SUSITNA HYDROELECTRIC PROJECT

FERC LICENSE APPLICATION DRAWINGS

REVISED EXHIBIT F

APRIL 1984

PRELIMINARY
DRAFT
DOCUMENT

HARZA-EBASCO
SUSITNA JOINT VENTURE

ALASKA POWER AUTHORITY

DOCUMENT No. 1459

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 IN 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.

DEVIL CANYON:

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

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SUSITNA JOINT VENTURE

ALASKA POWER AUTHORITY

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PROJECT NO. 7114-000

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

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WATANA

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DEVIL CANYON

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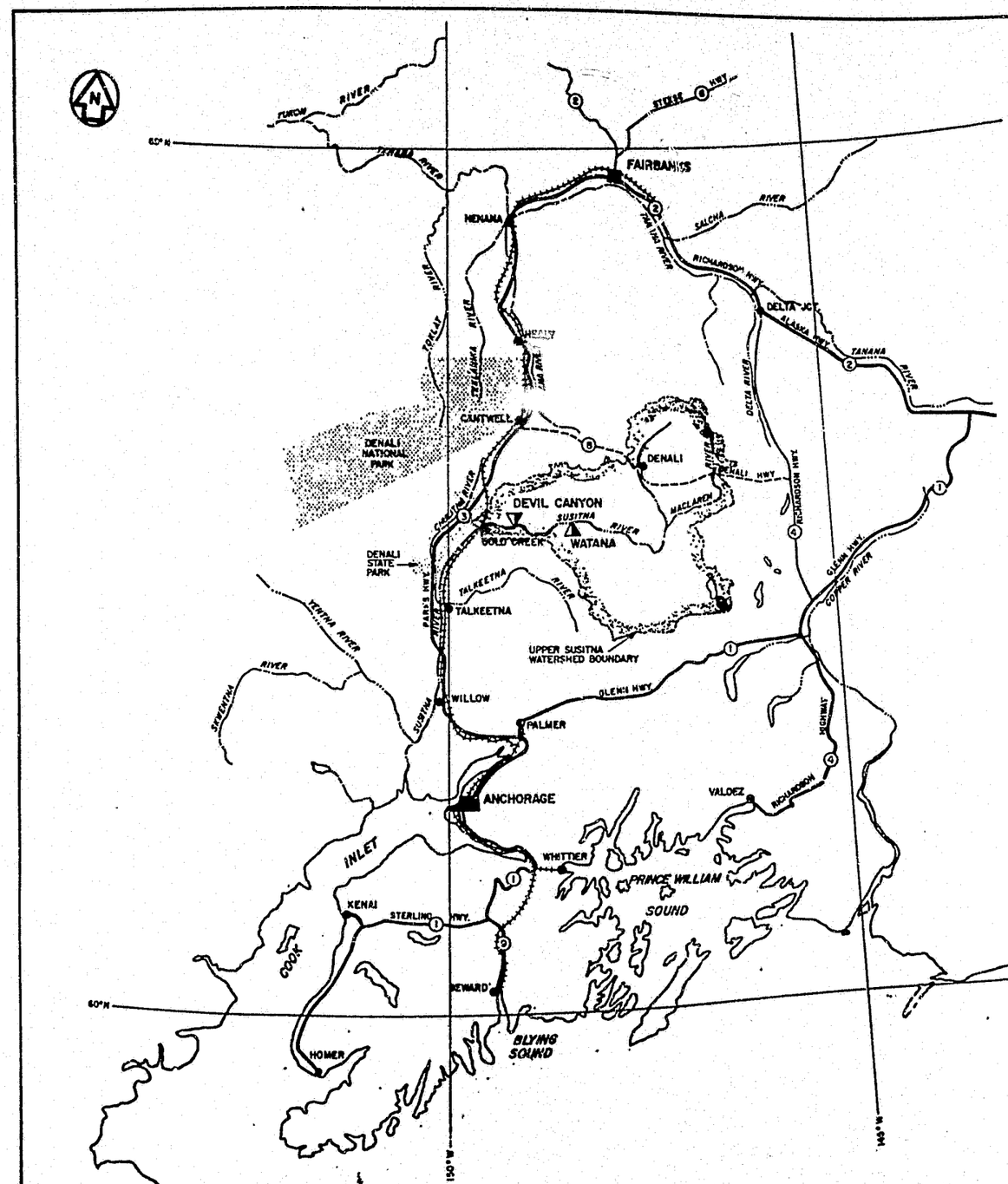
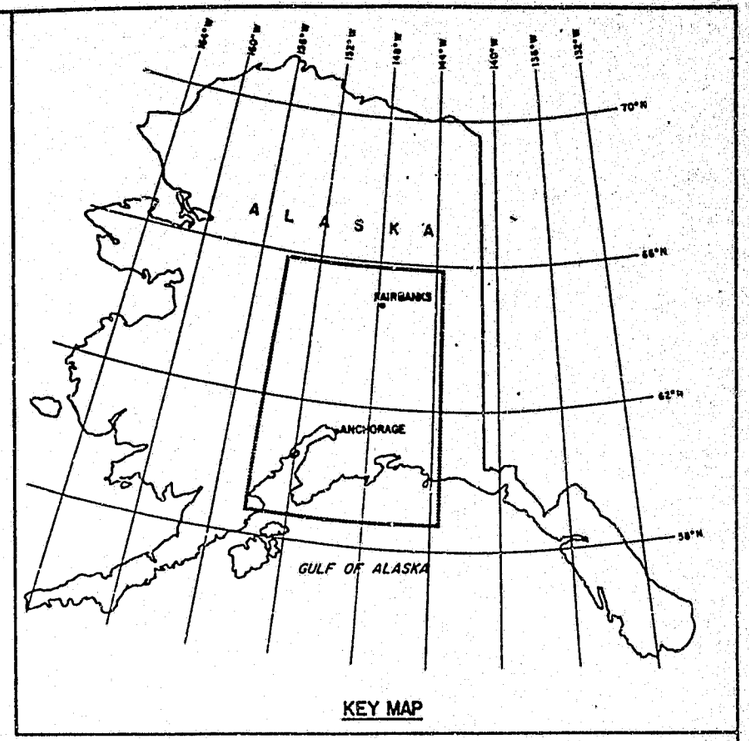
SUSITNA JOINT VENTURE

NOTES:

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





KEY MAP

LEGEND

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

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

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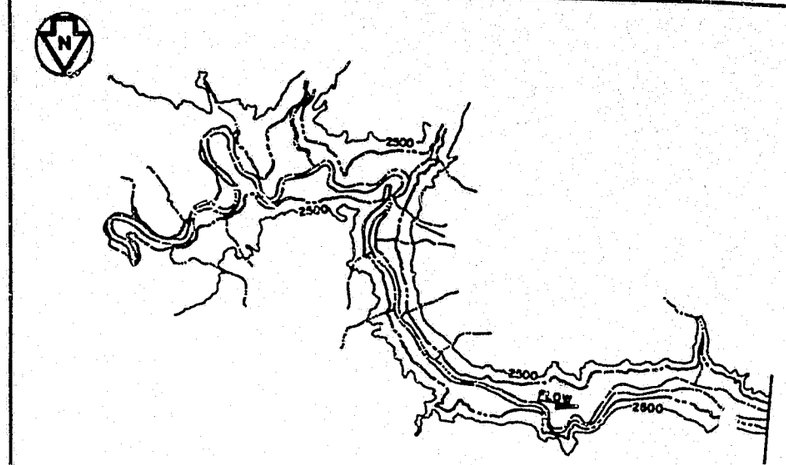
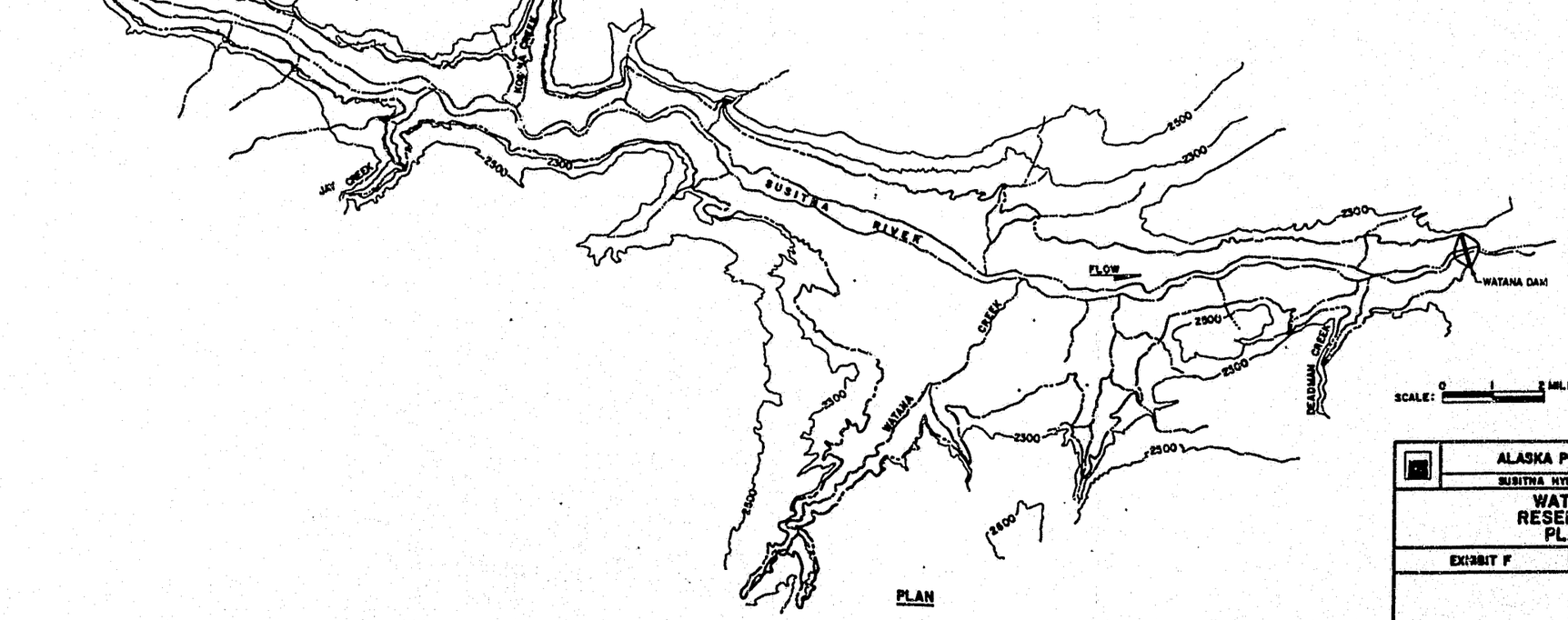
SUSITNA HYDROELECTRIC PROJECT

RAILBELT AREA

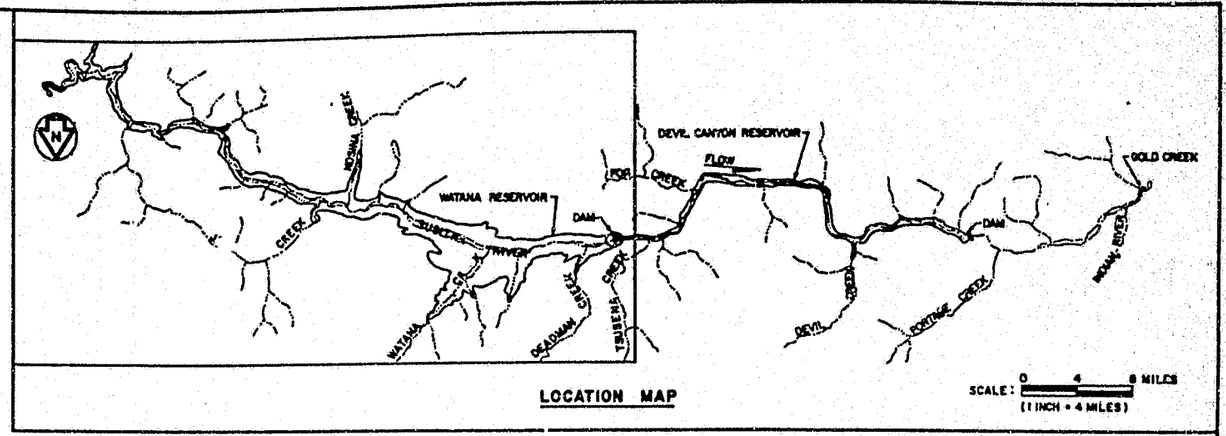
EXHIBIT F | PLATE F1





PLAN

SCALE: 0 1 2 MILES
(1 INCH = 1 MILE)



LOCATION MAP

SCALE: 0 4 8 MILES
(1 INCH = 4 MILES)

LEGEND

——— NORMAL MAXIMUM OPERATING LEVEL EL. 2183'

2300 CONTOURS ARE IN FEET ABOVE MSL

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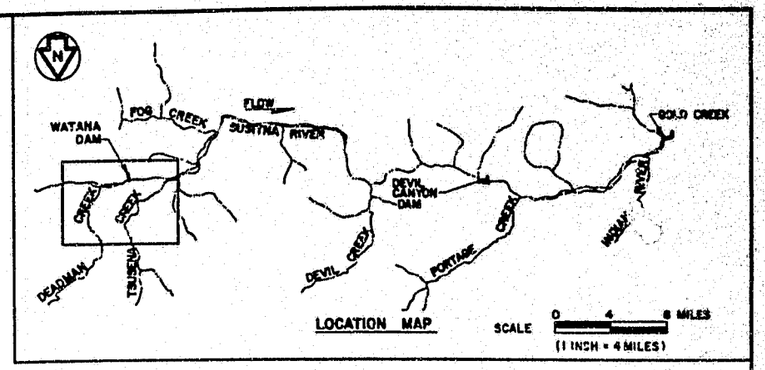
WATANA RESERVOIR PLAN

EXHIBIT F | PLATE F2



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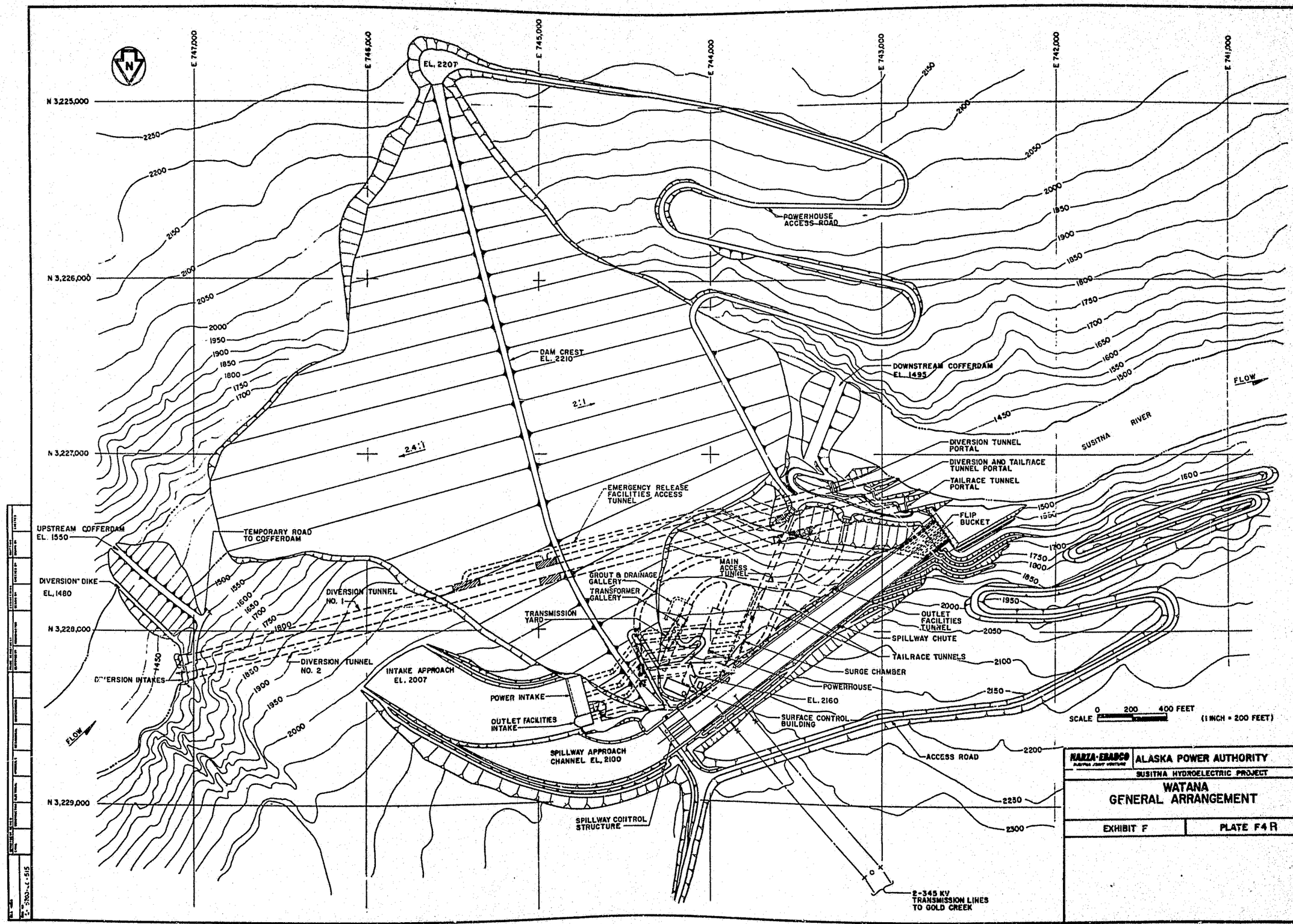
WATANA SITE LAYOUT	
EXHIBIT F	PLATE F3 R

DWG. NO. 7114 - 3


E 747,000
E 746,000
E 745,000
E 744,000
E 743,000
E 742,000
E 741,000
N 3,225,000
N 3,226,000
N 3,227,000
N 3,228,000
N 3,229,000
EL. 2207
POWERHOUSE ACCESS ROAD
DAM CREST EL. 2210
2:1
2.4:1
DOWNSTREAM COFFERDAM EL. 1495
FLOW
DIVERSION TUNNEL PORTAL
DIVERSION AND TAILRACE TUNNEL PORTAL
TAILRACE TUNNEL PORTAL
SUSITNA RIVER
EMERGENCY RELEASE FACILITIES ACCESS TUNNEL
FLIP BUCKET
UPSTREAM COFFERDAM EL. 1550
TEMPORARY ROAD TO COFFERDAM
DIVERSION DIKE EL. 1480
DIVERSION TUNNEL NO. 1
GROUT & DRAINAGE GALLERY
TRANSFORMER GALLERY
MAIN ACCESS TUNNEL
TRANSMISSION YARD
OUTLET FACILITIES TUNNEL
SPILLWAY CHUTE
TAILRACE TUNNELS
SURGE CHAMBER
POWERHOUSE EL. 2160
SURFACE CONTROL BUILDING
DIVERSION INTAKES
DIVERSION TUNNEL NO. 2
INTAKE APPROACH EL. 2007
POWER INTAKE
OUTLET FACILITIES INTAKE
SPILLWAY APPROACH CHANNEL EL. 2100
SPILLWAY CONTROL STRUCTURE
ACCESS ROAD
2-345 KV TRANSMISSION LINES TO GOLD CREEK
SCALE 0 200 400 FEET
(1 INCH = 200 FEET)
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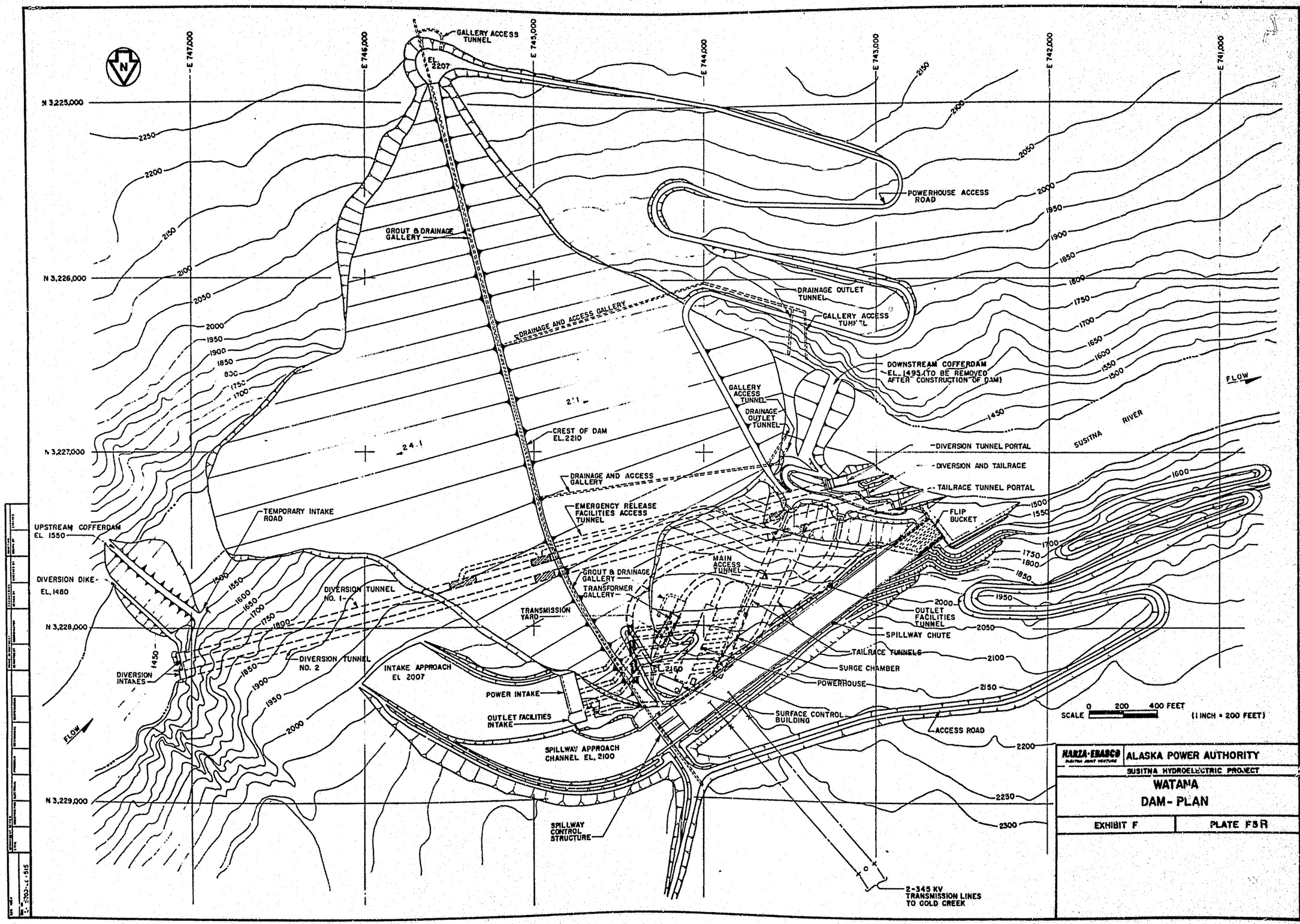
SUSITNA HYDROELECTRIC PROJECT
WATANA
GENERAL ARRANGEMENT
EXHIBIT F
PLATE F4 R



