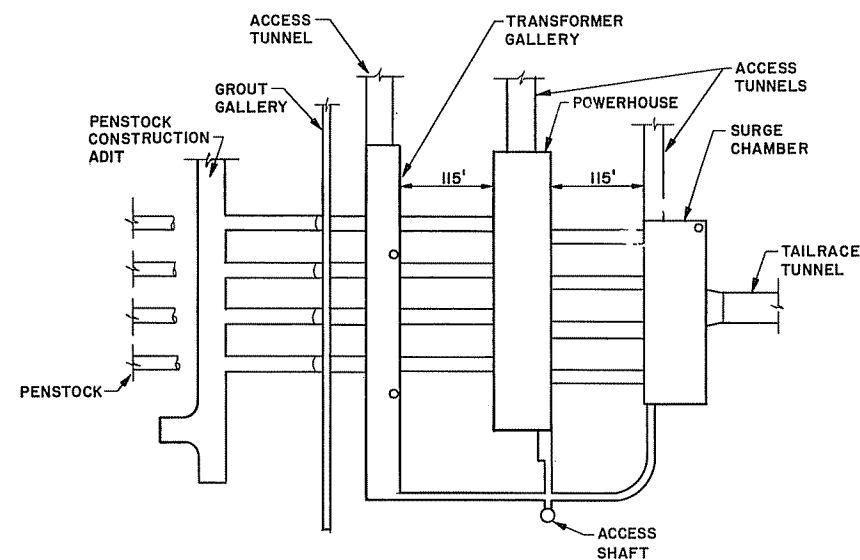
SECTION D-D
SCALE B

SCALE B 0 8 16 FEET
SCALE A 0 100 200 FEET

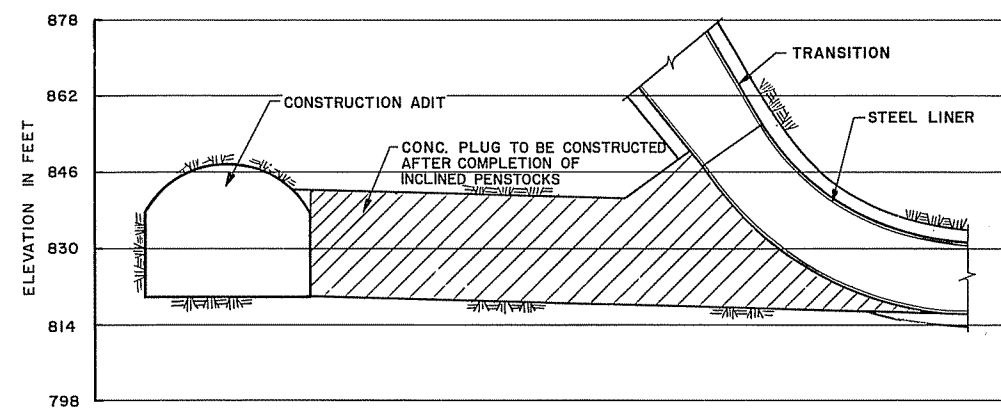
MARZA-ERASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
POWER FACILITIES ACCESS	
EXHIBIT F	PLATE F60



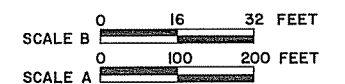
SECTION A-A
SCALE B



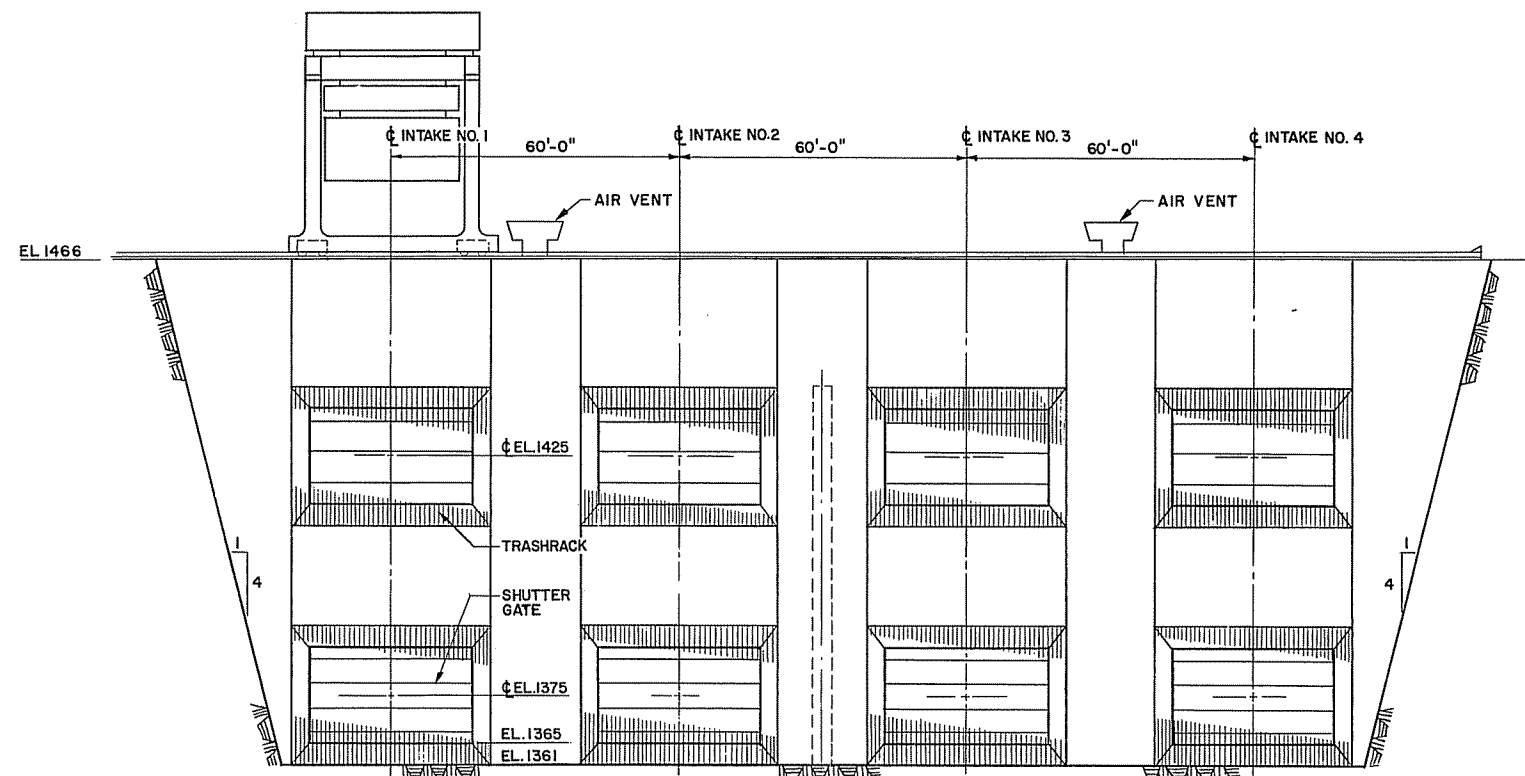
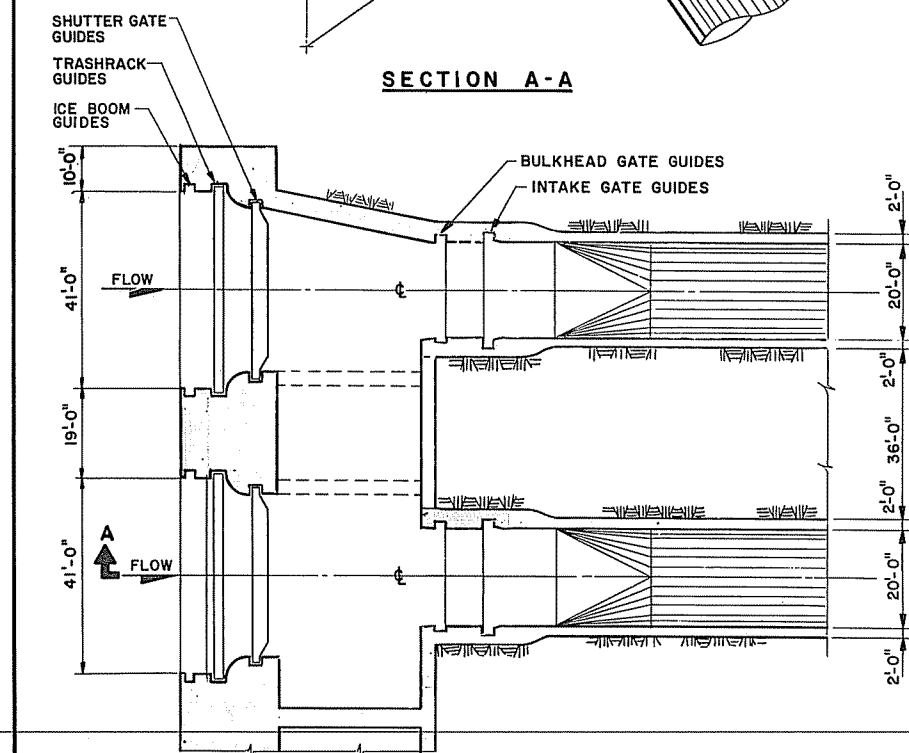
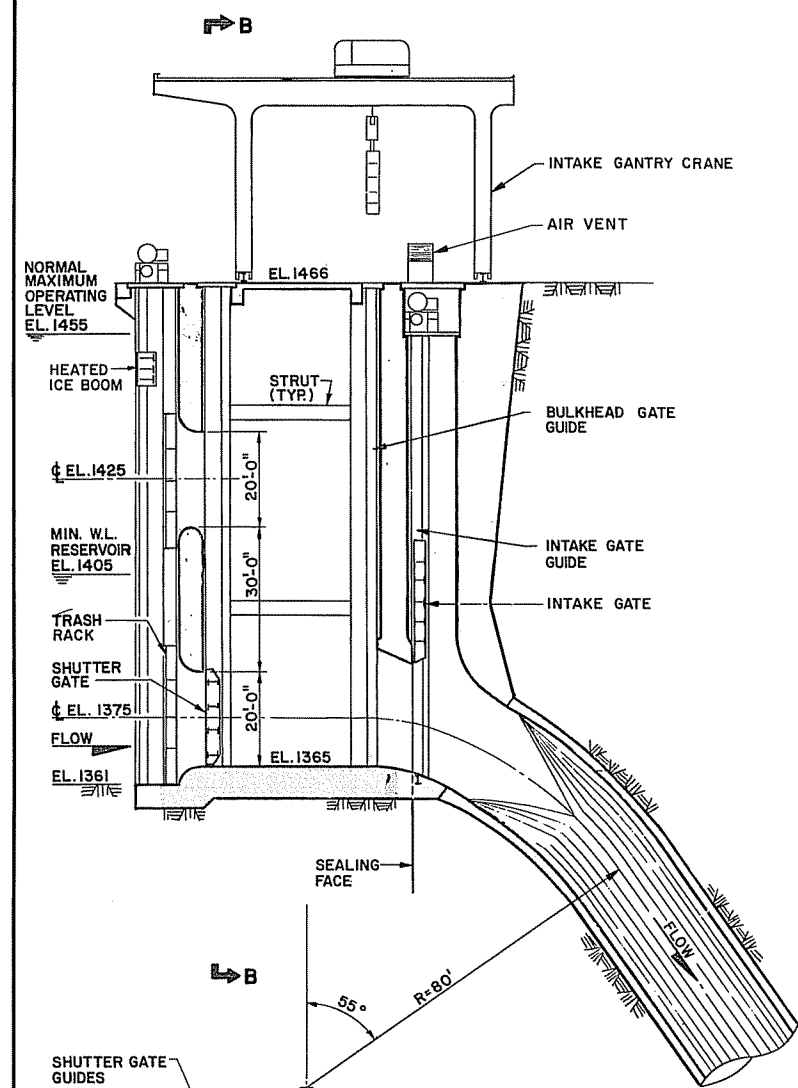
PLAN
SCALE A



SECTION B-B
SCALE B

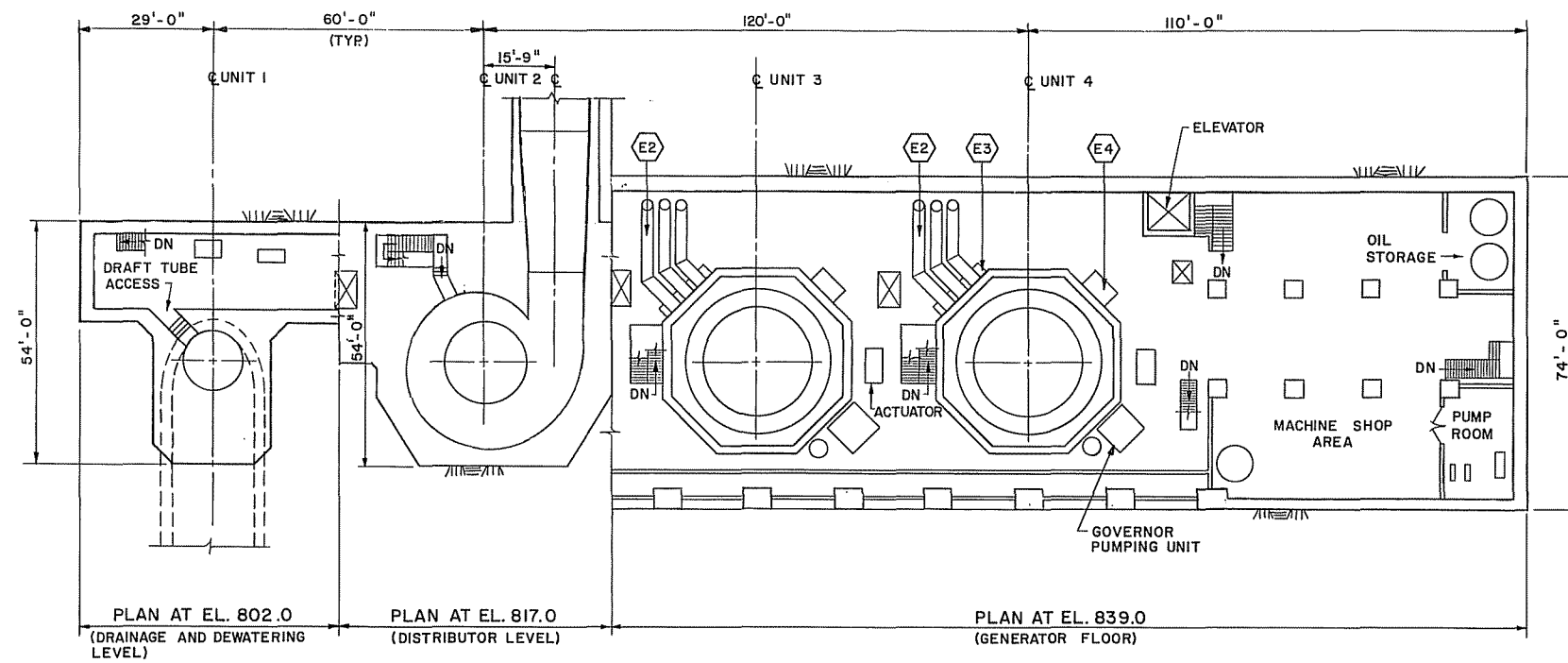


MARZA-BASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
POWER FACILITIES PLAN & SECTIONS	
EXHIBIT F	PLATE F61

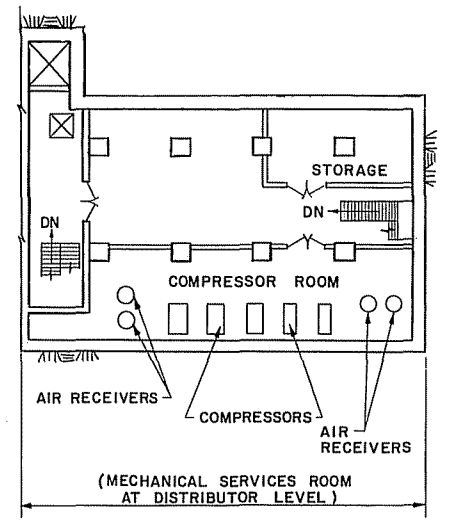


SCALE 0 16 32 FEET

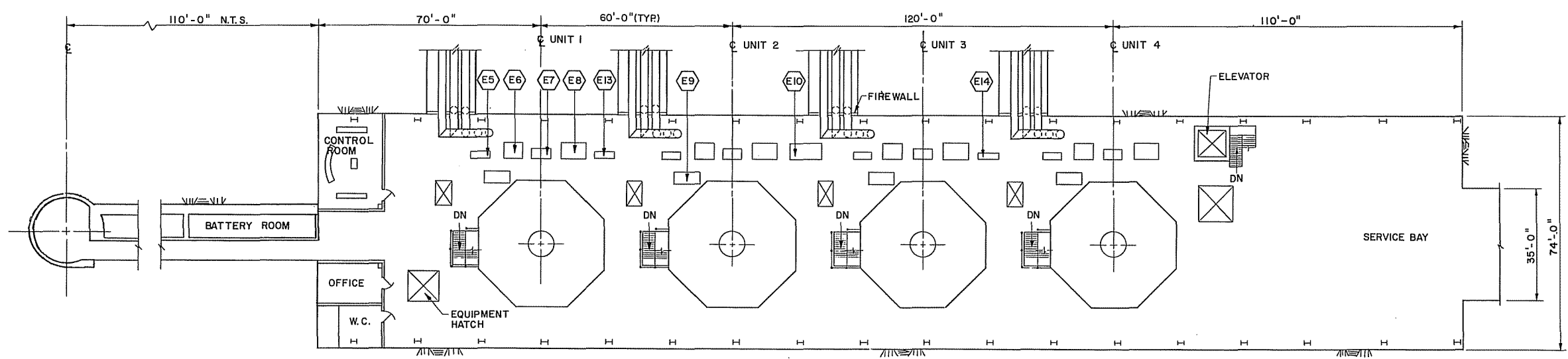
MARZA-ERASCO SUSITNA JOINT VENTURE ALASKA POWER AUTHORITY SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
POWER INTAKE SECTIONS	
EXHIBIT F	PLATE F 62



POWERHOUSE PLAN



**PLAN
AT EL. 817.0**

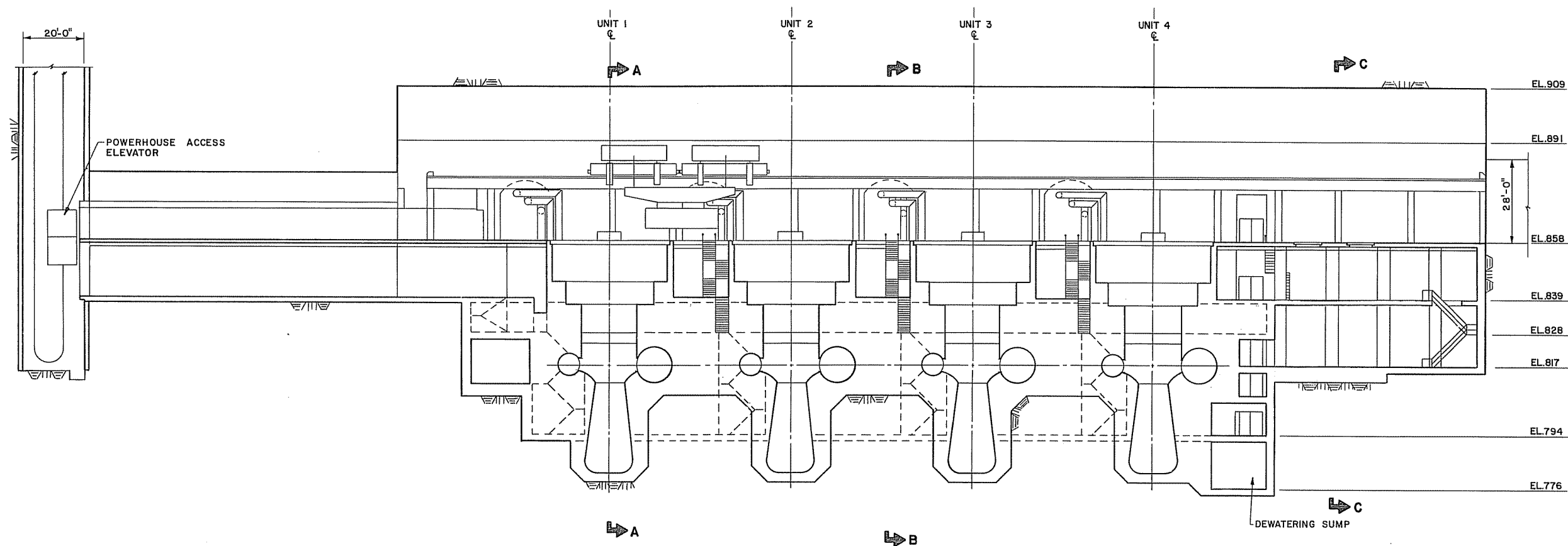


**POWERHOUSE PLAN
AT EL. 858.0**

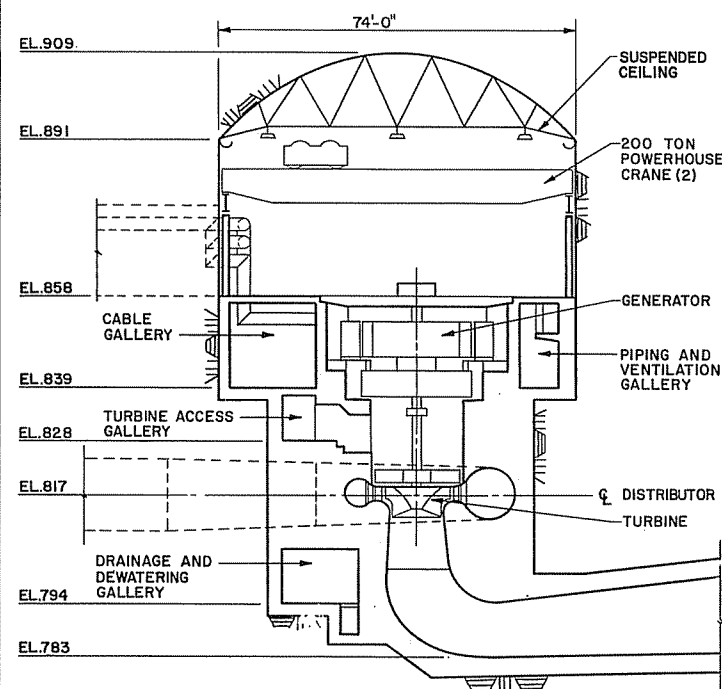
SCALE 0 16 32 FEET

- 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 SWITCHGEAR
 - 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

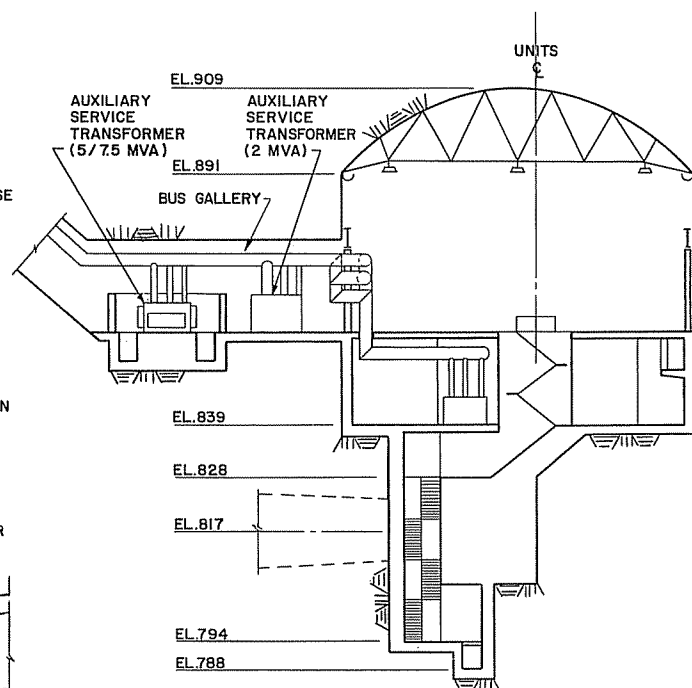
MARZA-EBASCO SUSITNA JOINT VENTURE		ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)			
POWERHOUSE PLANS			
EXHIBIT F		PLATE F63	



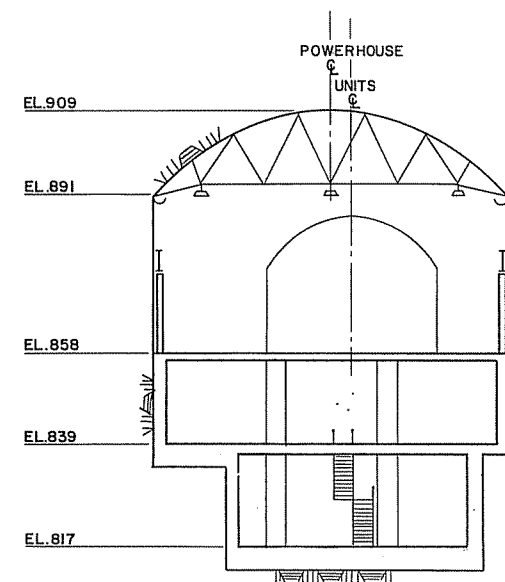
LONGITUDINAL SECTION (THRU CENTERLINE OF UNITS)



SECTION A-A (SECTION THRU CENTERLINE OF UNIT)



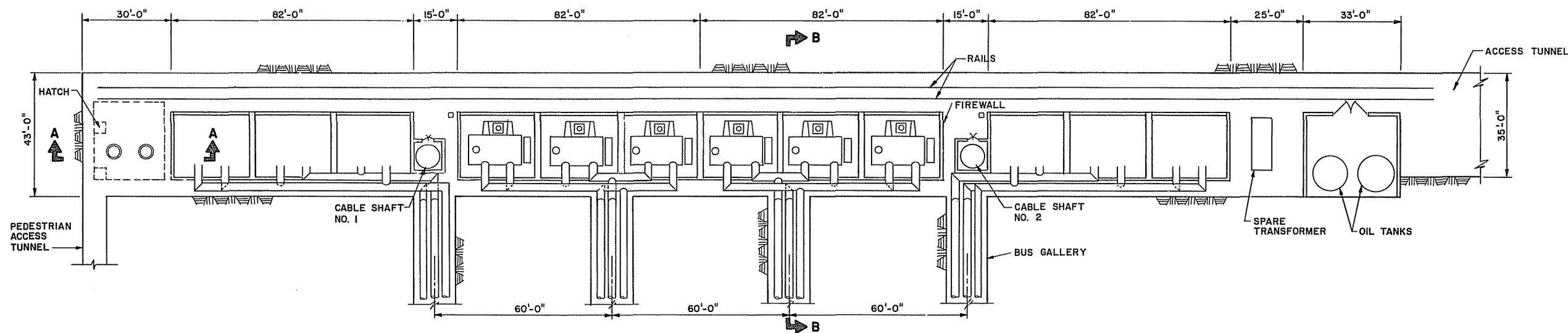
SECTION B-B (SECTION THRU BUS GALLERY)



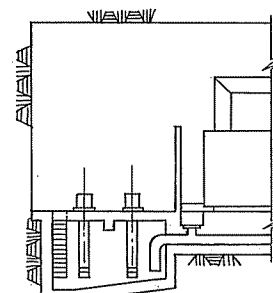
SECTION C-C (SECTION THRU SERVICE BAY)

SCALE 0 16 32 FEET

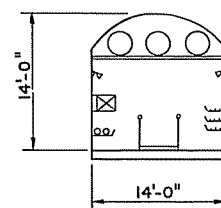
MARZA-BEASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
POWERHOUSE SECTIONS	
EXHIBIT F	PLATE F 64



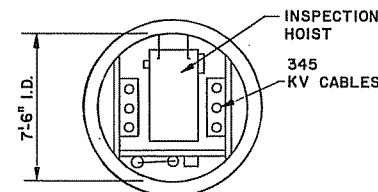
PLAN
SCALE A



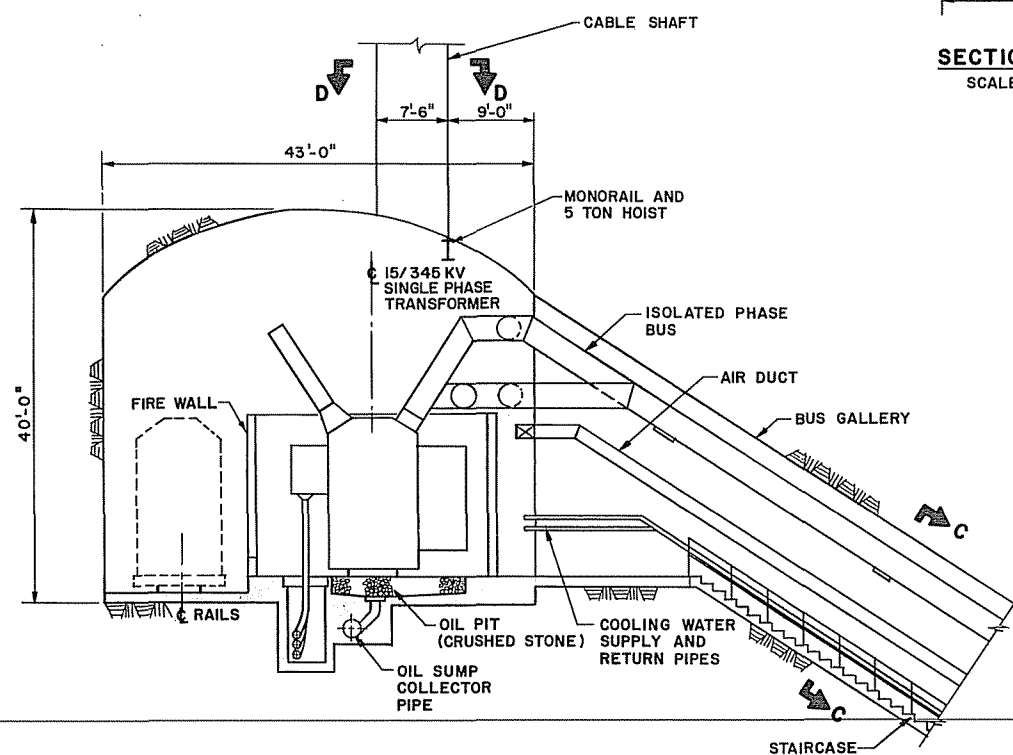
SECTION A-A
SCALE A



SECTION C-C
SCALE B



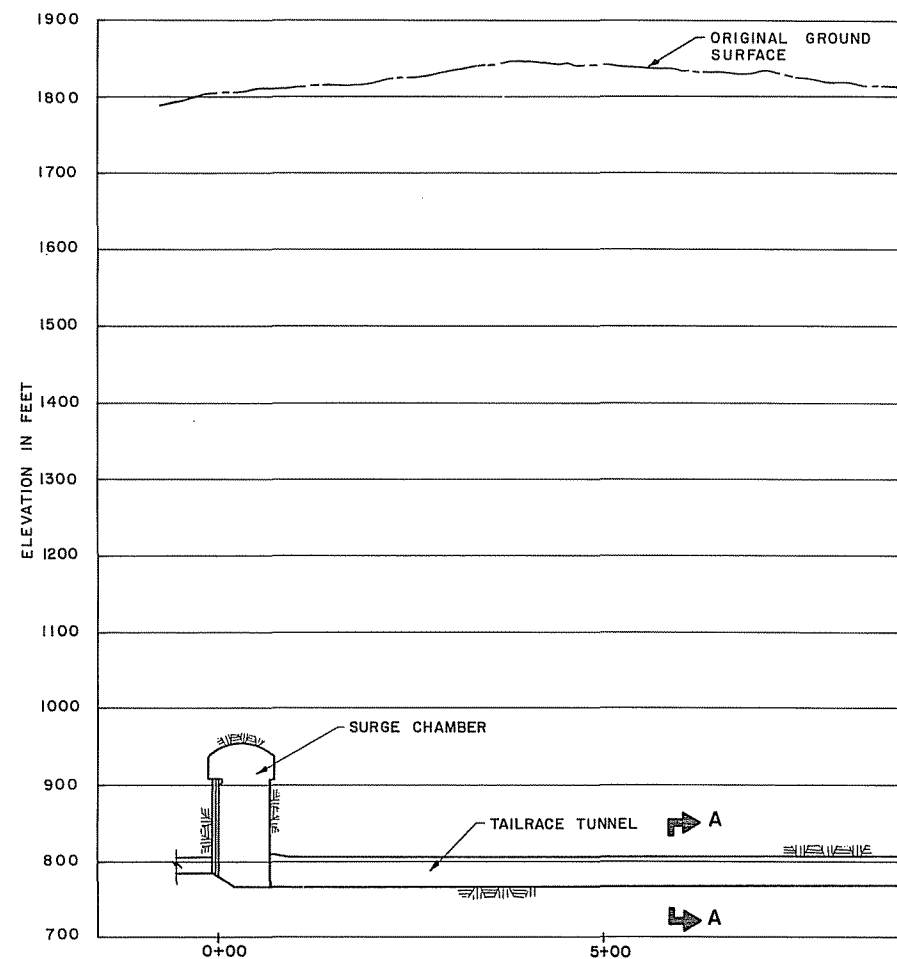
SECTION D-D
SCALE C



SECTION B-B
SCALE B

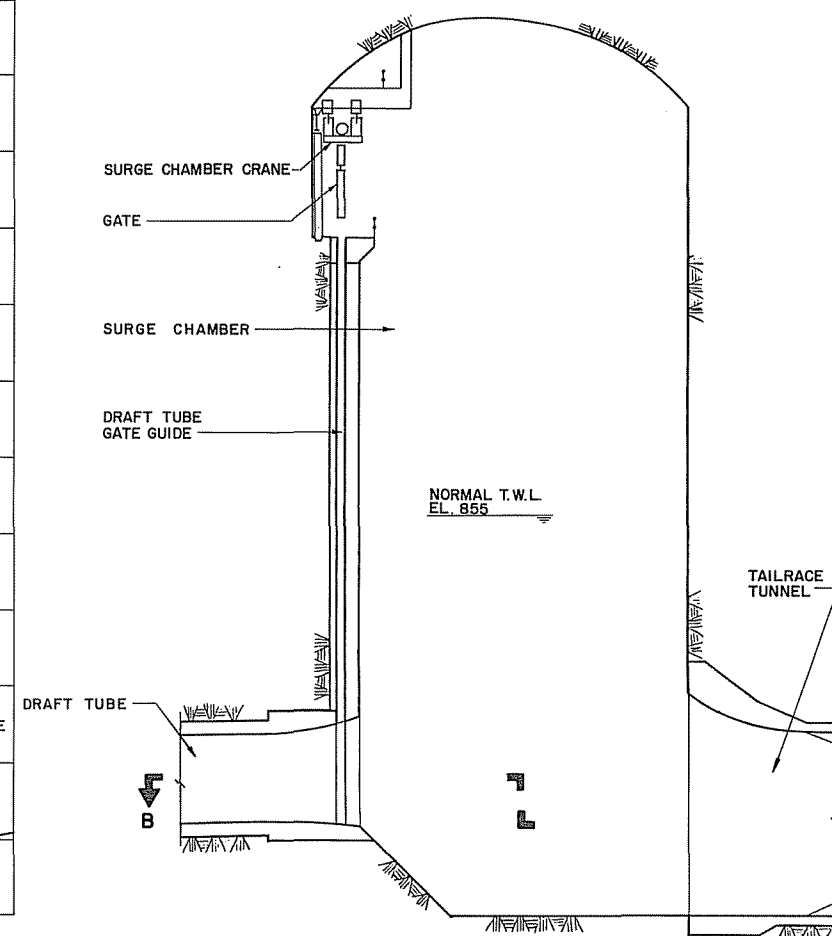
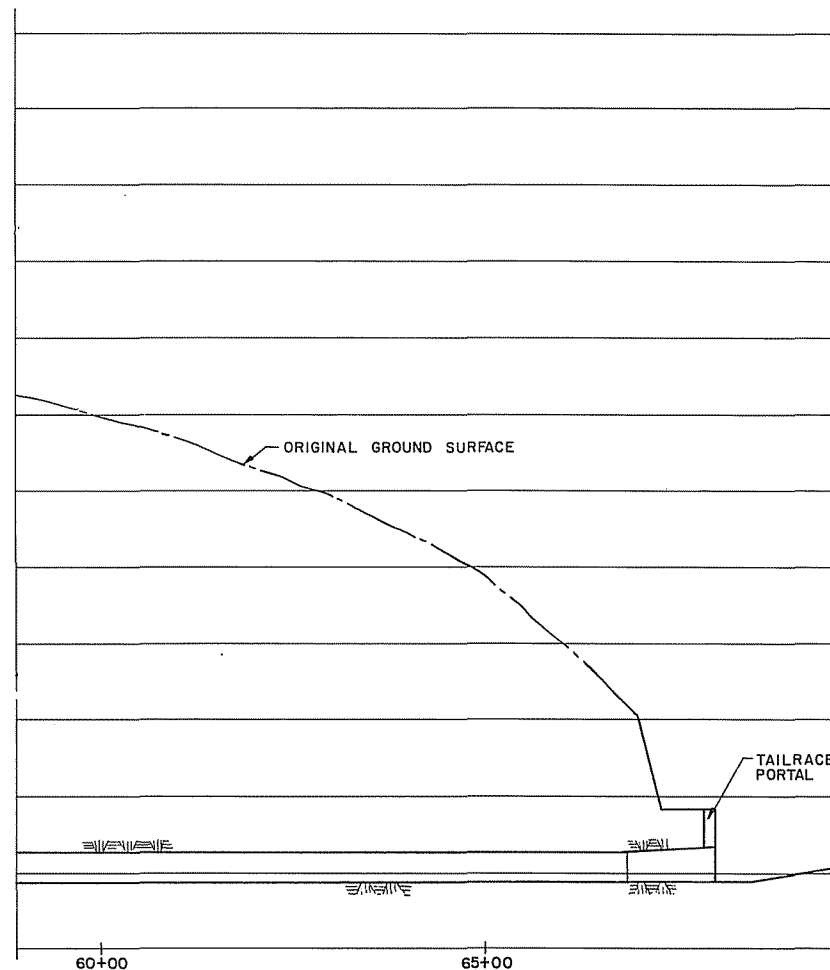
SCALE C 0 4 8 FEET
SCALE B 0 8 16 FEET
SCALE A 0 16 32 FEET

MARZA-EMASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
TRANSFORMER GALLERY PLAN AND SECTIONS	
EXHIBIT F	PLATE F65

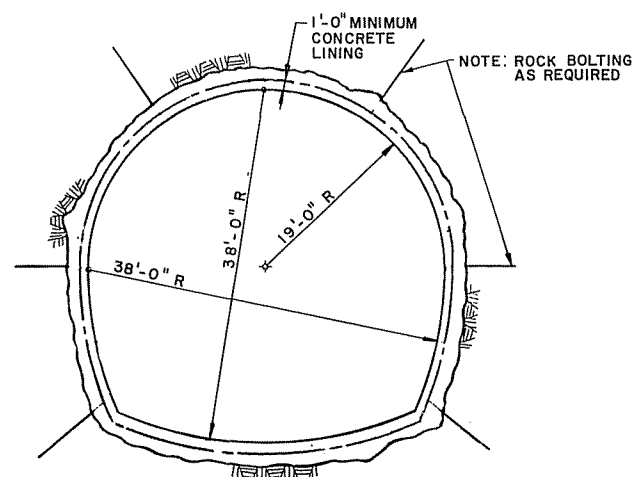


FLOW

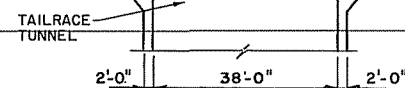
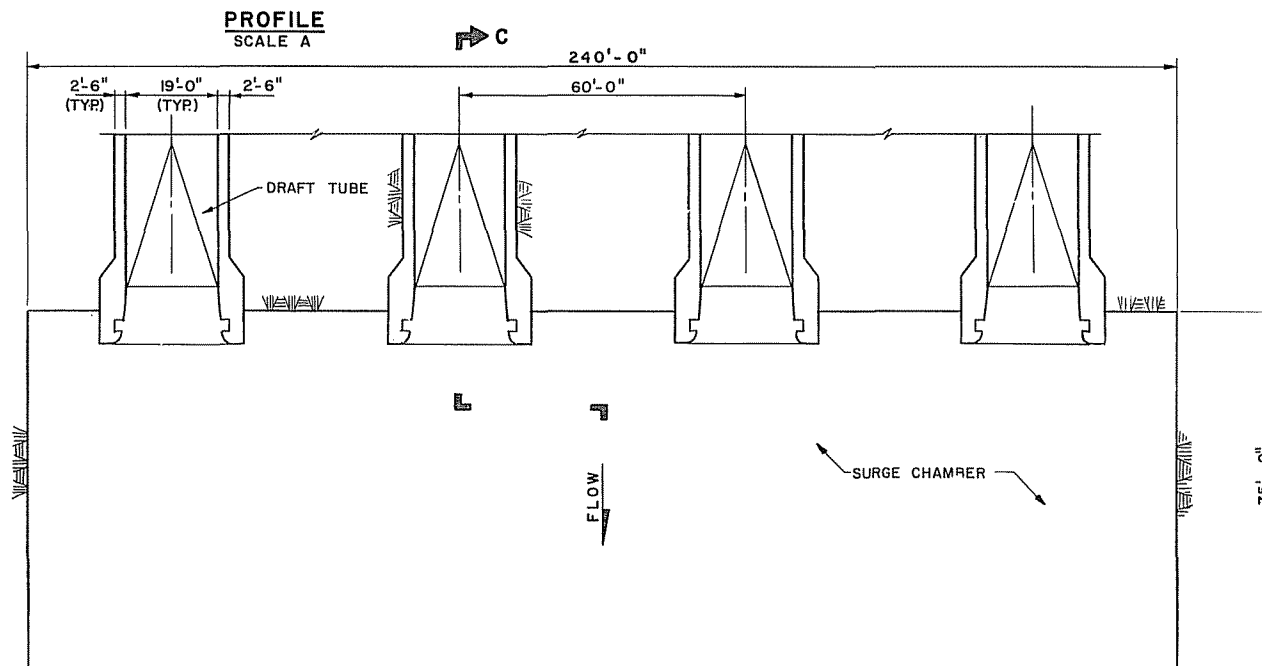
STATIONING IN FEET



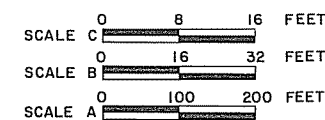
SECTION C-C
SCALE B



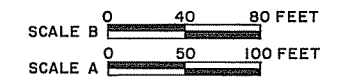
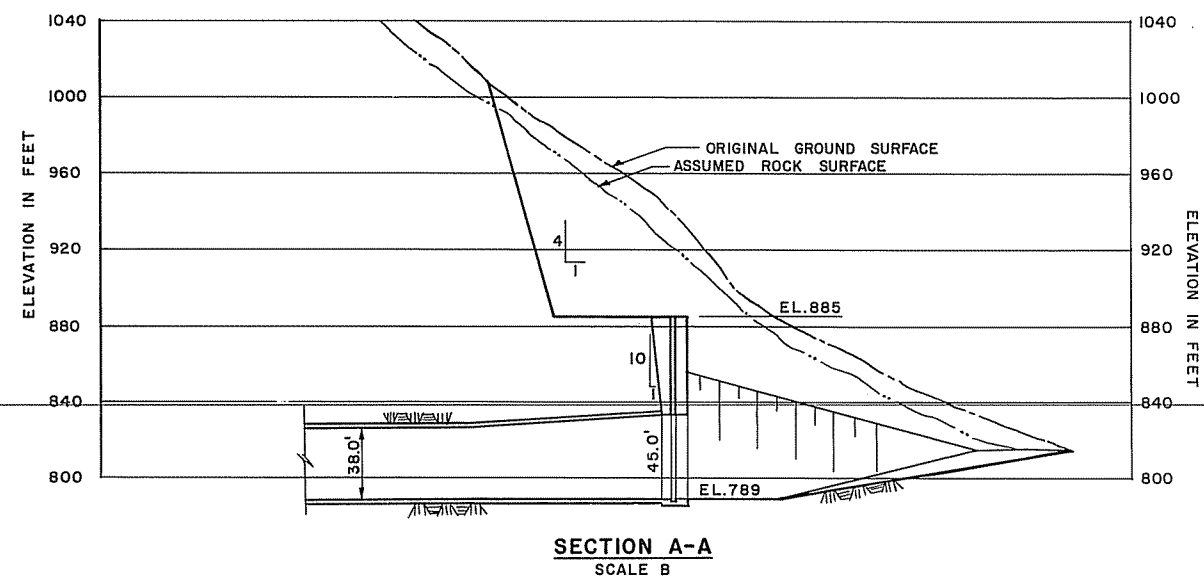
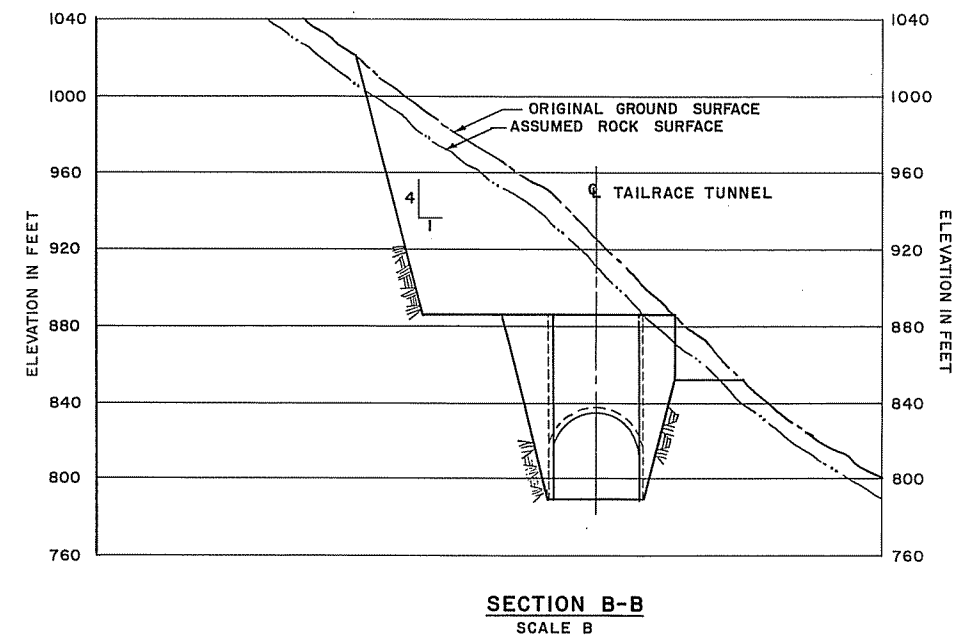
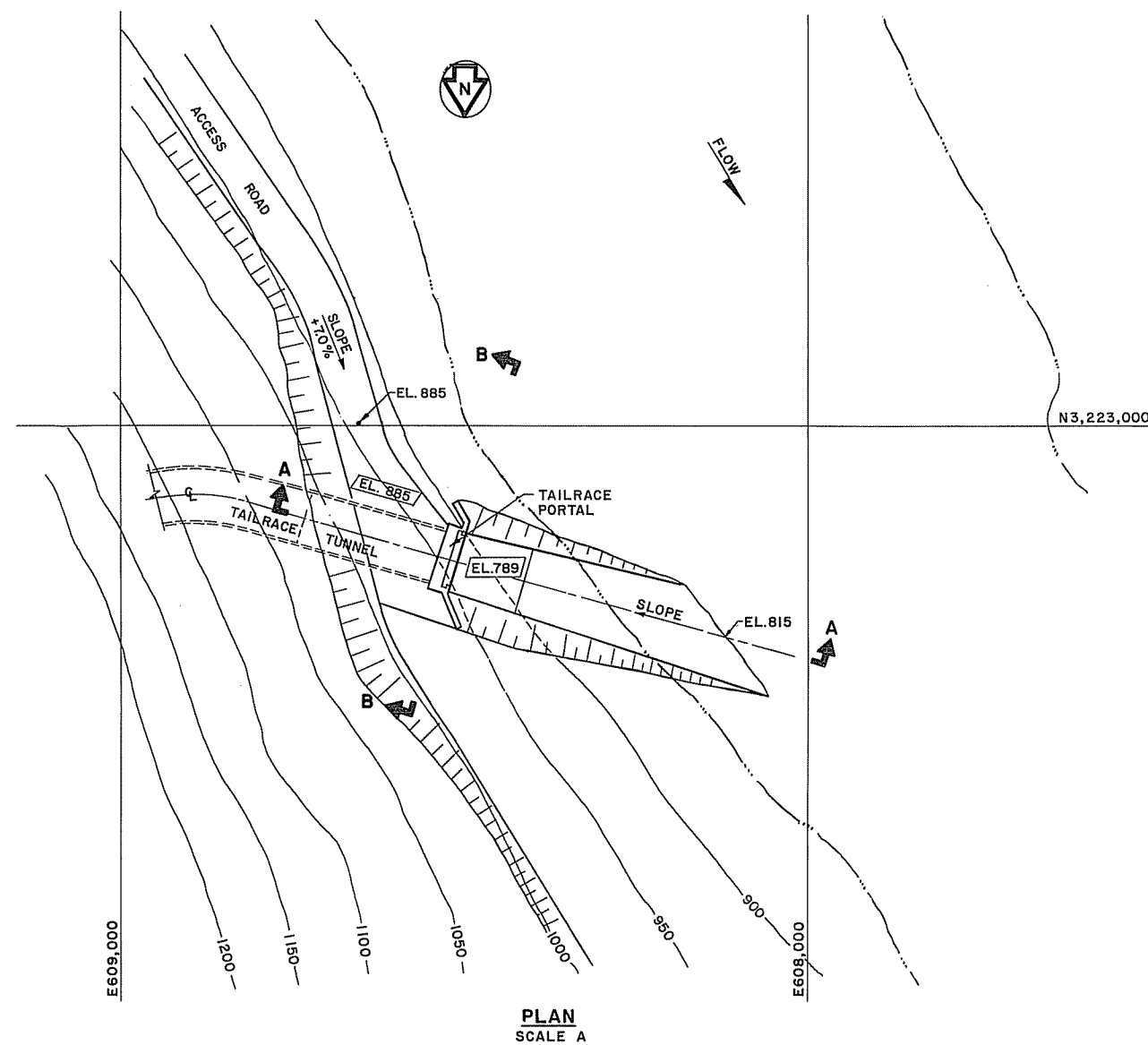
SECTION A-A
CONCRETE LINED TAILRACE TUNNEL
SCALE C



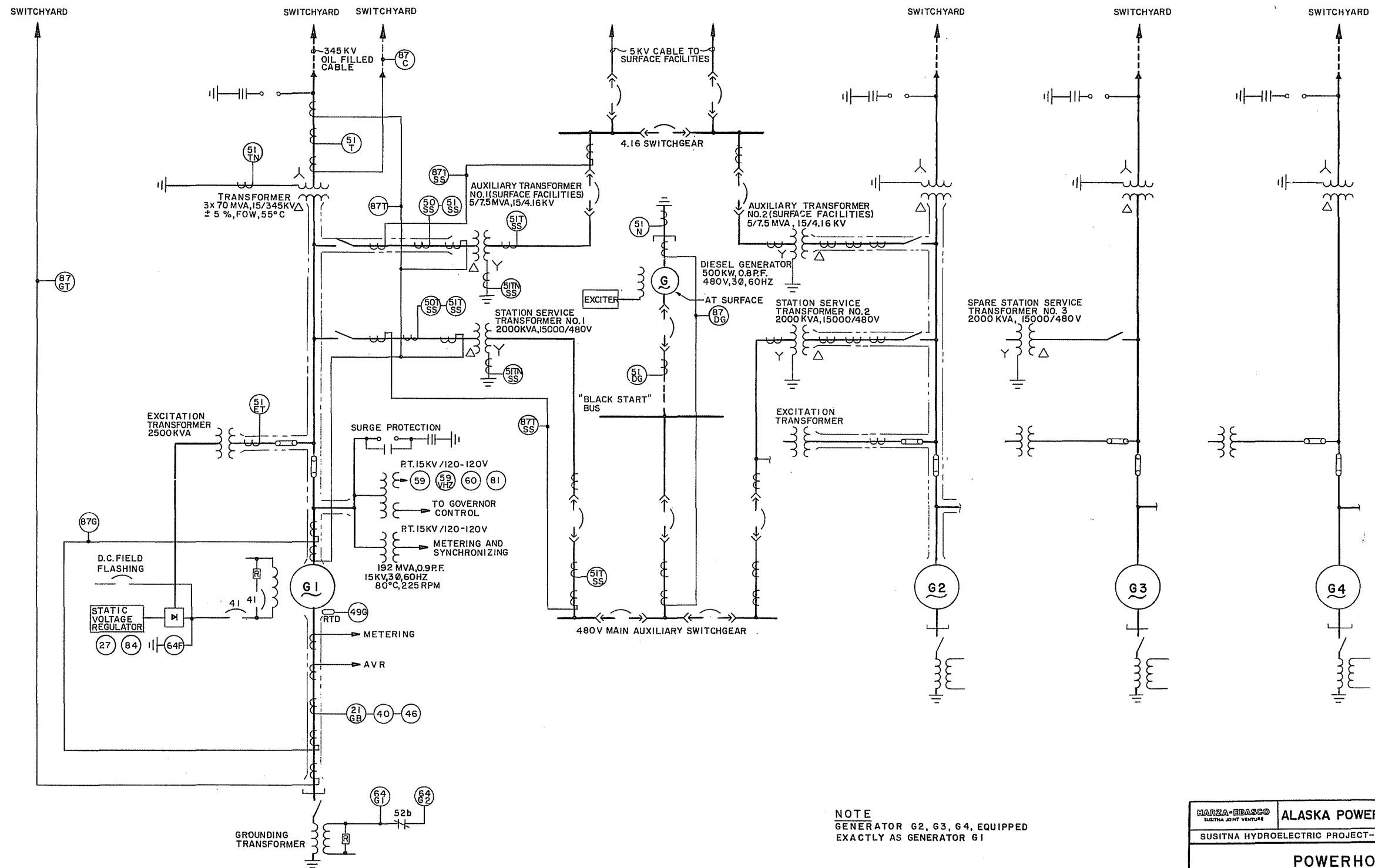
SECTION B-B
SCALE B



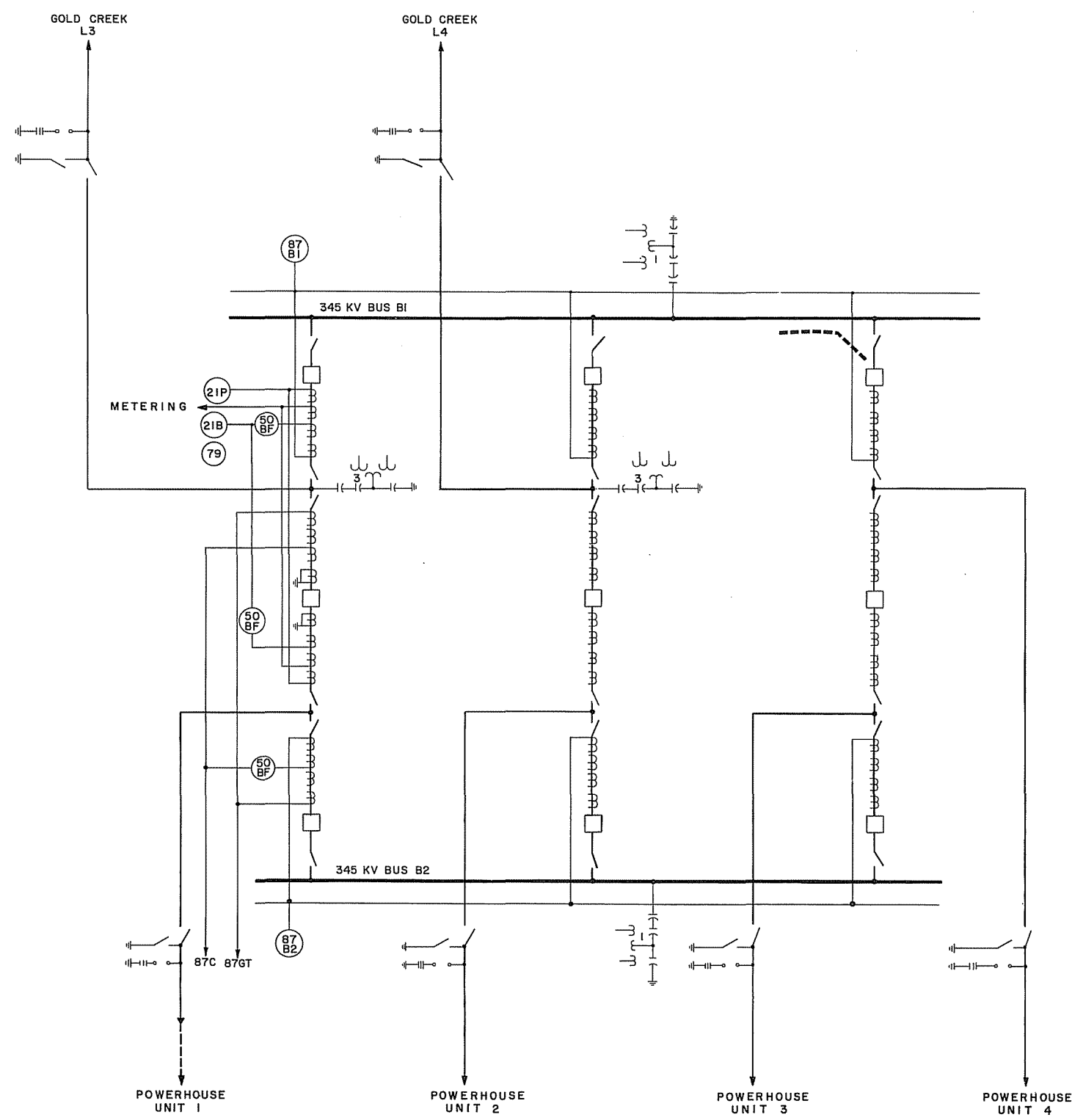
MARZA-EDASCO SUSITNA JOINT VENTURE		ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)			
SURGE CHAMBER AND TAILRACE SECTIONS			
EXHIBIT F		PLATE F66	



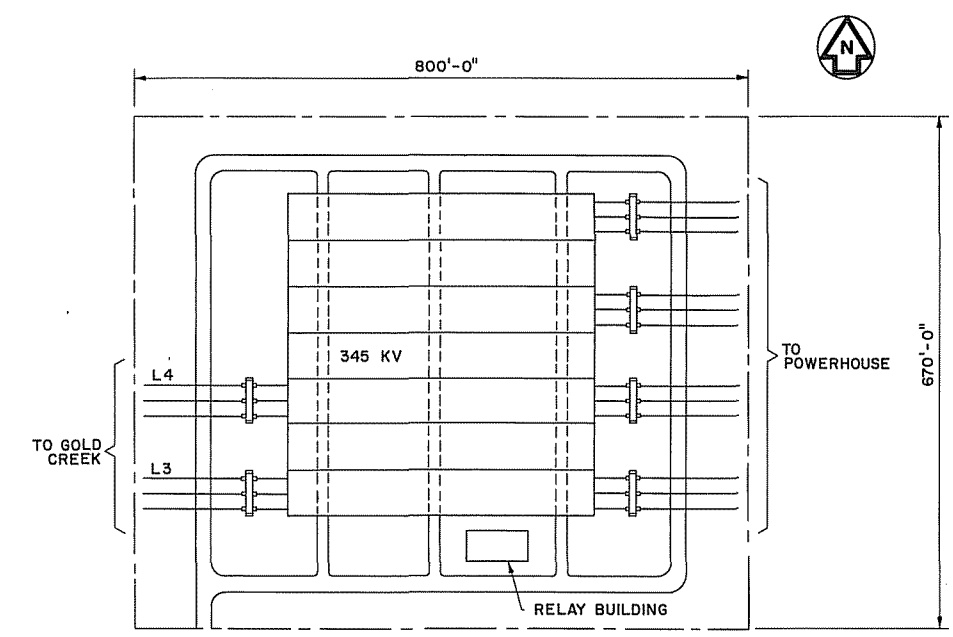
HARZA-ERASSO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
TAILRACE PORTAL PLAN AND SECTIONS	
EXHIBIT F	PLATE F67



MARZA-EDASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
POWERHOUSE SINGLE LINE DIAGRAM	
EXHIBIT F	PLATE F 68



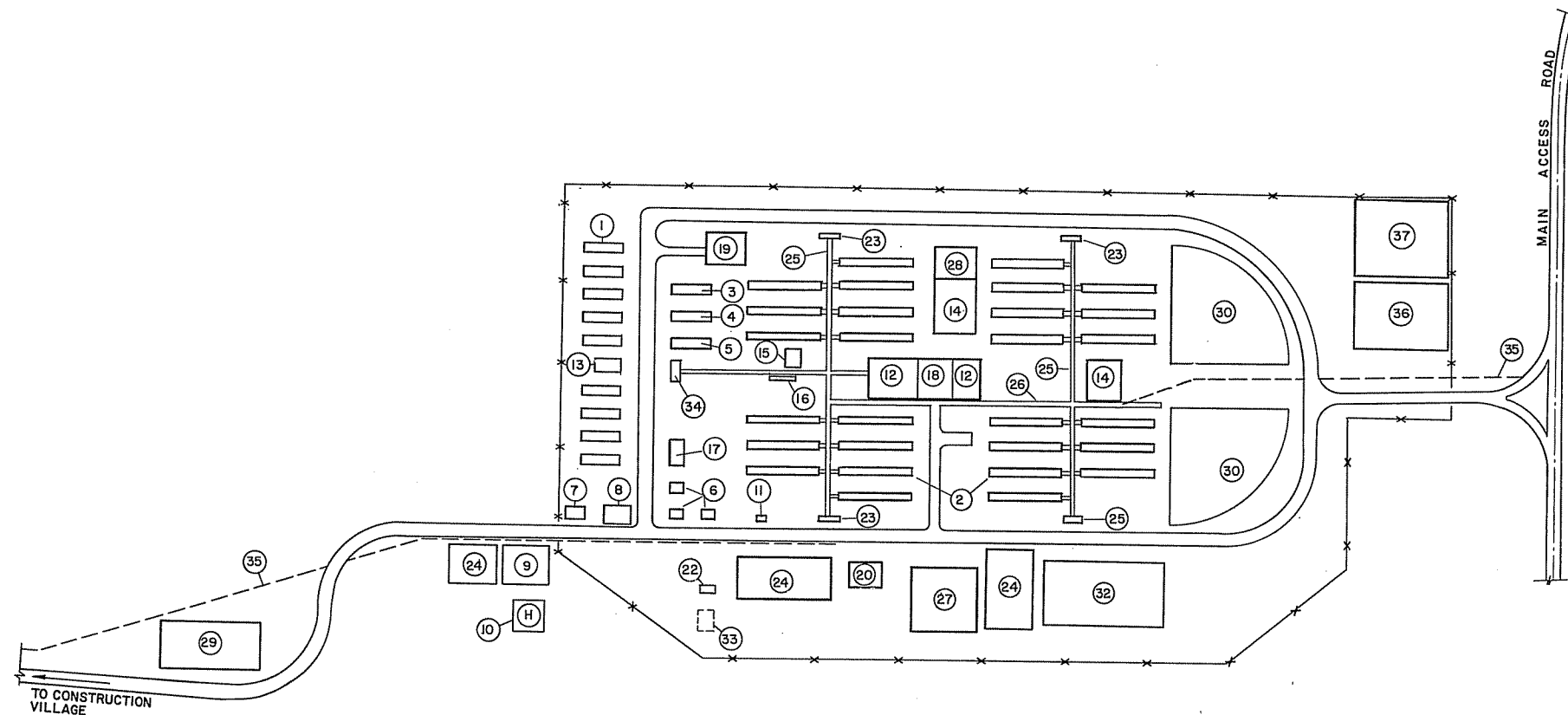
SINGLE LINE DIAGRAM



SWITCHYARD PLAN
SCALE A

SCALE A 0 100 200 FEET

HAZARDOUS SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
SWITCHYARD SINGLE LINE DIAGRAM AND PLAN	
EXHIBIT F	PLATE F69



LEGEND

- 1 STAFF AND FOREMAN HOUSING
- 2 DORMITORIES
- 3 MANAGER'S GUEST HOUSE
- 4 OWNER'S GUEST HOUSE
- 5 CONTRACTOR'S GUEST HOUSE
- 6 CAMP MANAGER'S OFFICES
- 7 SECURITY
- 8 FIRE AND OIL SPILL
- 9 HOSPITAL
- 10 HELIPAD (MEDICAL EMERGENCY)
- 11 COMMUNICATIONS CENTER
- 12 KITCHEN AND DINING
- 13 STAFF CLUBHOUSE
- 14 RECREATION HALL
- 15 BANK
- 16 LAUNDRIES
- 17 SOILS LAB
- 18 FOOD SERVICE WAREHOUSE
- 19 WAREHOUSE
- 20 MAINTENANCE GARAGE
- 21 PUMP HOUSE
- 22 GENERATING STATION
- 23 BUS STATION
- 24 PARKING AND LAYDOWN AREAS
- 25 10' PERMAWALK
- 26 16' PERMAWALK
- 27 GYMNASIUM
- 28 SWIMMING POOL
- 29 HOCKEY RINK
- 30 BASEBALL FIELD
- 31 SOFTBALL FIELD
- 32 FOOTBALL FIELD
- 33 FUEL STORAGE (50,000 GAL.)
- 34 STORE
- 35 UTILIDOR
- 36 WATER TREATMENT PLANT
- 37 WATER RESERVOIR