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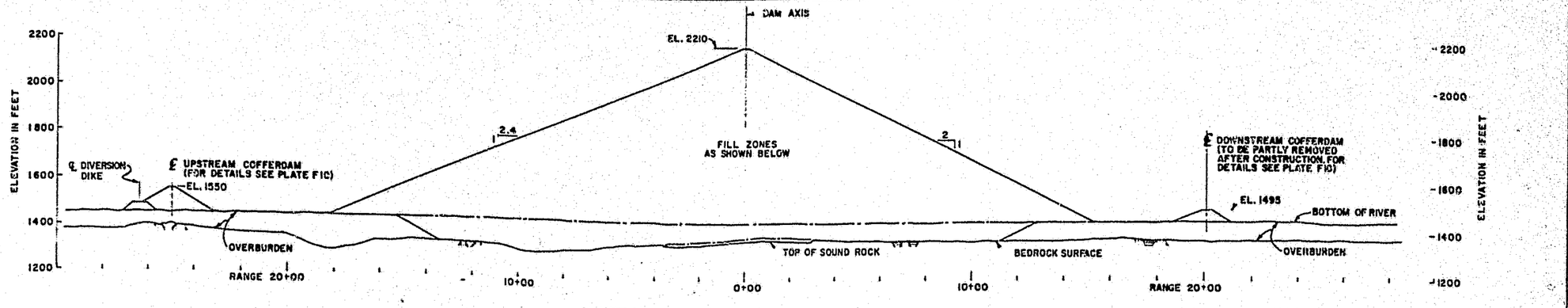
SUSITNA HYDROELECTRIC PROJECT

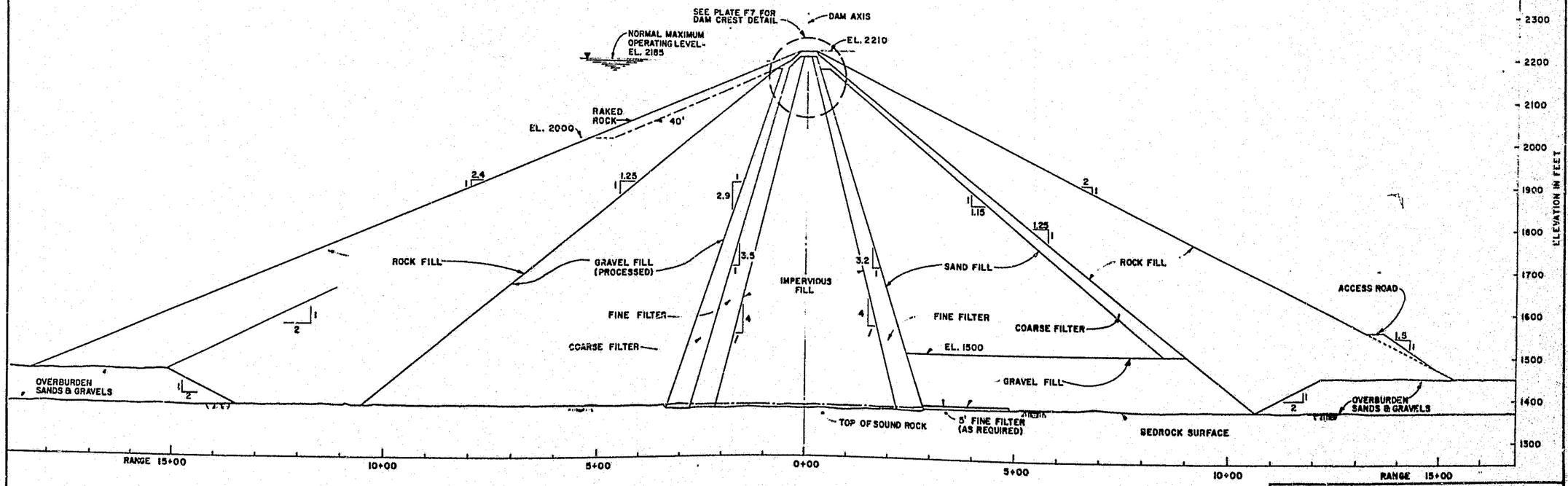
WATANA DAM - PLAN

EXHIBIT F | PLATE F5R



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)

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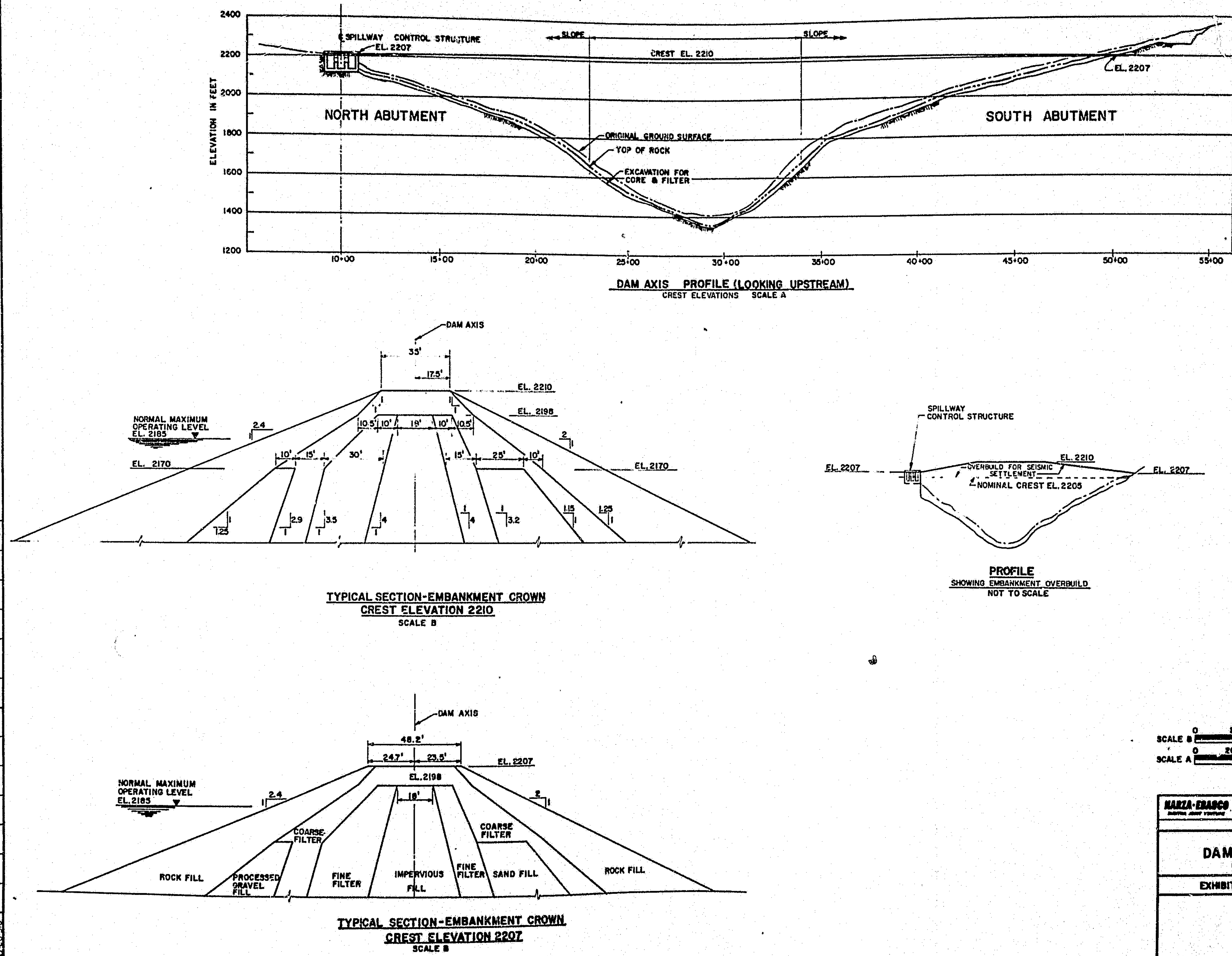
SUSITNA HYDROELECTRIC PROJECT

WATANA DAM TYPICAL SECTION

EXHIBIT F | PLATE F6 R



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

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

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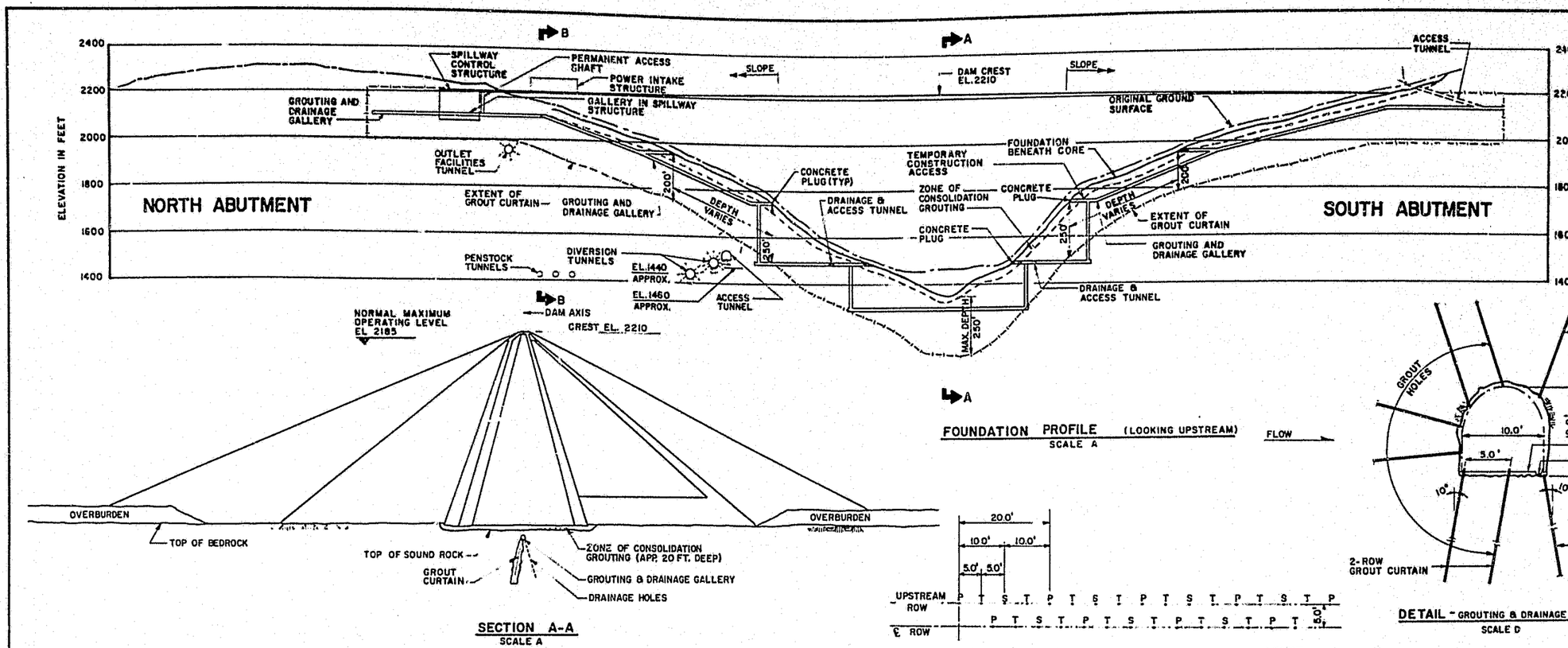
SUSITNA HYDROELECTRIC PROJECT

WATANA
DAM AXIS PROFILE AND CREST DETAILS

EXHIBIT F | PLATE F7 R



SECTION A-A
SCALE A

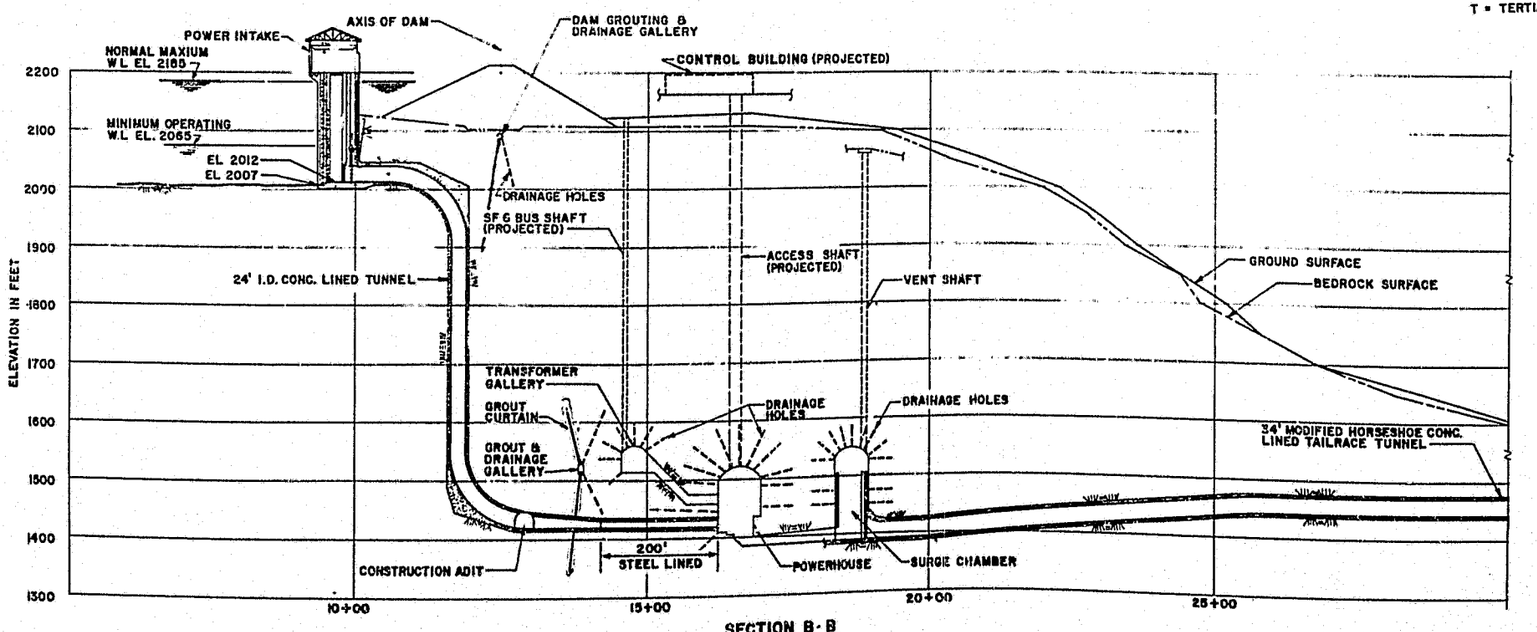
FOUNDATION PROFILE (LOOKING UPSTREAM)
SCALE A

FLOW

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 B-B
SCALE B

SCALE D 0 5 10 FEET (1 INCH = 5 FEET)
SCALE C 0 10 20 FEET (1 INCH = 10 FEET)
SCALE B 0 100 200 FEET (1 INCH = 100 FEET)
SCALE A 0 200 400 FEET (1 INCH = 200 FEET)

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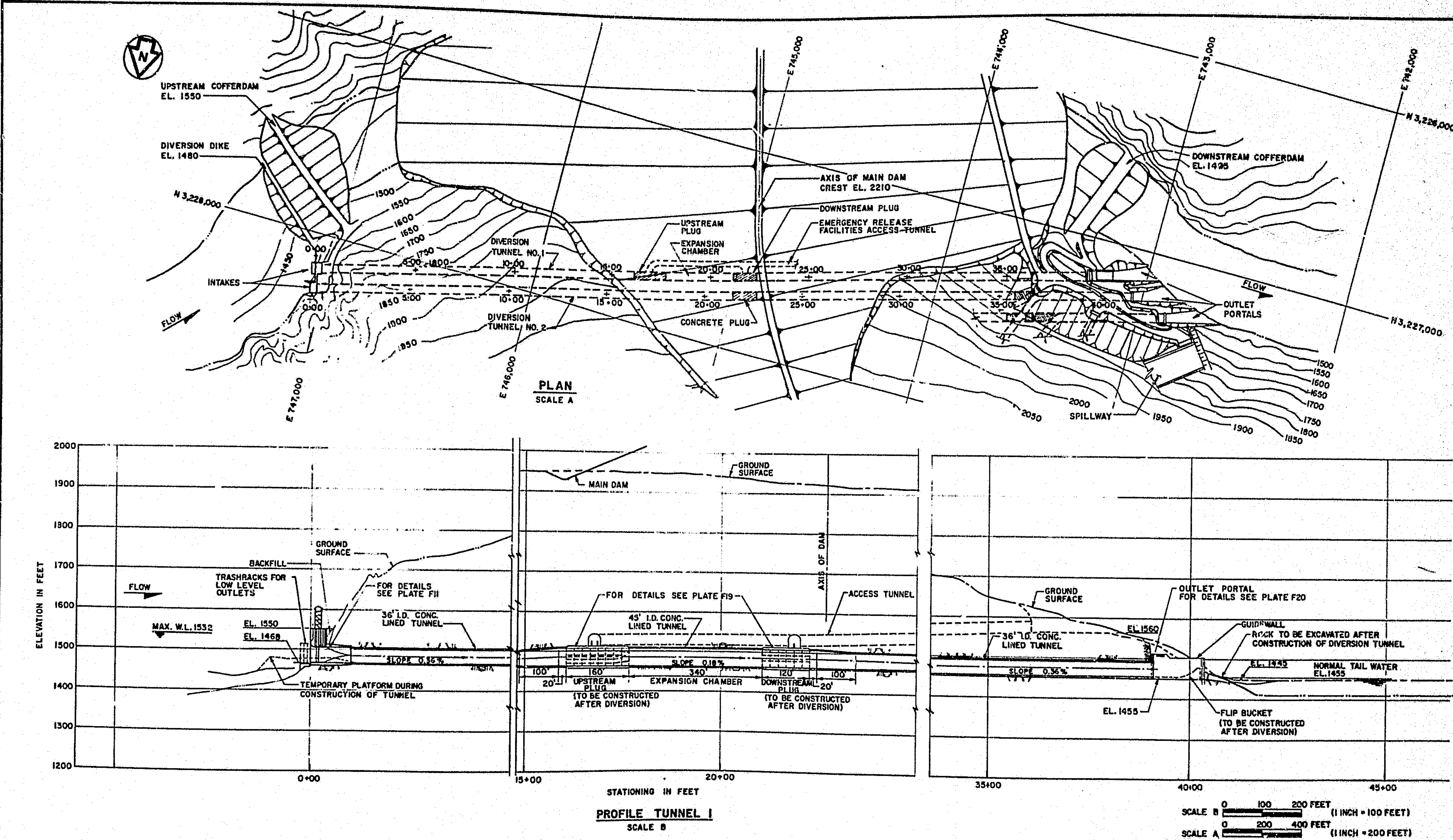
WATANA
MAIN DAM
GROUTING & DRAINAGE

EXHIBIT F | PLATE F8R



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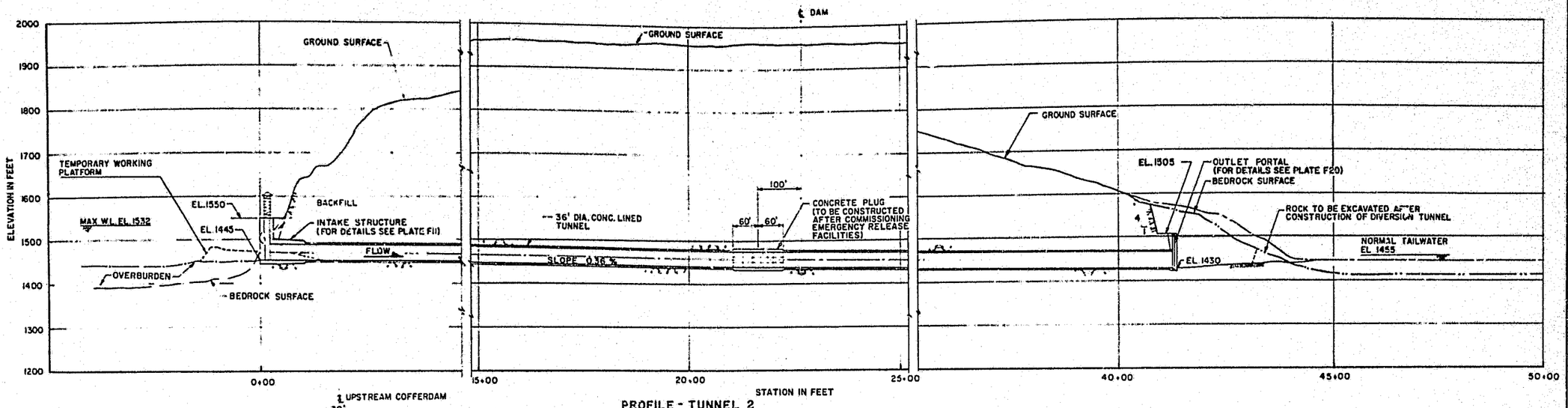
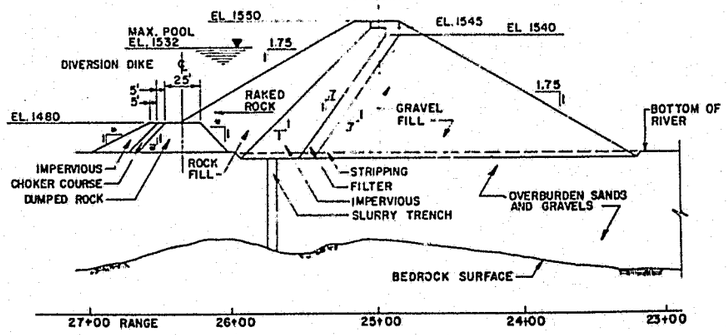
WATANA
DIVERSION
GENERAL ARRANGEMENT

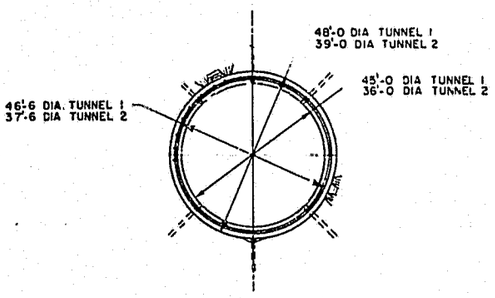
EXHIBIT F | PLATE F9 R



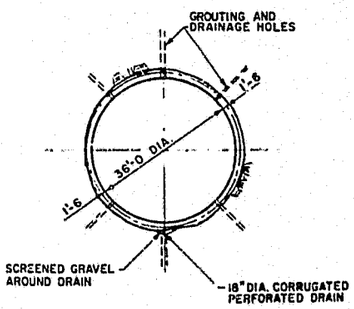
PROFILE - TUNNEL 2
SCALE A



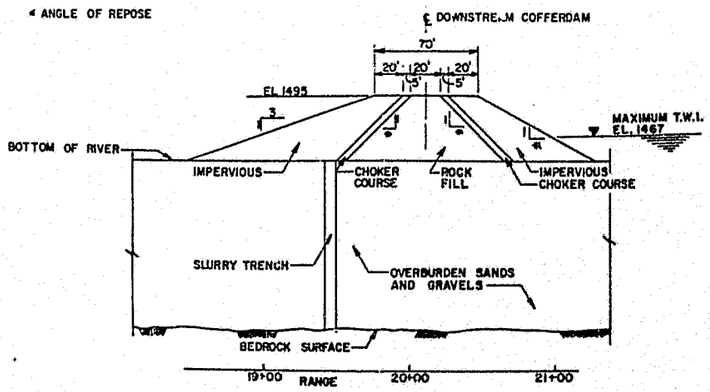
TYPICAL SECTION UPSTREAM COFFERDAM
SCALE B



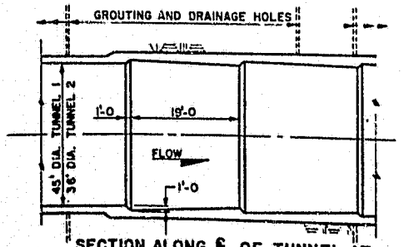
CROSS SECTION AT PLUG (TYPICAL)
N.T.S



TYPICAL TUNNEL CROSS SECTION
N.T.S.