SCALE 0 200 400 FEET

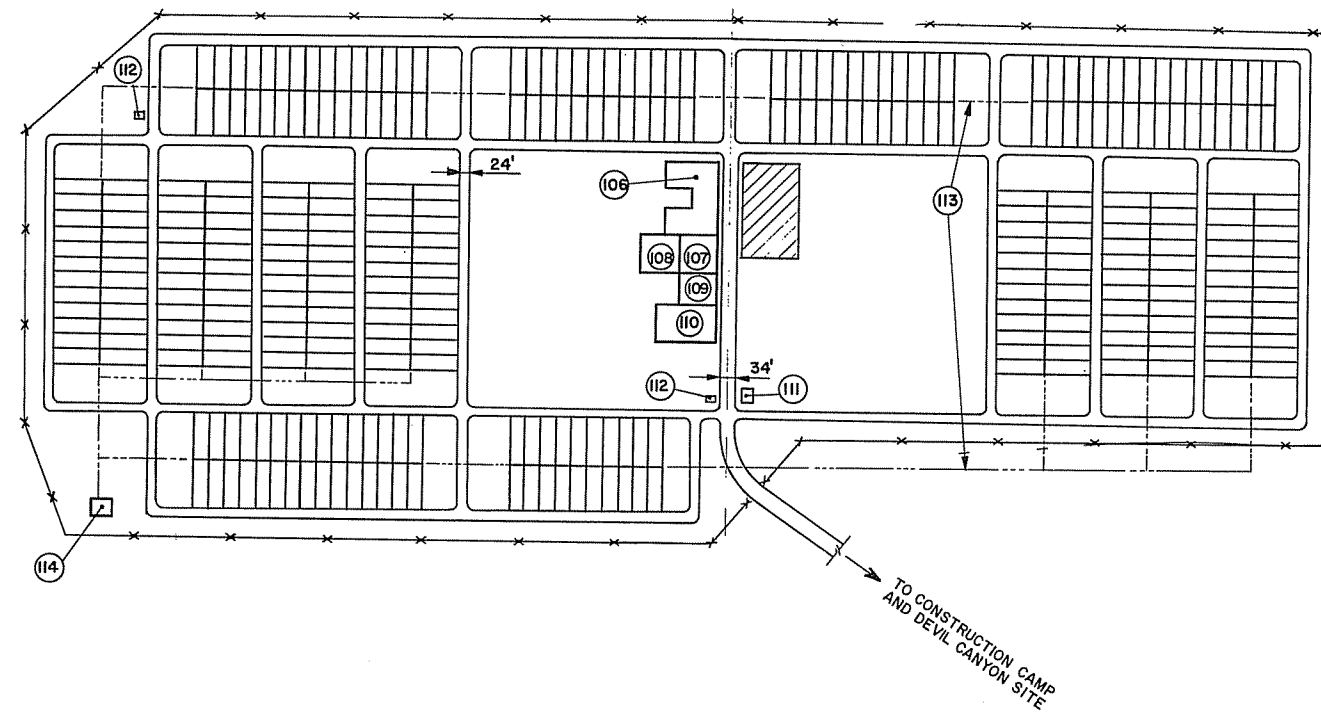
HARZA-EDASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
CONSTRUCTION CAMP GENERAL PLAN	
EXHIBIT F	PLATE F 72

LEGEND

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

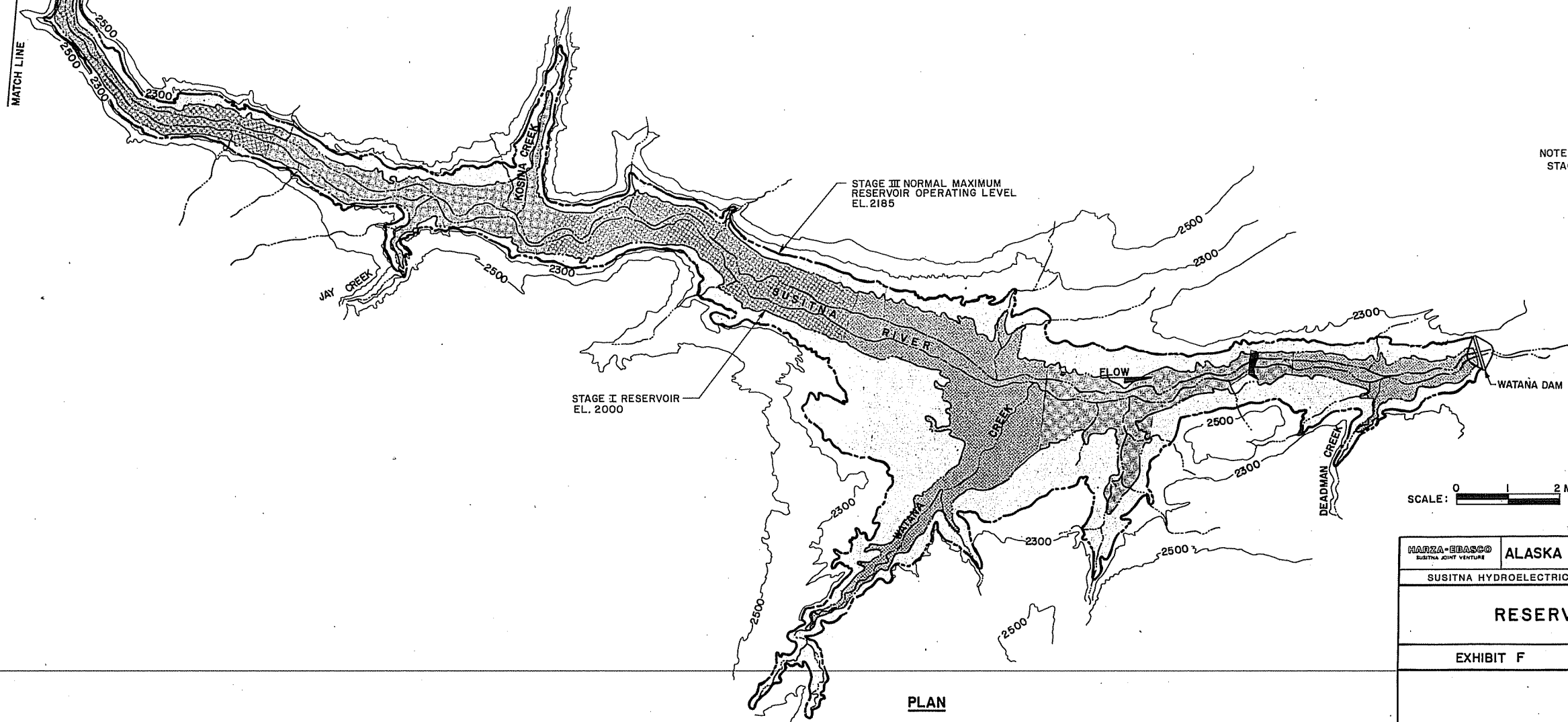
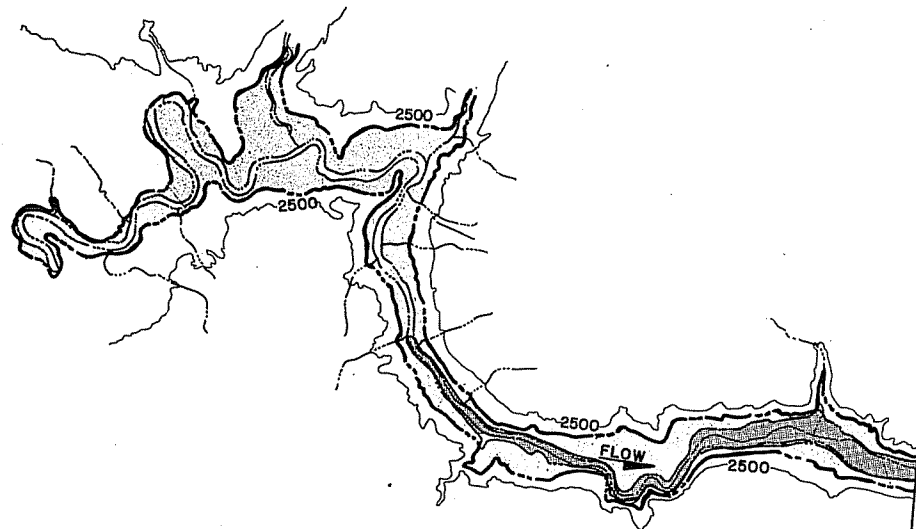
VILLAGE HOUSING - 320 UNITS

- FAMILY HOUSING - 2 B.R. - 16 UNITS (24'x50')
- FAMILY HOUSING - 3 B.R. - 16 UNITS (24'x50')
- FAMILY HOUSING - 4 B.R. - 16 UNITS (28'x50')
- FAMILY HOUSING - 3 B.R. - 72 UNITS (14'x60')
- FAMILY HOUSING - 3 B.R. - 200 UNITS (14'x60')
- (106) SCHOOL - 30'x35' (12 UNITS)
- (107) GYM - 100'x100'
- (108) SWIMMING POOL - 100'x100'
- (109) RECREATION CENTER 80'x100'
- (110) STORE - 100'x160'
- (111) FIRE STATION - 30'x40'
- (112) GENERATING STATION - 20'x30' (2 UNITS)
- (113) UTILIDOR
- (114) SEWER PUMPING STATION - 50'x60'

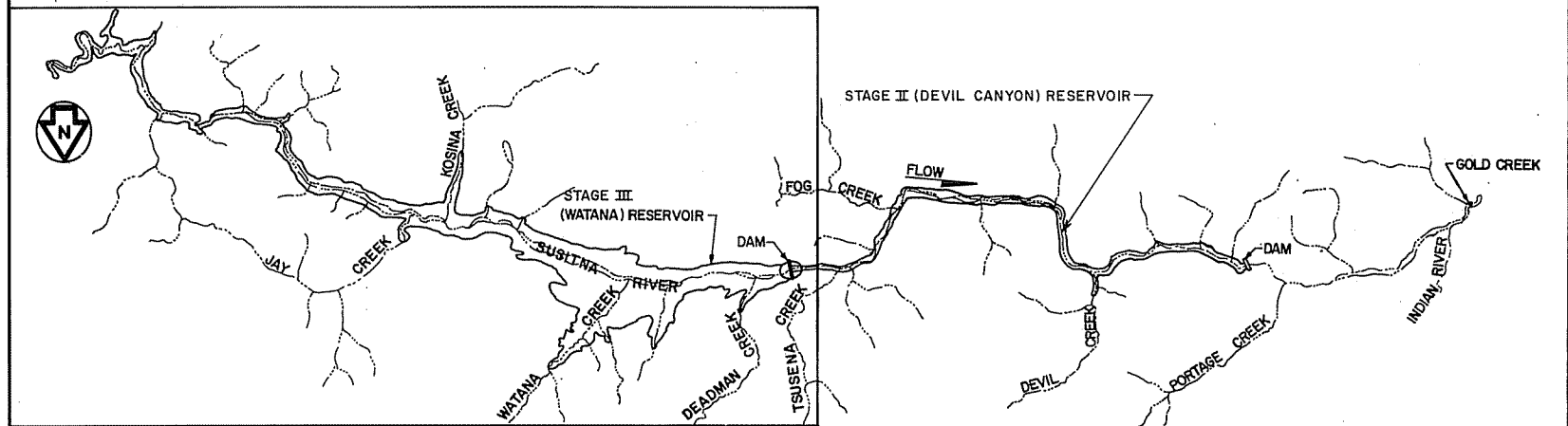


SCALE 0 200 400 FEET

MARZA-BRASSO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (DEVIL CANYON)	
CONSTRUCTION VILLAGE	
EXHIBIT F	PLATE F 73



PLAN



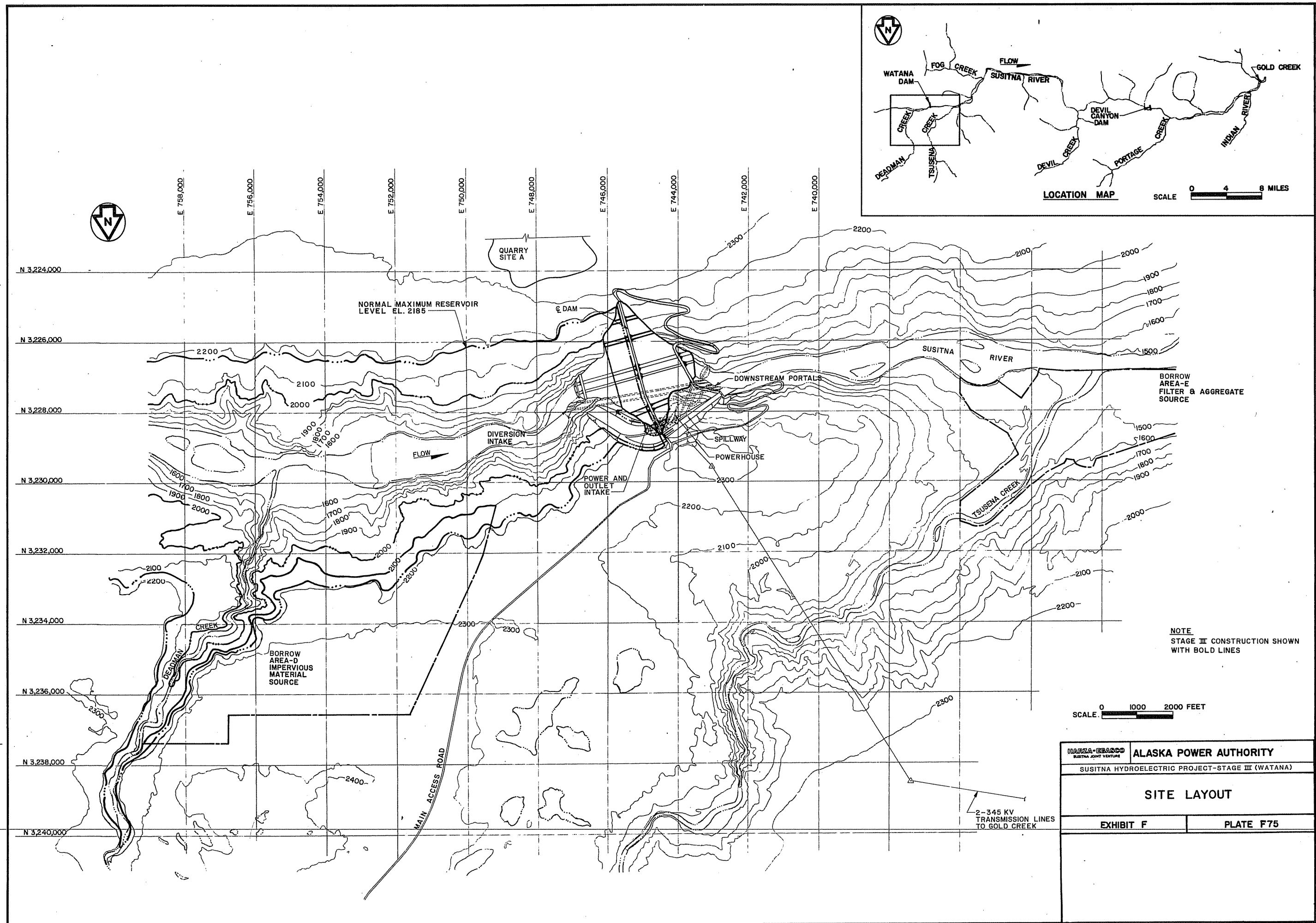
LOCATION MAP

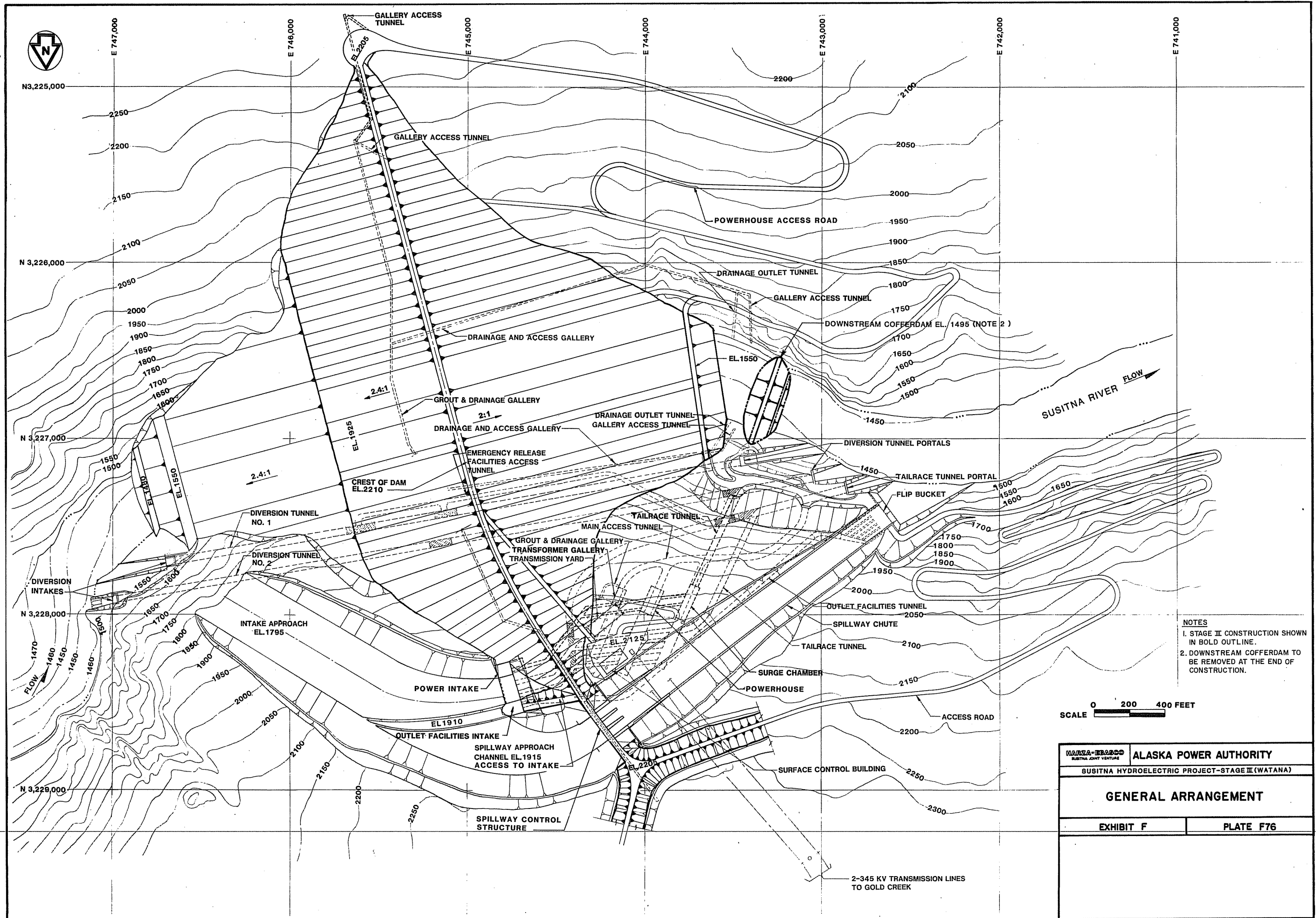
SCALE: 0 4 8 MILES

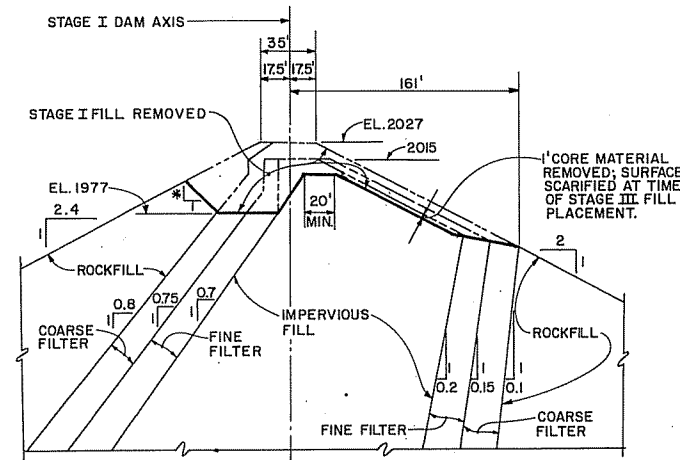
NOTE:
STAGE I RESERVOIR IS SHADED

SCALE: 0 1 2 MILES

MARZA-EDASCO SUSITNA JOINT VENTURE		ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)			
RESERVOIR PLAN			
EXHIBIT F		PLATE F74	

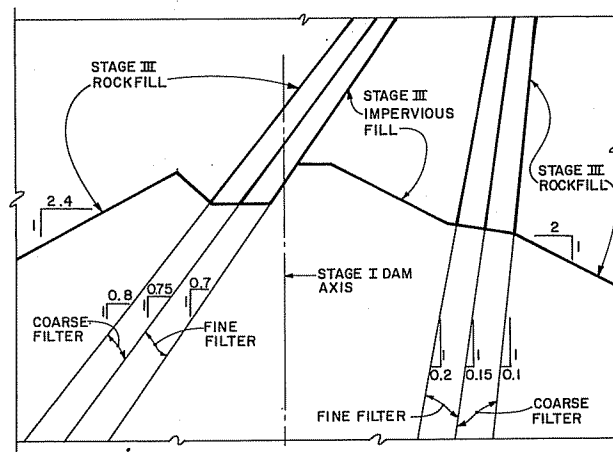




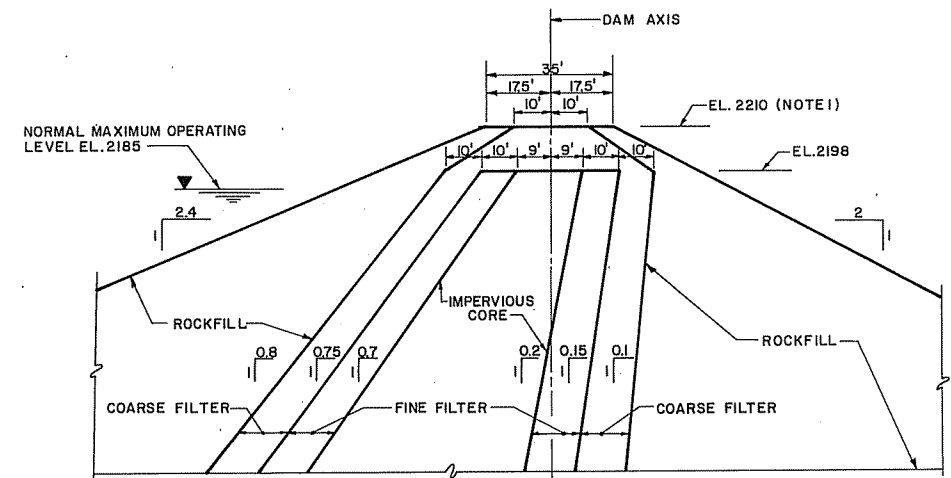


* STABLE

EXCAVATION DETAIL



FILL DETAIL

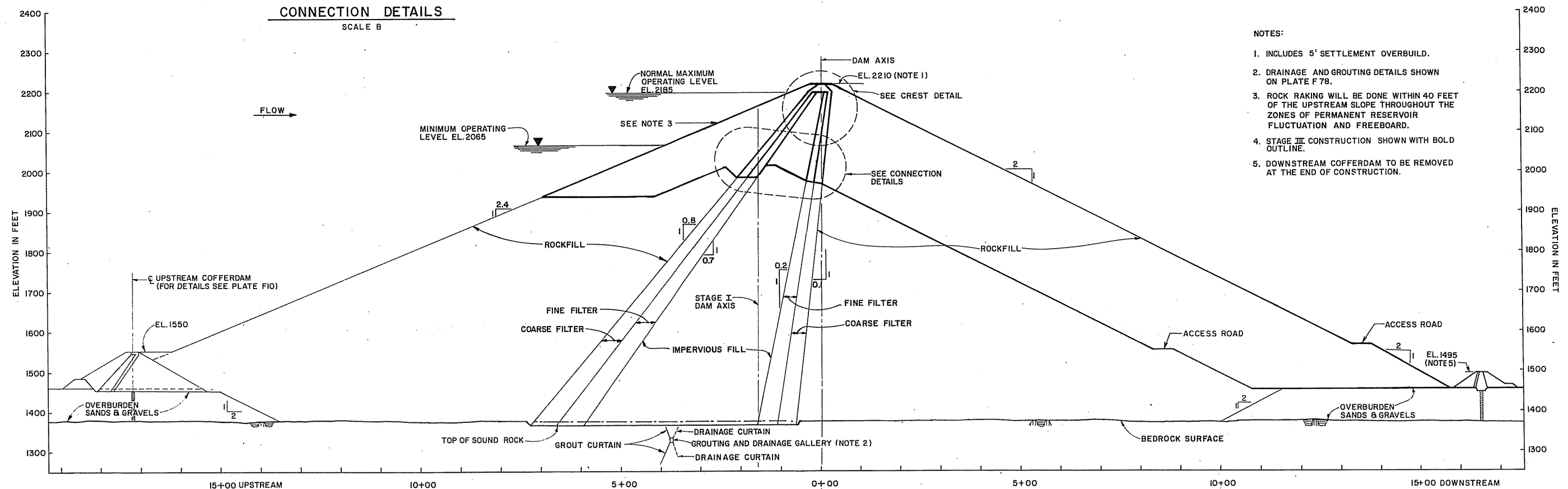


CREST DETAIL

SCALE C

CONNECTION DETAILS

SCALE B



TYPICAL SECTION - DAM EMBANKMENT (MAXIMUM HEIGHT)

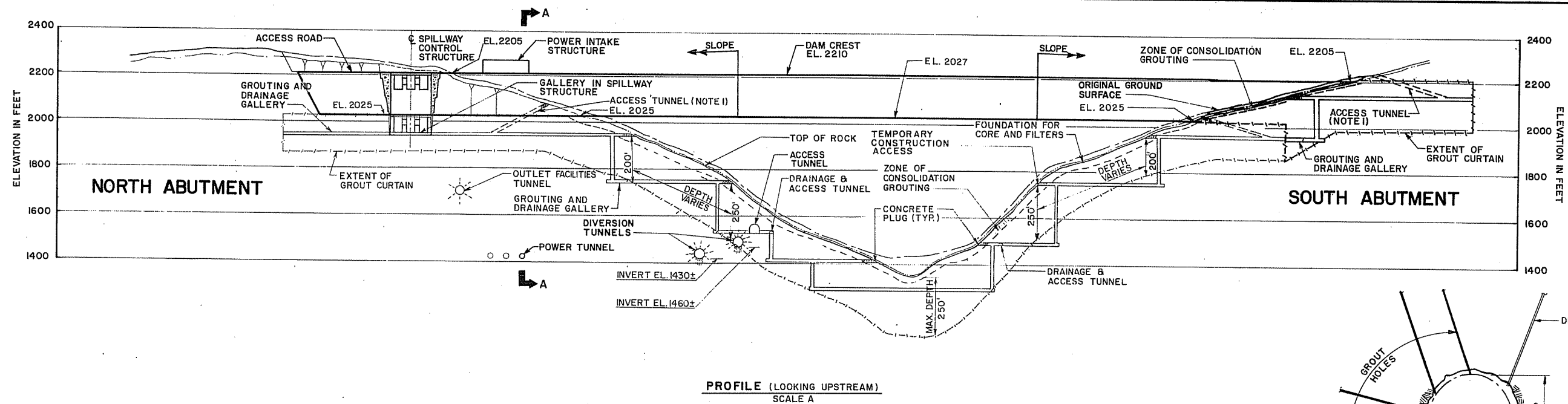
SCALE A



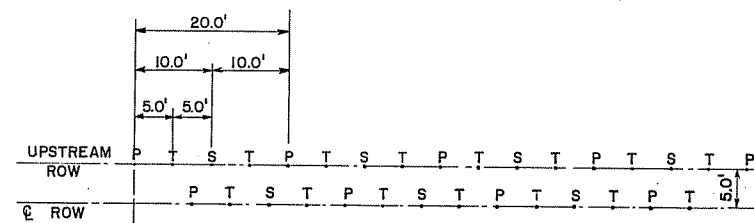
NOTES:

1. INCLUDES 5' SETTLEMENT OVERBUILD.
2. DRAINAGE AND GROUTING DETAILS SHOWN ON PLATE F 78.
3. ROCK RAKING WILL BE DONE WITHIN 40 FEET OF THE UPSTREAM SLOPE THROUGHOUT THE ZONES OF PERMANENT RESERVOIR FLUCTUATION AND FREEBOARD.
4. STAGE III CONSTRUCTION SHOWN WITH BOLD OUTLINE.
5. DOWNSTREAM COFFERDAM TO BE REMOVED AT THE END OF CONSTRUCTION.

MARZA-EDASSO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)	
DAM TYPICAL SECTION AND DETAILS	
EXHIBIT F	PLATE F77

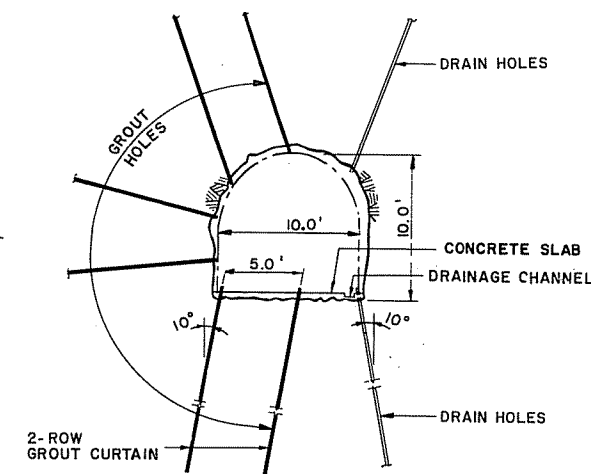


PROFILE (LOOKING UPSTREAM)
SCALE A

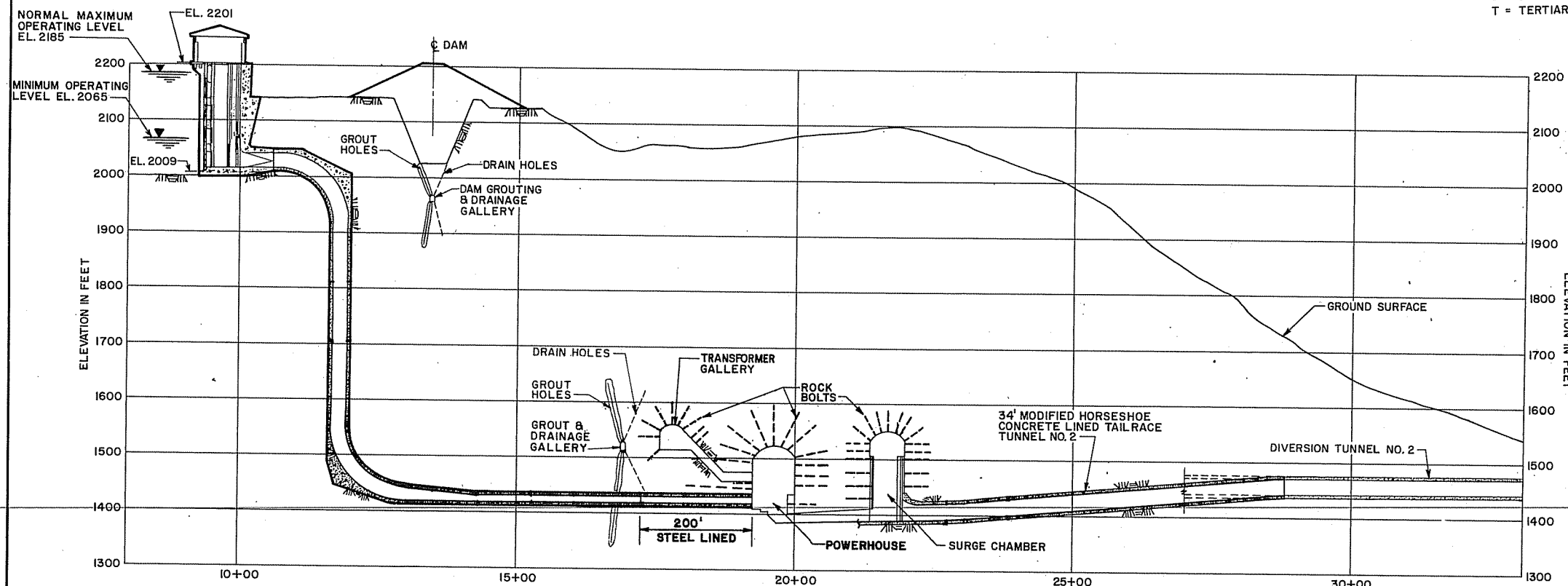


GROUT HOLE SPACING
SCALE C.

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



DETAIL - GROUTING & DRAINAGE GALLERY
SCALE D



SECTION A-A
SCALE B

- NOTES
1. ACCESS WOULD BE FROM THE DOWNSTREAM SIDE OF THE DAM.
 2. WORK THIS DRAWING WITH PLATE F 76
 3. STAGE III CONSTRUCTION SHOWN WITH BOLD OUTLINE

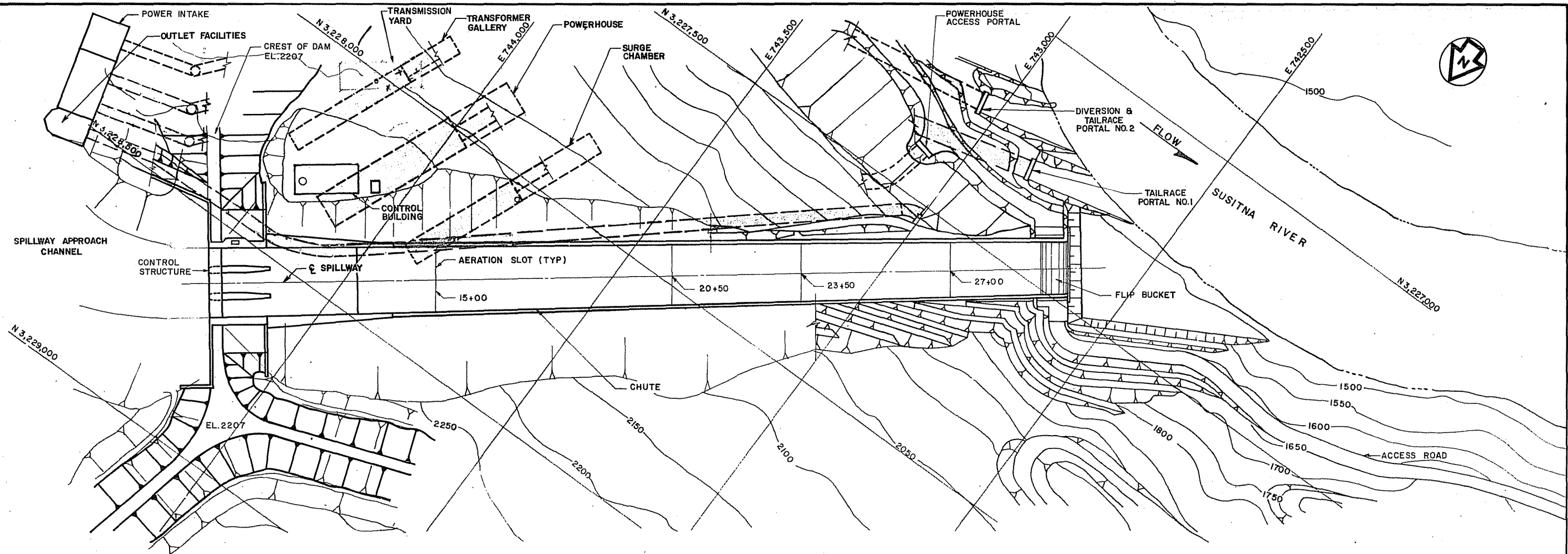
SCALE D 0 5 10 FEET

SCALE C 0 10 20 FEET

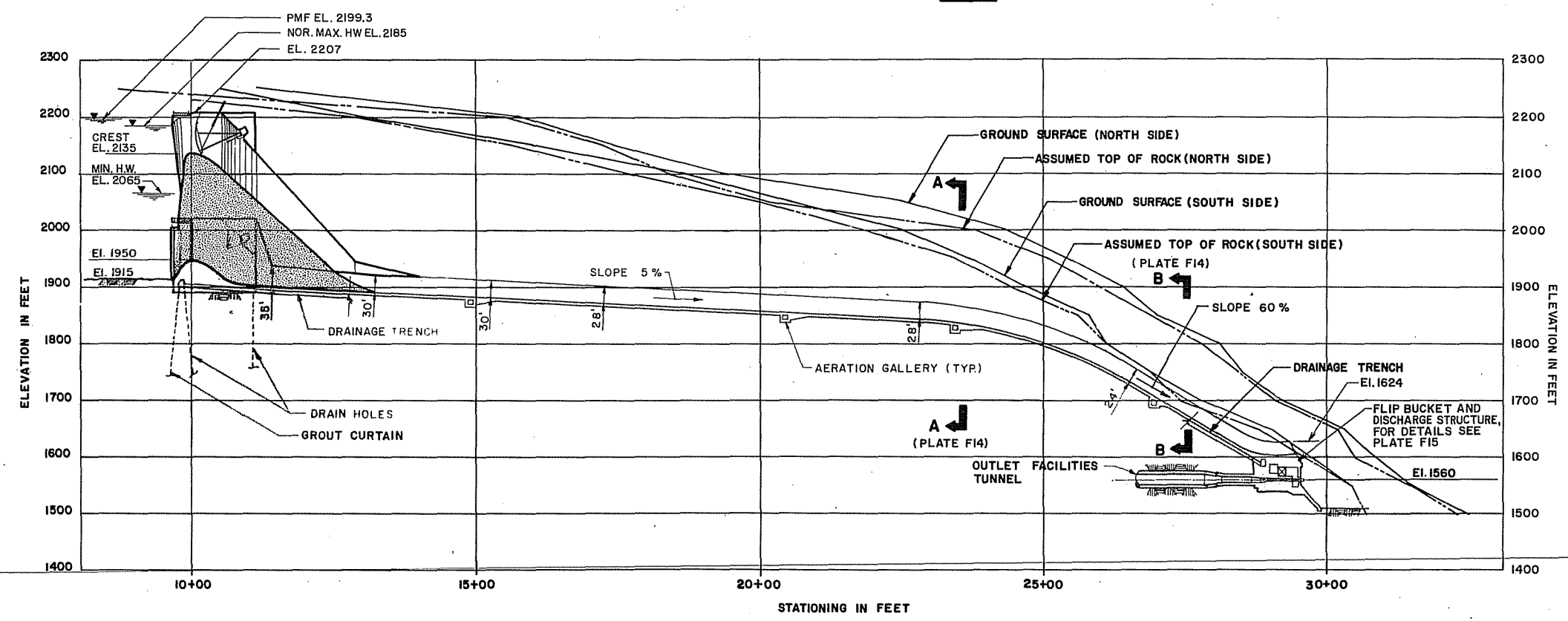
SCALE B 0 100 200 FEET

SCALE A 0 200 400 FEET

HARZA-EDASCO SUSITNA JOINT VENTURE	
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)	
DAM GROUTING & DRAINAGE	
EXHIBIT F	PLATE F 78



PLAN

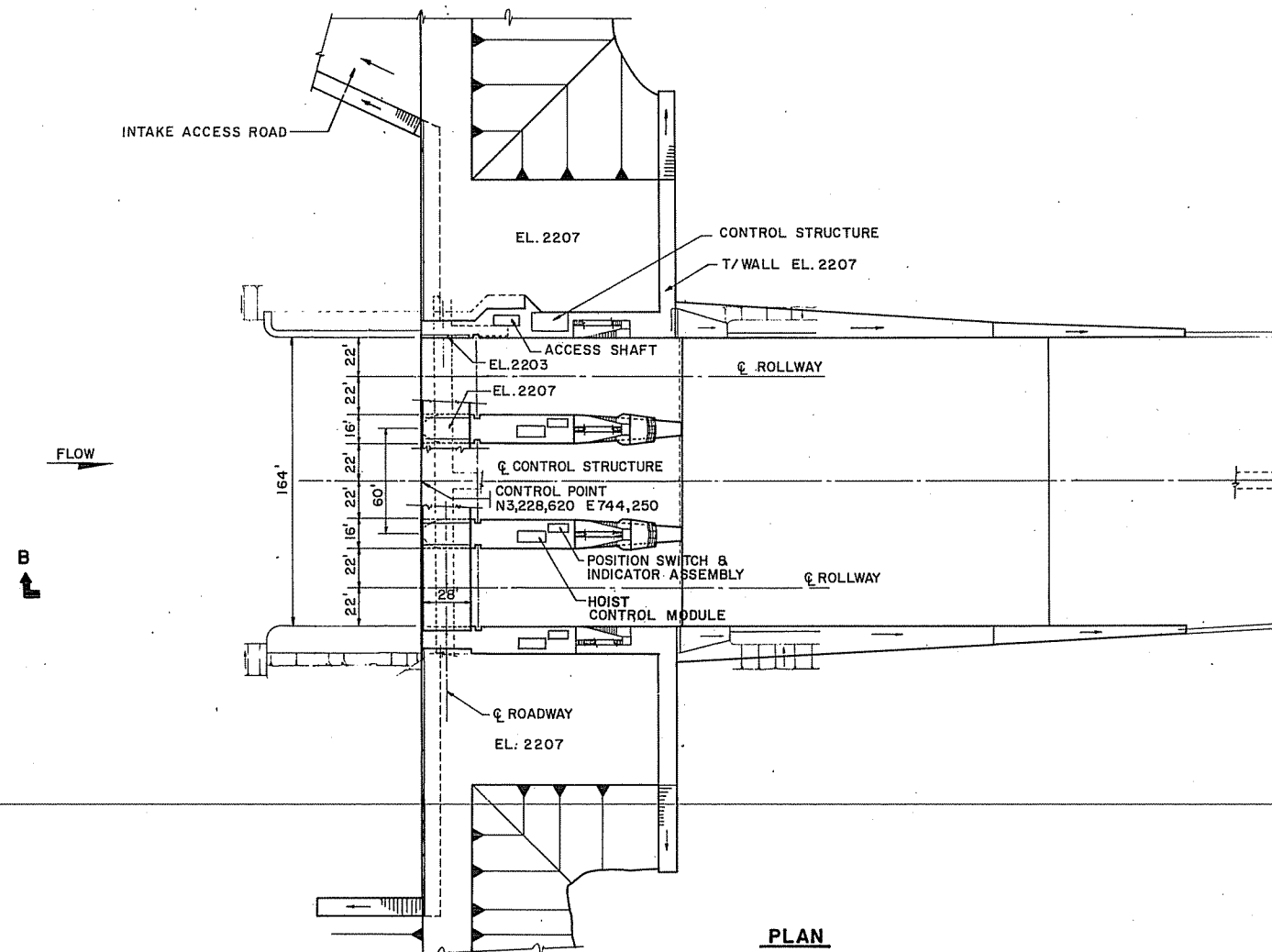
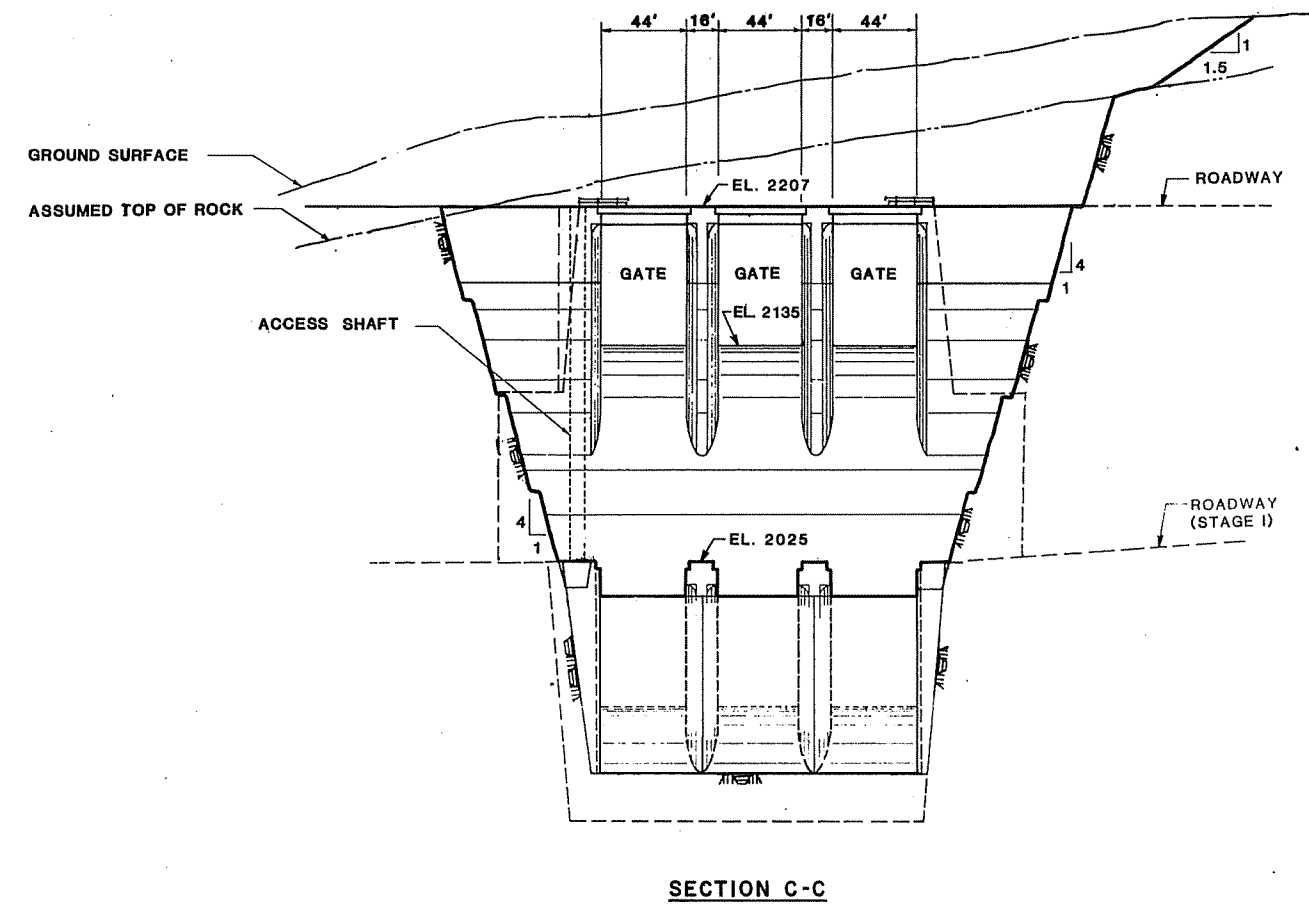
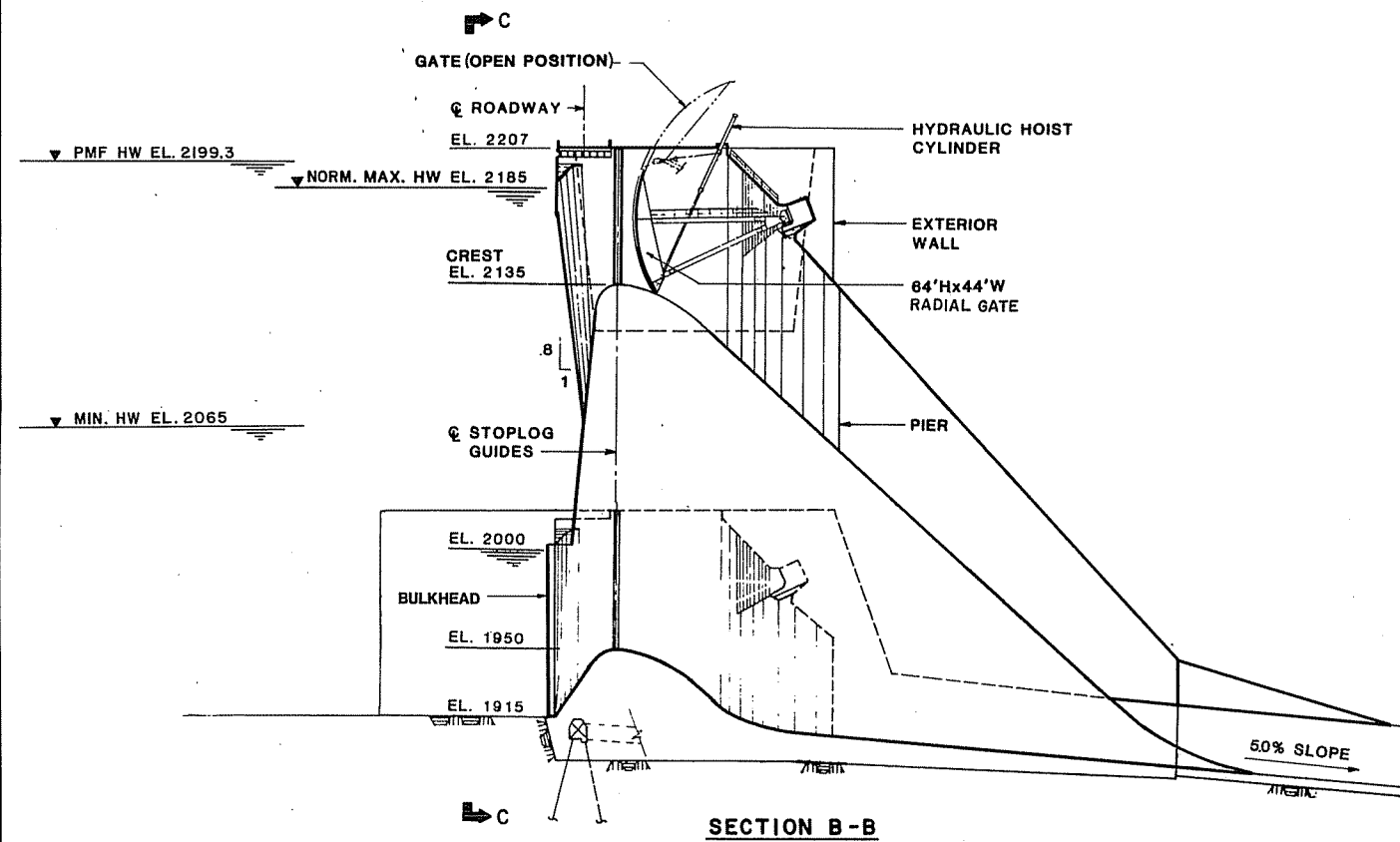


PROFILE

NOTE
STAGE III CONSTRUCTION SHOWN
WITH BOLD LINES



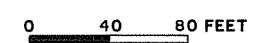
MANZA-TRABCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)	
SPILLWAY GENERAL ARRANGEMENT	
EXHIBIT F	PLATE F79



**SPILLWAY CONTROL STRUCTURE
SUMMARY OF STABILITY ANALYSES**

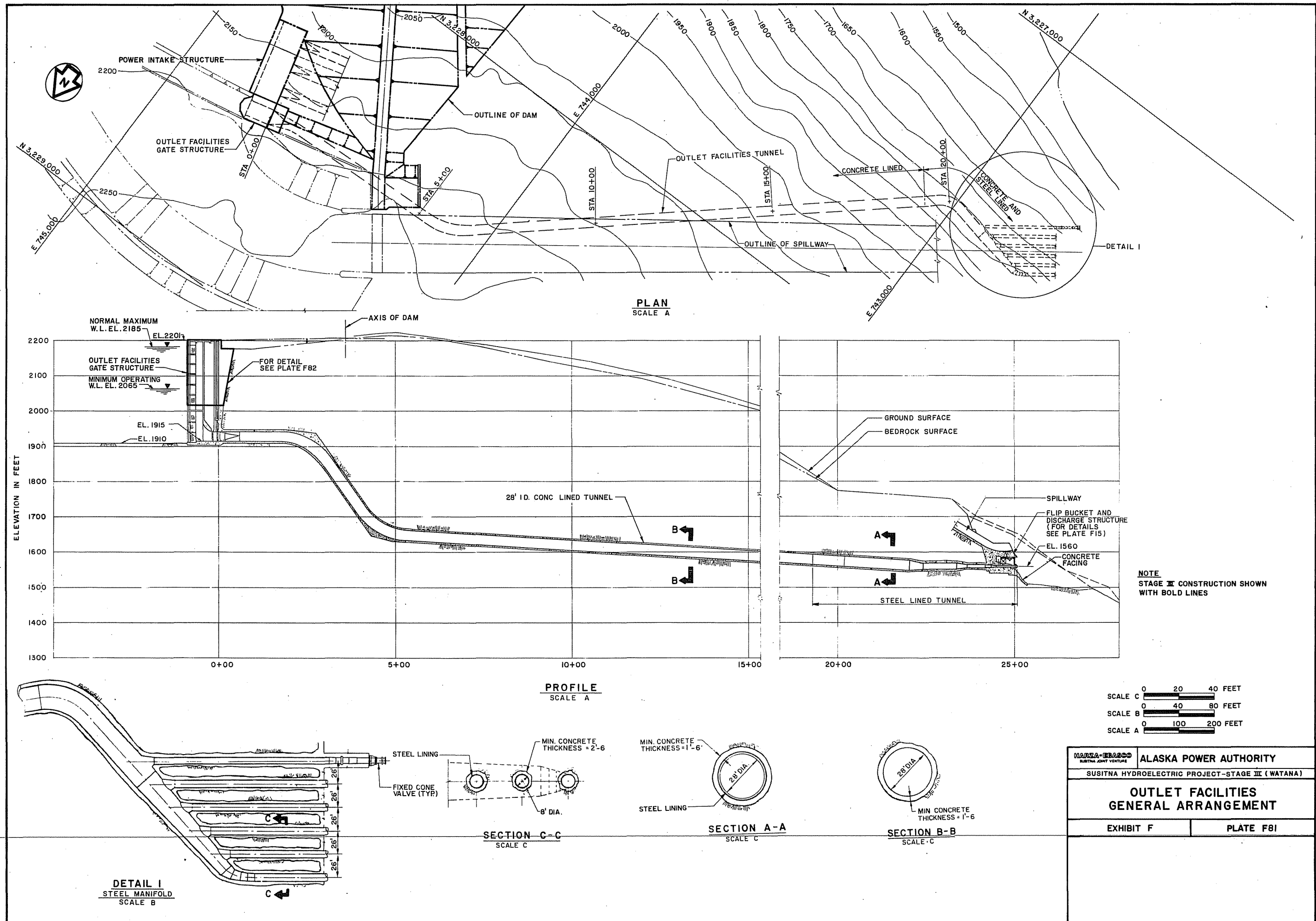
LOAD CONDITION	FOUNDATION STRESS U.S/D.S (PSI)	Xcg (FT)	FACTORS OF SAFETY			
			SLIDING	SHEAR FRICTION	FLOATATION	OVERTURNING
NORMAL INCLUDES ICE LOADS	138.9 / 113.6	5.5	N.A.	4.6	5.9	2.9
UNUSUAL 100/110 YR. EARTHQUAKE	59.0 / 193.6	29.4	N.A.	2.7	5.9	1.9
UNUSUAL DRAIN PLUGGED PMF	61.2 / 116.2	17.1	N.A.	3.8	2.4	1.7
EXTREME EARTHQUAKE	-91.1 / 343.6	95.0	N.A.	1.5	5.9	1.4

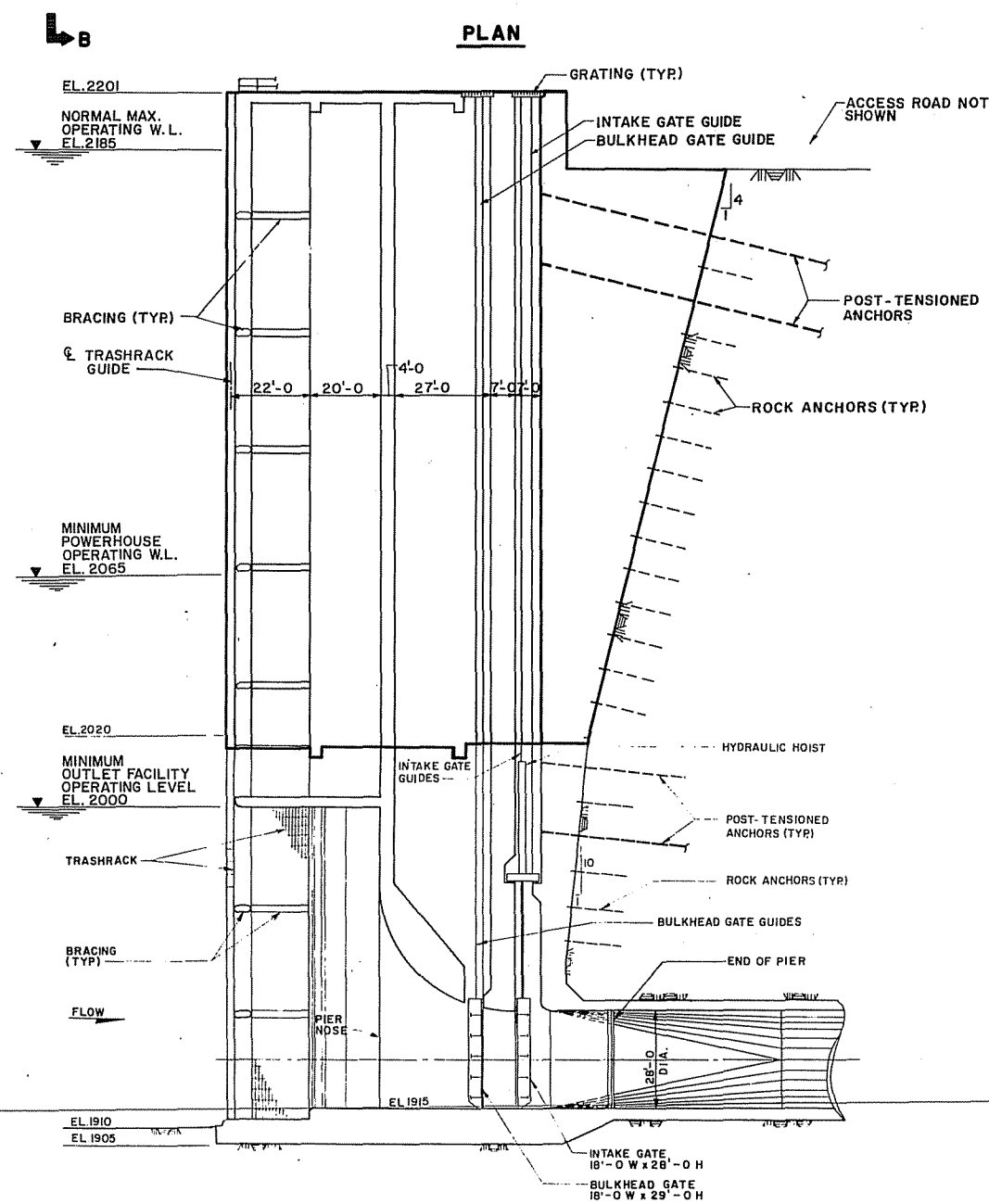
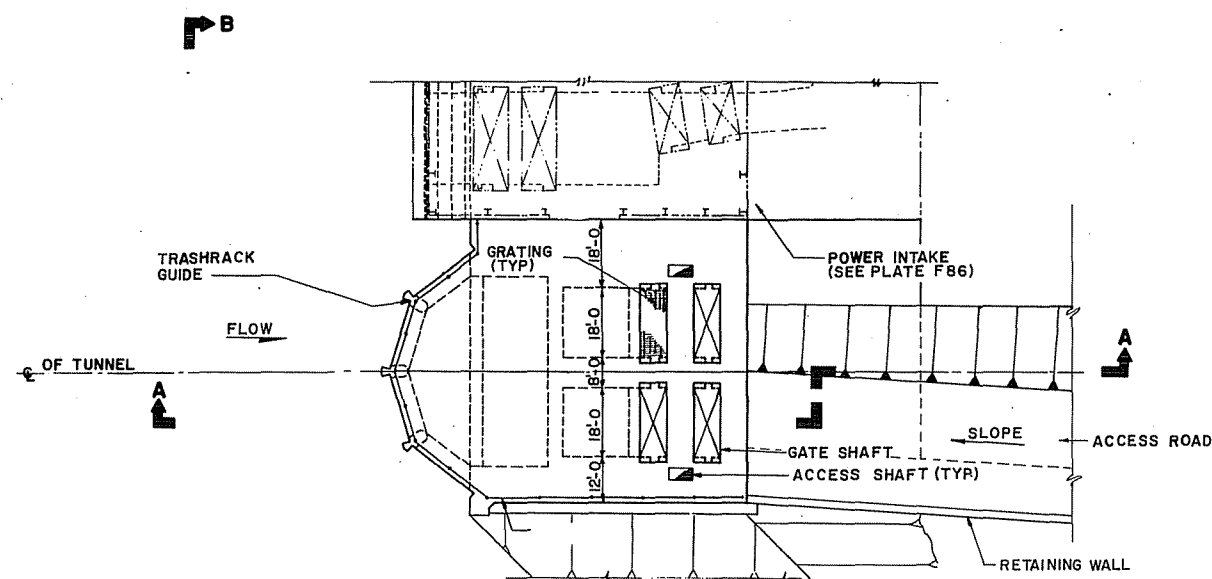
PHYSICAL PARAMETERS
 $\phi = 41^\circ$
 $c = 150 \text{ PSI}$



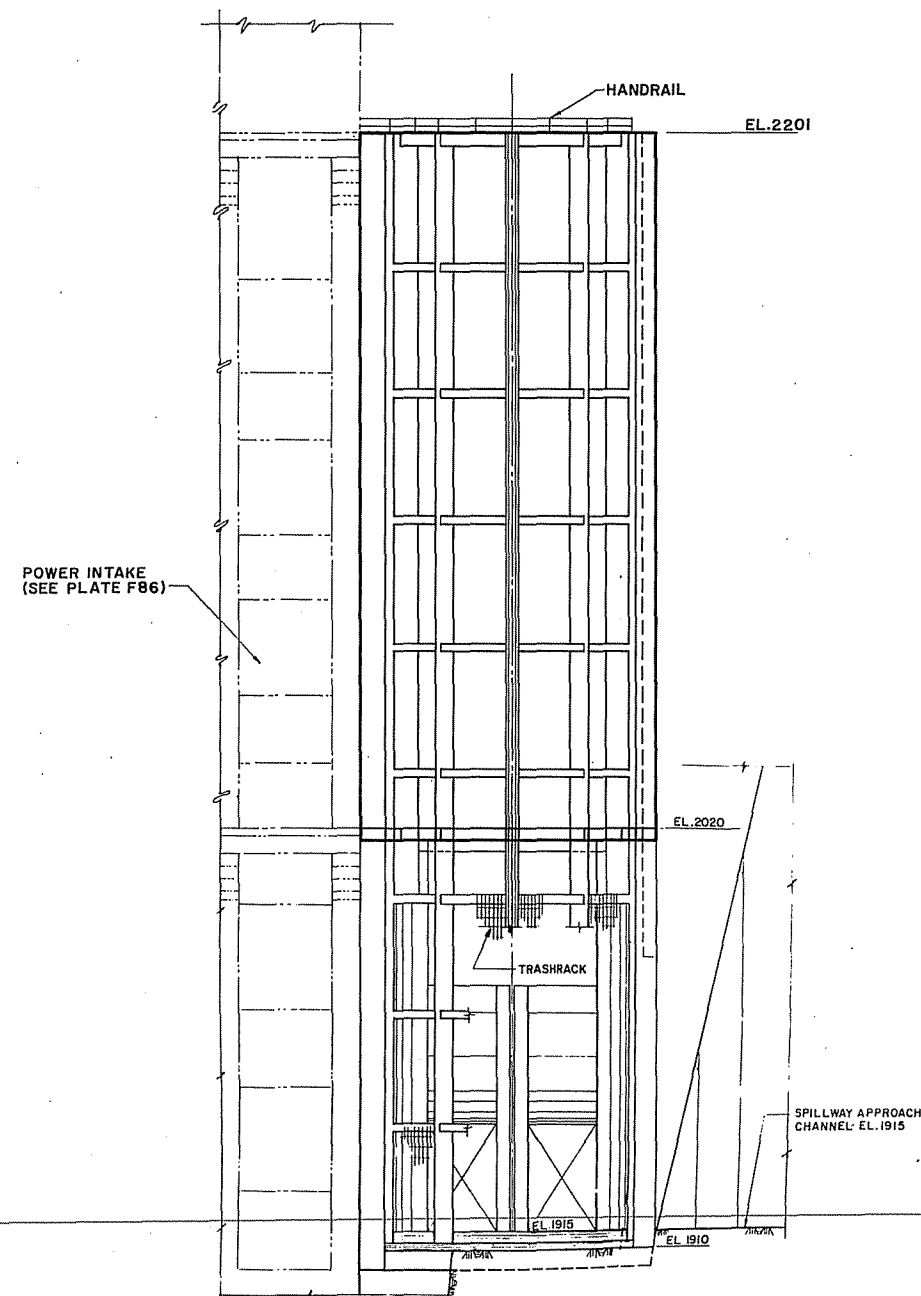
NOTE
 STAGE III CONSTRUCTION SHOWN
 WITH BOLD LINES

HAZRA-BRASCO SUSITNA JOINT VENTURE		ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)			
SPILLWAY CONTROL STRUCTURE			
EXHIBIT F		PLATE F80	