TYPICAL SECTION DOWNSTREAM COFFERDAM
SCALE B



SECTION ALONG ℄ OF TUNNEL AT PLUG LOCATION
SCALE C

SCALE C 0 10 20 FEET (1 INCH = 10 FEET)
SCALE B 0 40 80 FEET (1 INCH = 40 FEET)
SCALE A 0 100 200 FEET (1 INCH = 100 FEET)

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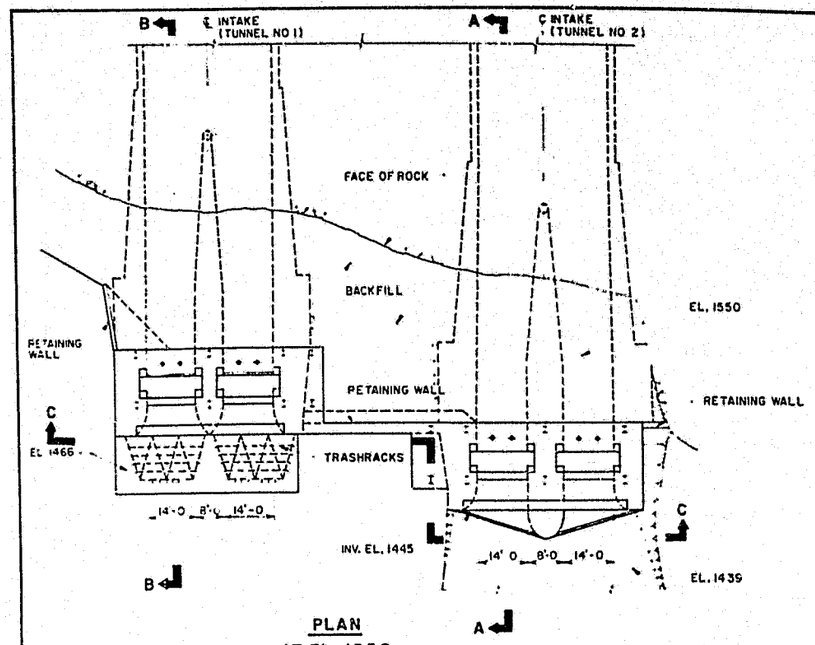
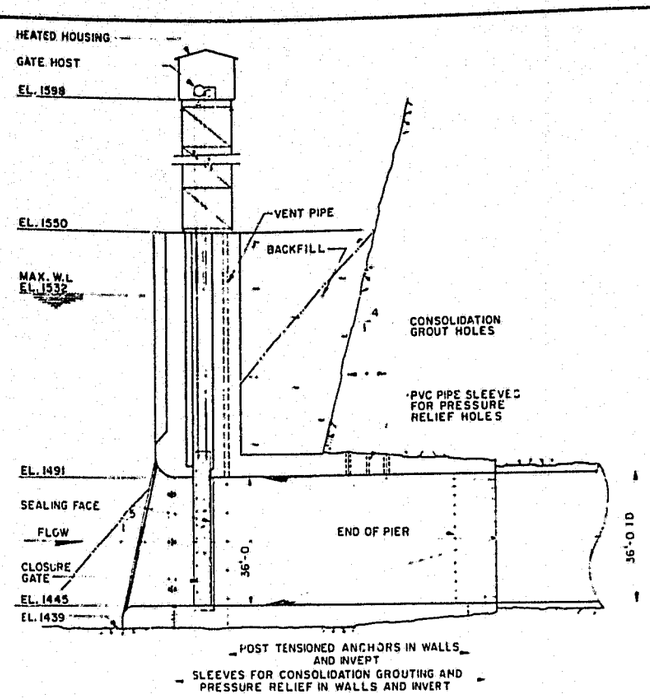
WATANA COFFERDAM AND DIVERSION TUNNEL PROFILE AND SECTIONS

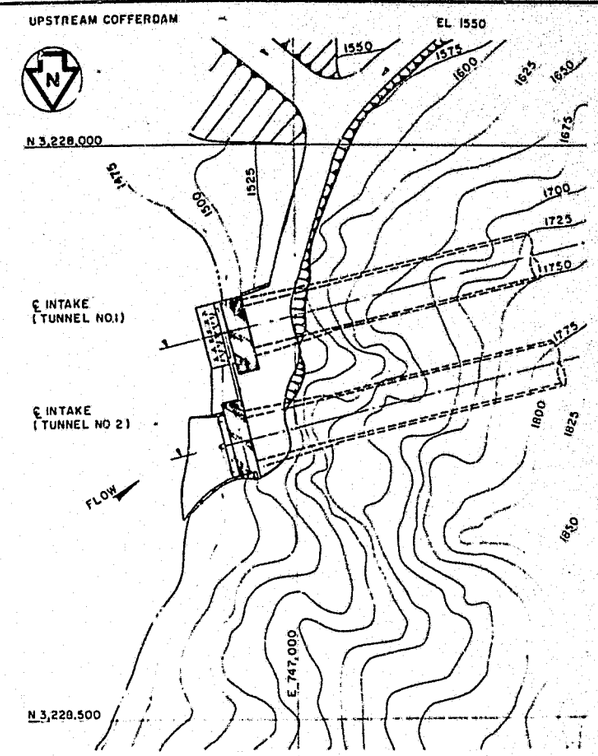
EXHIBIT F | PLATE F10 R



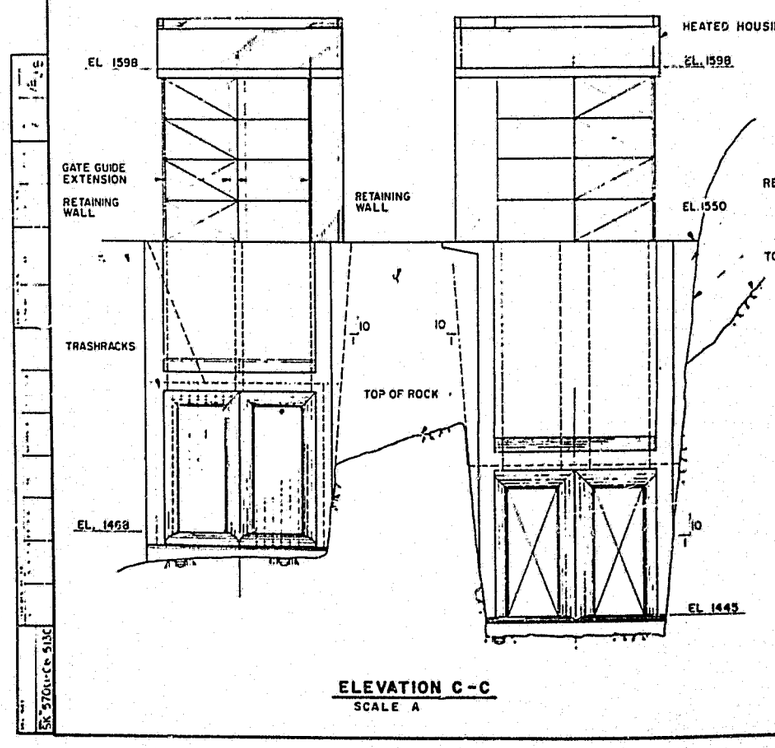
PLAN
AT EL. 1550
SCALE A



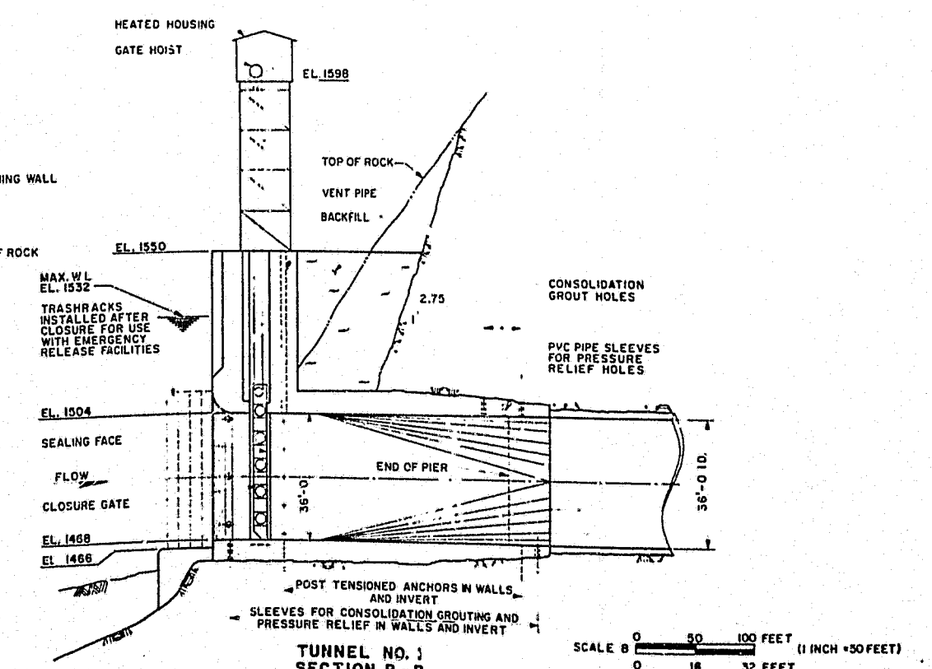
TUNNEL NO. 2
SECTION A-A
SCALE A



LOCATION PLAN
SCALE B



ELEVATION C-C
SCALE A



TUNNEL NO. 1
SECTION B-B
SCALE A

SCALE B 0 50 100 FEET (1 INCH =50 FEET)
SCALE A 0 16 32 FEET (1/16 INCH =1 FOOT)

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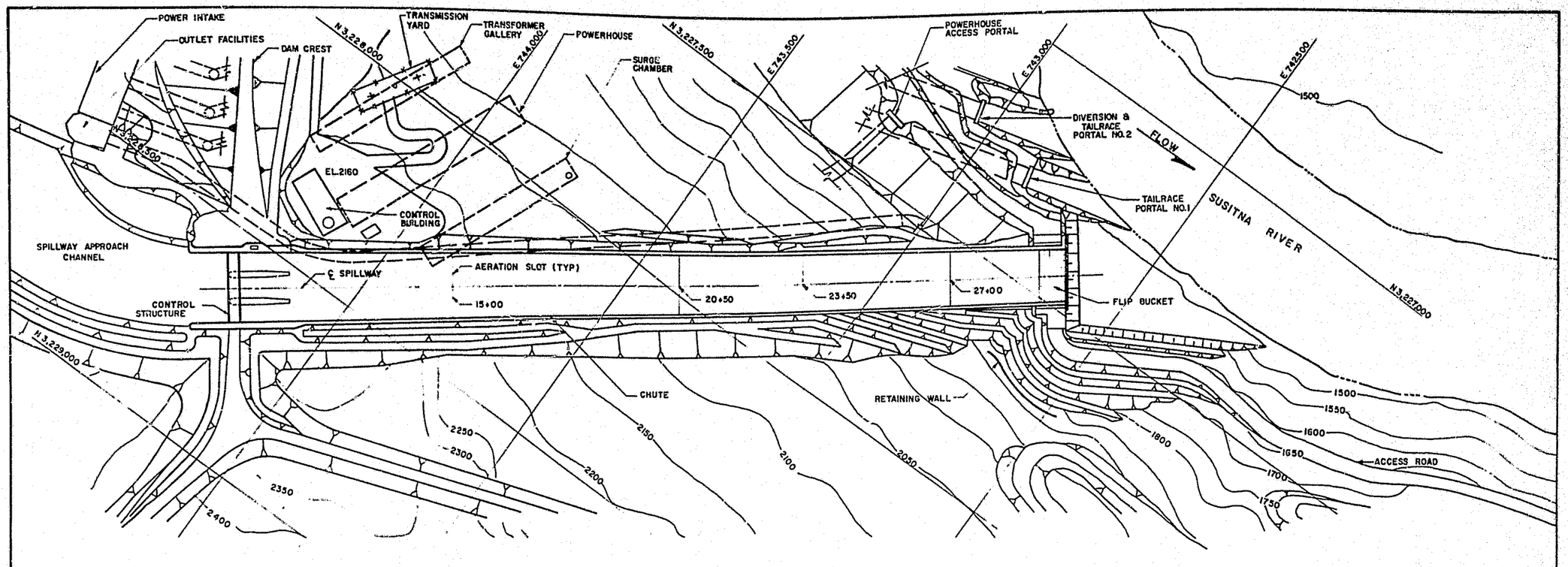
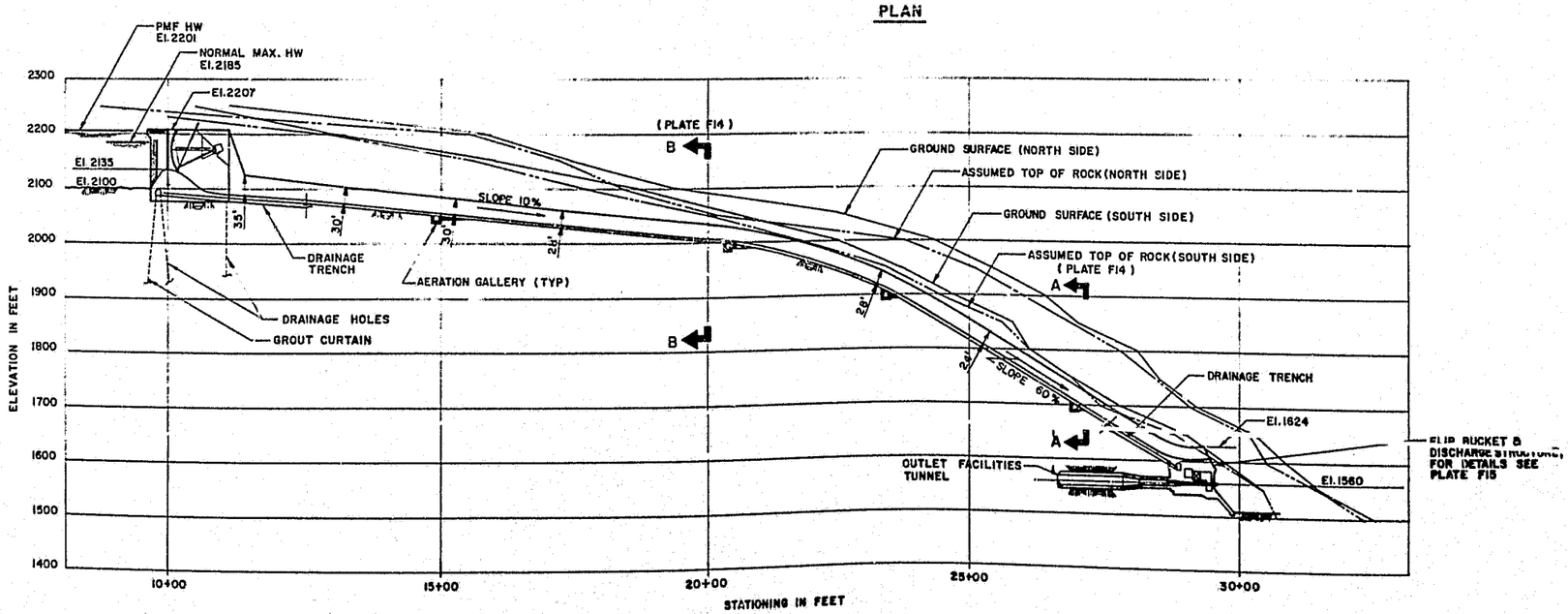
SUSITNA HYDROELECTRIC PROJECT	
WATANA DIVERSION INTAKE STRUCTURES	
EXHIBIT F	PLATE F1L R

SK 5706-Ce 5106



PLAN



PROFILE

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

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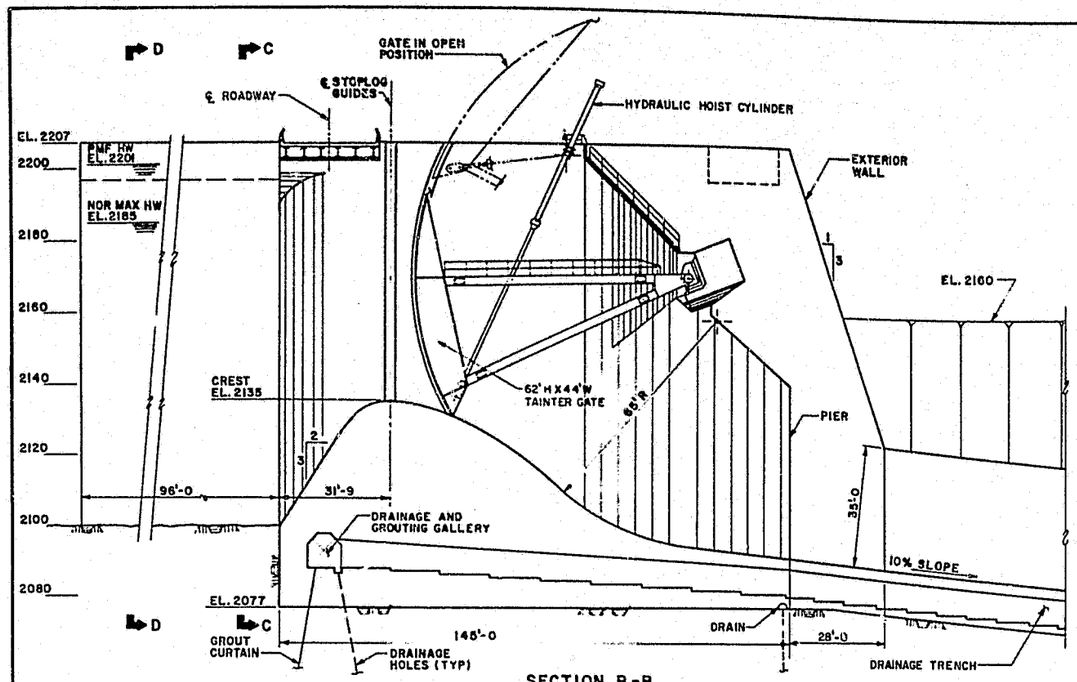
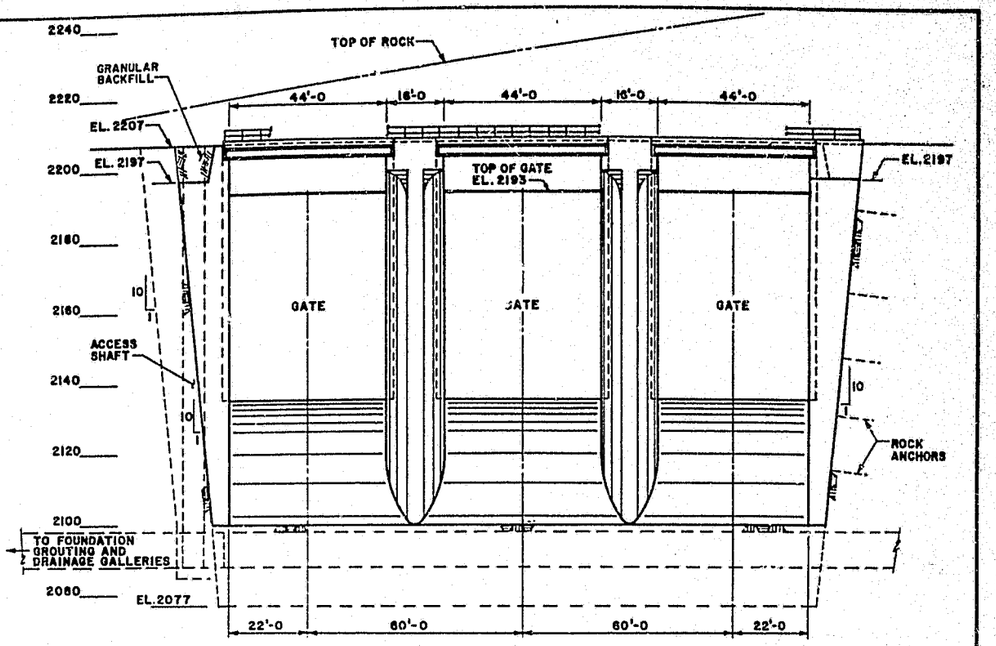
SUSITNA HYDROELECTRIC PROJECT