SECTION A-A

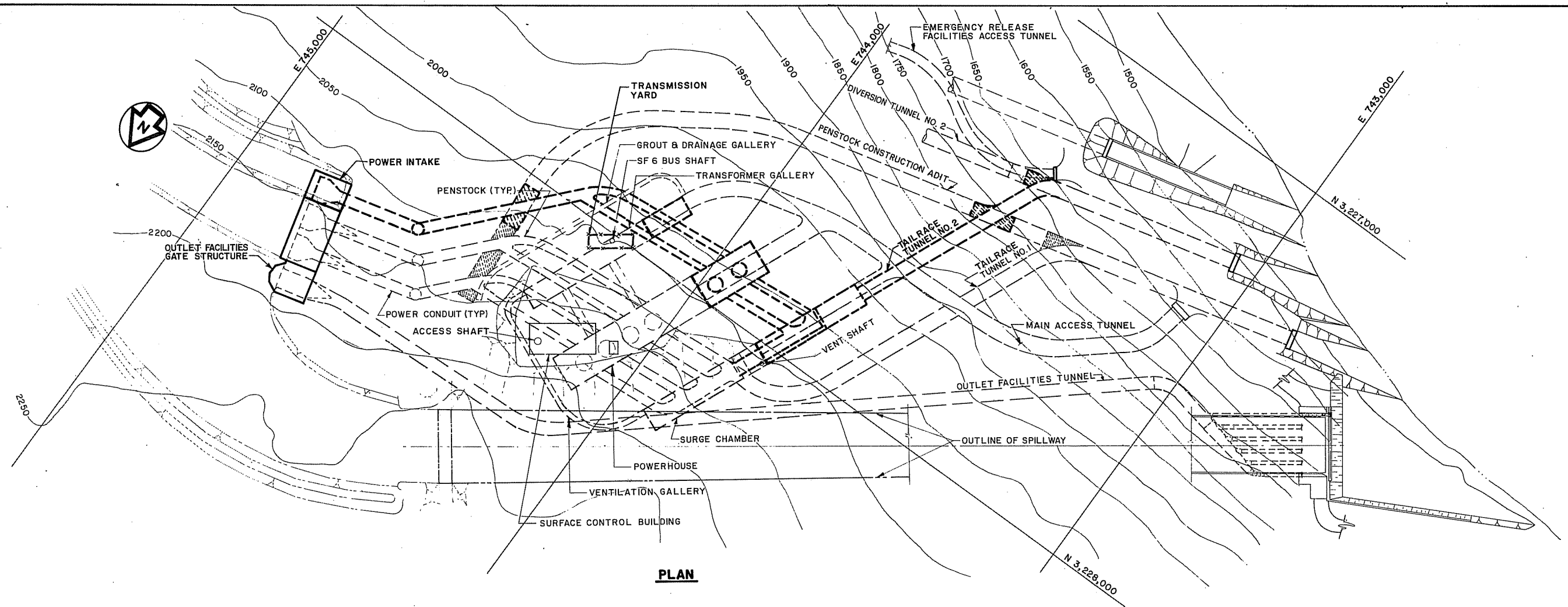


SECTION B-B

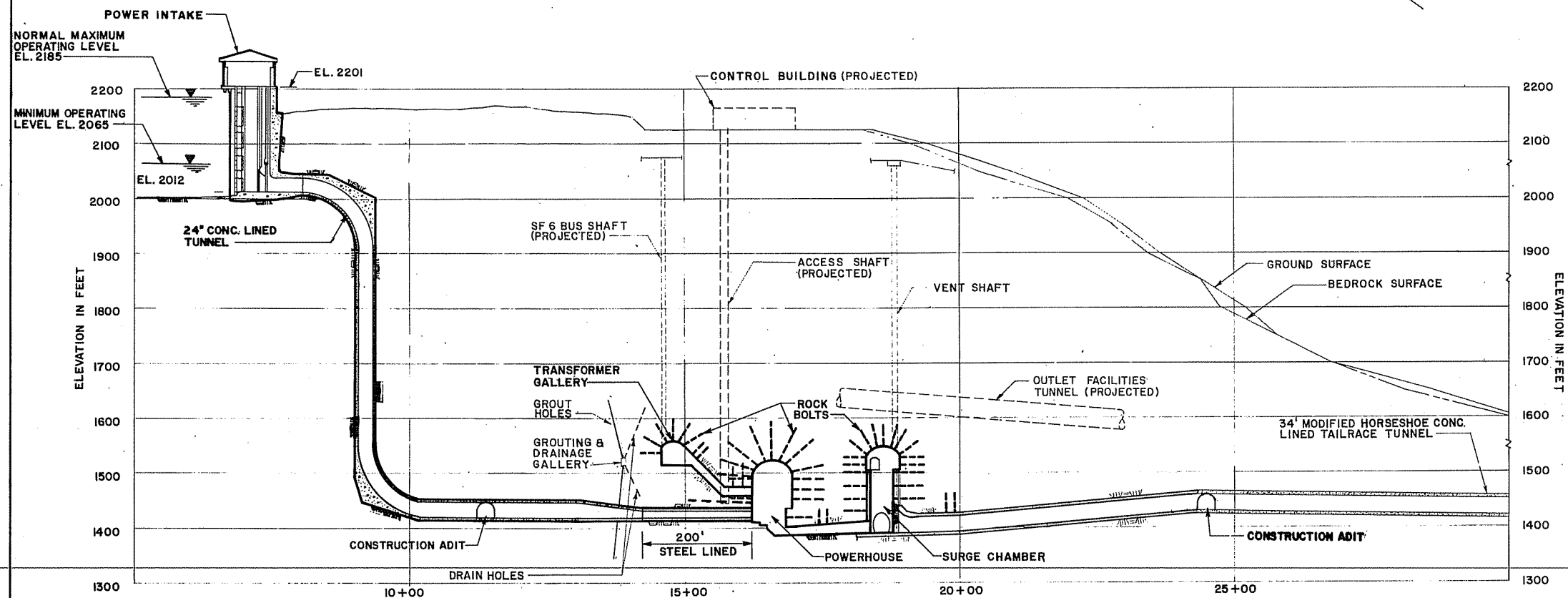
NOTE
STAGE III CONSTRUCTION SHOWN
WITH BOLD LINES

0 20 40 FEET

MANZA-BRACCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)	
OUTLET FACILITIES GATE STRUCTURE	
EXHIBIT F	PLATE F-82



PLAN

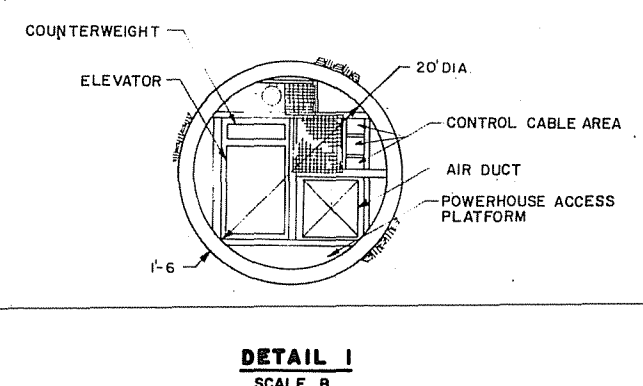
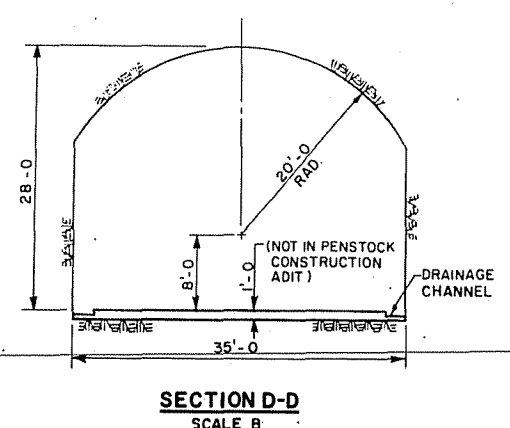
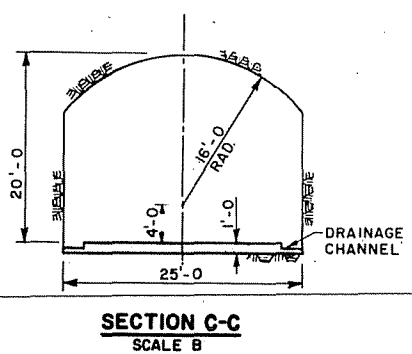
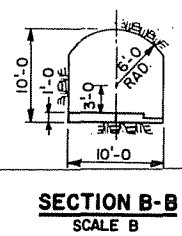
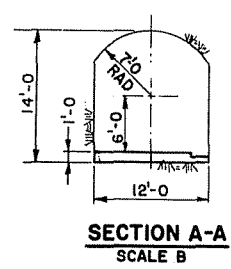
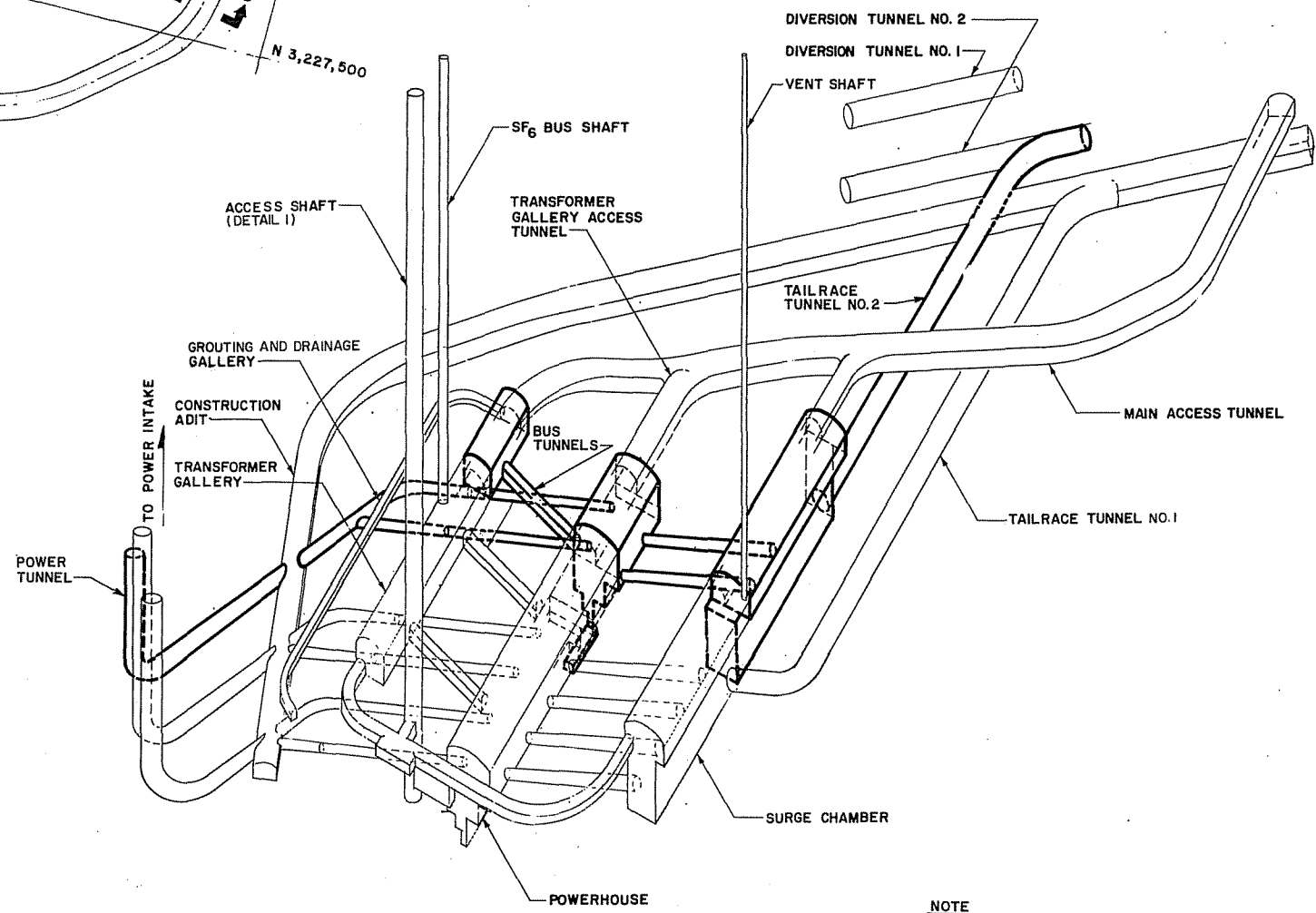
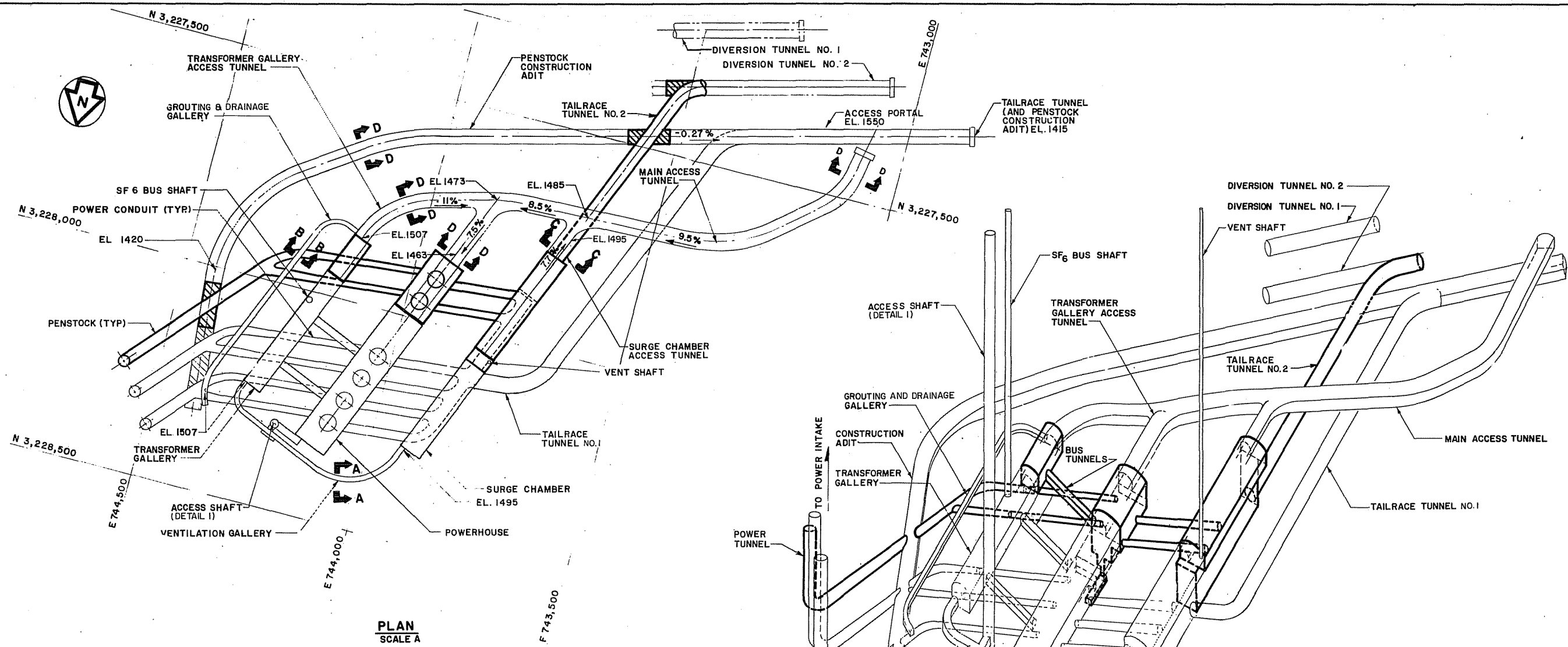


PROFILE

NOTE
STAGE II CONSTRUCTION SHOWN
WITH BOLD LINES

SCALE 0 100 200 FEET

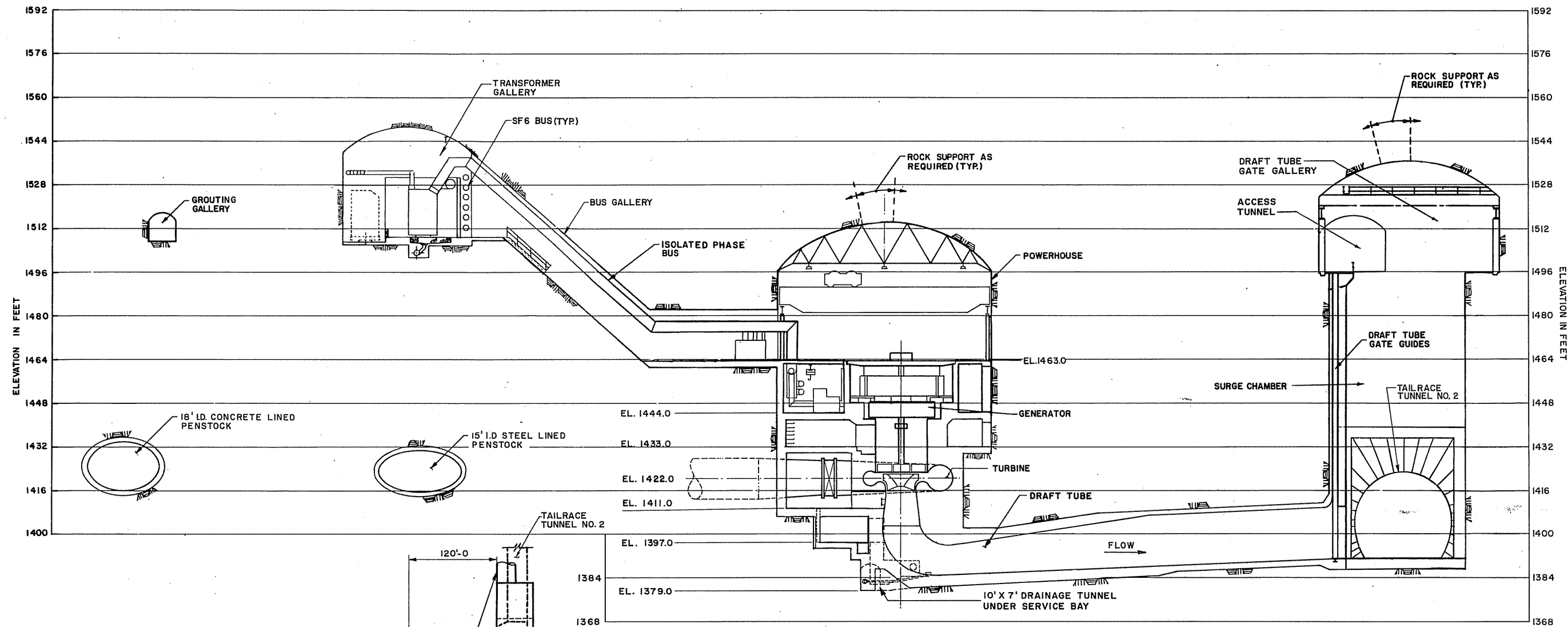
HAZA-BLASCO ELECTRA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE II (WATANA)	
POWER FACILITIES GENERAL ARRANGEMENT	
EXHIBIT F	PLATE F83



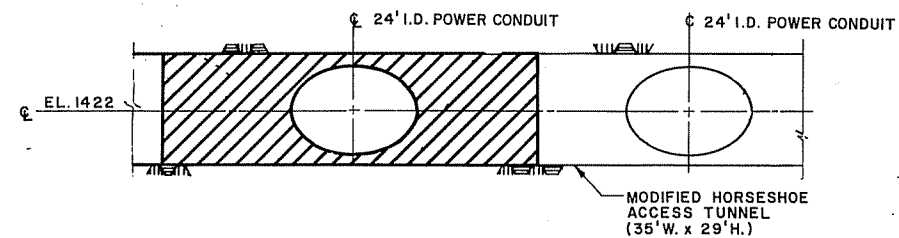
NOTE
STAGE III CONSTRUCTION SHOWN
WITH BOLD LINES

SCALE B 0 8 16 FEET
SCALE A 0 100 200 FEET

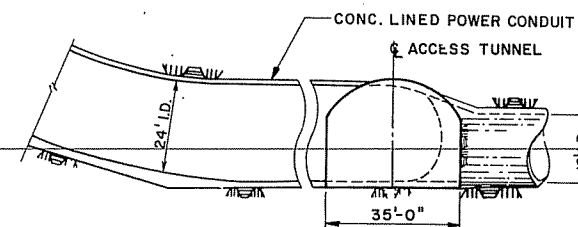
ALASKA POWER AUTHORITY SUSITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)	
POWER FACILITIES ACCESS	
EXHIBIT F	PLATE F84



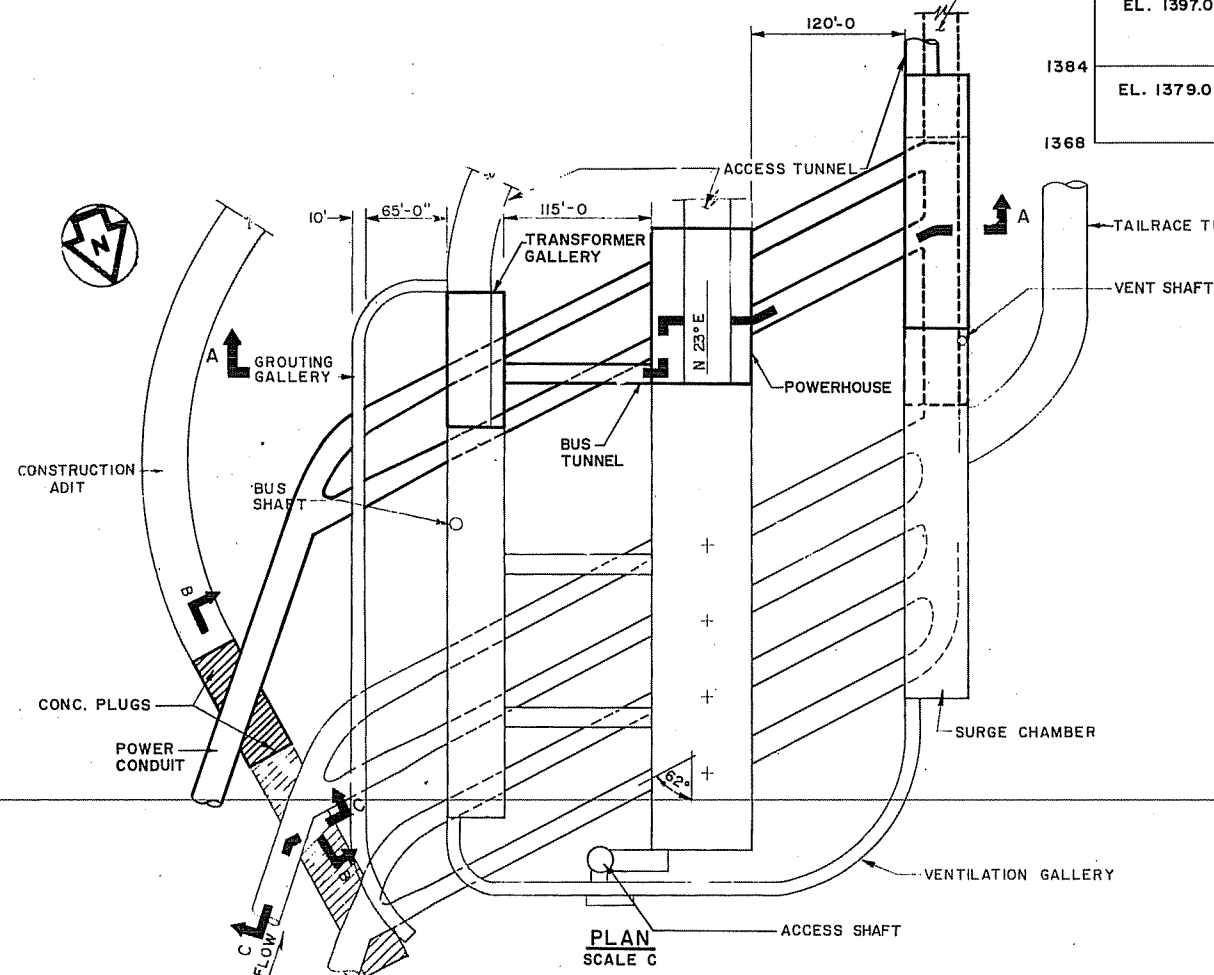
SECTION THROUGH CENTERLINE OF UNIT
SECTION A-A
 SCALE B



SECTION B-B
 SCALE A

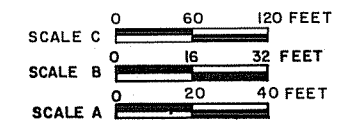


SECTION C-C
 SCALE A

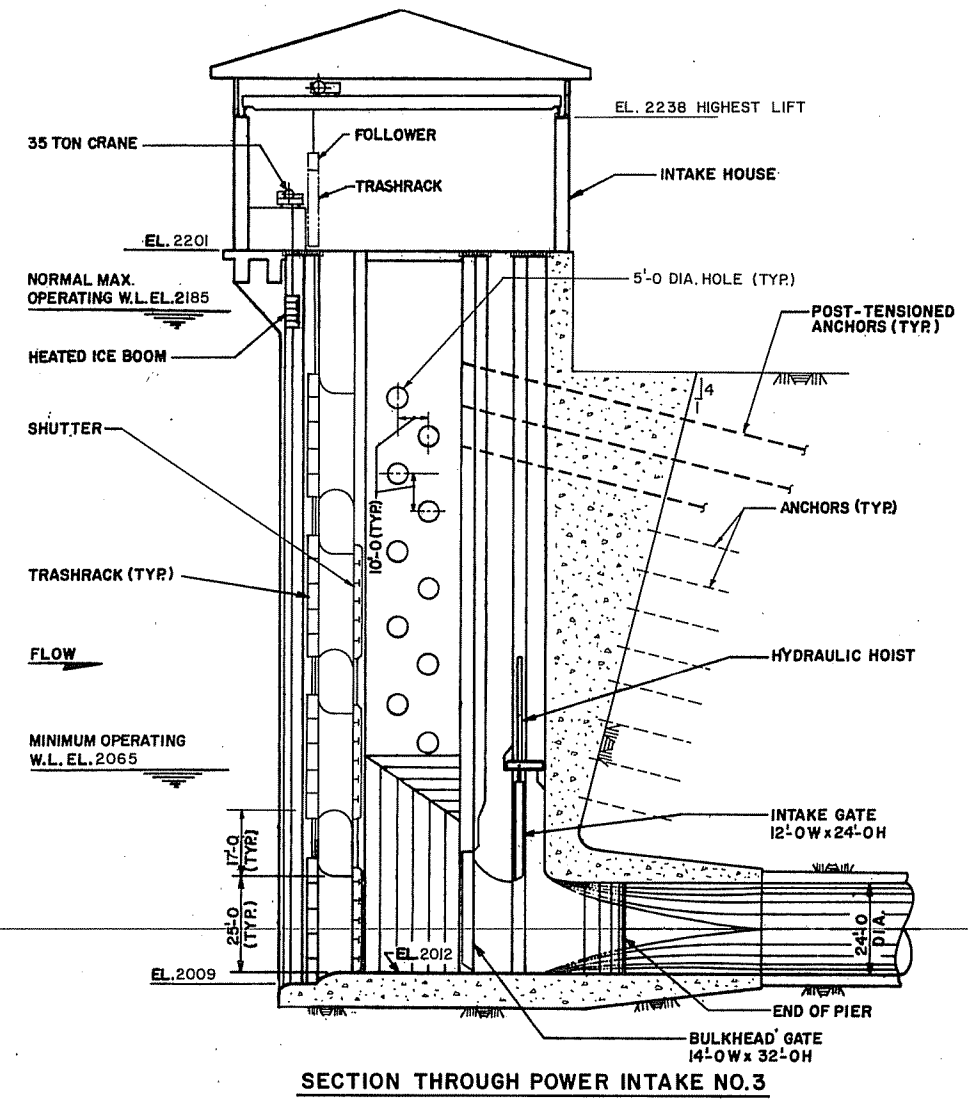
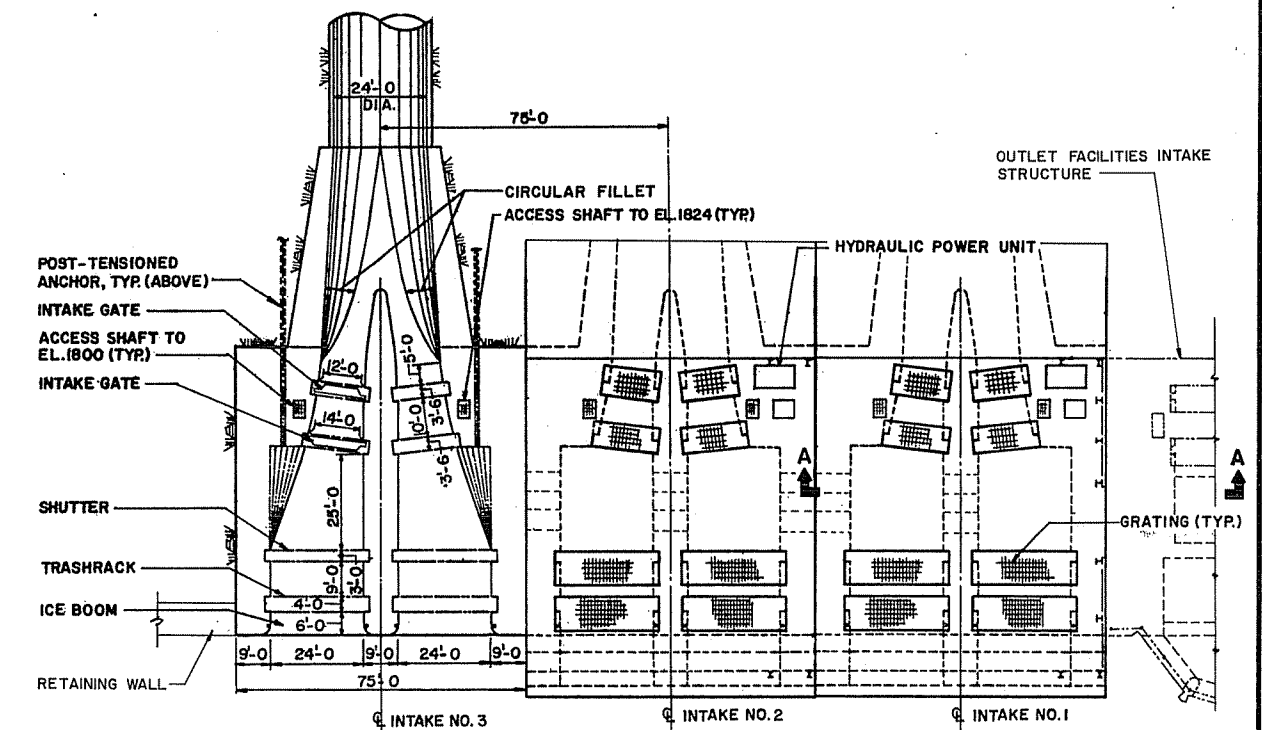
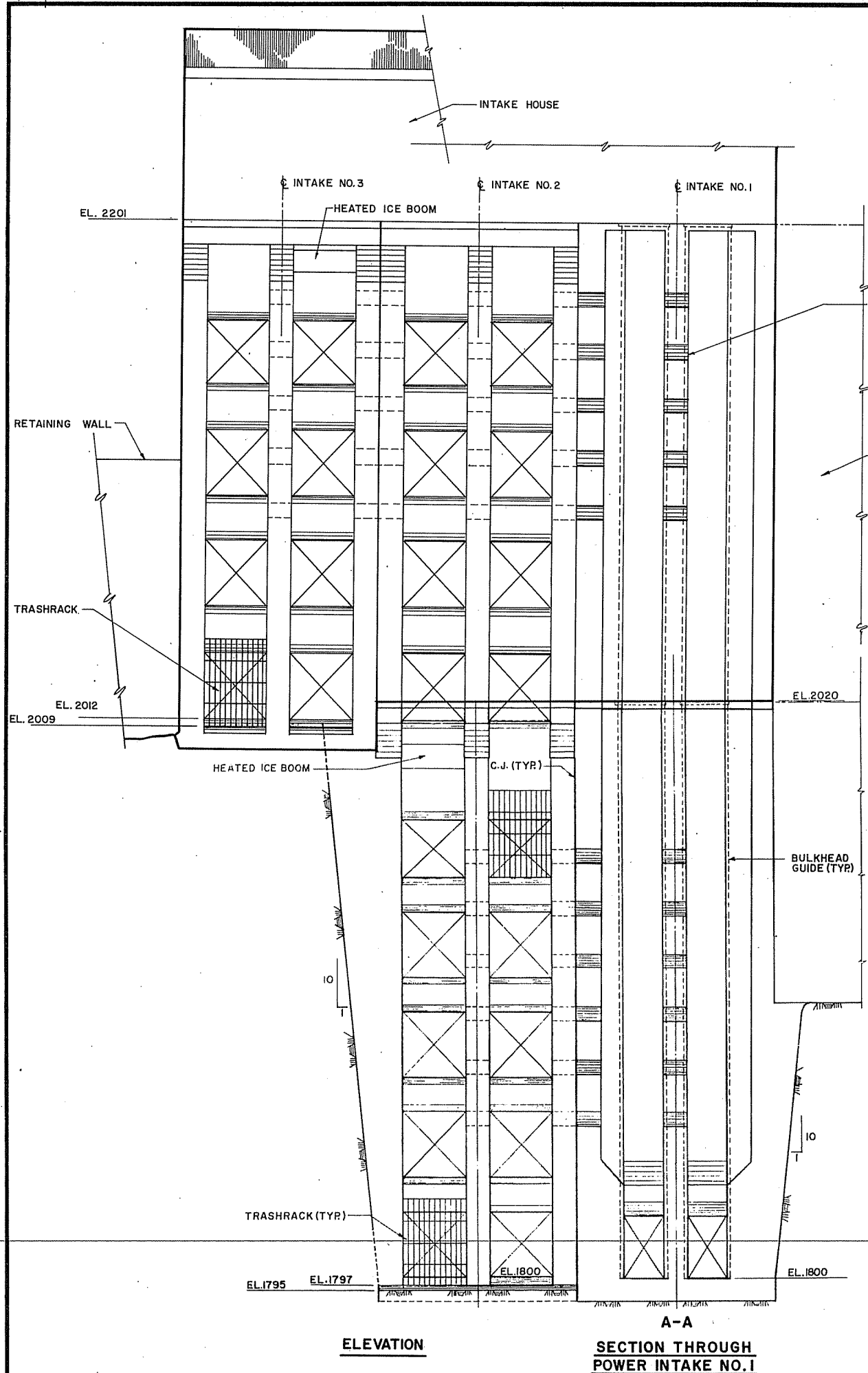