WATANA MAIN SPILLWAY GENERAL ARRANGEMENT

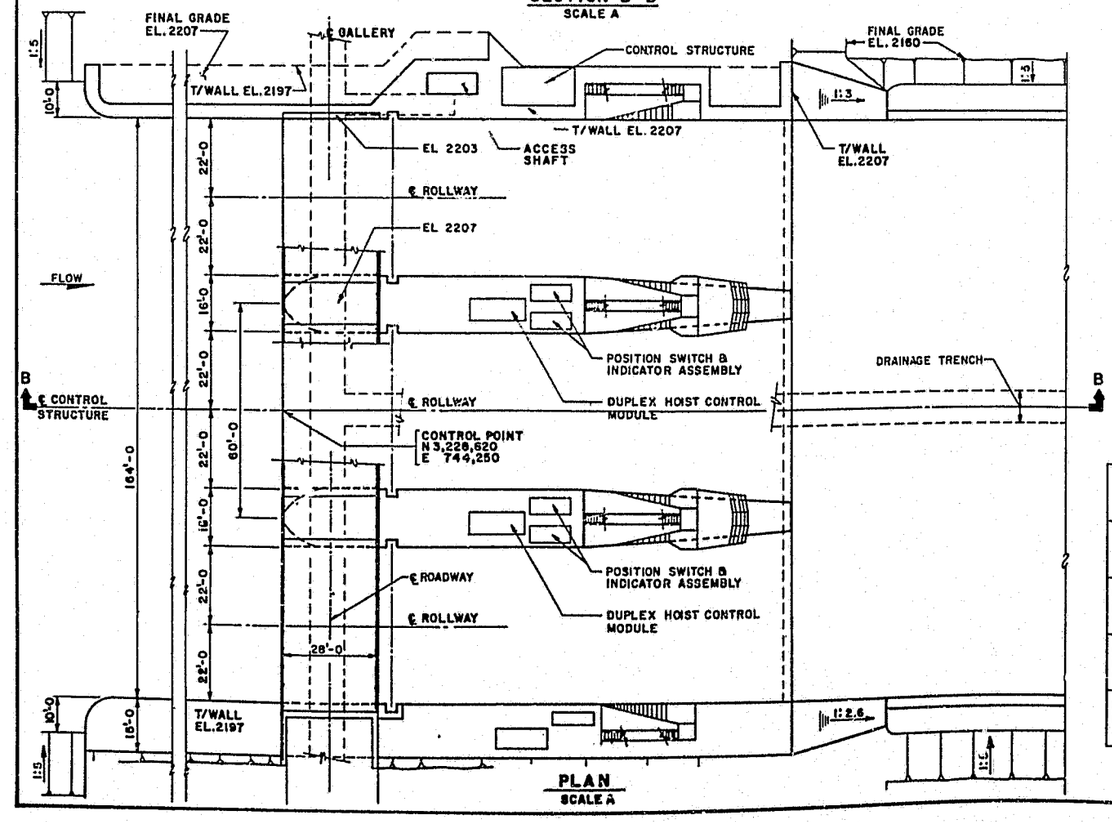
EXHIBIT F | PLATE F12 R



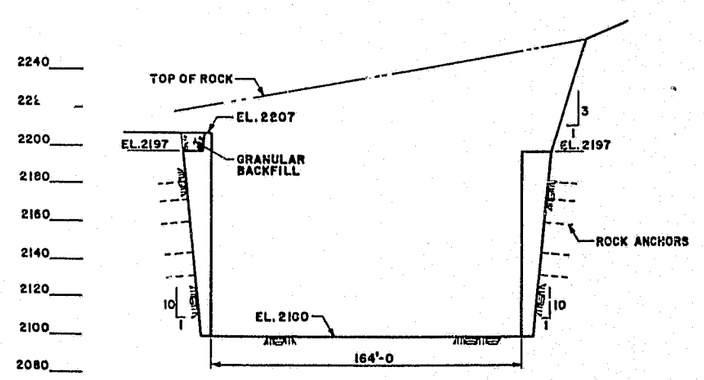
SECTION B-B
SCALE A



SECTION C-C
SCALE A



PLAN
SCALE A



SECTION D-D
SCALE B

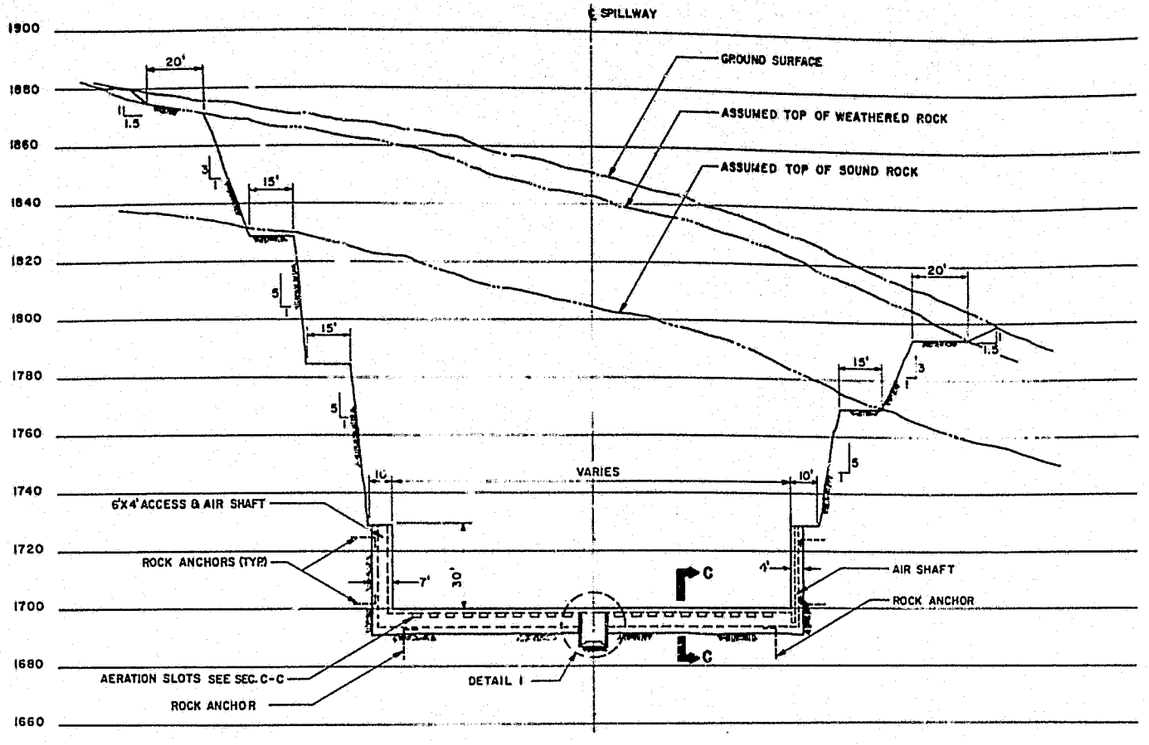
SPILLWAY CONTROL STRUCTURE
SUMMARY OF STABILITY ANALYSES

LOAD CONDITION	FOUNDATION STRESS U.S/D.S (PSI)	Xes (FT)	FACTORS OF SAFETY			
			SLIDING	SHEAR FRICTION	FLOATATION	OVERTURNING
NORMAL INCLUDES ICE LOADS	46.9 / 58.2	2.6'	N.A.	4.0	5.8	2.9
UNUSUAL 1:100/110 YR. EARTHQUAKE	21.7 / 83.5	14.2	N.A.	2.3	5.8	2.2
UNUSUAL DRAIN PLUGGED PMF	21.2 / 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

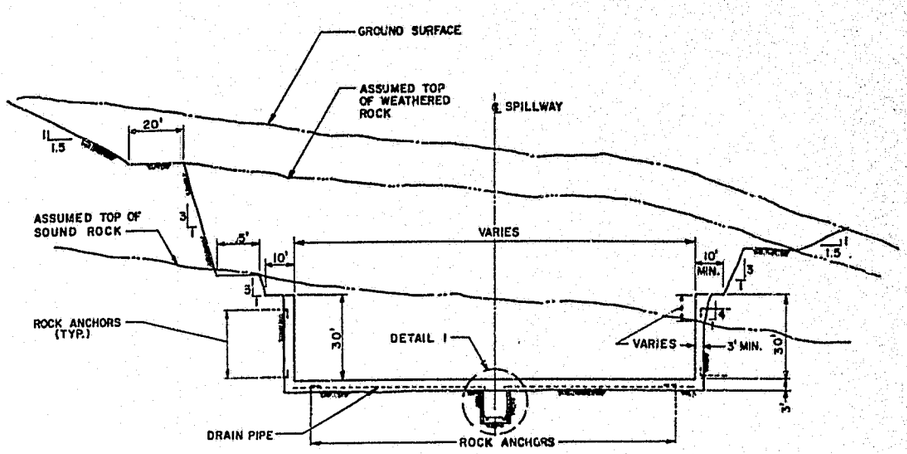
PHYSICAL PARAMETERS
Φ=41°
c=30 PSI

SCALE B 0 30 60 FEET (1 INCH = 30 FEET)
SCALE A 0 16 32 FEET (1/16 INCH = 1 FOOT)

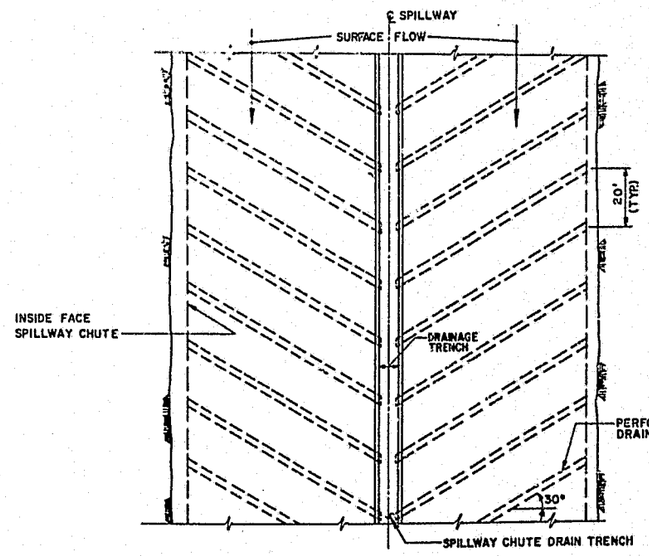
HARZA-EBASCO SUSITNA JOINT VENTURE | ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
WATANA
SPILLWAY
CONTROL STRUCTURE
EXHIBIT F | PLATE F 13 R



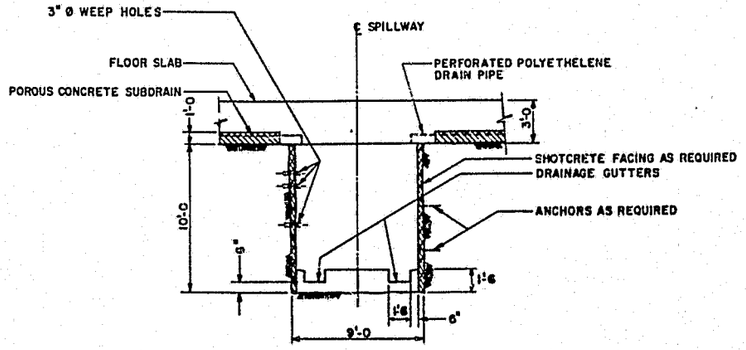
AERATION GALLERY
SECTION A-A (PLATE F12)
SCALE B



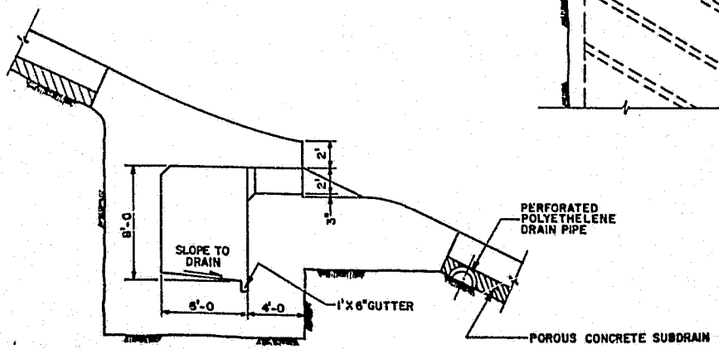
TYPICAL SPILLWAY CHUTE
SECTION B-B (PLATE F12)
SCALE B



DRAIN PLAN
SCALE B



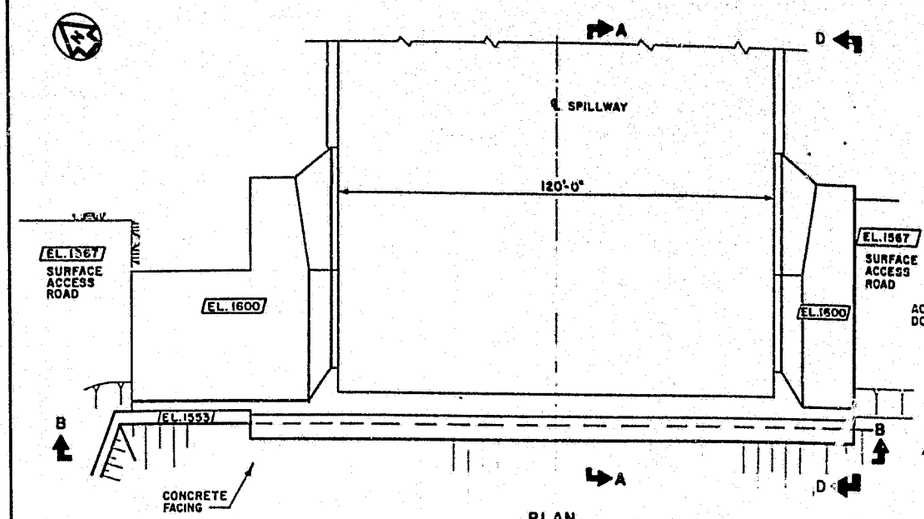
SPILLWAY CHUTE DRAINAGE TRENCH (TYPICAL)
DETAIL I
SCALE C



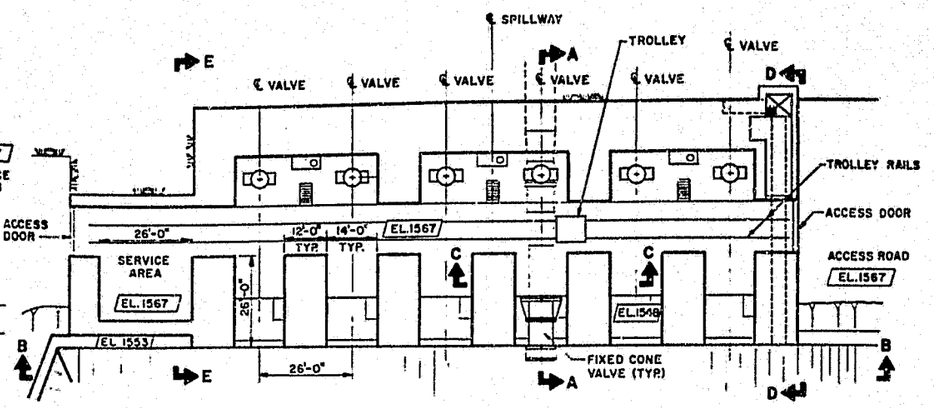
AERATION GALLERY
SECTION C-C
SCALE C

SCALE A 0 100 200 FEET (1 INCH = 100 FEET)
SCALE B 0 20 40 FEET (1 INCH = 20 FEET)
SCALE C 0 4 8 FEET (1/4 INCH = 1 FOOT)

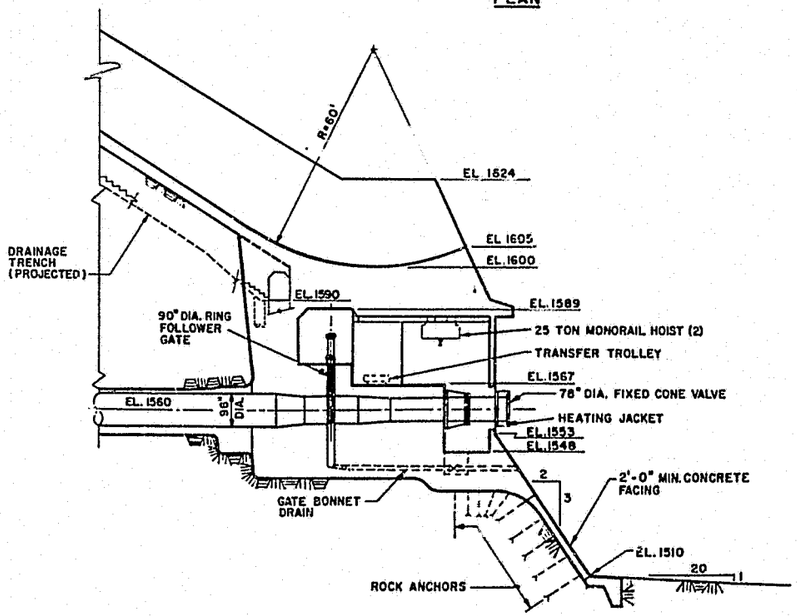
KARLA-ERASCO	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
WATANA SPILLWAY PROFILE, SECTIONS & DRAINAGE FEATURES	
EXHIBIT F	PLATE F 14 R



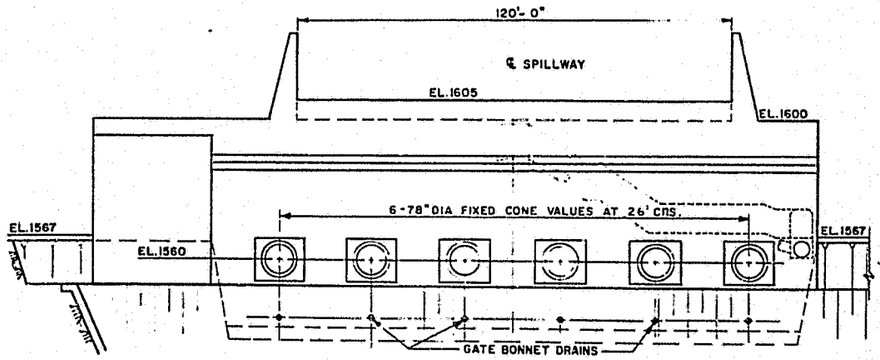
PLAN



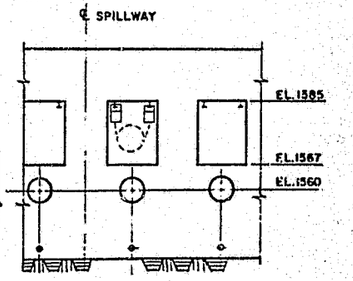
PLAN AT EL. 1567



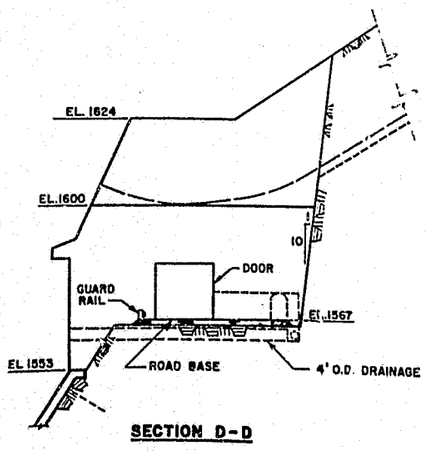
SECTION A-A (TYPICAL)



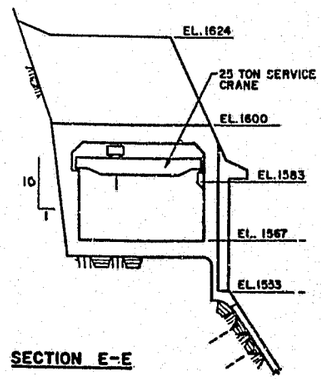
SECTION B-B



SECTION C-C



SECTION D-D

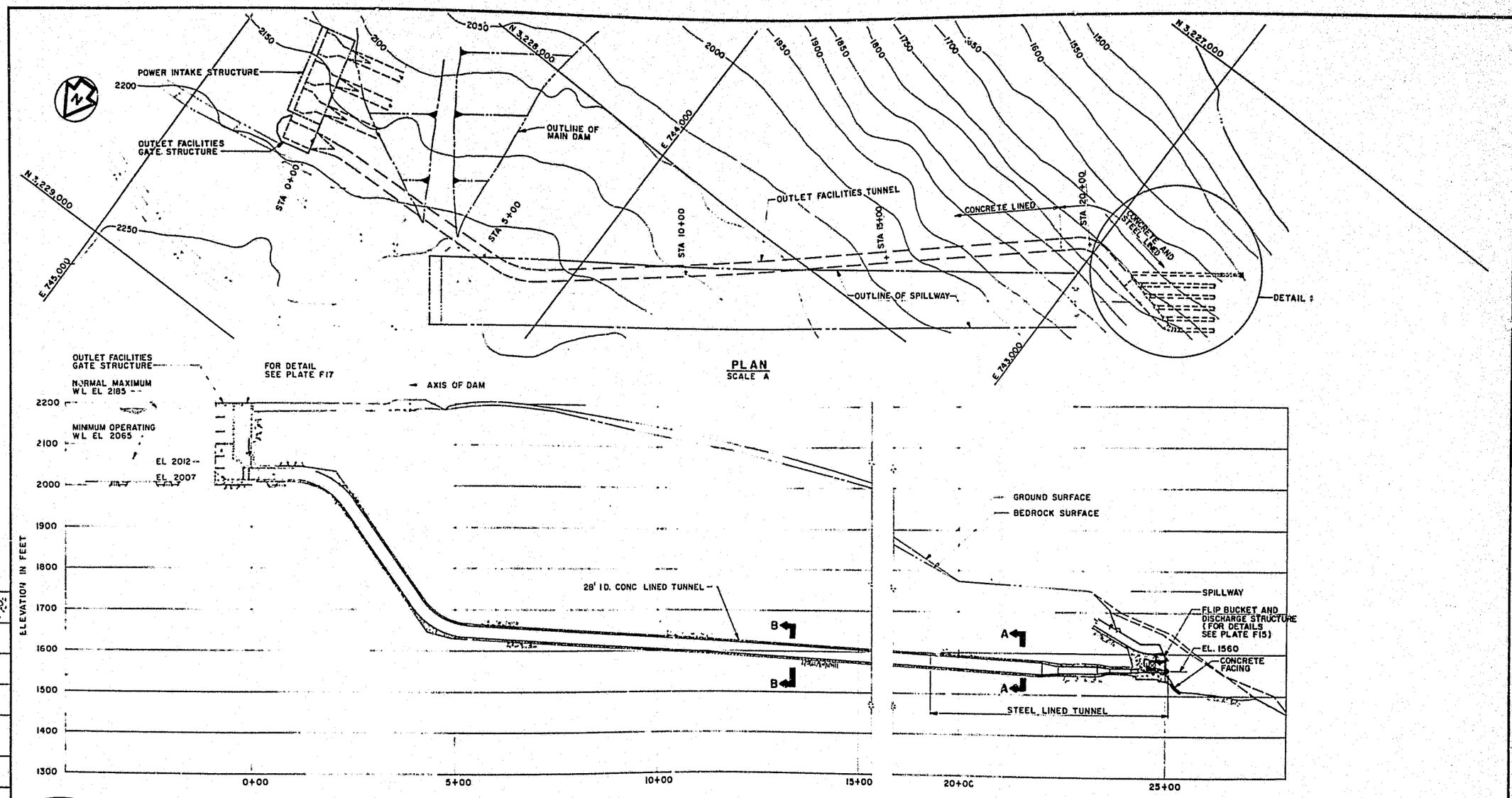


SECTION E-E

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

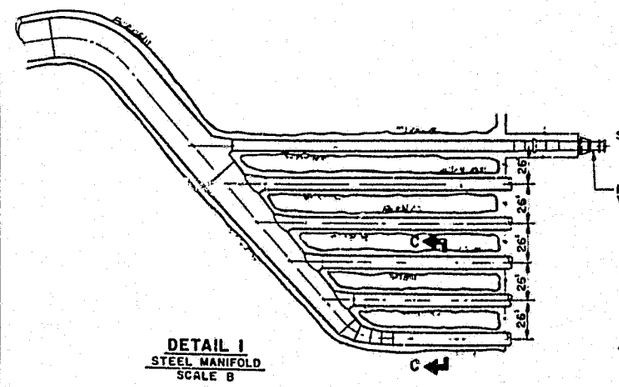
HARZA-EBASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
WATANA MAIN SPILLWAY FLIP BUCKET	
EXHIBIT F	PLATE F15 R