PLAN
 SCALE C

NOTE
 STAGE III CONSTRUCTION SHOWN
 WITH BOLD LINES



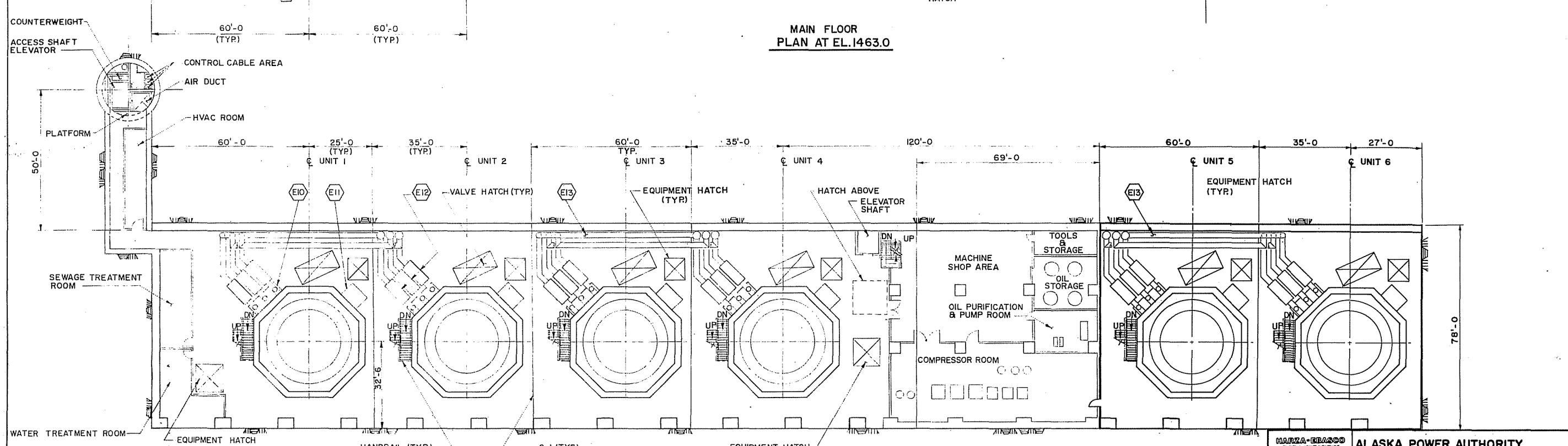
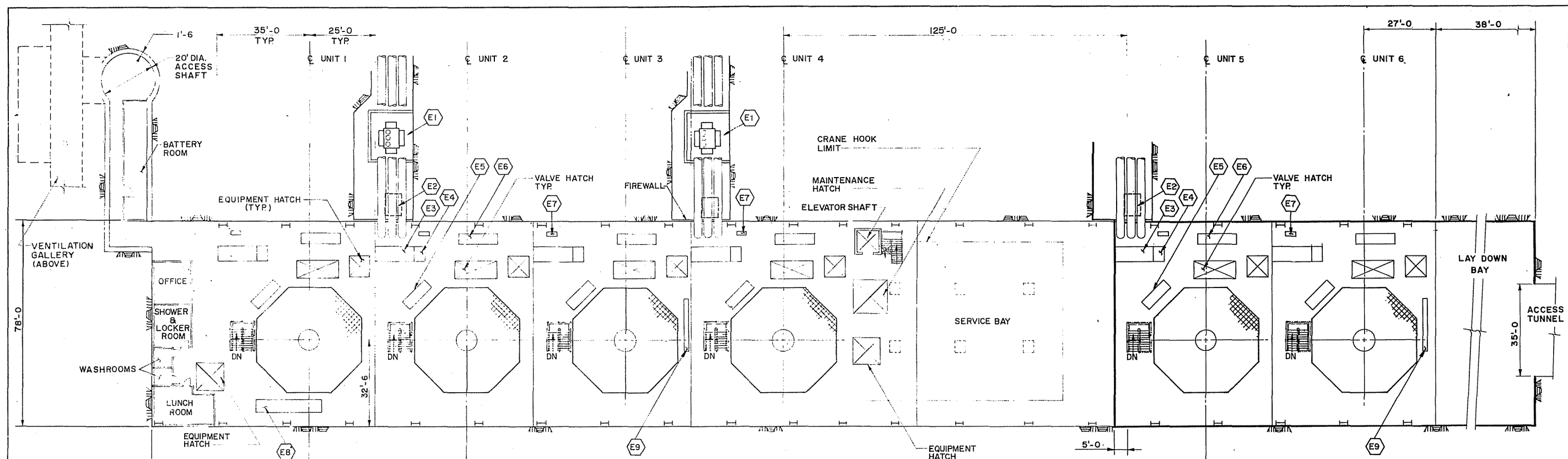
MARZA-BRASSO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY		
SUSITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)			
POWER FACILITIES PLAN & SECTIONS			
EXHIBIT F		PLATE F 85	



NOTE
STAGE III CONSTRUCTION SHOWN
WITH BOLD LINES

SCALE 0 20 40 FEET

HARZA-EDASCO SUBITNA JOINT VENTURE	
ALASKA POWER AUTHORITY	
SUBITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)	
POWER INTAKE SECTIONS	
EXHIBIT F	PLATE F86



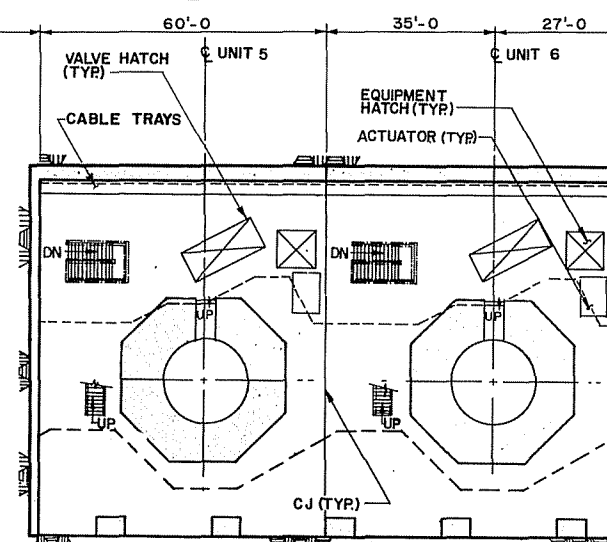
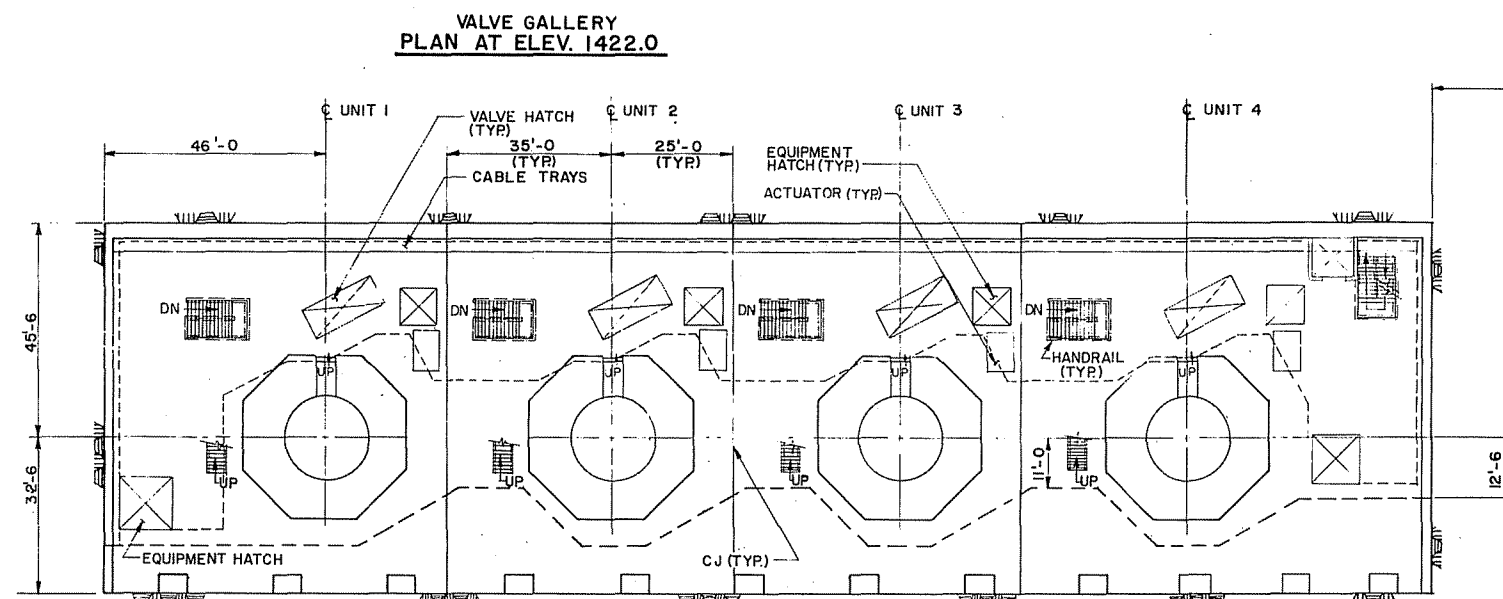
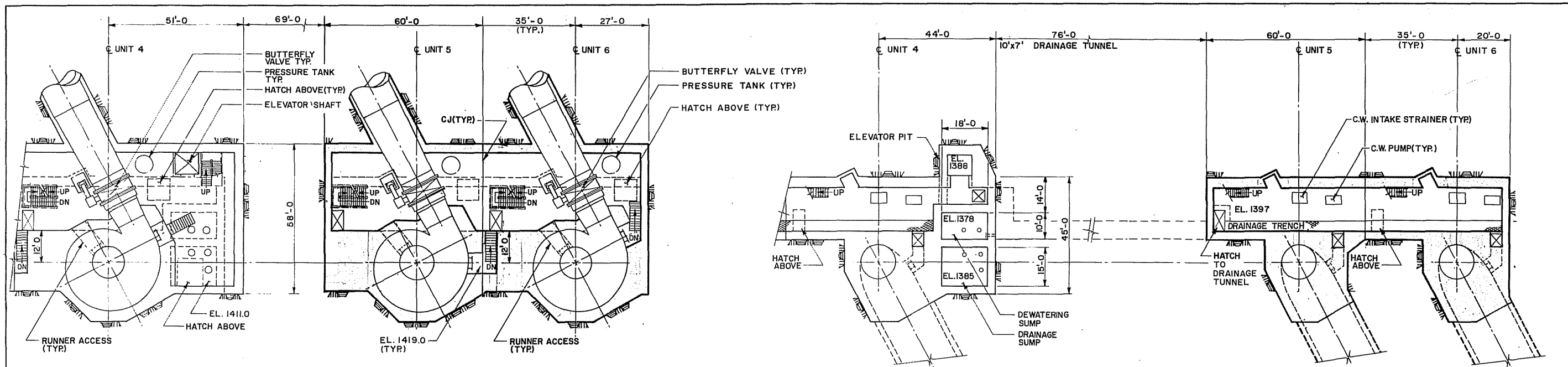
LEGEND

- 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

NOTE
STAGE III CONSTRUCTION SHOWN
WITH BOLD LINES

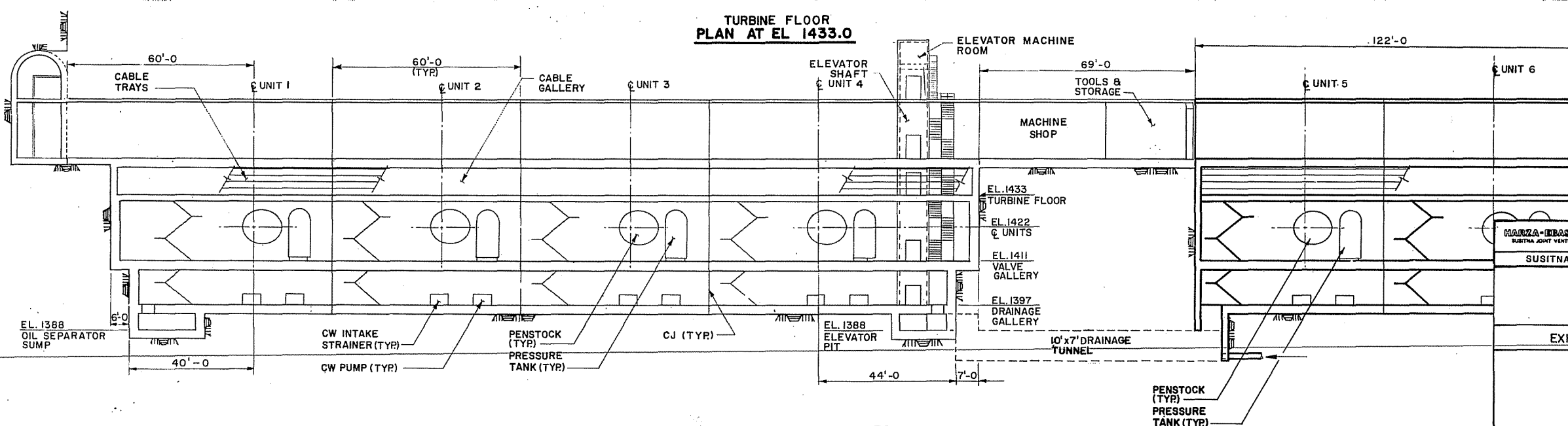


MARZA-BRASSO SUSITNA JOINT VENTURE	
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)	
POWERHOUSE PLANS	
EXHIBIT F	PLATE F.87

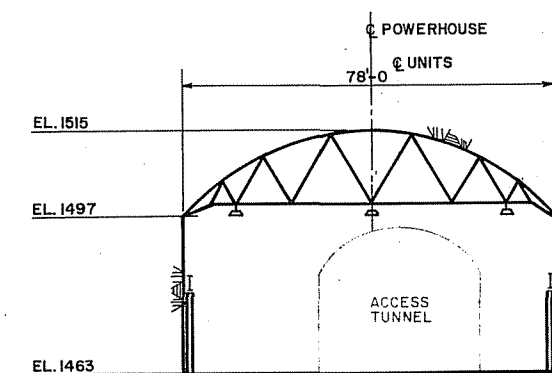
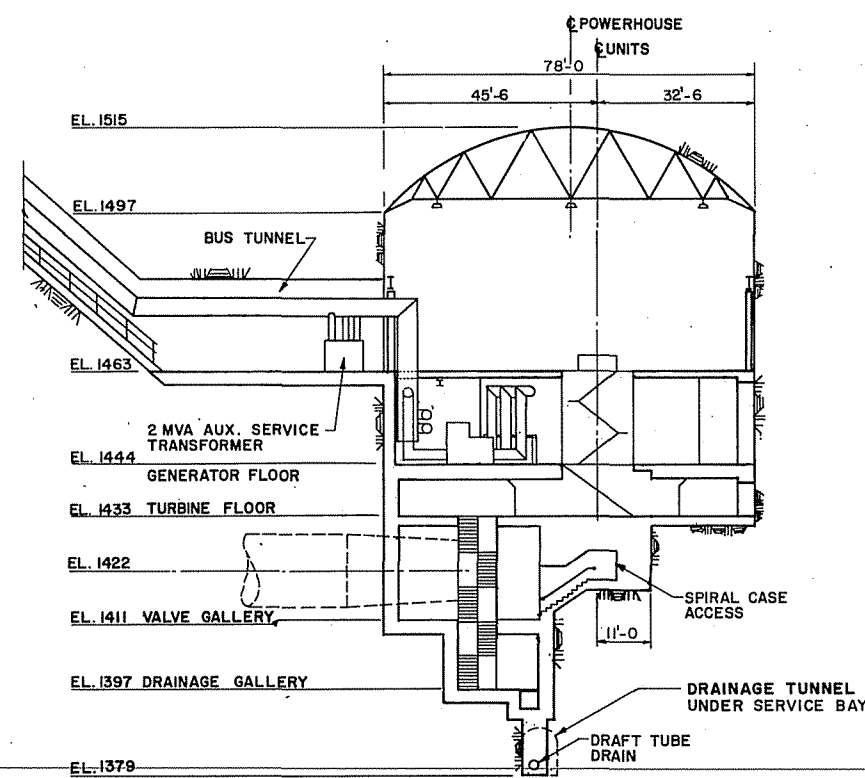
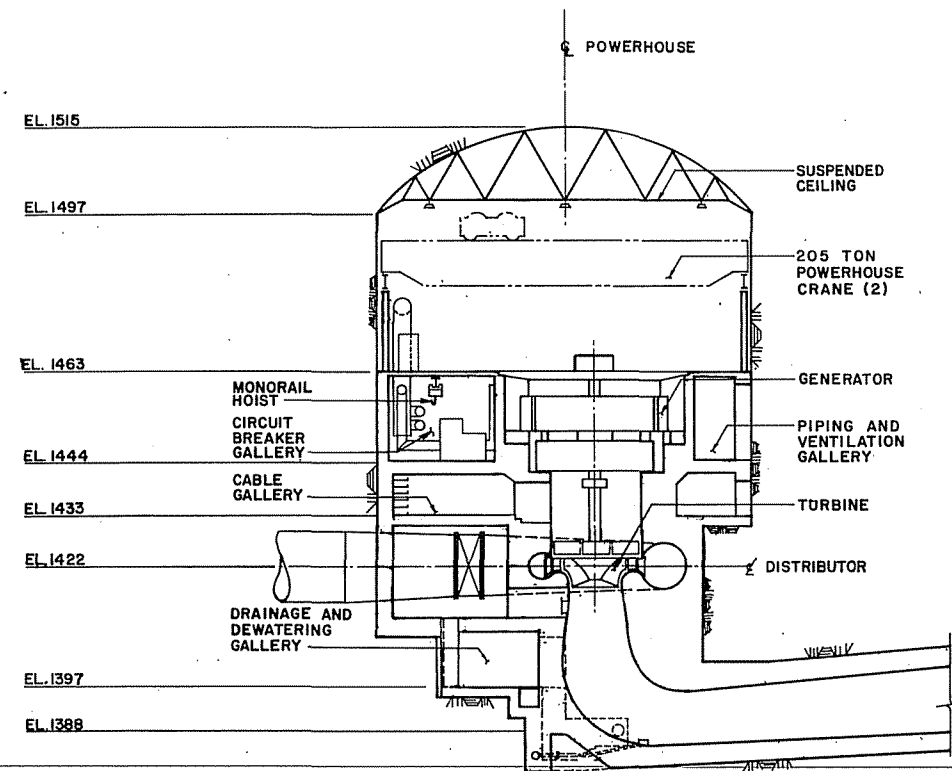
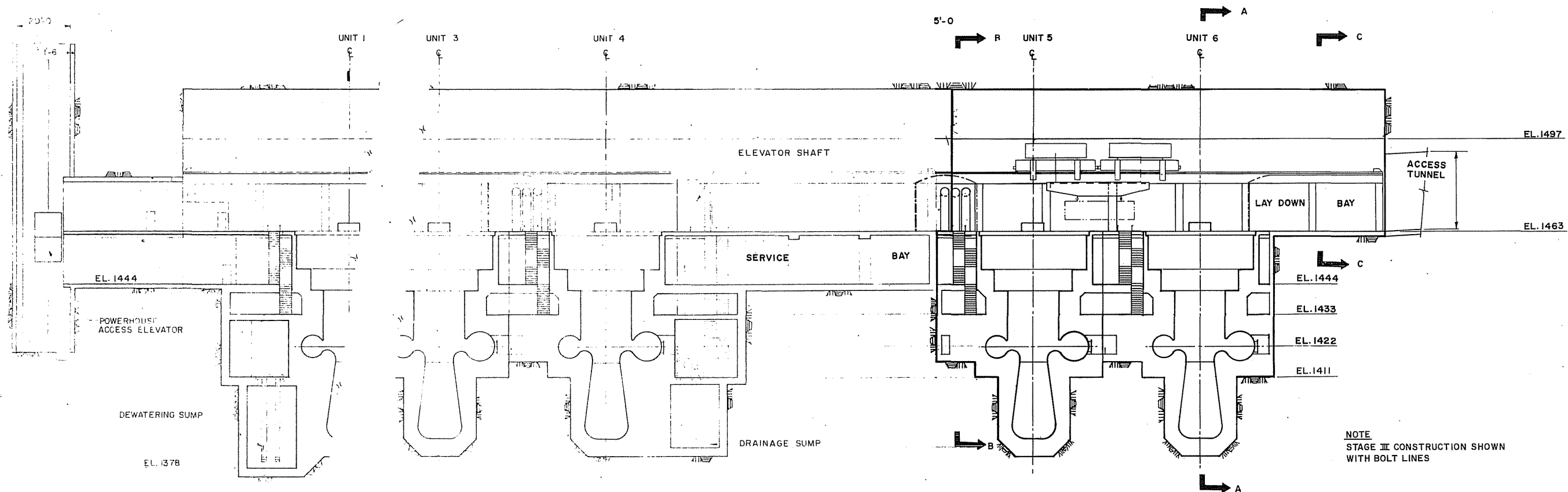


NOTE
STAGE III CONSTRUCTION SHOWN
WITH BOLD LINES

SCALE A 0 16 32 FEET

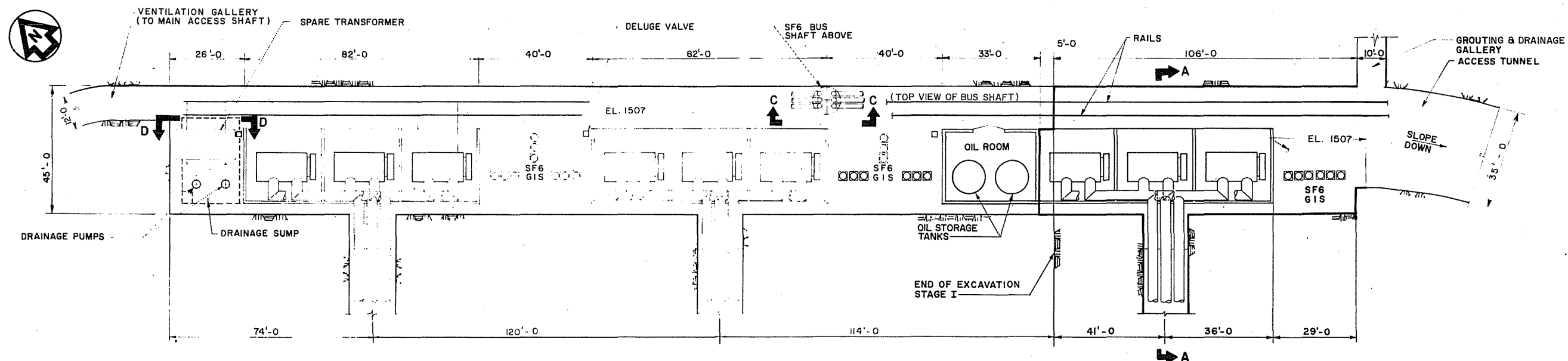


ALASKA POWER AUTHORITY SUSITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)	
POWERHOUSE PLANS AND SECTION	
EXHIBIT F	PLATE F.88

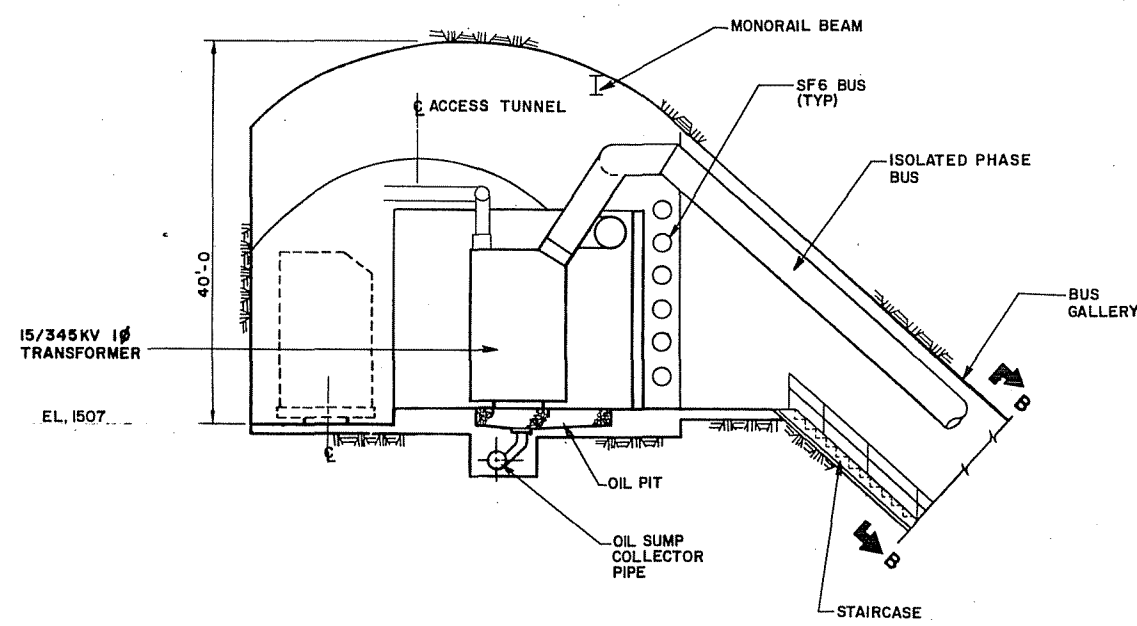


SCALE 0 16 32 FEET

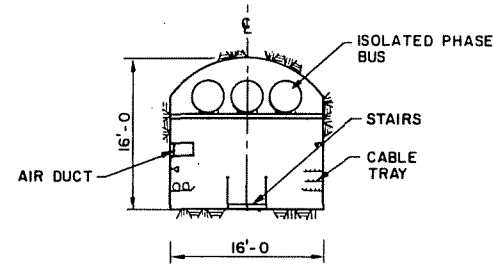
HANZA-BRACCO SUSITNA JOINT VENTURE		ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)			
POWERHOUSE SECTIONS			
EXHIBIT F		PLATE F89	



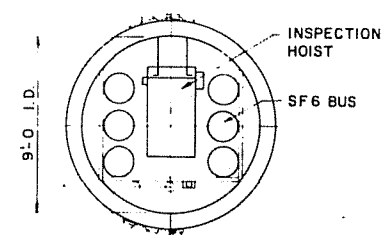
PLAN
SCALE A



SECTION A-A
SCALE B

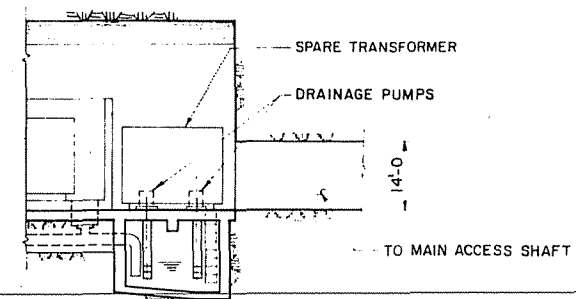
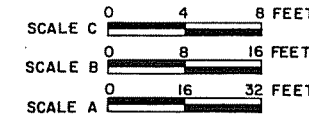


SECTION B-B
THROUGH BUS GALLERY
SCALE B



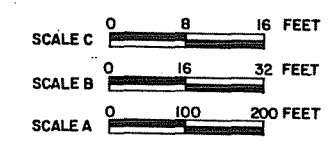
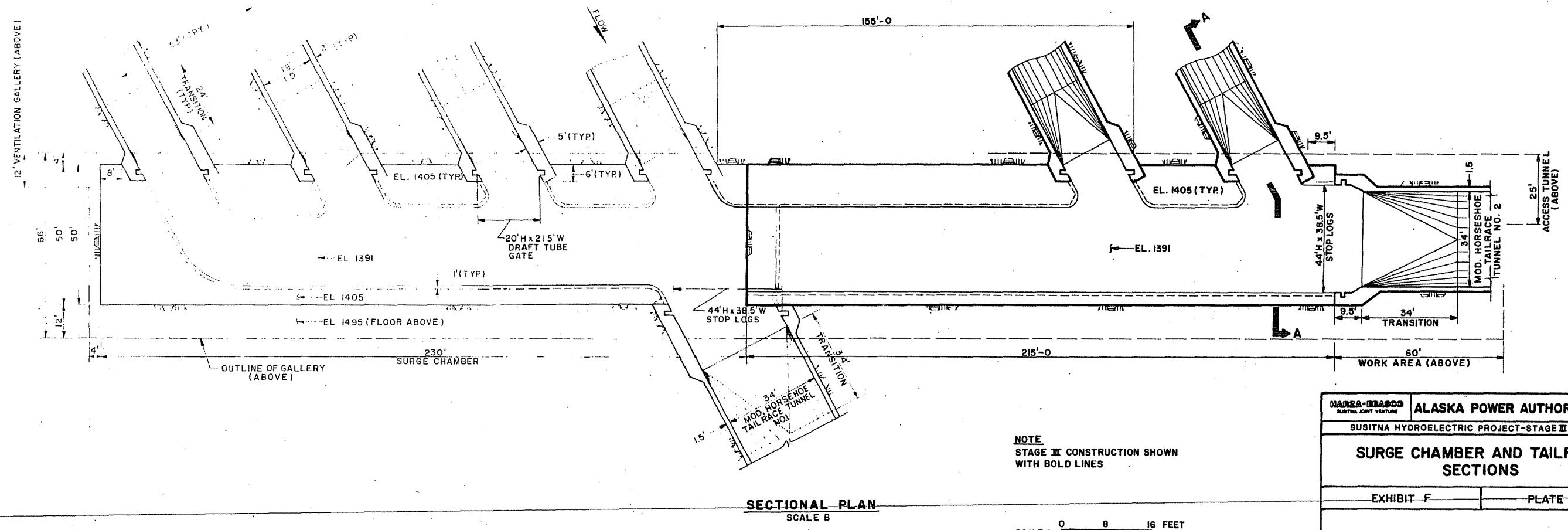
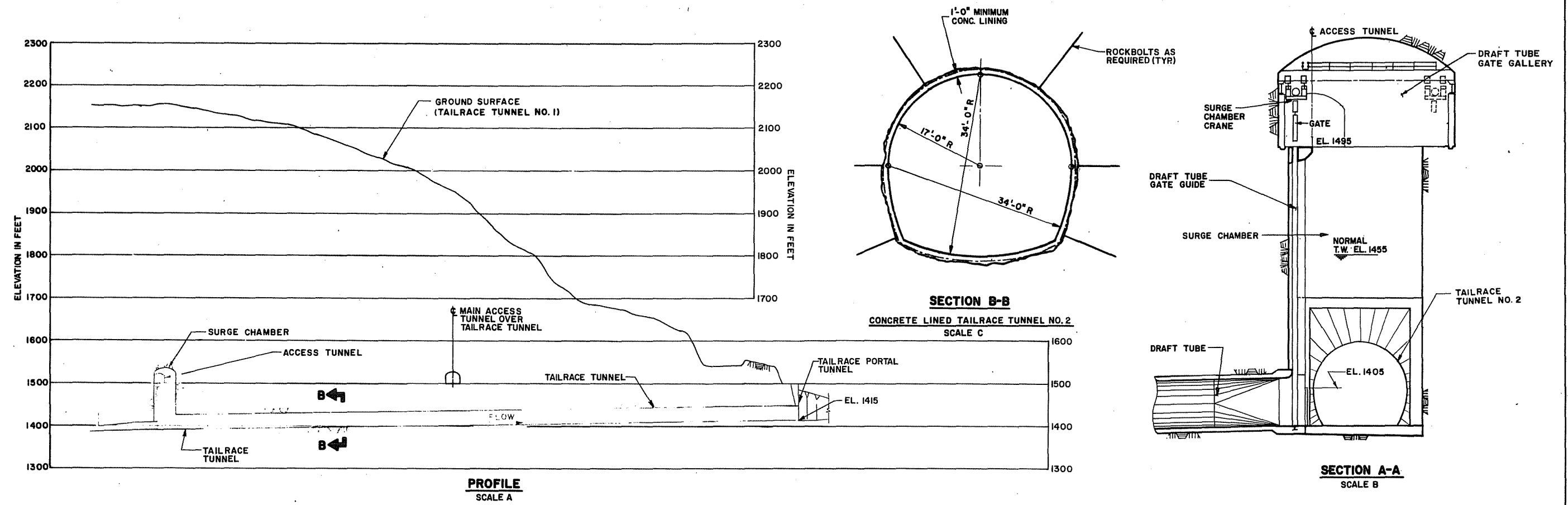
SECTION C-C
THROUGH BUS SHAFT
SCALE C

NOTE
STAGE III CONSTRUCTION SHOWN
WITH BOLD LINES

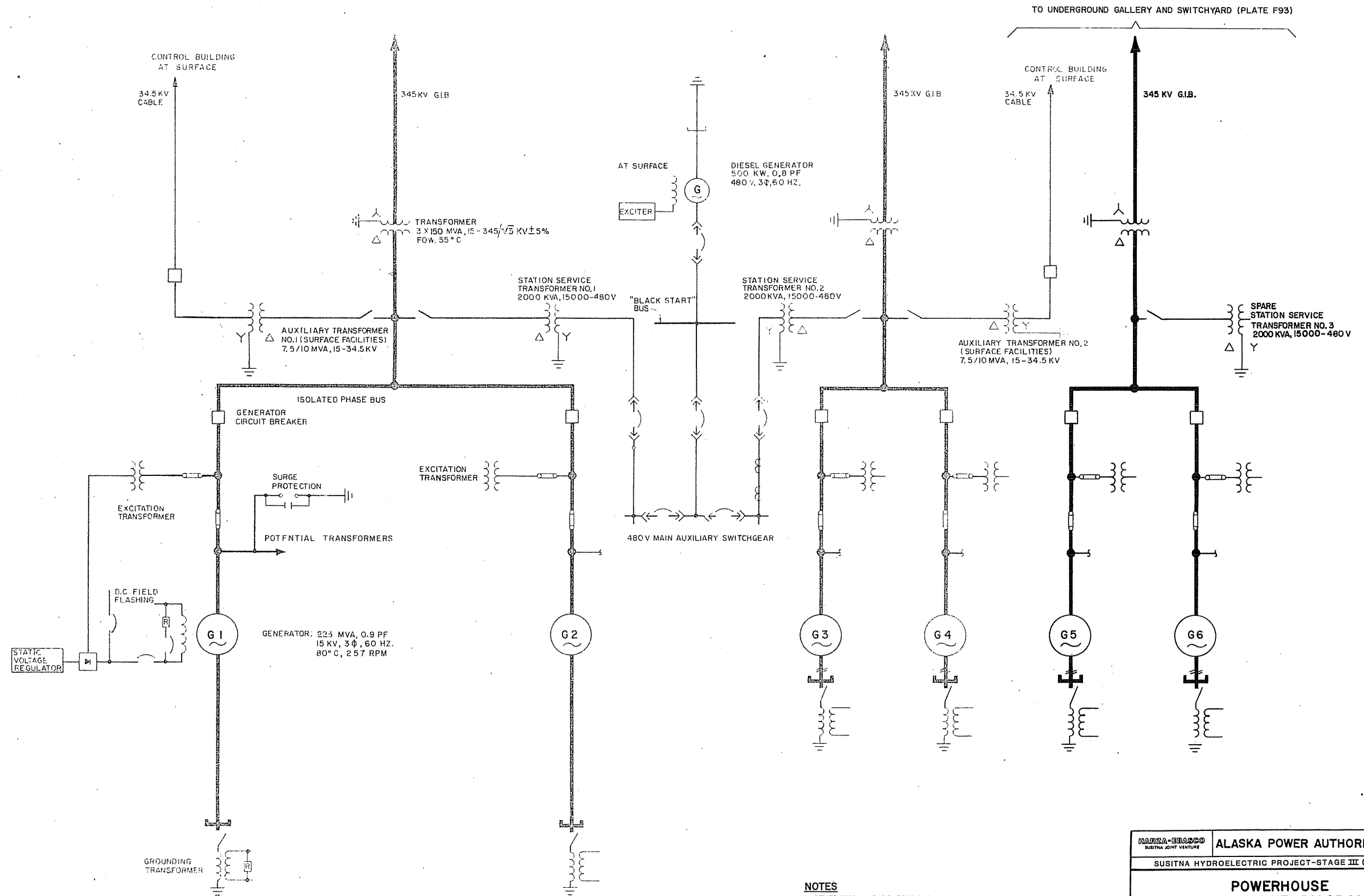


SECTION D-D
THROUGH SUMP
SCALE A

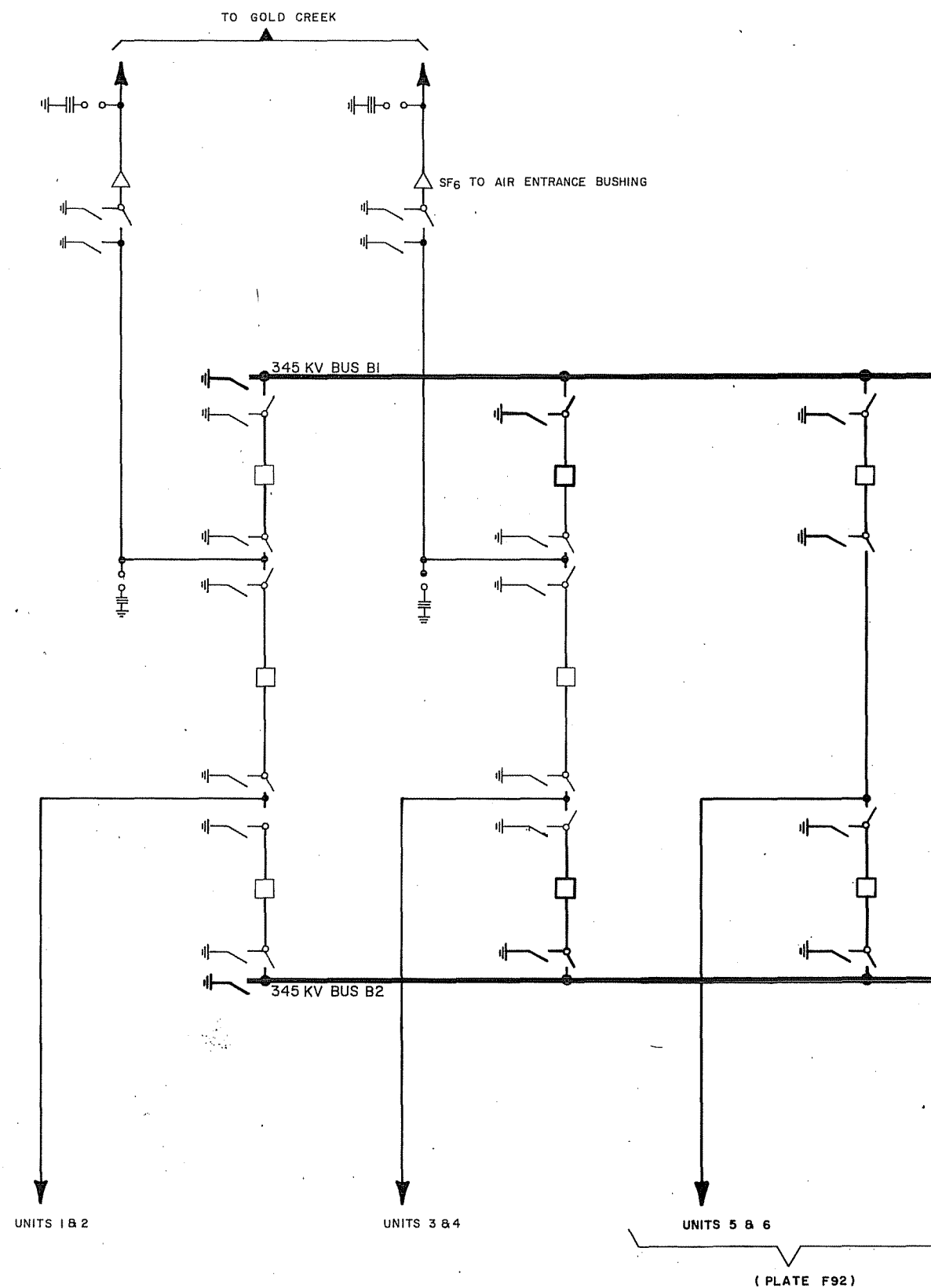
MARZA-TRACCO SUSITNA JOINT VENTURE		ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)			
TRANSFORMER GALLERY PLAN & SECTIONS			
EXHIBIT F		PLATE F90	



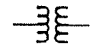
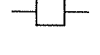
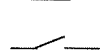
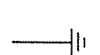
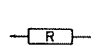
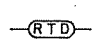
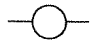
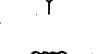
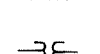
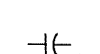
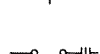
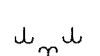
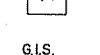
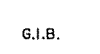
MARRA-BRASCO SUSITNA JOINT VENTURE	
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)	
SURGE CHAMBER AND TAILRACE SECTIONS	
EXHIBIT F	PLATE F91



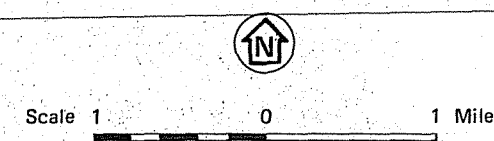
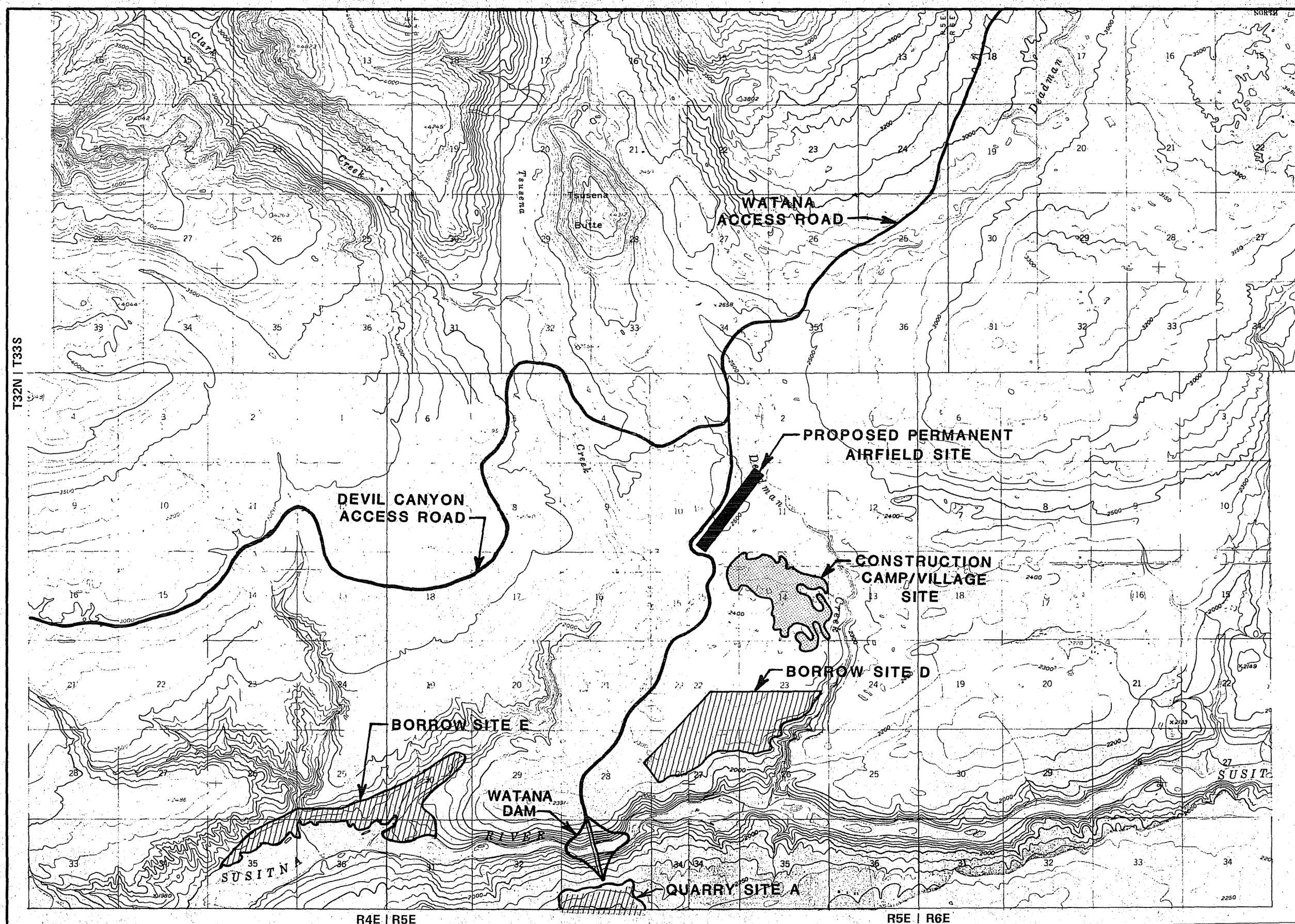
MARZA-BASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)	
POWERHOUSE SINGLE LINE DIAGRAM	
EXHIBIT F	PLATE F92



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
-  COUPLING CAPACITOR VOLTAGE TRANSFORMER
-  RECTIFIER
- G.I.S. GAS-INSULATED SWITCHGEAR
- G.I.B. GAS-INSULATED BUS

MARZA-TEACCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)	
345KV UNDERGROUND SWITCHYARD SINGLE LINE DIAGRAM	
EXHIBIT F	PLATE F93



MANZA-TRACCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)	
GENERAL LAYOUT SITE FACILITIES	
EXHIBIT F	PLATE F94

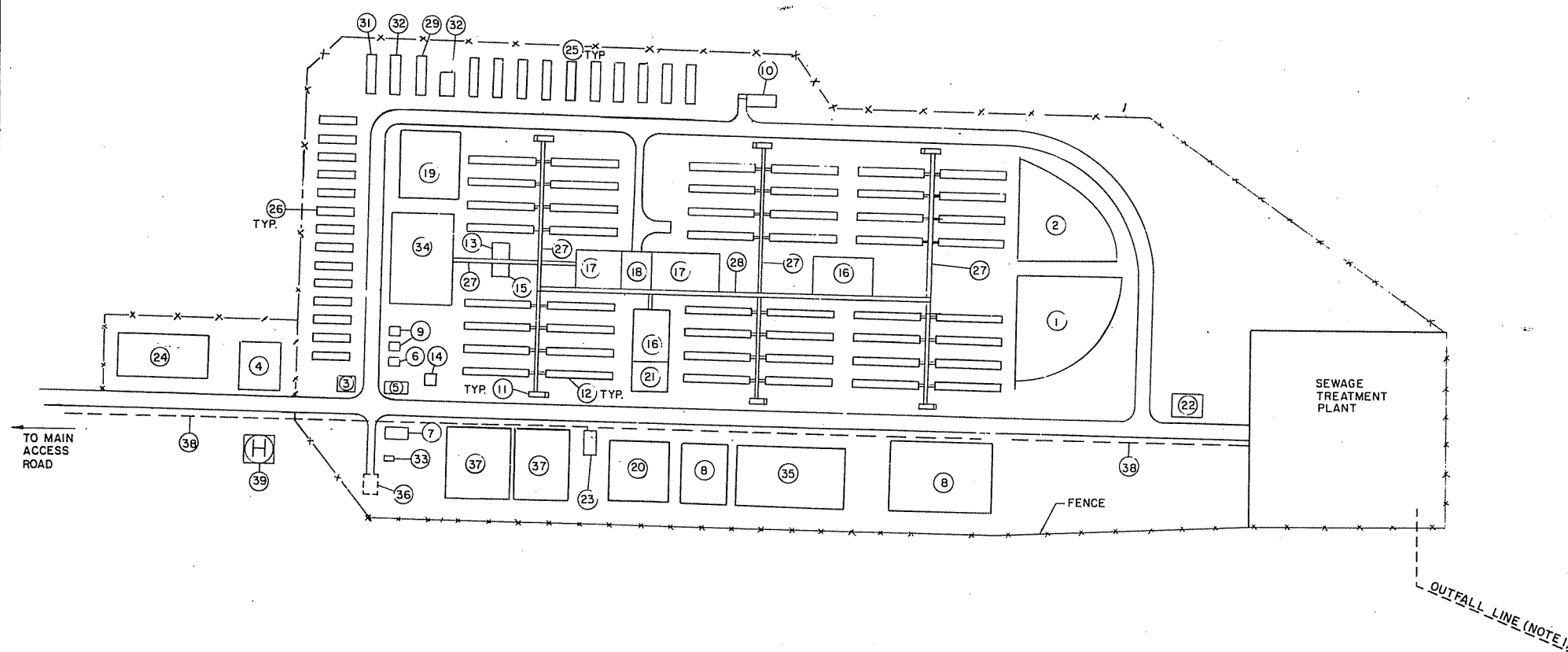
LEGEND

- ① BASEBALL
- ② SOFTBALL
- ③ SECURITY
- ④ HOSPITAL
- ⑤ FIRE & OIL SPILL
- ⑥ CAMP MANAGER'S OFFICE
- ⑦ SOILS LAB
- ⑧ PARKING AREAS
- ⑨ ADMINISTRATION OFFICES
- ⑩ STORE
- ⑪ BUS SHELTERS
- ⑫ DORMITORIES
- ⑬ LAUNDRY
- ⑭ COMMUNICATIONS CTR.
- ⑮ BANK
- ⑯ RECREATION HALL
- ⑰ KITCHEN & DINING
- ⑱ FOOD SERVICE WAREHOUSE
- ⑲ WAREHOUSE
- ⑳ GYMNASIUM
- ㉑ SWIMMING POOL
- ㉒ MAINTENANCE GARAGE
- ㉓ PUMP HOUSE (WATER)
- ㉔ HOCKEY RINK
- ㉕ BACHELOR DORMS MGMT. TYPE A
- ㉖ BACHELOR DORMS MGMT. TYPE B
- ㉗ 10' PERMAWALK
- ㉘ 16' PERMAWALK
- ㉙ MANAGER'S GUEST HOUSE
- ㉚ OWNER'S GUEST HOUSE
- ㉛ CONTRACTOR'S GUEST HOUSE
- ㉜ STAFF CLUBHOUSE
- ㉝ GENERATING STATION
- ㉞ RELOCATED CAMP HOUSING (160 SPACES)
- ㉟ FOOTBALL FIELD
- ㊱ FUEL STORAGE TANK
- ㊲ WATER RESERVOIR
- ㊳ UTILIDOR
- ㊴ HELIPAD

NOTE

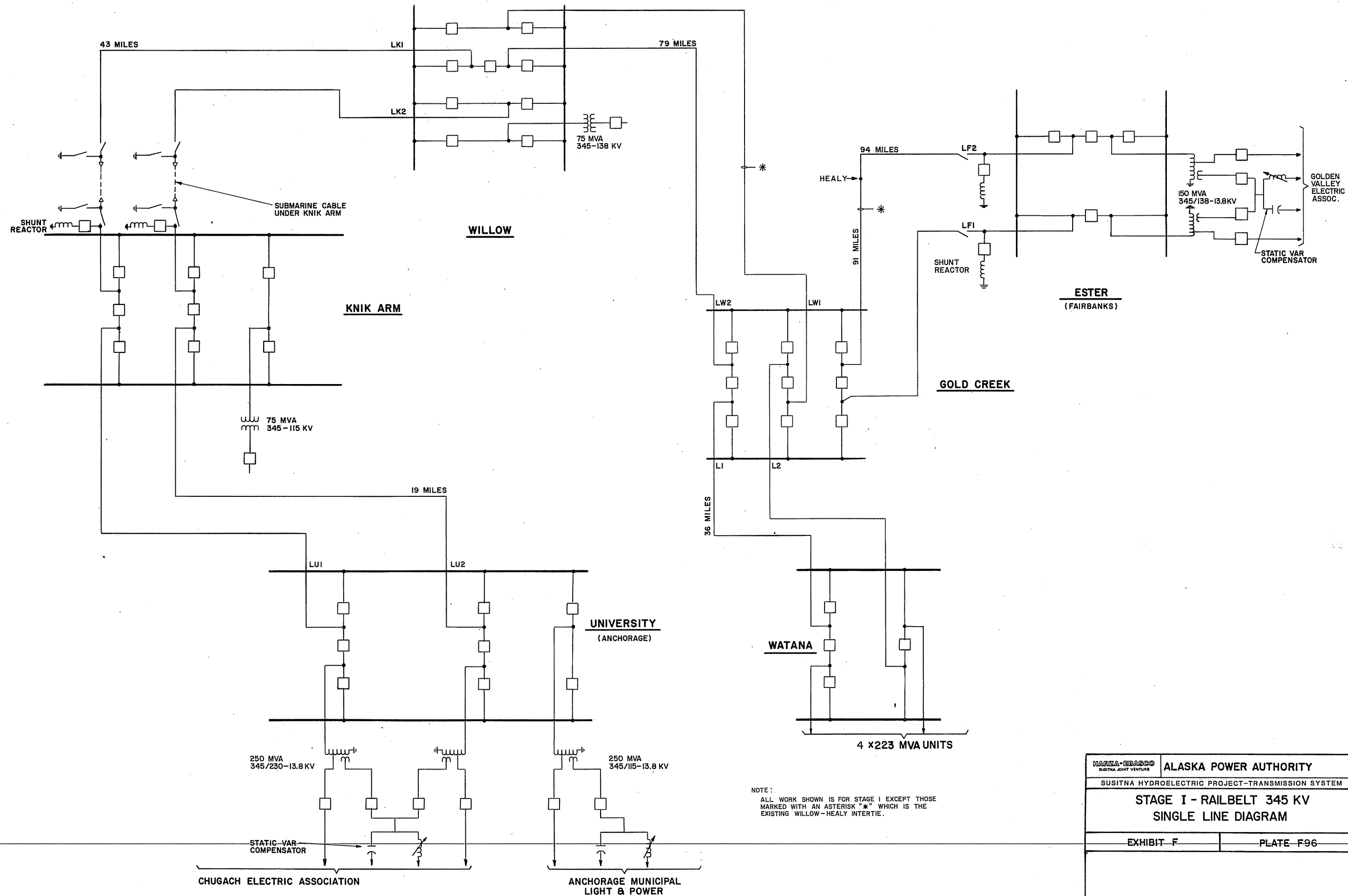
1. OUTFALL LINE LOCATION AND ORIENTATION WOULD BE SITUATED DOWNSLOPE AND DEPEND UPON TOPOGRAPHY
2. FACILITY CONSTRUCTED DURING STAGE I

SCALE 0 200 400 FEET

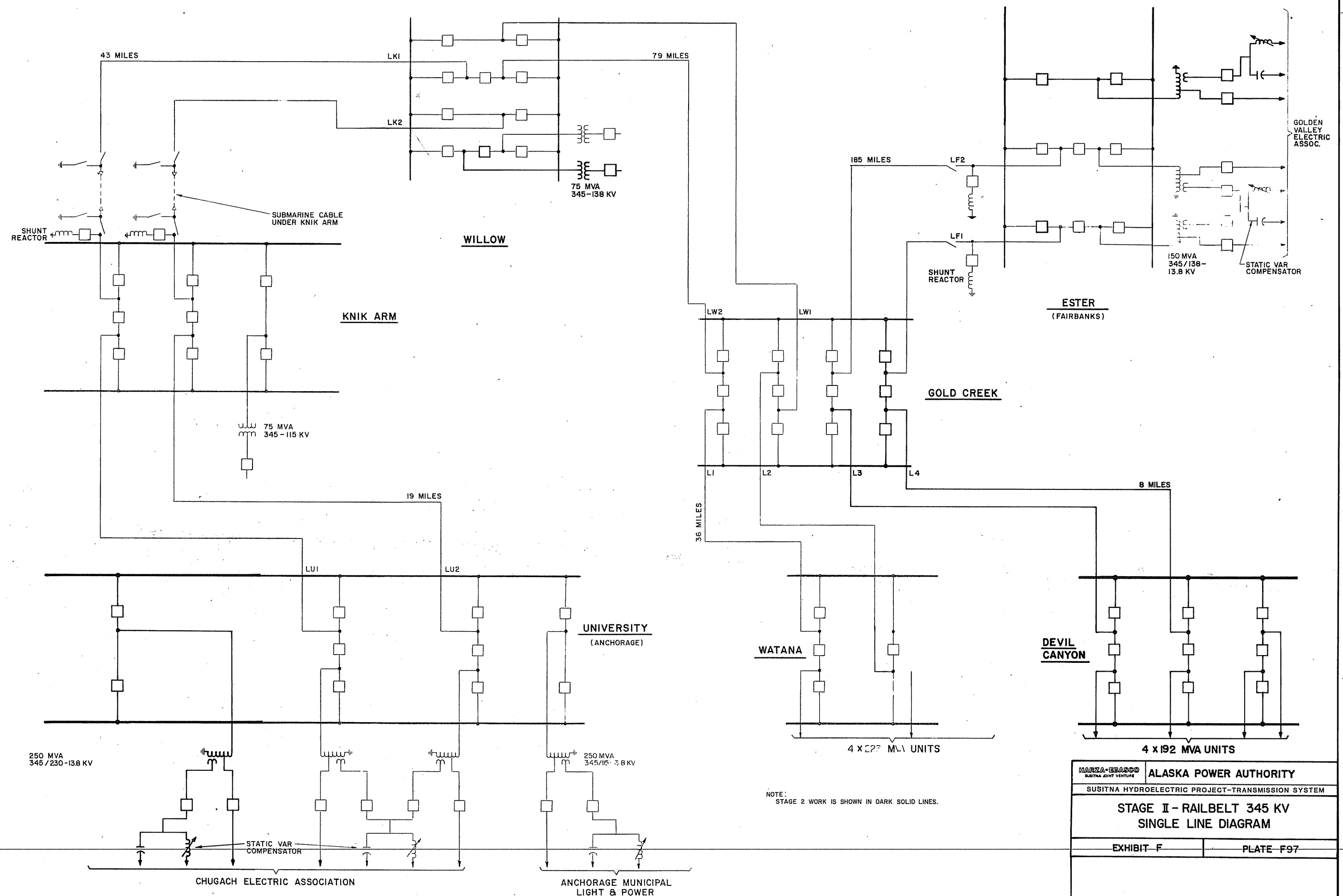


MARZA-EDASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY		
SUSITNA HYDROELECTRIC PROJECT-STAGE III (WATANA)			
CONSTRUCTION CAMP GENERAL PLAN			
EXHIBIT F		PLATE F95	

TRANSMISSION SYSTEM

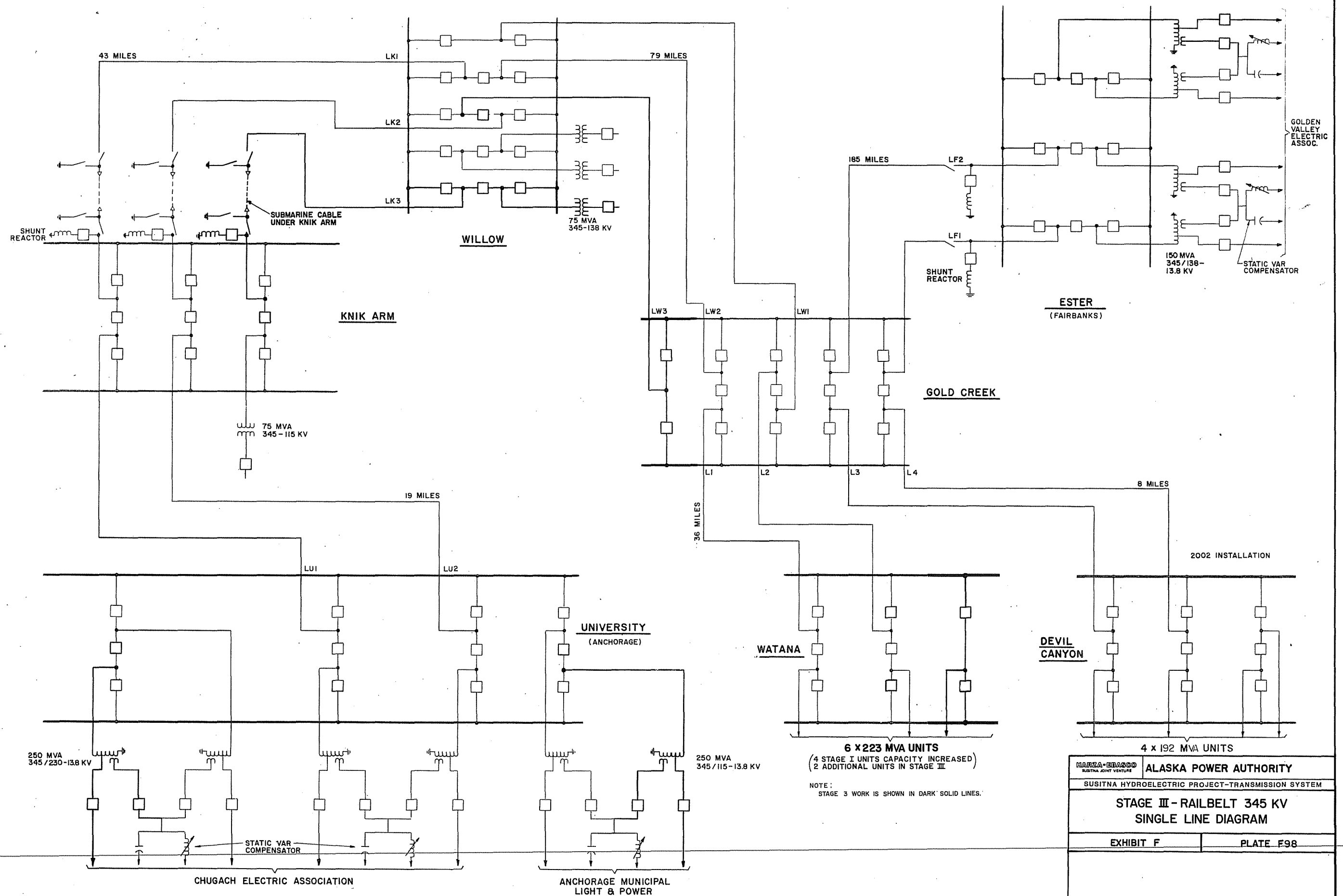


HARZA-BEASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-TRANSMISSION SYSTEM	
STAGE I - RAILBELT 345 KV SINGLE LINE DIAGRAM	
EXHIBIT F	PLATE F96
STAGE 1 (1996)	



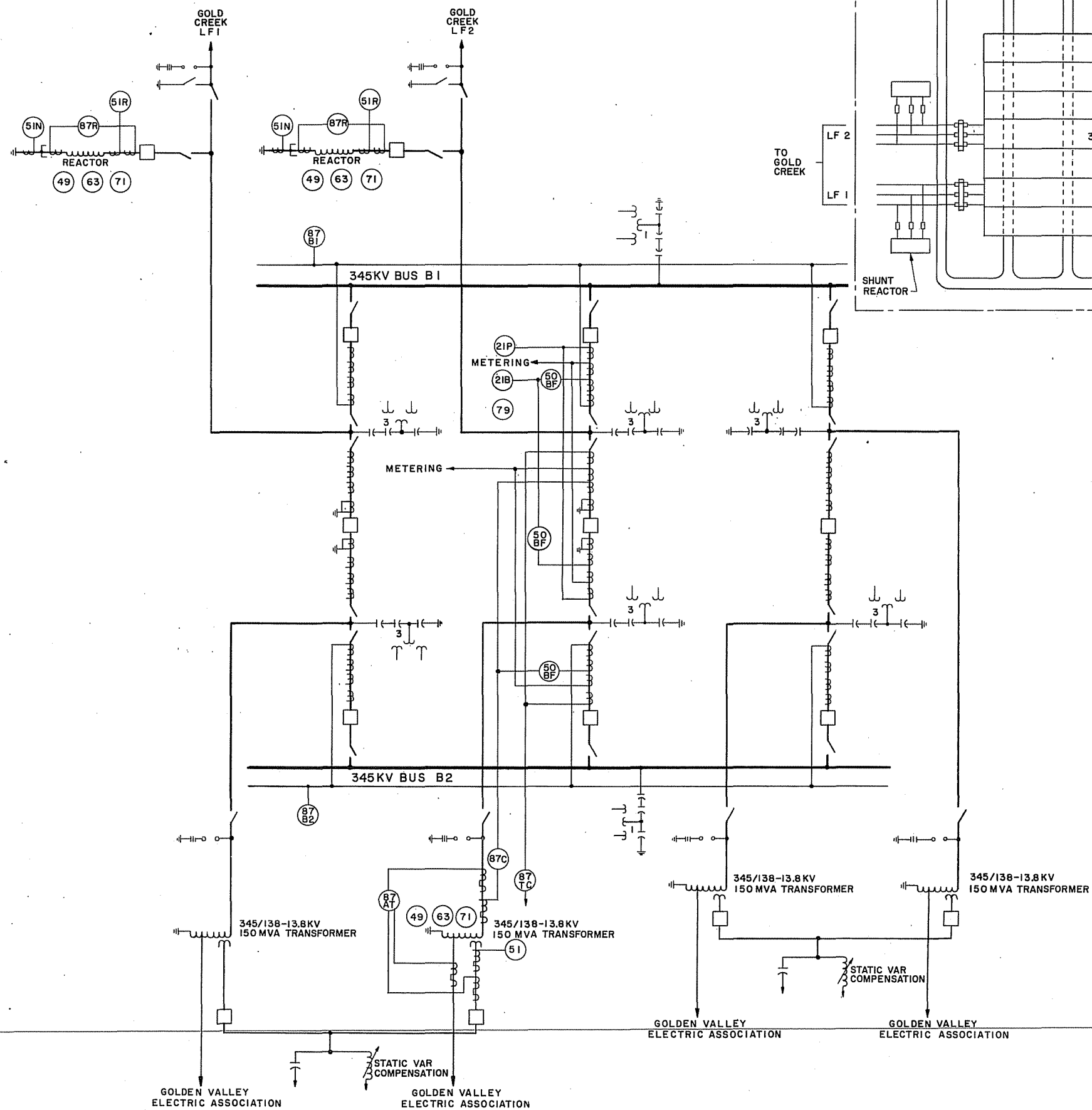
MARZA-ERASCO SUSITNA JOINT VENTURE	
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-TRANSMISSION SYSTEM	
STAGE II - RAILBELT 345 KV SINGLE LINE DIAGRAM	
EXHIBIT F	PLATE F97

STAGE 2 (2002)

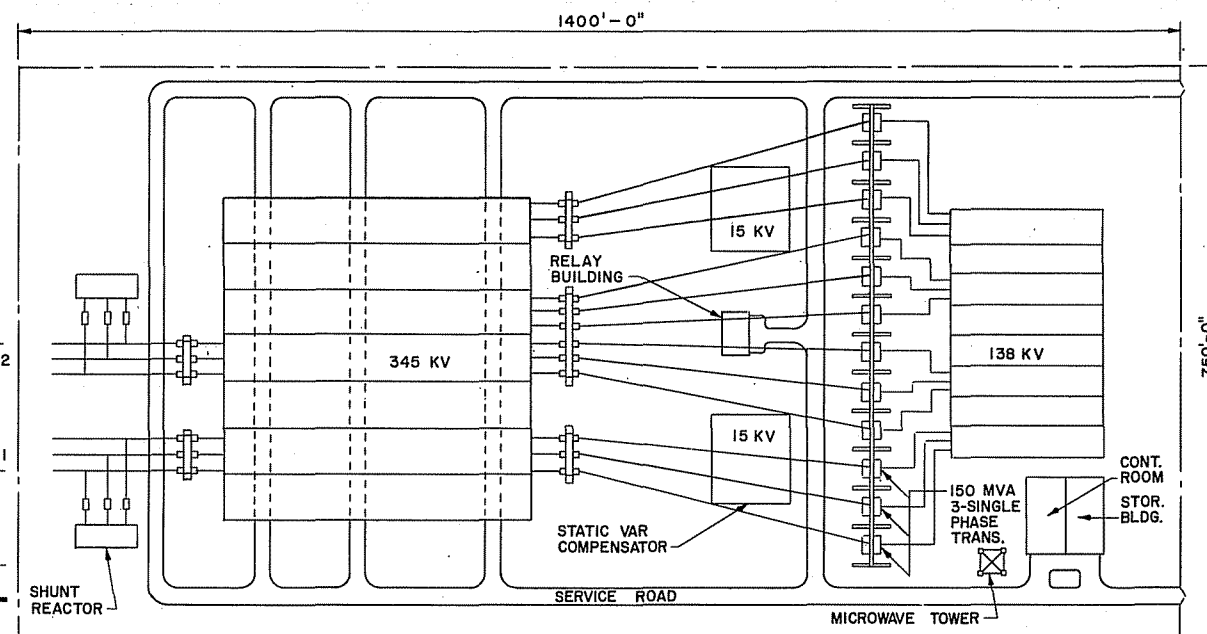


MARZA-EDASCO SUSITNA JOINT VENTURE	
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-TRANSMISSION SYSTEM	
STAGE III - RAILBELT 345 KV SINGLE LINE DIAGRAM	
EXHIBIT F	PLATE F98