FERC 7000-66-2208



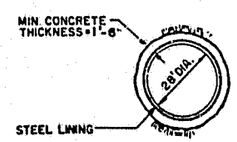
PLAN
SCALE A

PROFILE
SCALE, A

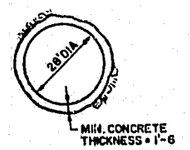


DETAIL I
STEEL MANIFOLD
SCALE B

SECTION C-C
SCALE C



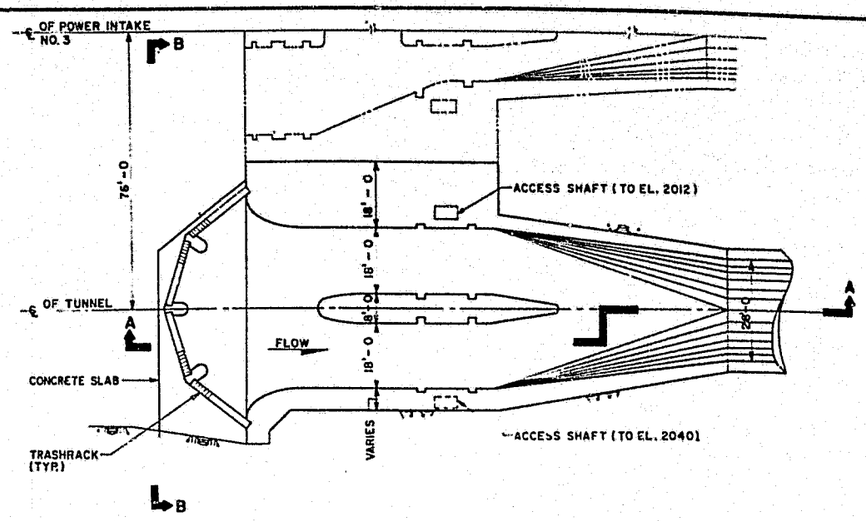
SECTION A-A
SCALE C



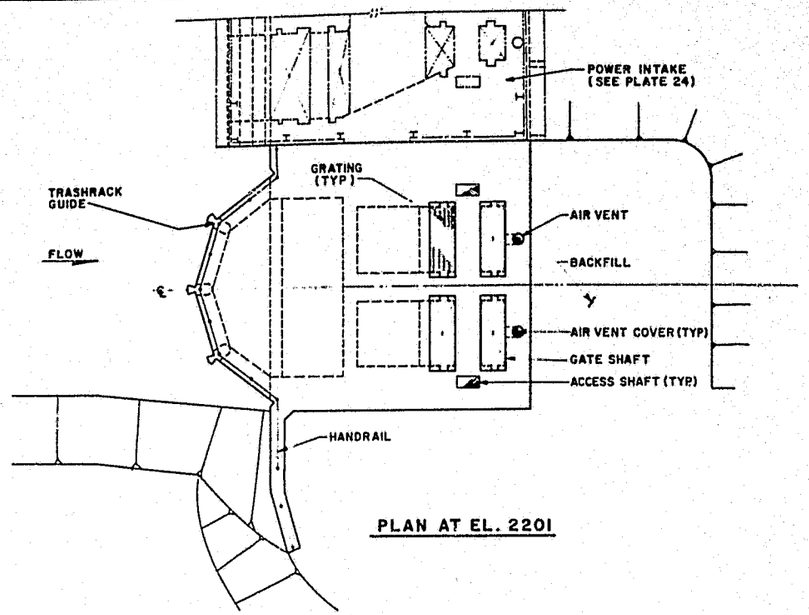
SECTION B-B
SCALE C

SCALE C 0 20 40 FEET (1 INCH = 20 FEET)
SCALE B 0 40 80 FEET (1 INCH = 40 FEET)
SCALE A 0 100 200 FEET (1 INCH = 100 FEET)

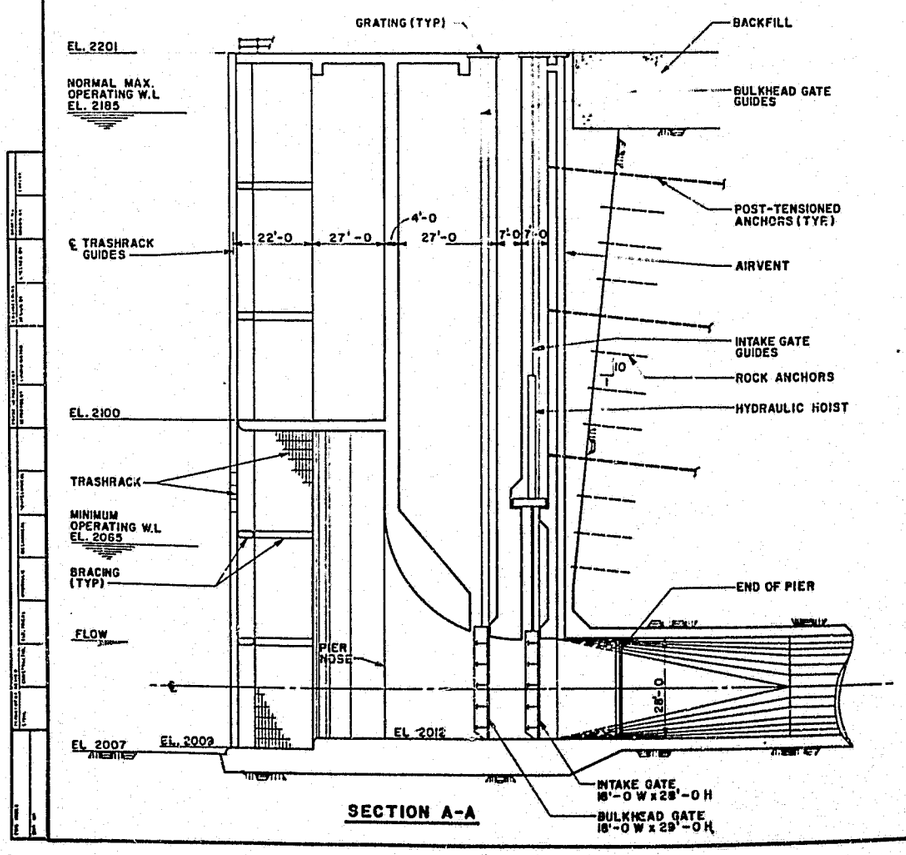
HARZA-EBASCO JOINT VENTURE | ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
WATANA OUTLET FACILITIES GENERAL ARRANGEMENT
EXHIBIT F | PLATE F16 R



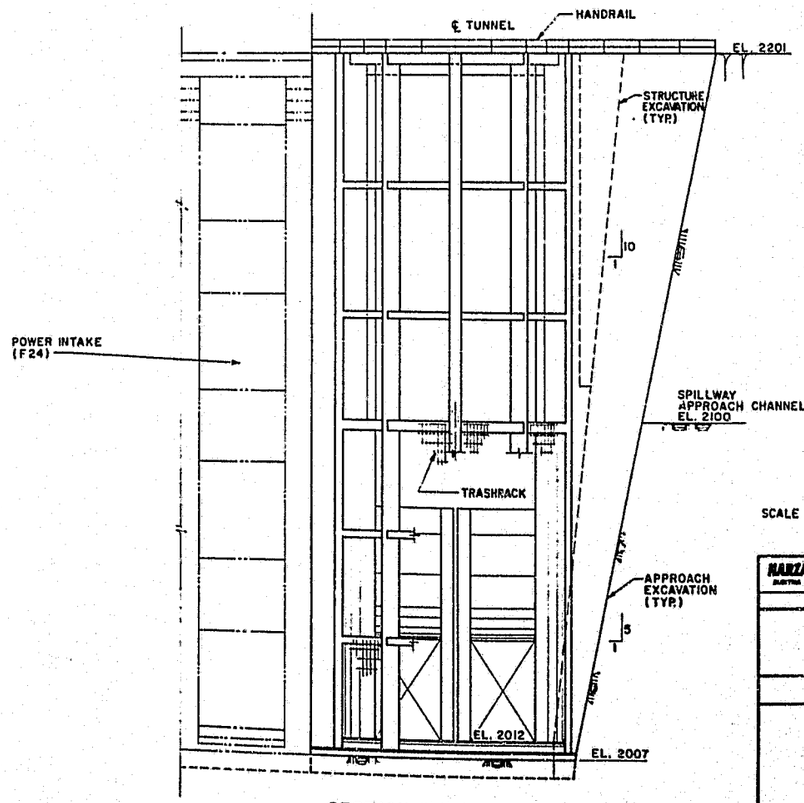
PLAN AT ℄ TUNNEL



PLAN AT EL. 2201



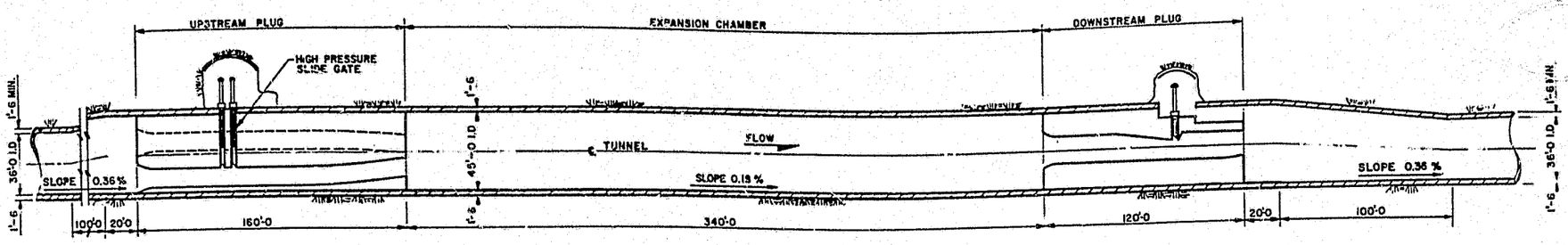
SECTION A-A



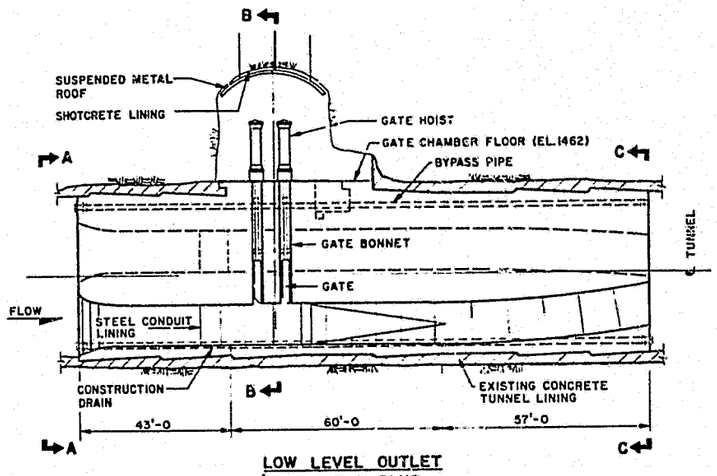
SECTION B-B

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

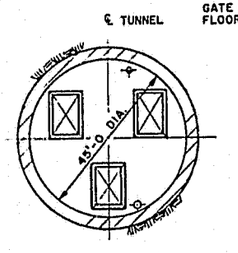
NARZA-EVASCO	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
WATANA OUTLET FACILITIES GATE STRUCTURE	
EXHIBIT F	PLATE F17R



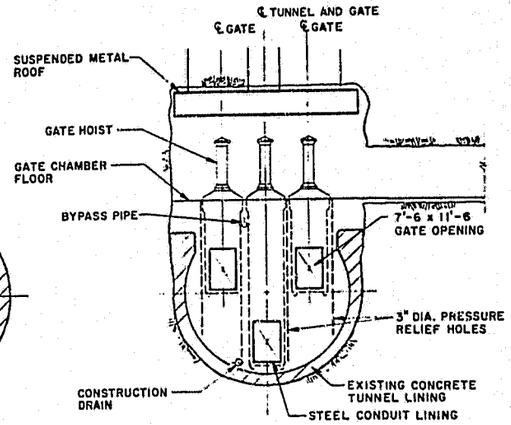
SECTION ALONG ℄ OF TUNNEL NO. 1
SCALE A



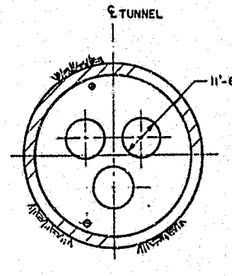
LOW LEVEL OUTLET
UPSTREAM PLUG
SCALE B



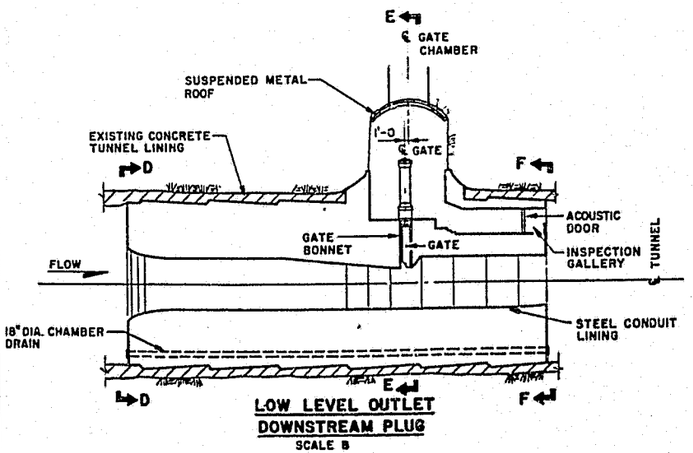
SECTION A-A
SCALE B



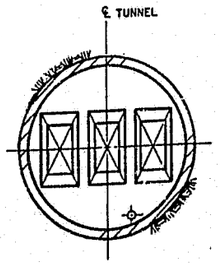
SECTION B-B
SCALE B



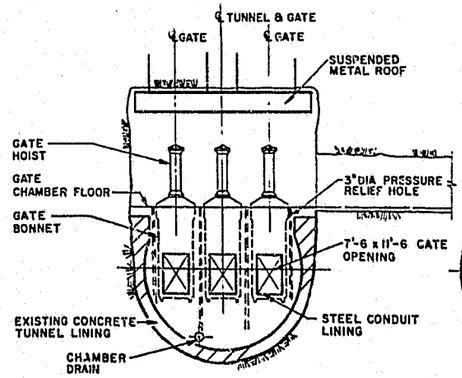
SECTION C-C
SCALE B



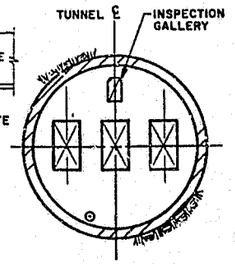
LOW LEVEL OUTLET
DOWNSTREAM PLUG
SCALE B



SECTION D-D
SCALE B



SECTION E-E
SCALE B



SECTION F-F
SCALE B

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

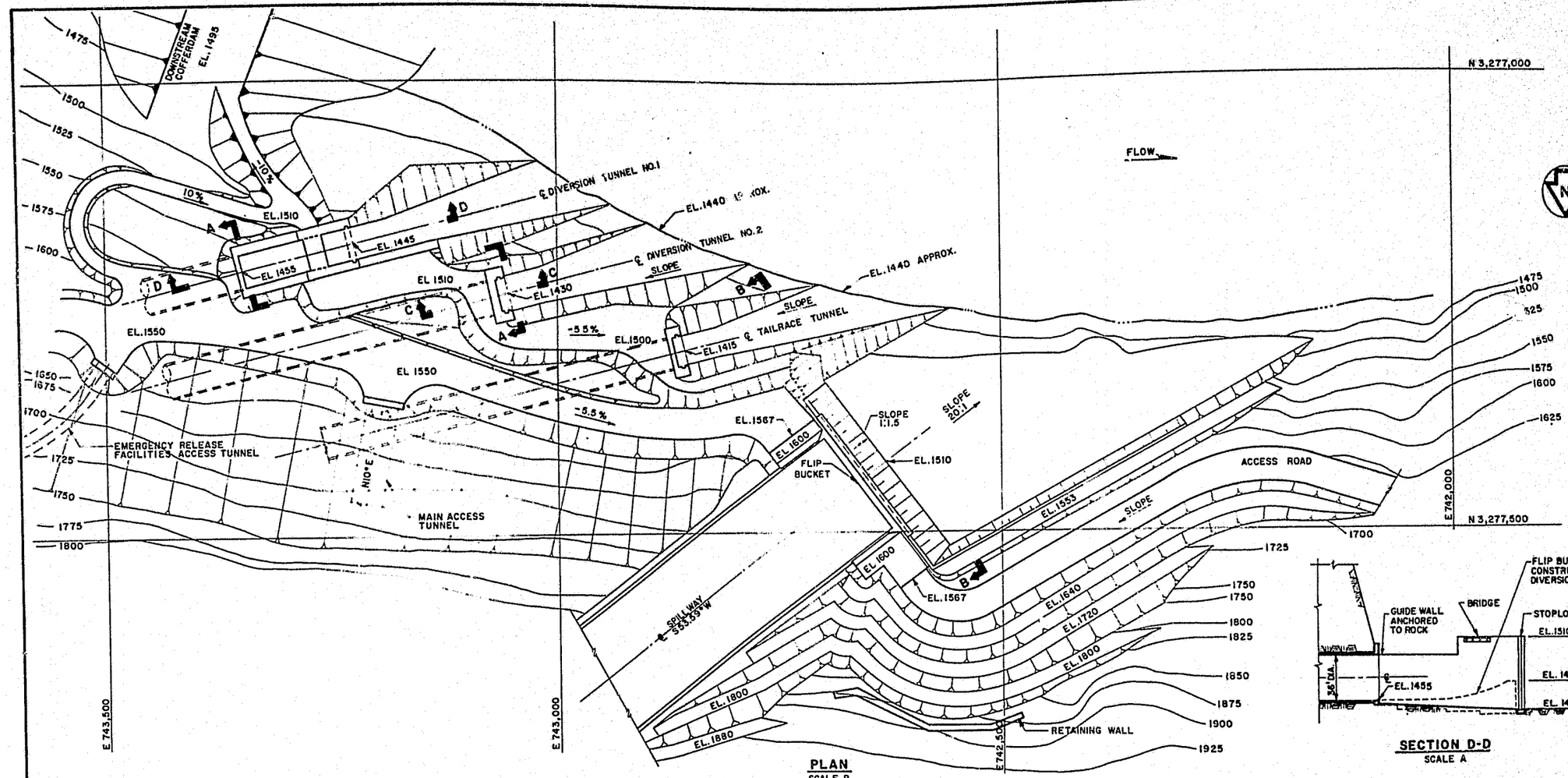
SCALE A 0 30 60 FEET (1 INCH = 30 FEET)

HARZA-EBASCO | ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

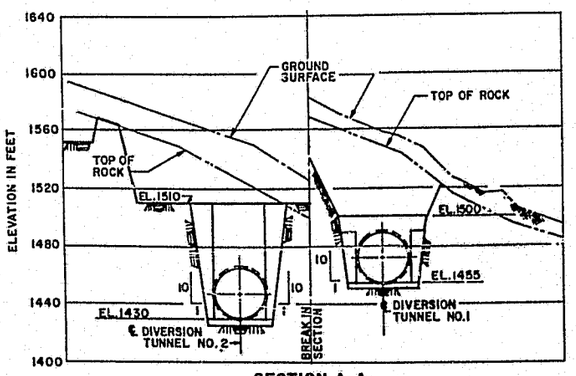
WATANA
EMERGENCY RELEASE FACILITIES
SECTIONS