STAGE 3 (2010)



SINGLE LINE DIAGRAM

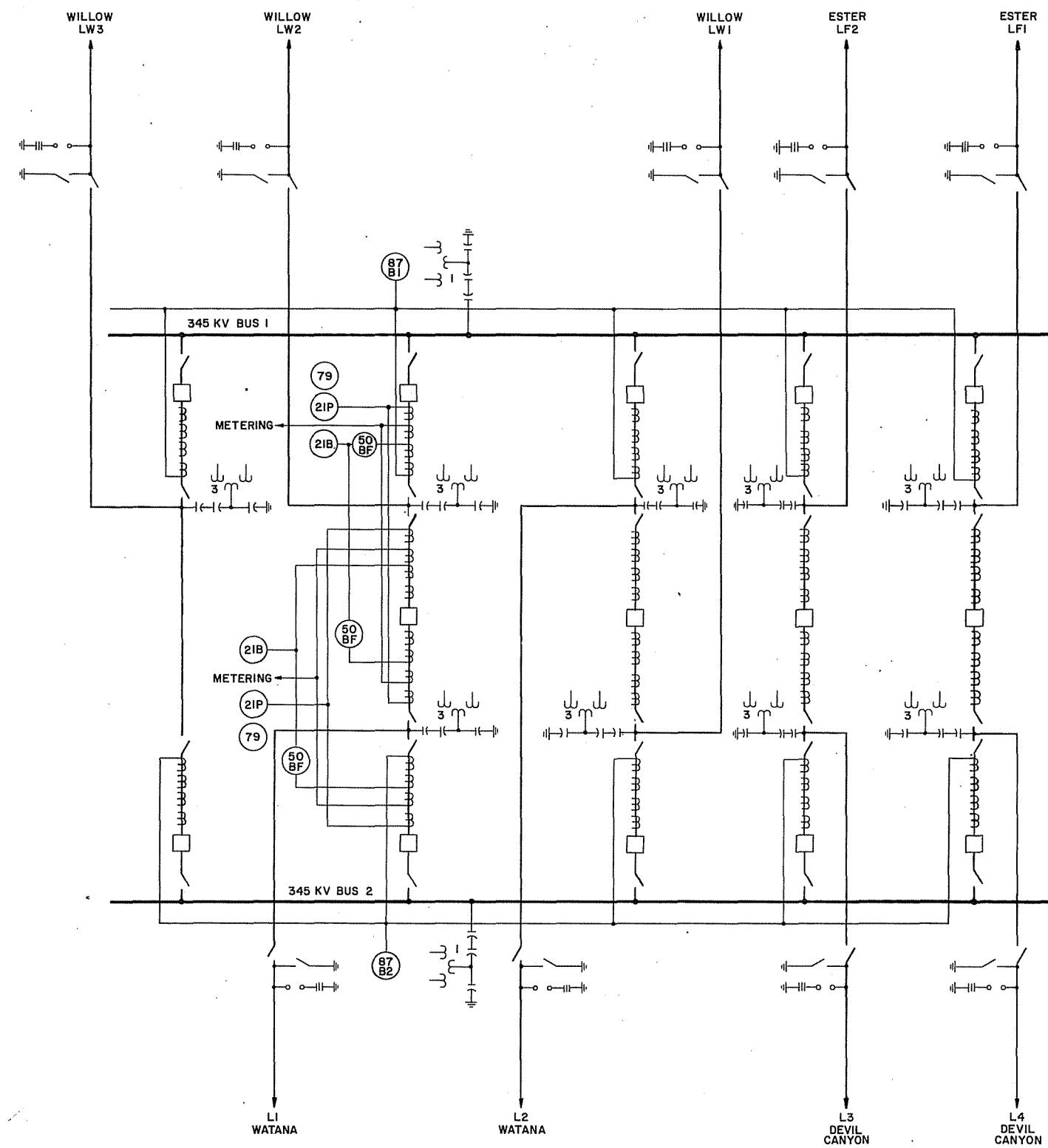


SUBSTATION PLAN
SCALE A

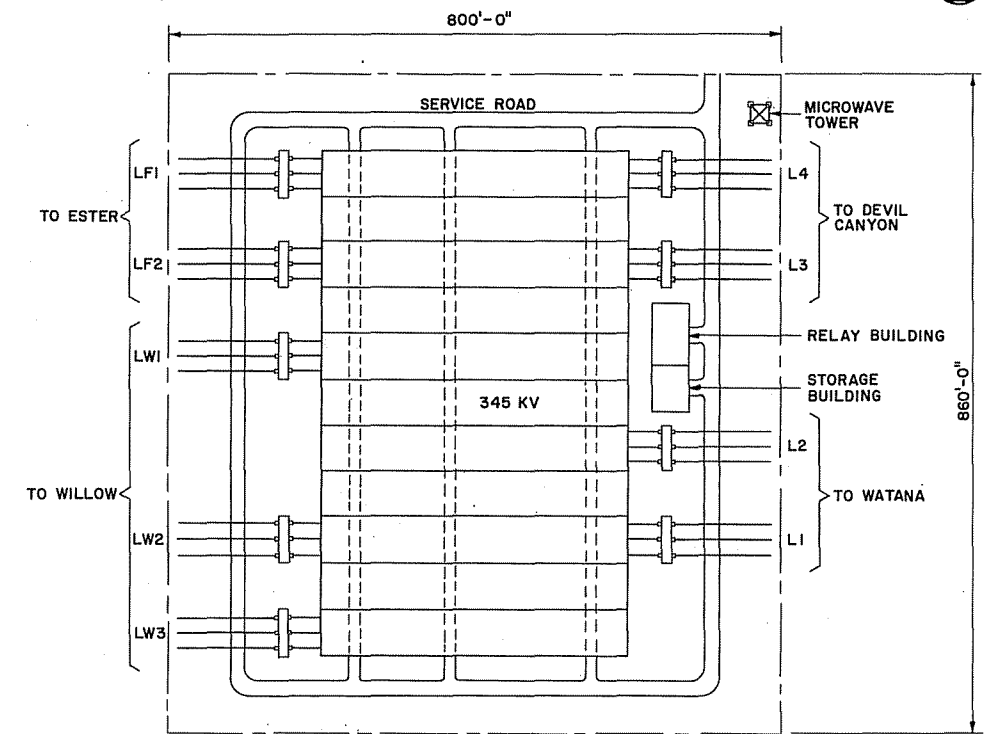
NOTE:
SHOWN IS THE ULTIMATE DEVELOPMENT OF THE
SUBSTATION. FOR STAGING DEVELOPMENT, REFER
TO PLATES F96, F97, AND F98, RAILBELT 345 KV
SINGLE LINE DIAGRAM.

SCALE A
0 100 200 FEET

MARZA-BRASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-TRANSMISSION SYSTEM	
ESTER SUBSTATION SINGLE LINE DIAGRAM AND PLAN	
EXHIBIT F	PLATE F99



SINGLE LINE DIAGRAM

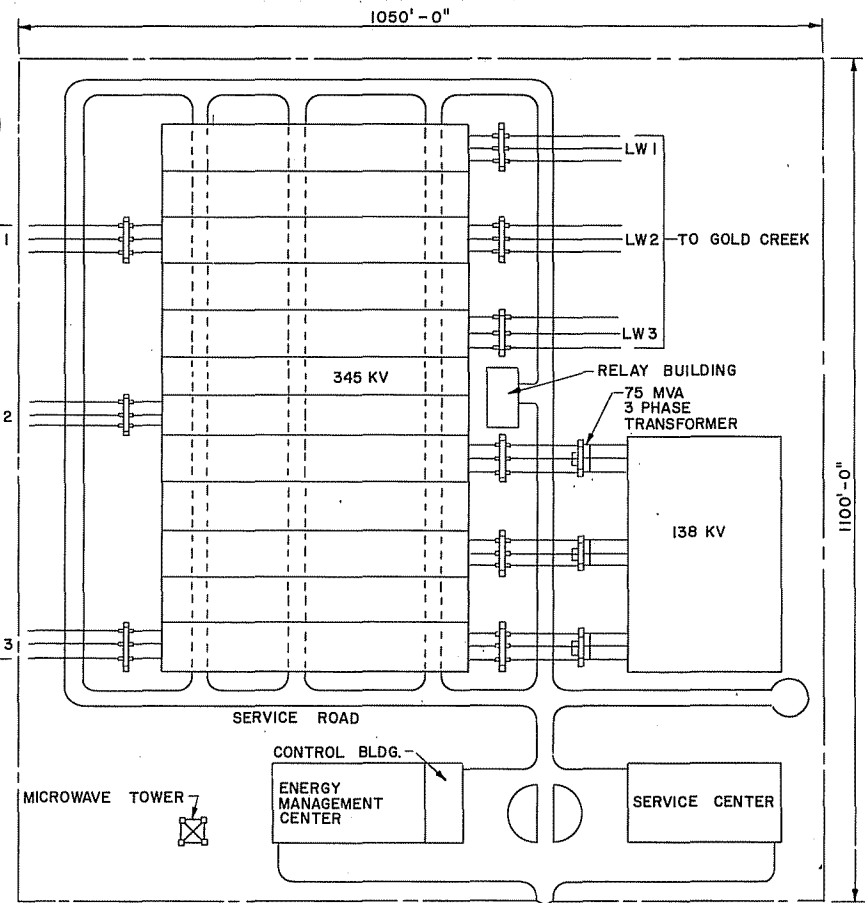
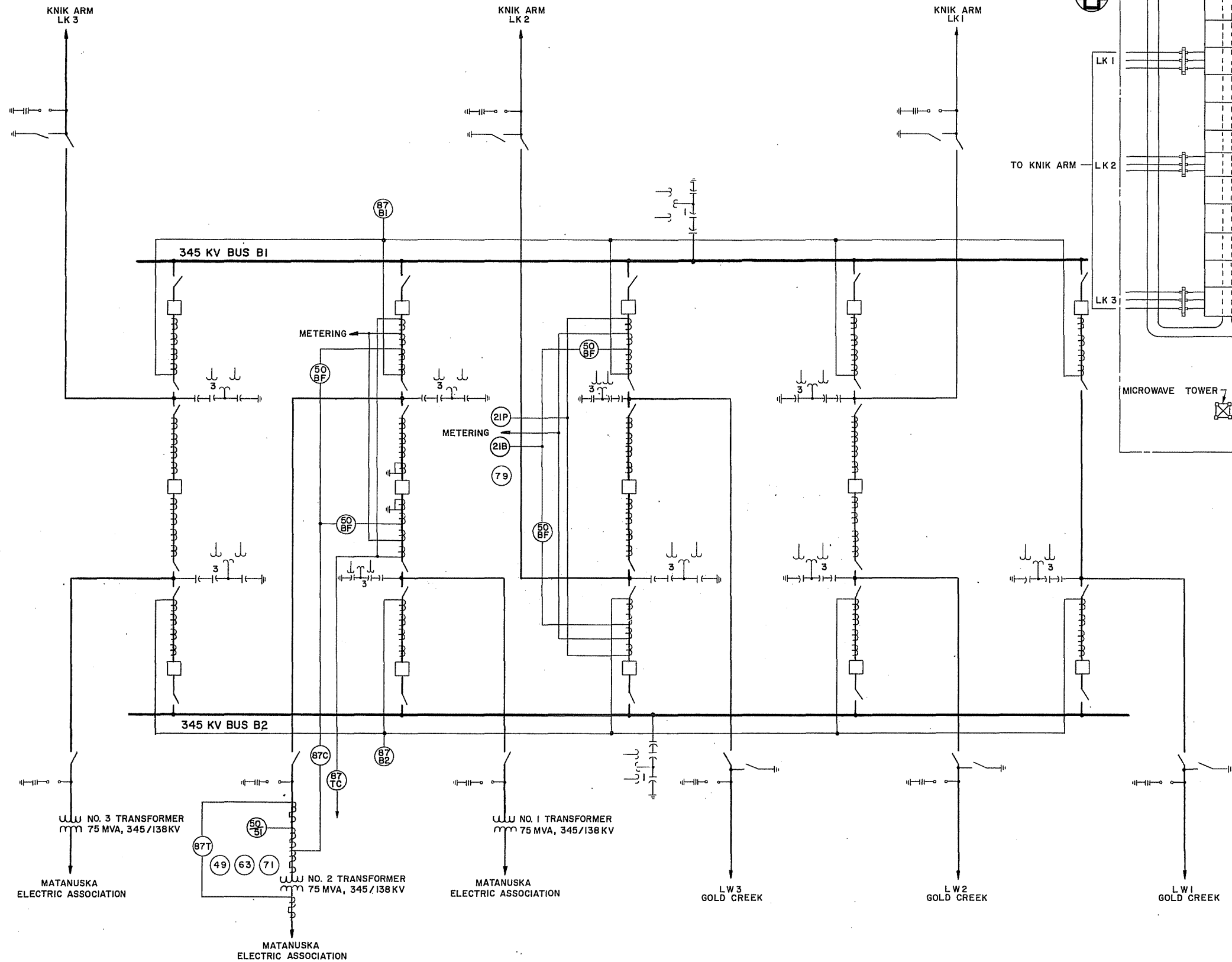


SWITCHYARD PLAN
SCALE A

NOTE:
SHOWN IS THE ULTIMATE DEVELOPMENT OF THE
SUBSTATION. FOR STAGING DEVELOPMENT, REFER
TO PLATES F96, F97, AND F98, RAILBELT 345 KV
SINGLE LINE DIAGRAM.

SCALE A 0 100 200 FEET

HANZA-EDASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-TRANSMISSION SYSTEM	
GOLD CREEK SWITCHYARD SINGLE LINE DIAGRAM AND PLAN	
EXHIBIT F	PLATE F-100



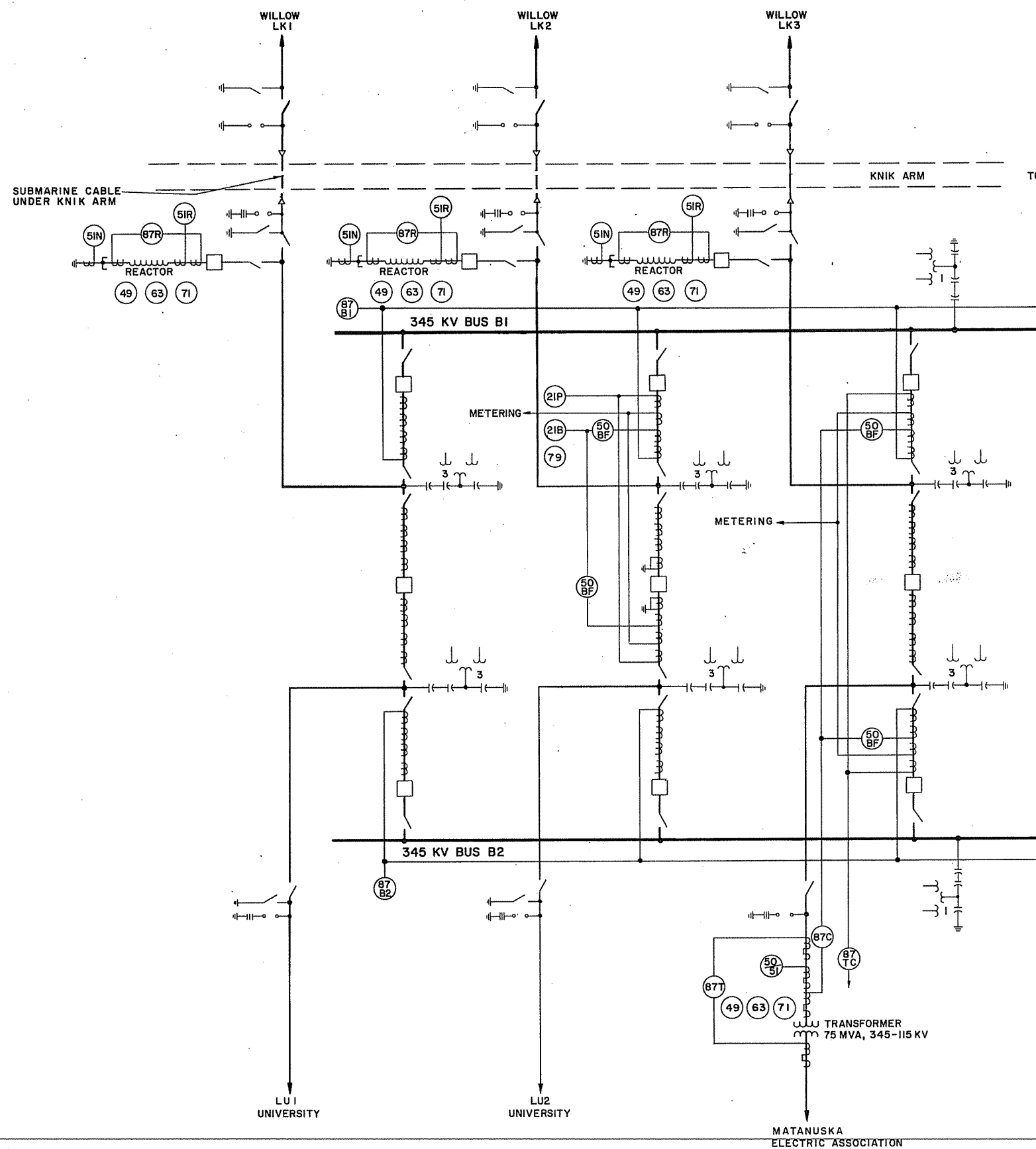
SUBSTATION PLAN
SCALE A

NOTE:
SHOWN IS THE ULTIMATE DEVELOPMENT OF THE
SUBSTATION. FOR STAGING DEVELOPMENT, REFER
TO PLATES F96, F97, AND F98, RAILBELT 345 KV
SINGLE LINE DIAGRAM.

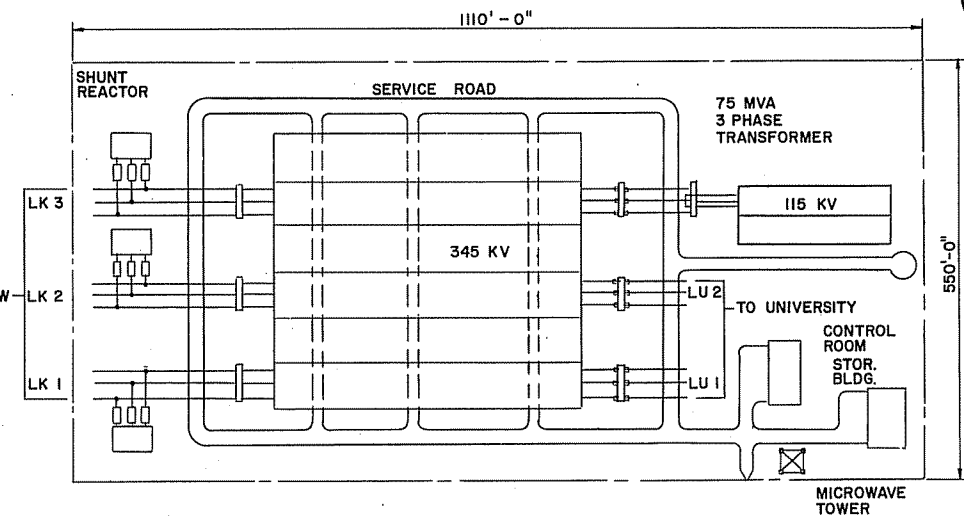
SCALE A
0 100 200 FEET

SINGLE LINE DIAGRAM

HARZA-EDASCO SUSITNA JOINT VENTURE	
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-TRANSMISSION SYSTEM	
WILLOW SUBSTATION SINGLE LINE DIAGRAM AND PLAN	
EXHIBIT F	PLATE F101



SINGLE LINE DIAGRAM

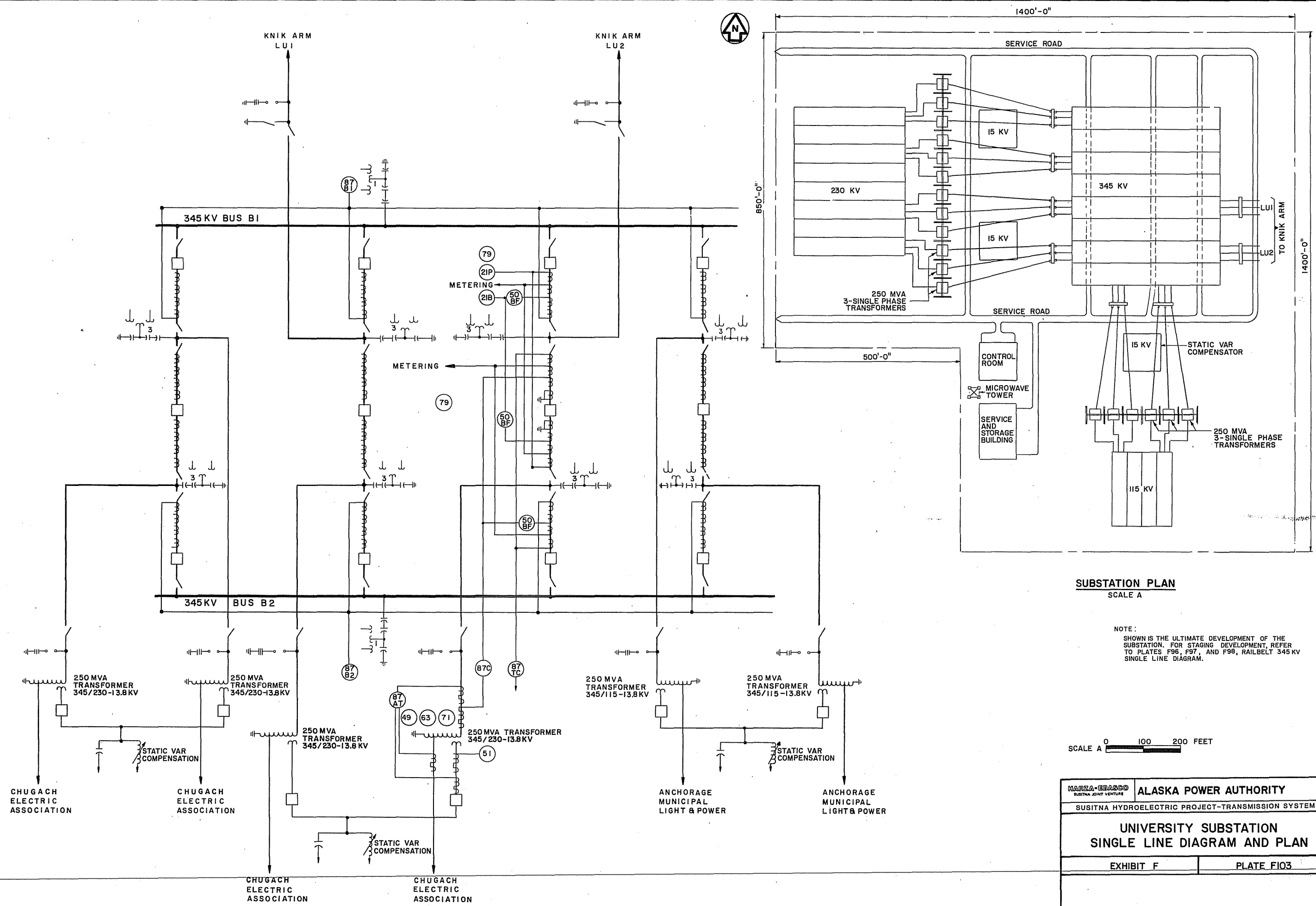


SUBSTATION PLAN
SCALE A

NOTE:
SHOWN IS THE ULTIMATE DEVELOPMENT OF THE
SUBSTATION. FOR STAGING DEVELOPMENT, REFER
TO PLATES F96, AND F98, RAILBELT 345 KV
SINGLE LINE DIAGRAM.

0 100 200 FEET
SCALE A

MARZA-ERASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-TRANSMISSION SYSTEM	
KNIK ARM SUBSTATION SINGLE LINE DIAGRAM, AND PLAN	
EXHIBIT F	PLATE F102



SUBSTATION PLAN
SCALE A

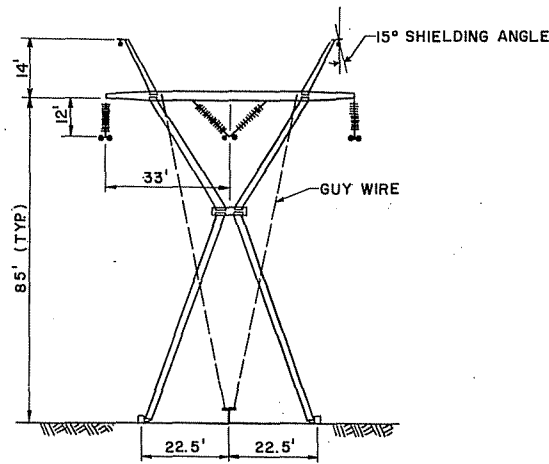
NOTE:
SHOWN IS THE ULTIMATE DEVELOPMENT OF THE
SUBSTATION. FOR STAGING DEVELOPMENT, REFER
TO PLATES F96, F97, AND F98, RAILBELT 345 KV
SINGLE LINE DIAGRAM.

SCALE A 0 100 200 FEET

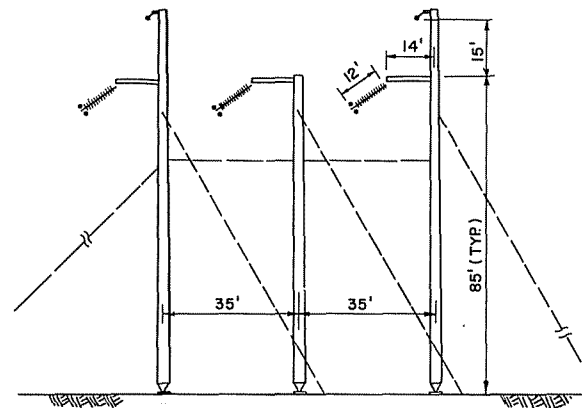
MANZA-ELIASSON ELECTRA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-TRANSMISSION SYSTEM	
UNIVERSITY SUBSTATION SINGLE LINE DIAGRAM AND PLAN	
EXHIBIT F	PLATE F103

NOTES:

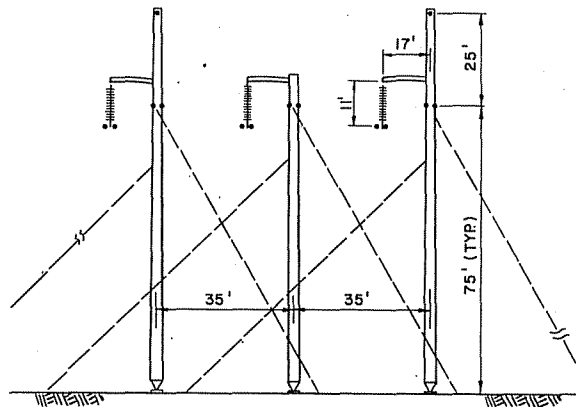
- 1. BASED ON PROPOSED STRUCTURES FOR INTERTIE PROJECT.
- 2. AVERAGE CONDUCTOR SAG - 37 FEET.
- 3. AVERAGE TOWER SPACING - 1400 FEET.



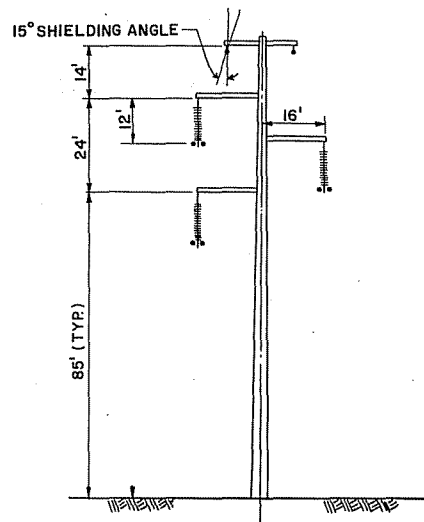
345 kV TANGENT OR LIGHT ANGLE STRUCTURE



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



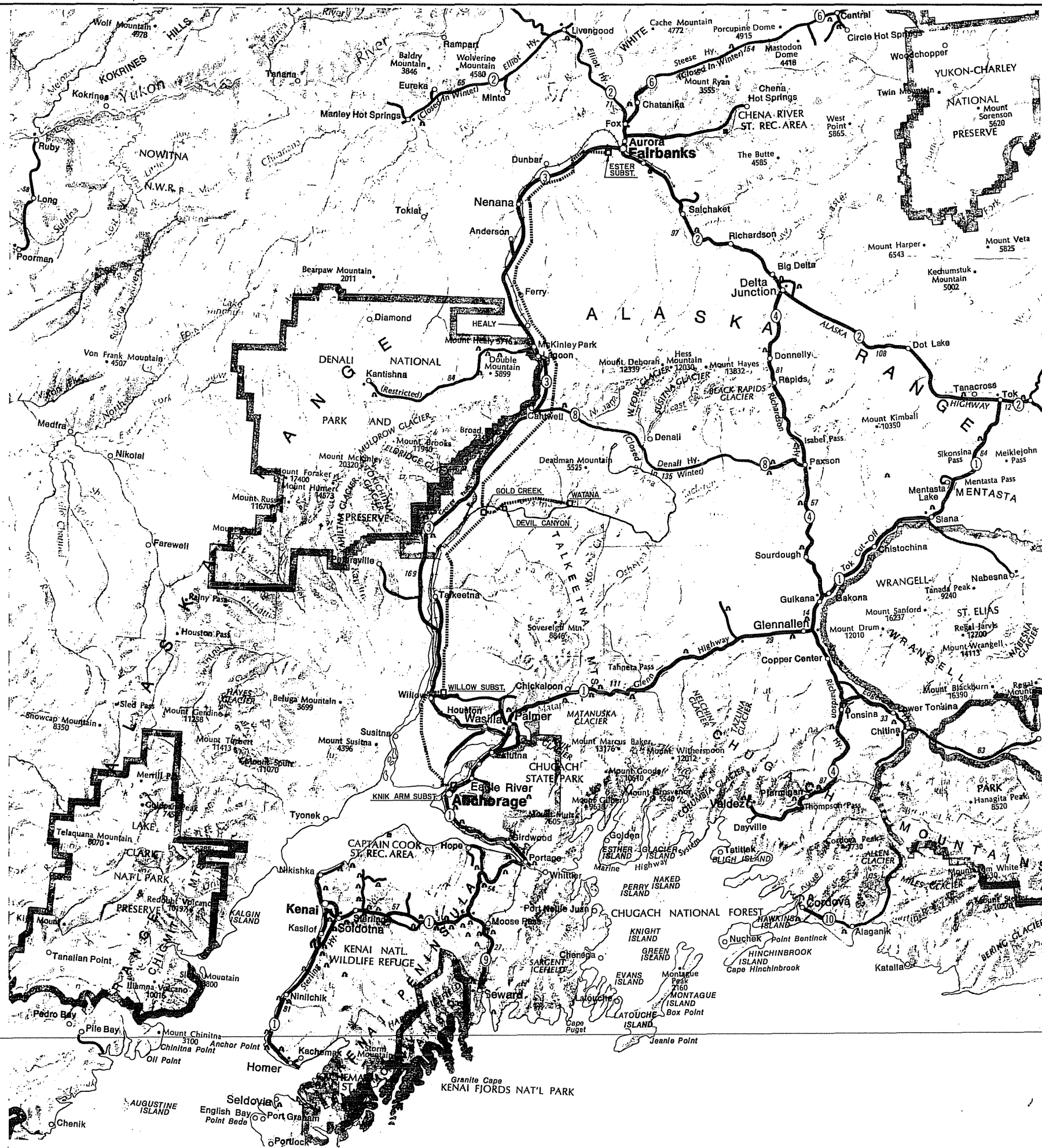
345 kV HEAVY ANGLE (8° - 50°) DEAD END STRUCTURE



345 kV SINGLE CIRCUIT TANGENT POLE

SCALE 0 20 40 FEET

MANZA-ERASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT-TRANSMISSION SYSTEM	
TYPICAL TRANSMISSION LINE STRUCTURES	
EXHIBIT F	PLATE F104



LEGEND

- 345 KV TRANSMISSION CORRIDOR
- SUBSTATION SITE
- R.O.W. - RIGHT-OF-WAY

NUMBER OF LINES	WIDTH OF R.O.W. (FT)	DISTANCE BETWEEN LINES (FT)	DISTANCE FROM LINE TO EDGE OF R.O.W. (FT)
1	190	—	95
2	295	105 ±	95
3	400	105 ±	95
4	505	105 ±	95

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

MARZA-ERASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT-TRANSMISSION SYSTEM		
345 KV SYSTEM TRANSMISSION CORRIDOR		
EXHIBIT F	PLATE F105	