EXHIBIT F | PLATE F19R

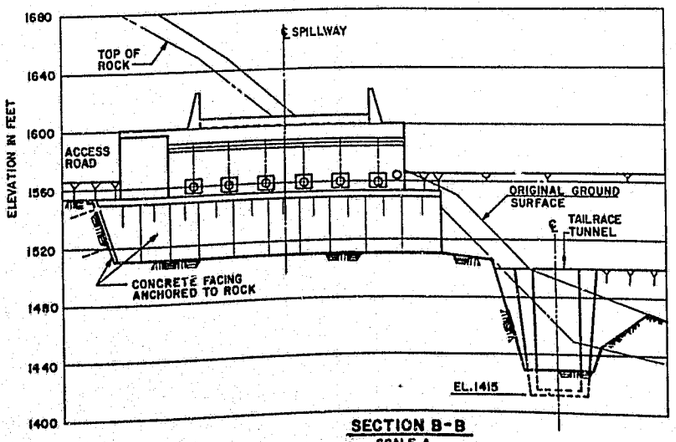


PLAN
SCALE B

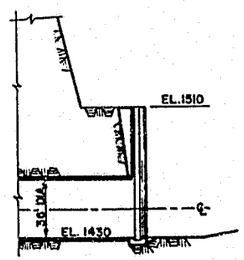
SECTION D-D
SCALE A



SECTION A-A
SCALE A



SECTION B-B
SCALE A

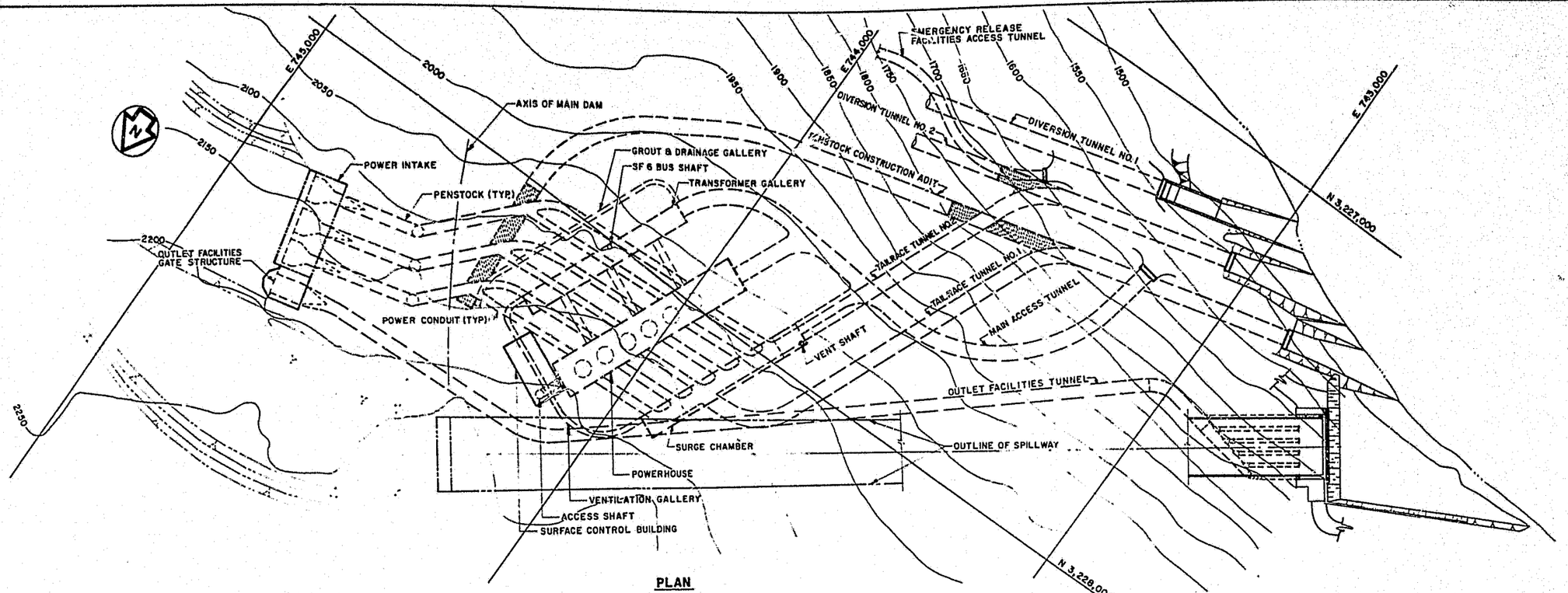


SECTION C-C
SCALE A

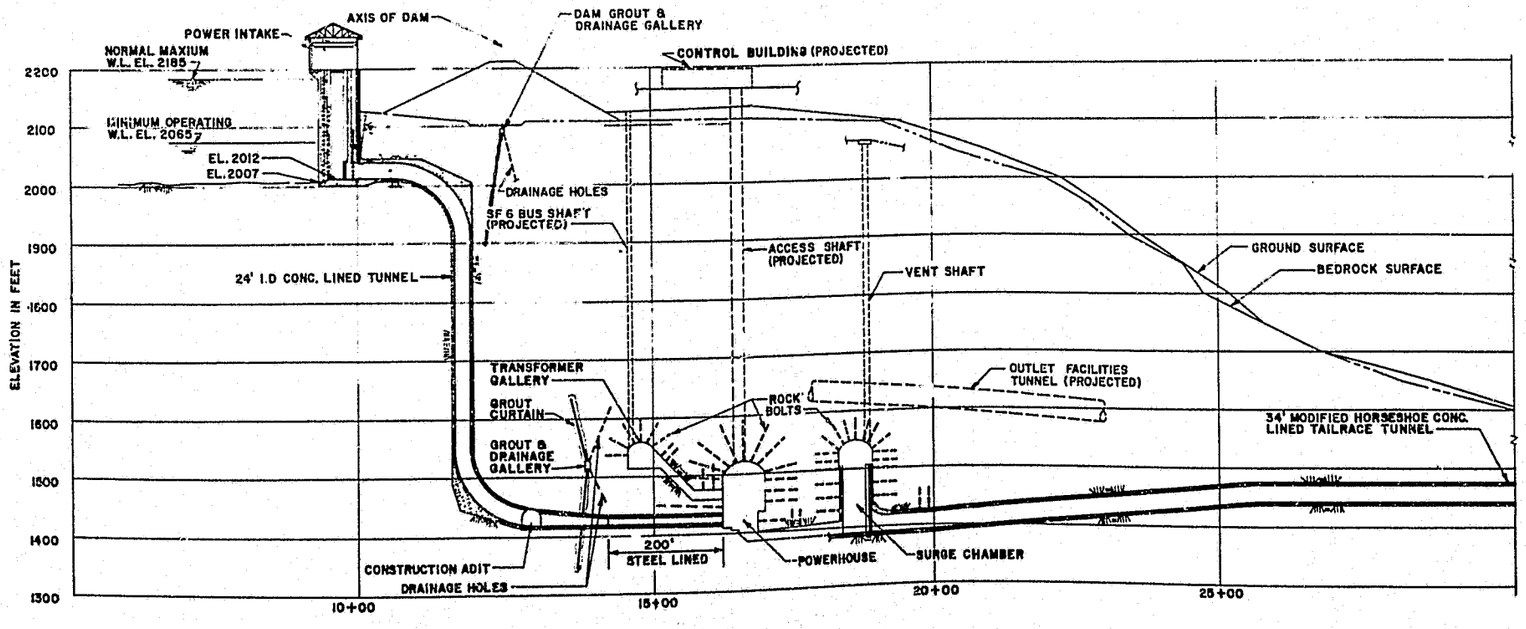
SCALE B 0 50 100 FEET (1 INCH = 50 FEET)

SCALE A 0 40 80 FEET (1 INCH = 40 FEET)

HARZA-EBASCO	ALASKA POWER AUTHORITY
SUBITNA HYDROELECTRIC PROJECT	
WATANA DOWNSTREAM PORTALS PLAN & SECTIONS	
EXHIBIT F	PLATE F20R



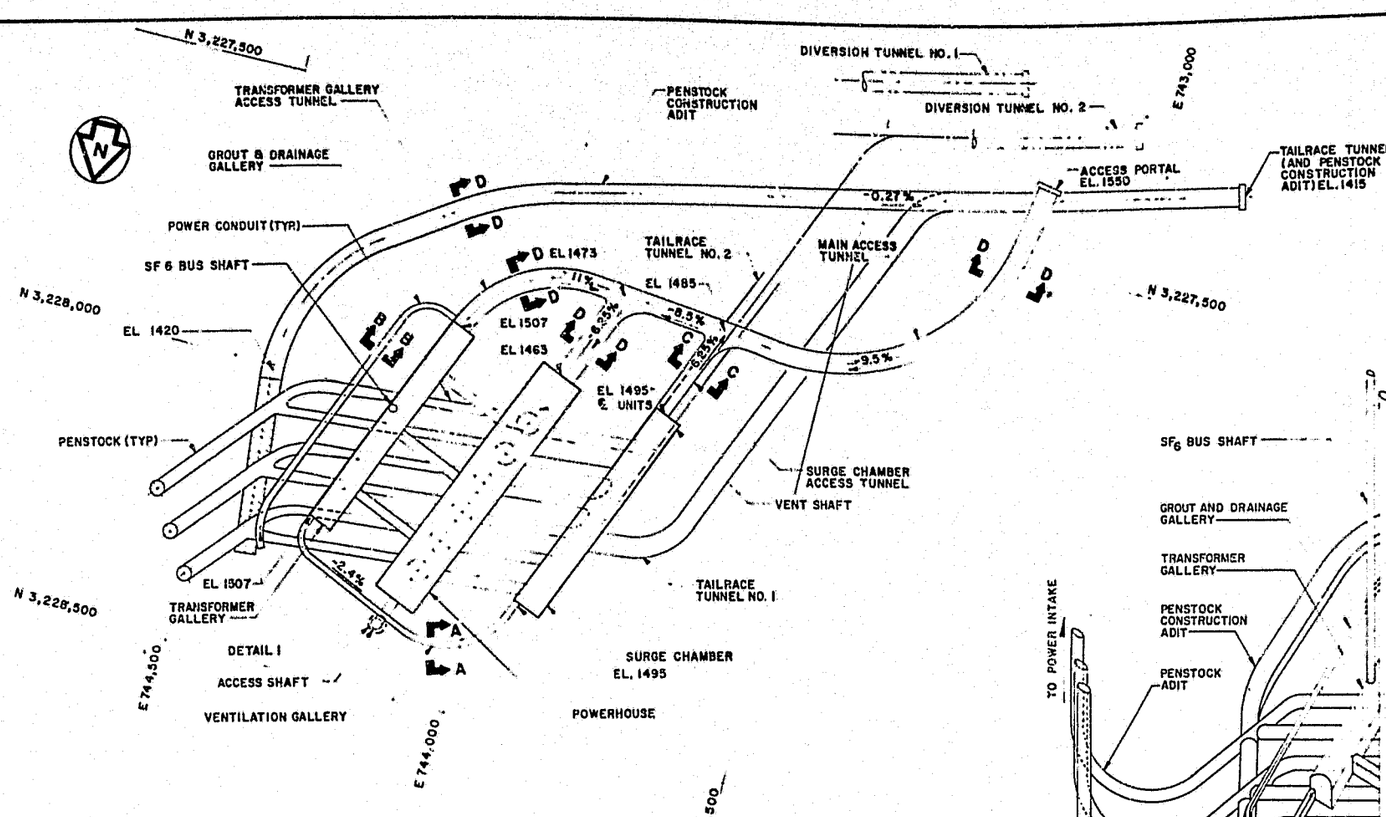
PLAN

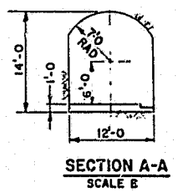


PROFILE

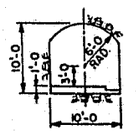
SCALE 0 100 200 FEET (1 INCH = 100 FEET)

HARZA-EBASCO JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
WATANA POWER FACILITIES GENERAL ARRANGEMENT	
EXHIBIT F	PLATE F21R

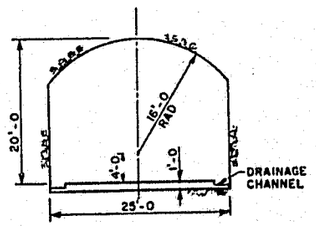




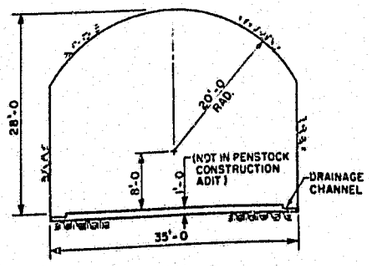
SECTION A-A
SCALE B



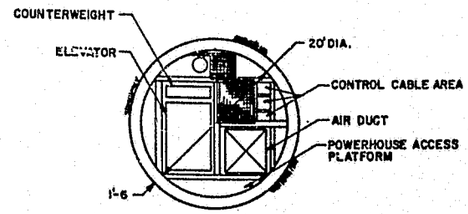
SECTION B-B
SCALE B



SECTION C-C
SCALE B



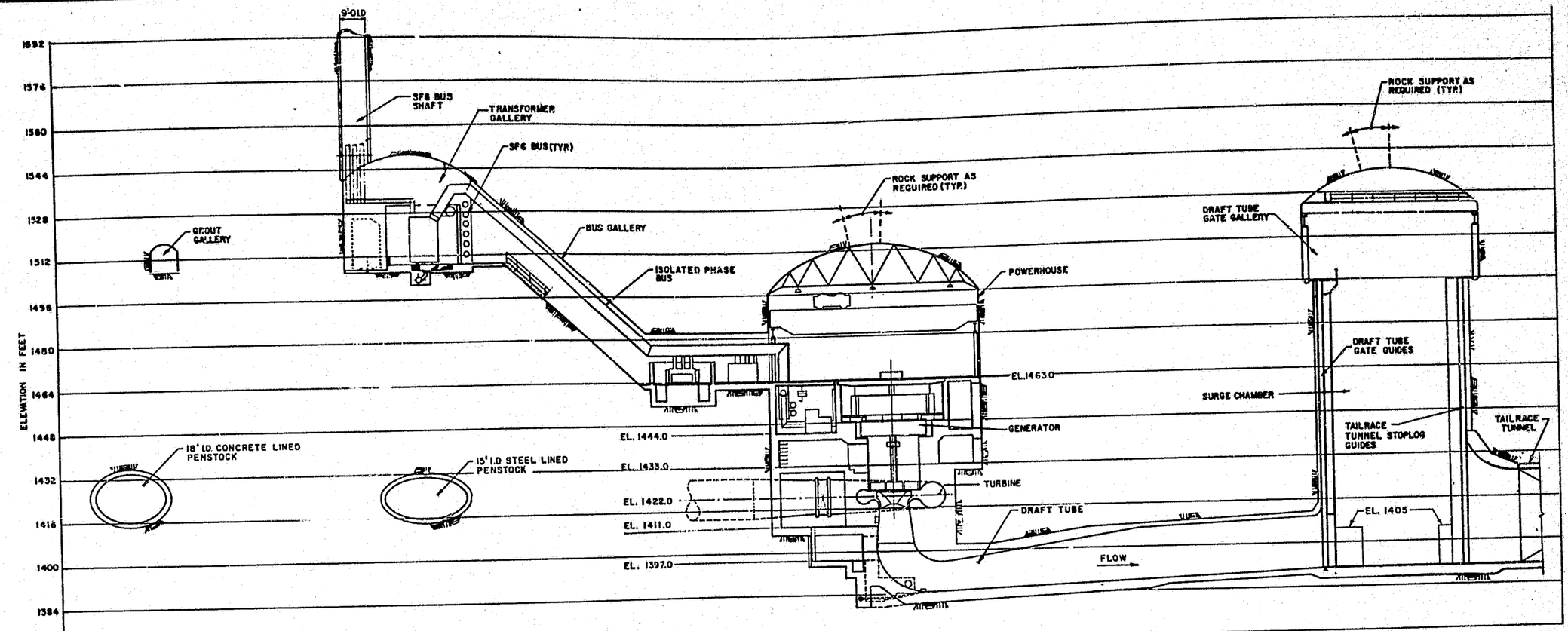
SECTION D-D
SCALE B



DETAIL 1
SCALE B

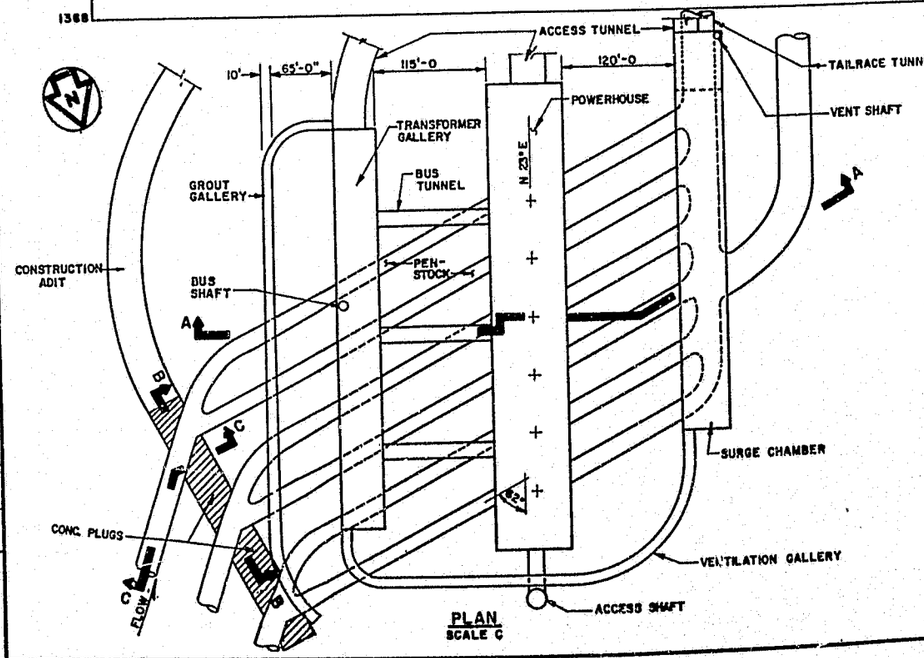
SCALE B 0 8 16 FEET (1/8 INCH = 1 FOOT)
SCALE A 0 100 200 FEET (1 INCH = 100 FEET)

HARZA-EBASCO | ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
WATANA
POWER FACILITIES
ACCESS
EXHIBIT F | PLATE F 22 R

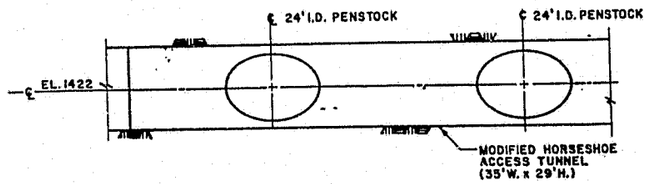


SECTION THRU CENTERLINE OF UNIT

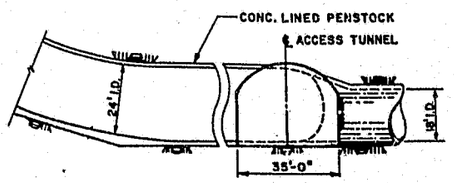
SECTION A-A
SCALE B



PLAN
SCALE C



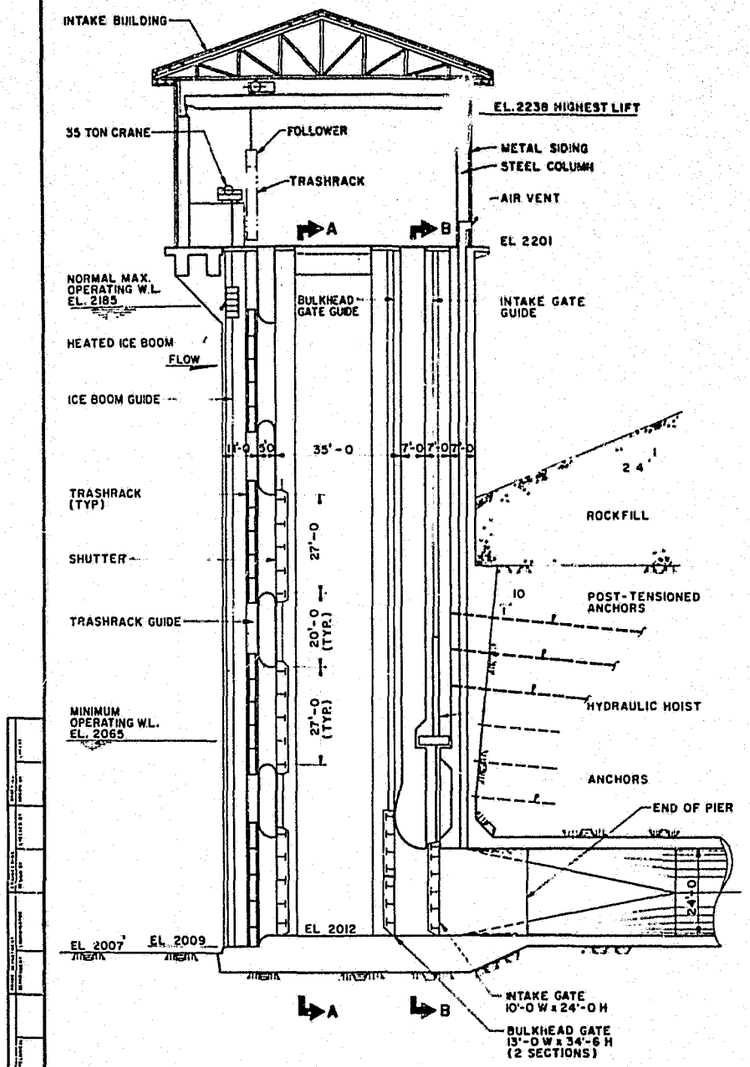
SECTION B-B
SCALE A



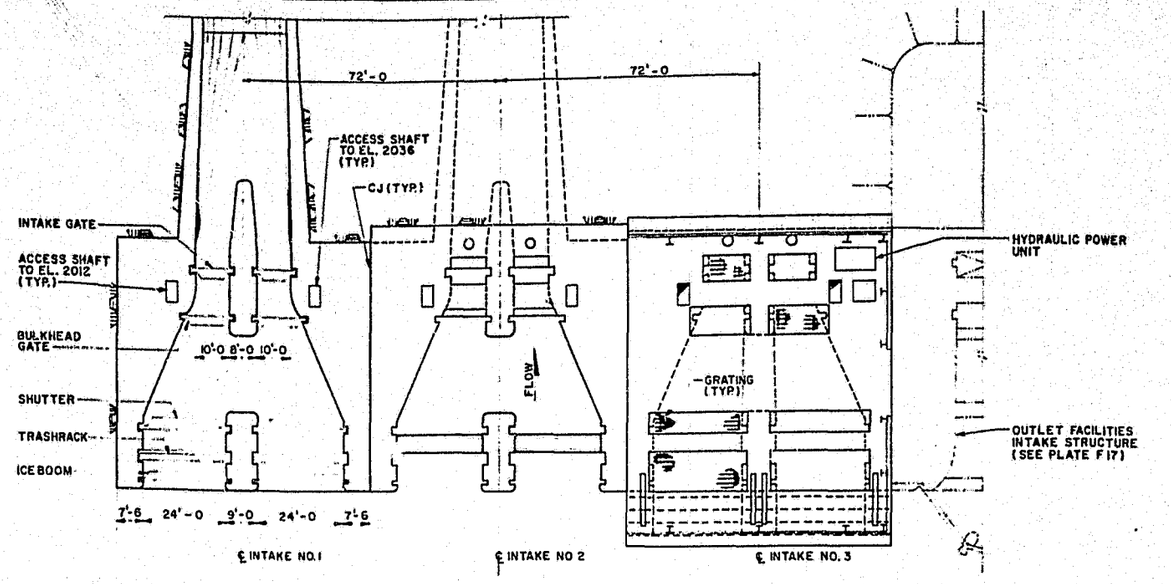
SECTION C-C
SCALE A

SCALE C 0 60 120 FEET (1 INCH = 60 FEET)
SCALE B 0 16 32 FEET (1/16 INCH = 1 FOOT)
SCALE A 0 20 40 FEET (1 INCH = 20 FEET)

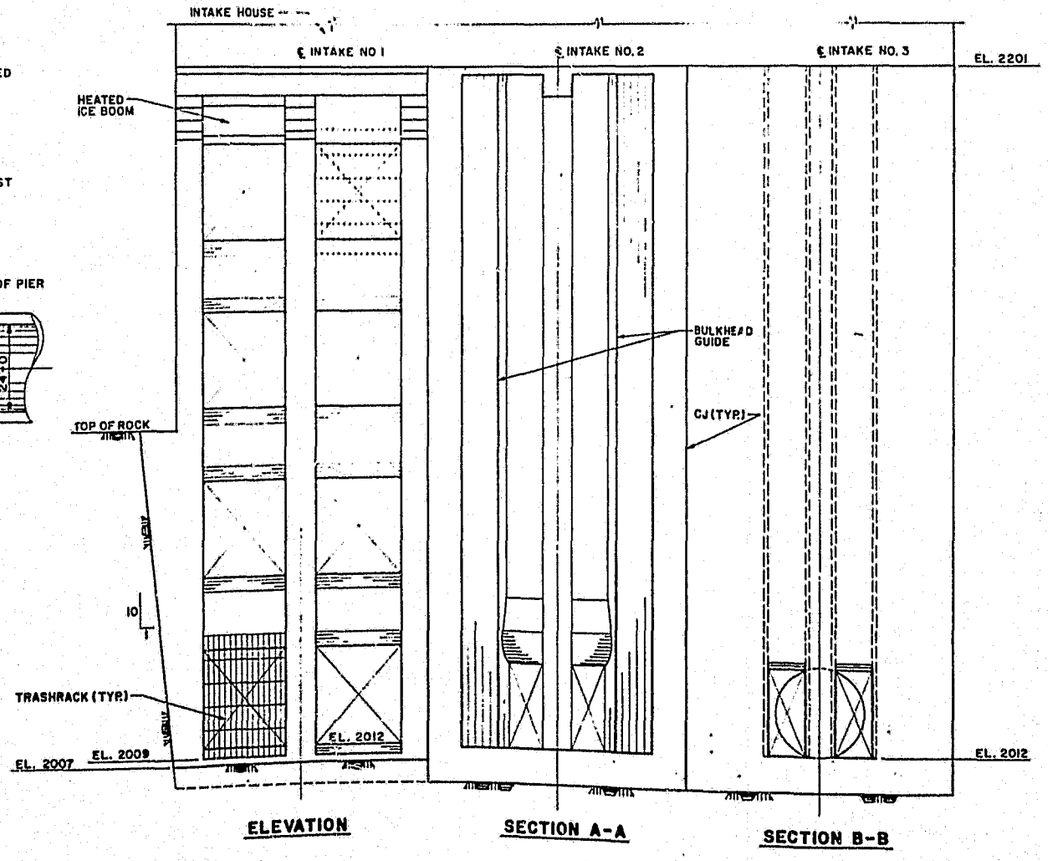
HARZA-EBASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
WATANA POWER FACILITIES PLAN & SECTIONS	
EXHIBIT F	PLATE F23R



SECTION THROUGH POWER INTAKE



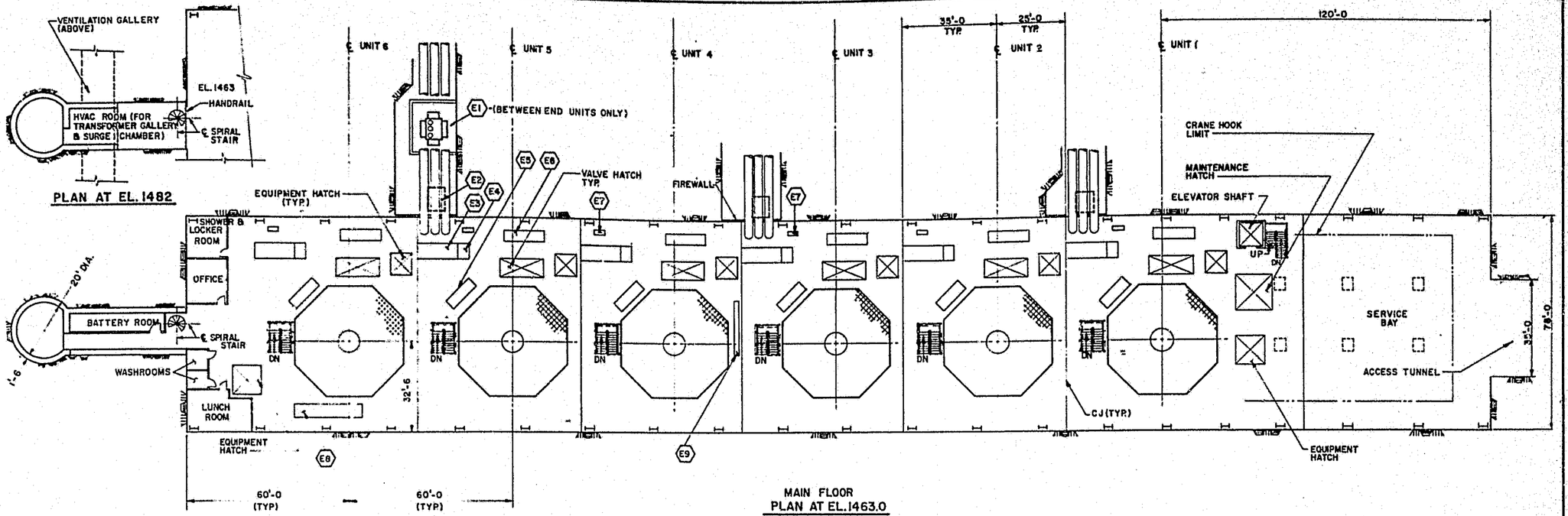
PLAN AT EL. 2024 PLAN AT EL. 2065 PLAN AT EL. 2201

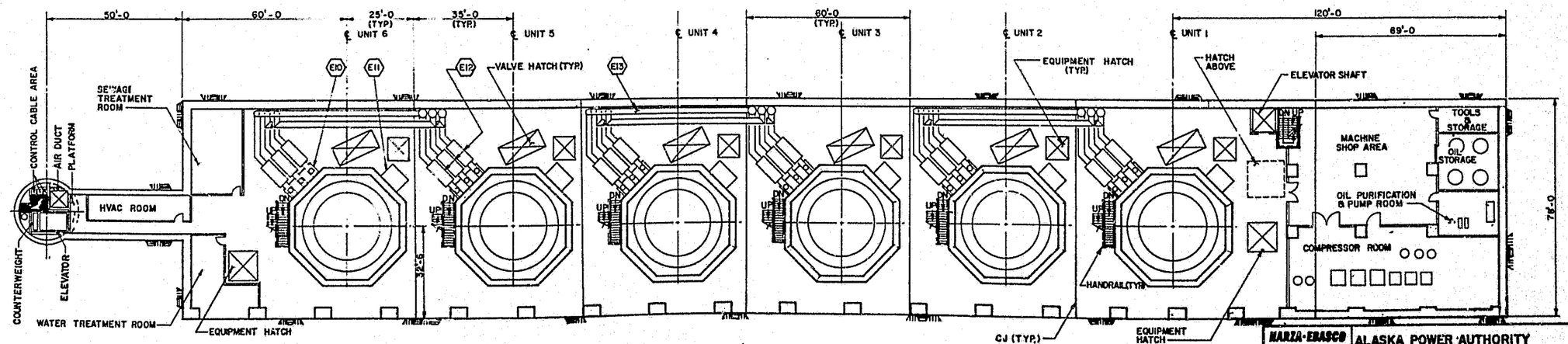


ELEVATION SECTION A-A SECTION B-B

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

MARIA-KRASCO JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
WATANA POWER INTAKE SECTIONS	
EXHIBIT F	PLATE F 24 R



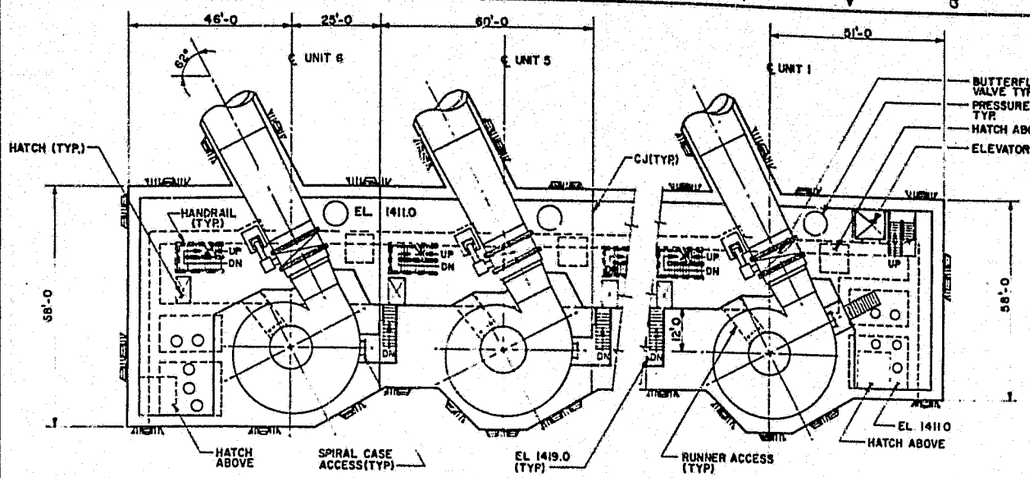


LEGEND

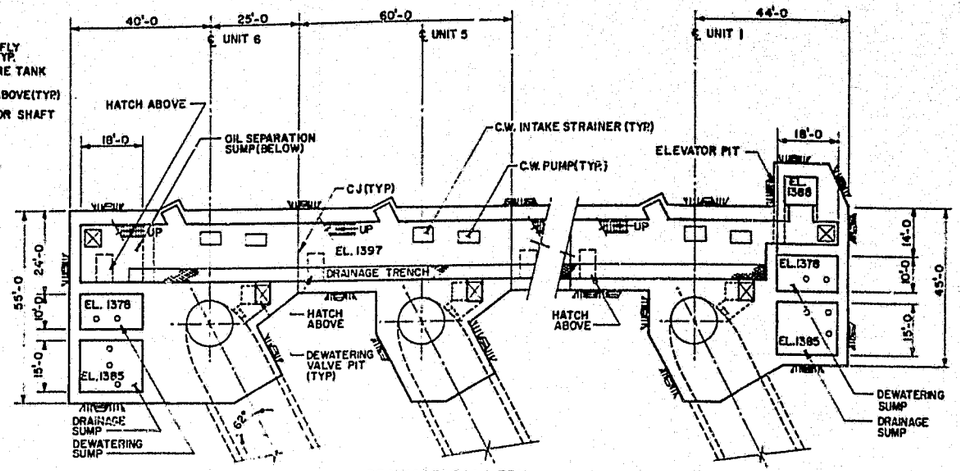
E1 AUXILIARY SERVICE TRANSFORMER 7.5/10MVA
E2 AUXILIARY SERVICE TRANSFORMER 2 MVA (TYP)
E3 UNIT CONTROL SWITCH BOARD (TYP)
E4 GOVERNOR ELECT CUBICLE (TYP.)
E5 EXCITATION TRANSFORMER (TYP.)
E6 EXCITATION CUBICLES (TYP.)
E7 480V PDP (TYP.)
E8 STATION SERVICE SWITCHGEAR (480V)
E9 ESSENTIAL AC/DC SWBD
E10 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)

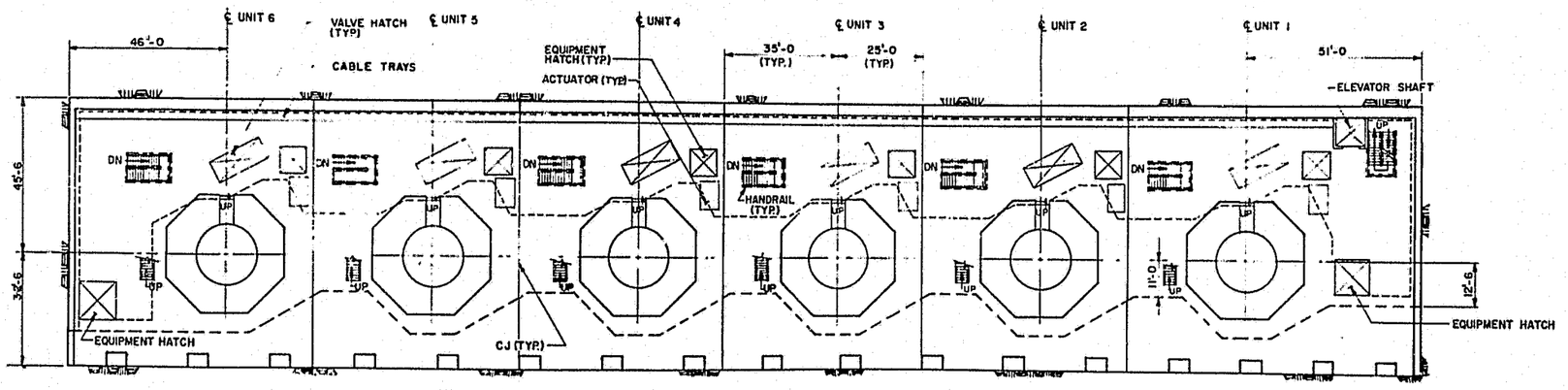
KARZA-ERASCO DIGITAL JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
WATANA POWERHOUSE PLANS	
EXHIBIT F	PLATE F25R



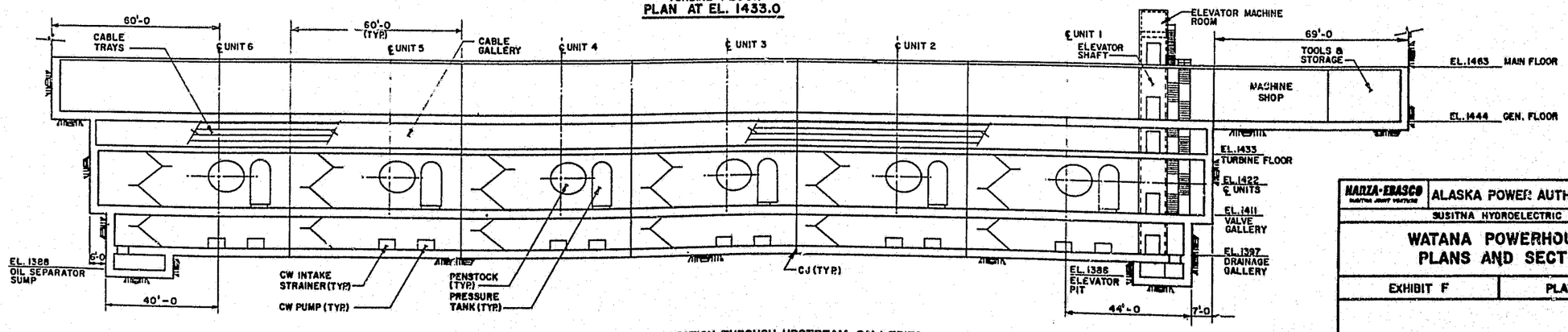
VALVE GALLERY
PLAN AT ELEV. 1422.0



DRAINAGE GALLERY
PLAN AT EL. 1397.0



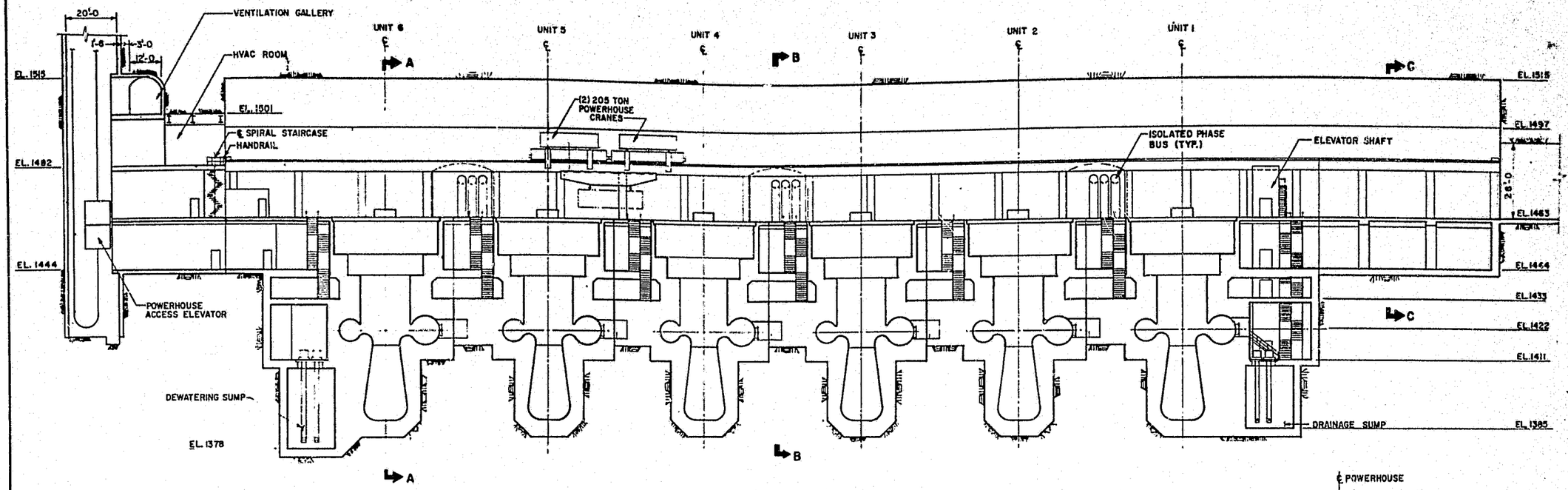
TURBINE FLOOR
PLAN AT EL. 1433.0



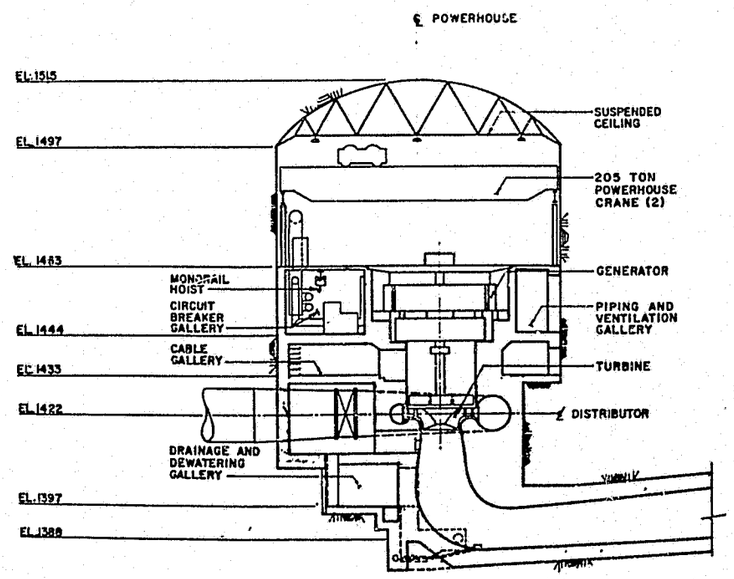
SECTION THROUGH UPSTREAM GALLERIES

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

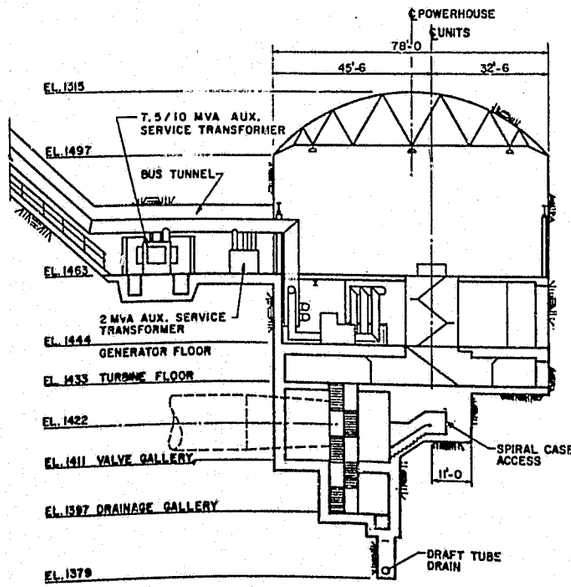
HARZA-EBASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
WATANA POWERHOUSE PLANS AND SECTION	
EXHIBIT F	PLATE F 25 A R



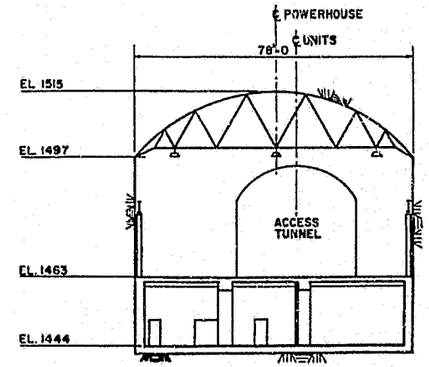
LONGITUDINAL SECTION (THRU CENTERLINE OF UNITS, UNITS NOT SHOWN)



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 (1/16 INCH = 1 FOOT)

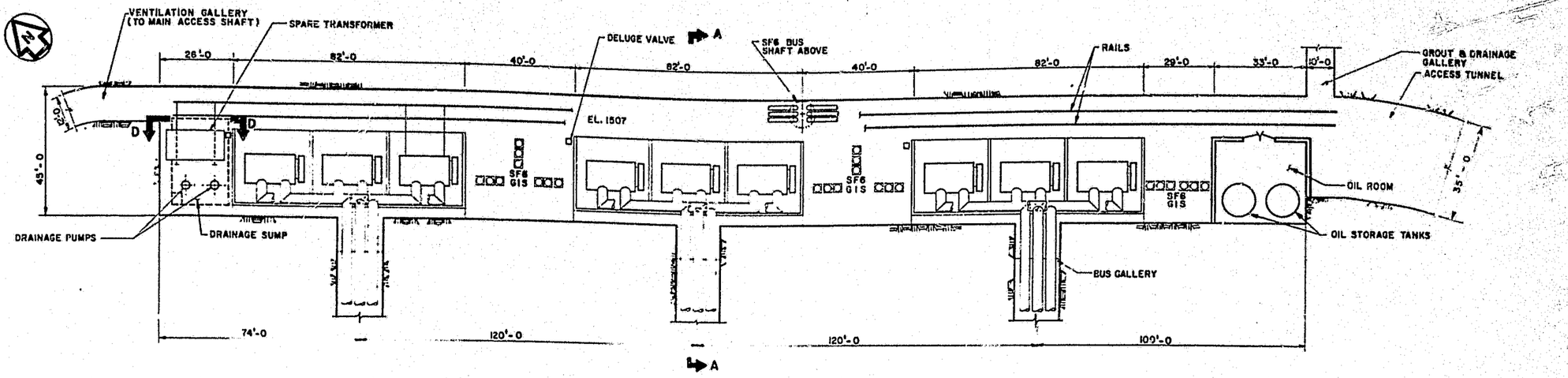
HARZA-EBASCO JOINT VENTURE | ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

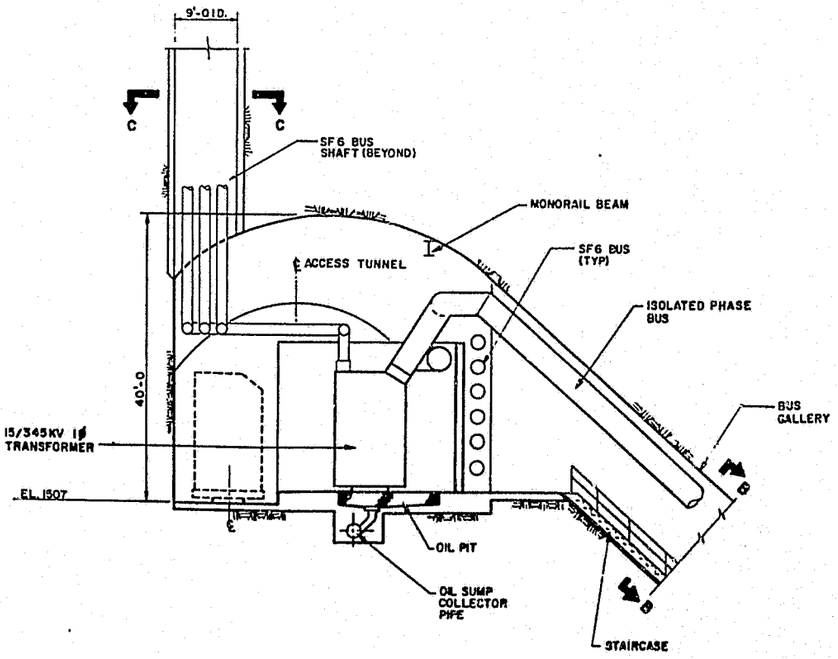
WATANA POWERHOUSE SECTIONS

EXHIBIT F | PLATE F26R

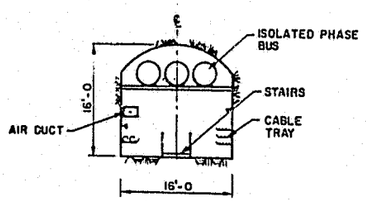
R2700-66-5308



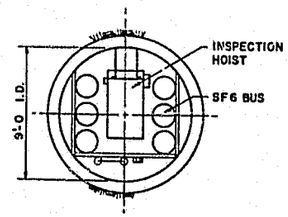
PLAN
SCALE A



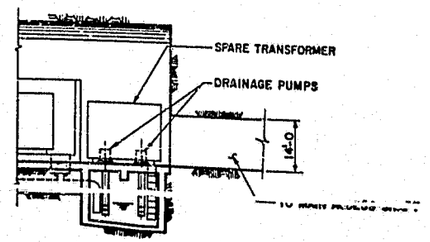
SECTION A-A
SCALE B



SECTION B-B
THROUGH BUS GALLERY
SCALE B



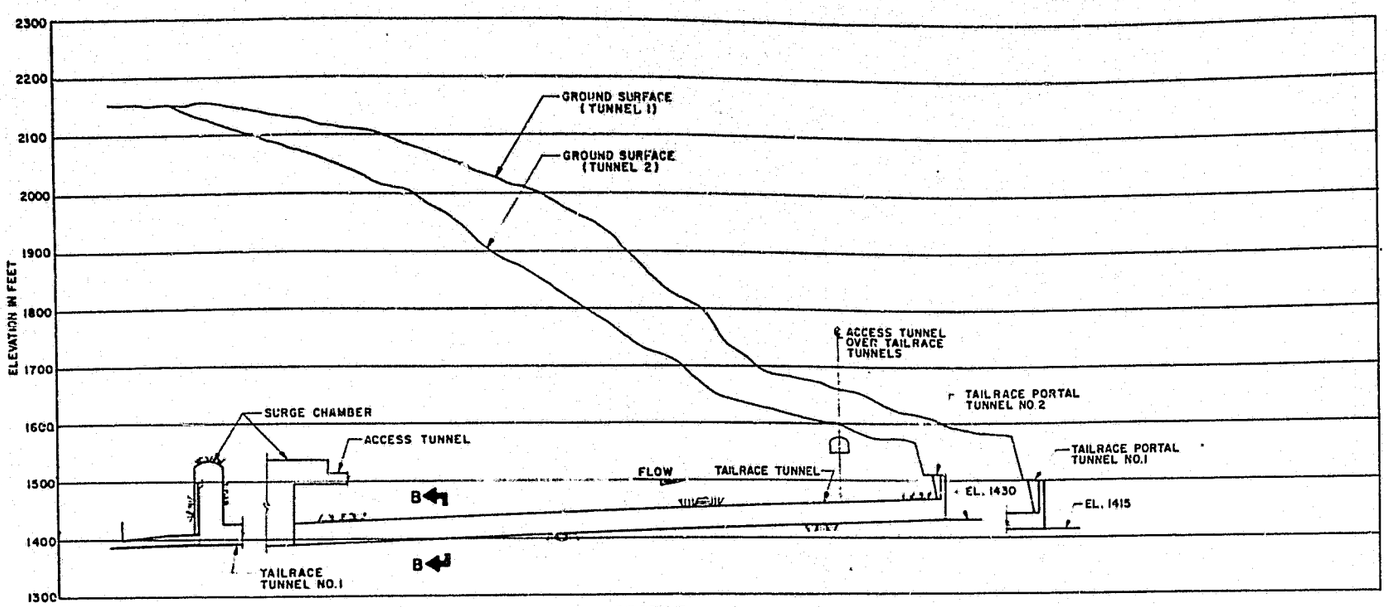
SECTION C-C
THROUGH BUS SHAFT
SCALE C



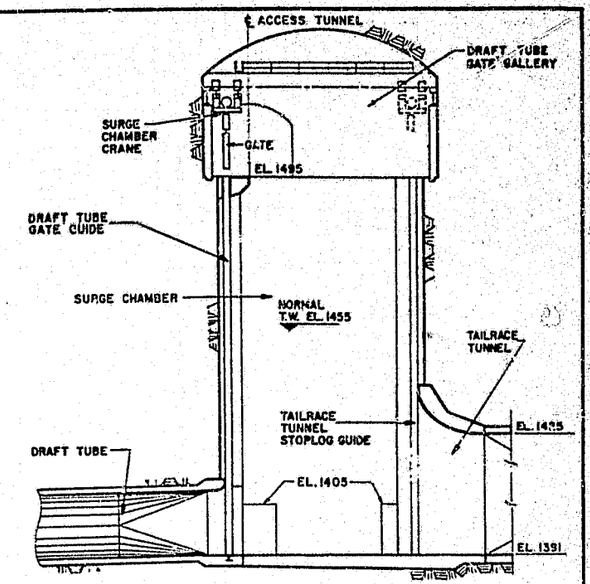
SECTION D-D
THROUGH SUMP
SCALE A

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)

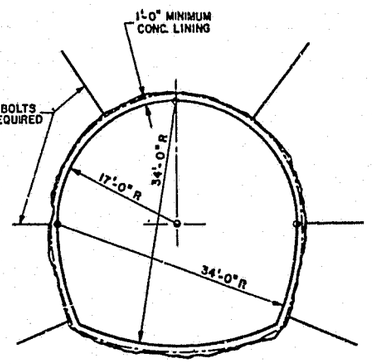
KARZA-EBASCO SUSITNA JOINT VENTURE | ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
WATANA
TRANSFORMER GALLERY
PLAN & SECTIONS
EXHIBIT F



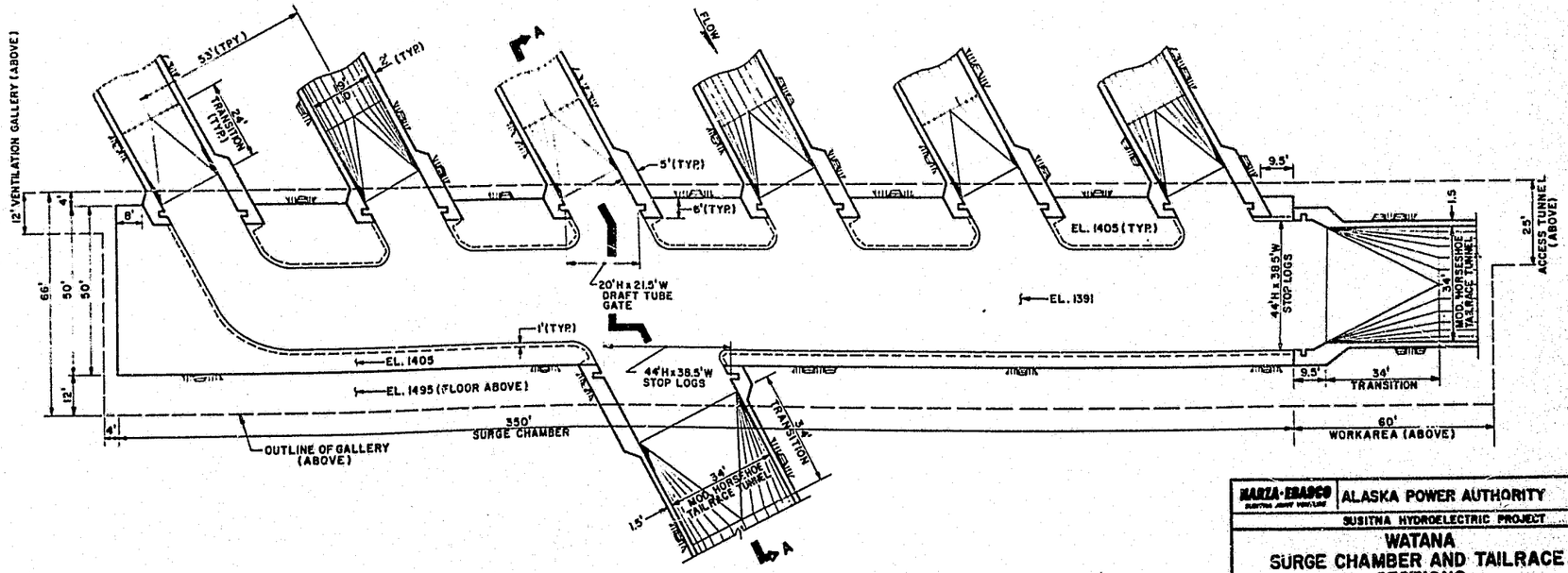
PROFILE
SCALE A



SECTION A-A
SCALE B



SECTION B-B
CONCRETE LINED TAILRACE TUNNEL
SCALE C

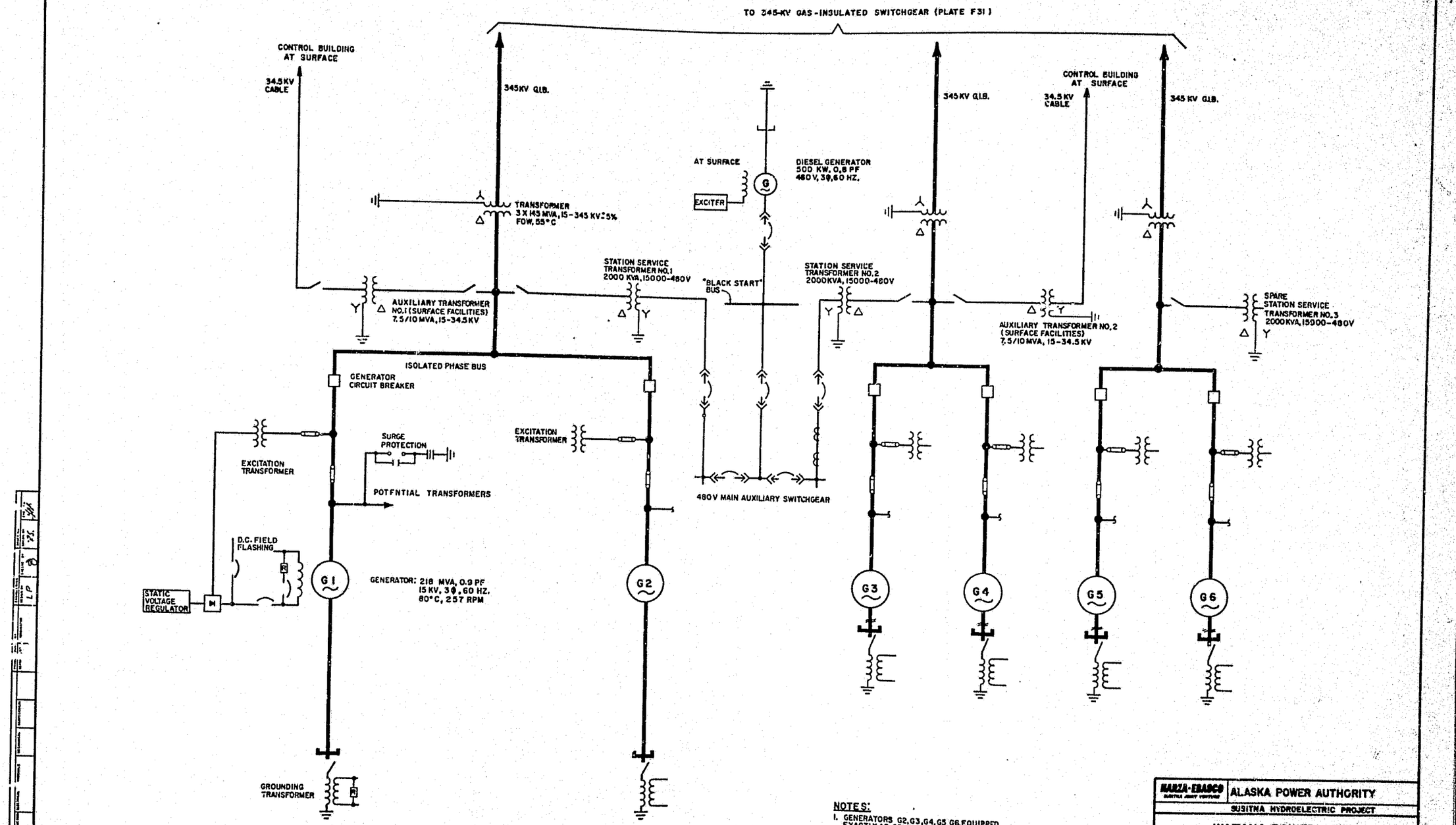


SECTIONAL PLAN
SCALE B

SCALE C 0 8 16 FEET (1/8 INCH = 1 FOOT)
SCALE B 0 16 32 FEET (1/16 INCH = 1 FOOT)
SCALE A 0 100 200 FEET (1 INCH = 100 FEET)

HARZA-EBASCO	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
WATANA SURGE CHAMBER AND TAILRACE SECTIONS	
EXHIBIT F	PLATE F28R

FERC-3700-C6-532



NOTES:

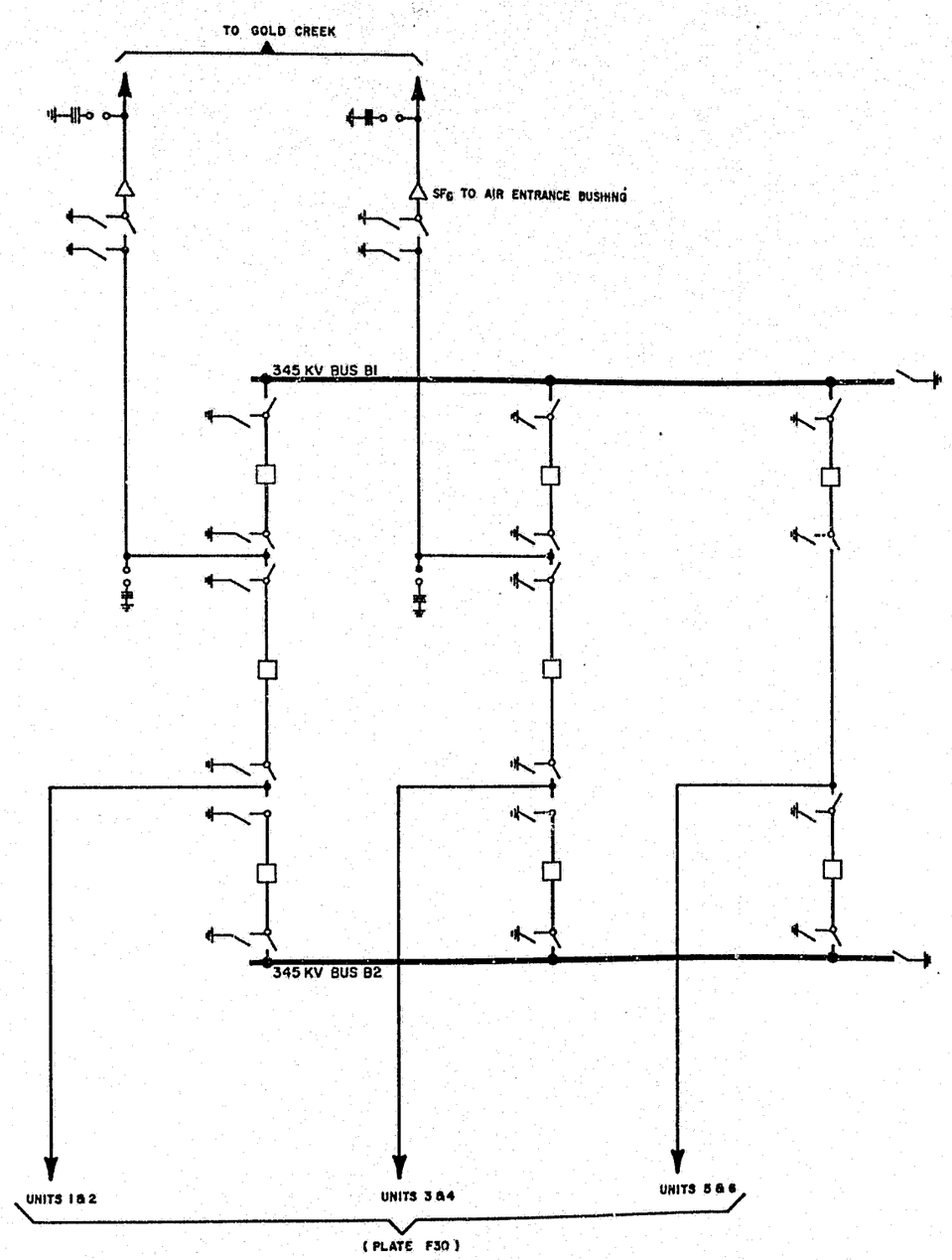
1. GENERATORS G2, G3, G4, G5, G6, EQUIPPED EXACTLY AS GENERATOR G1.
2. SYMBOLS SHOWN ON F31

MARZA-ERASCO | ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

WATANA POWERHOUSE SINGLE LINE DIAGRAM

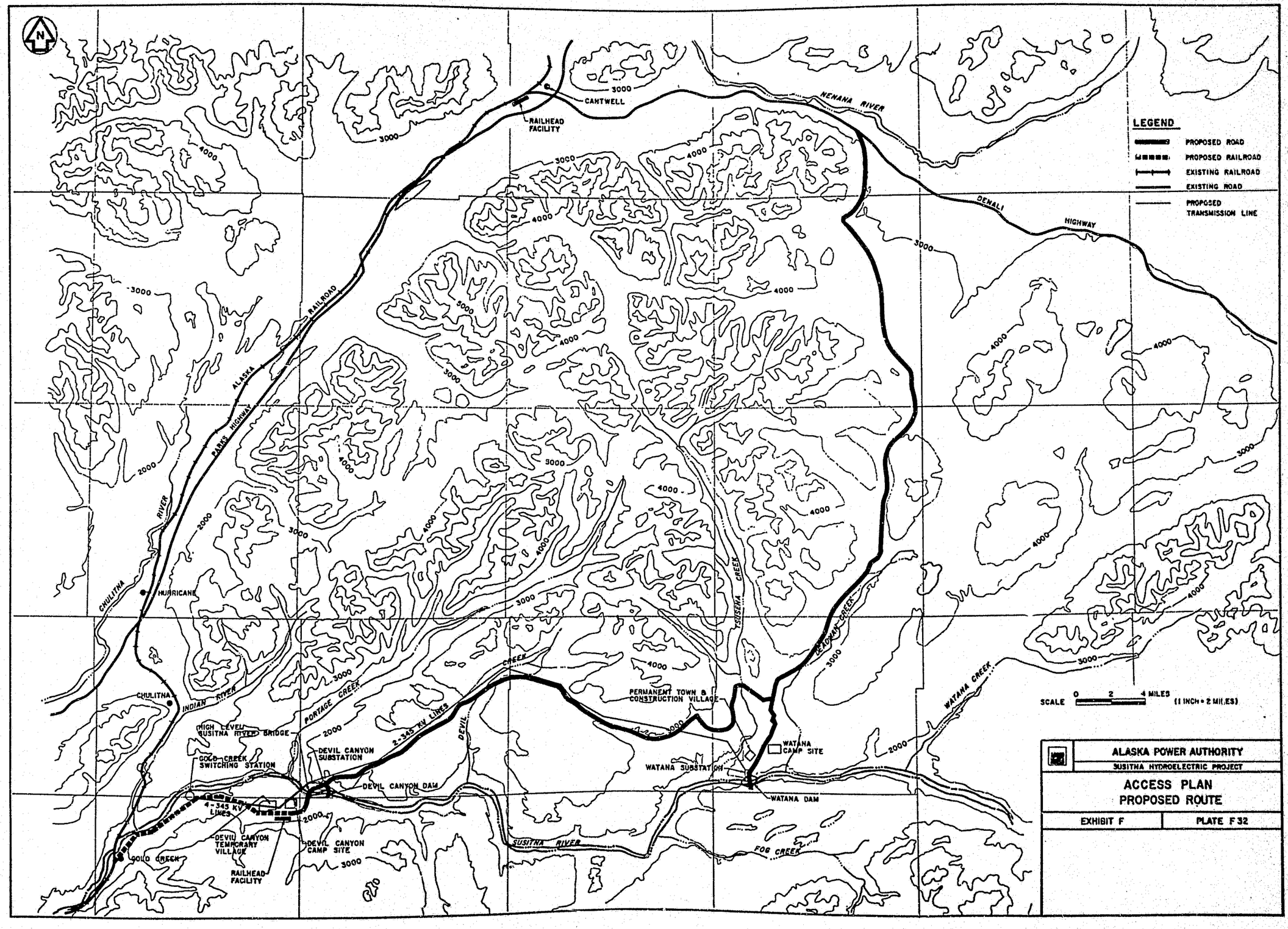
EXHIBIT F | PLATE F30.R

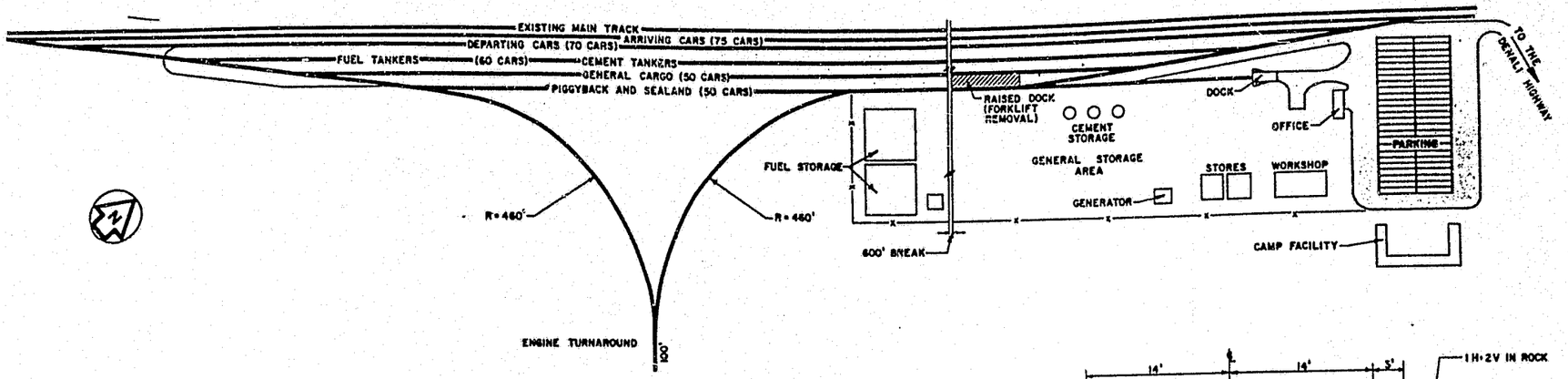


LEGEND

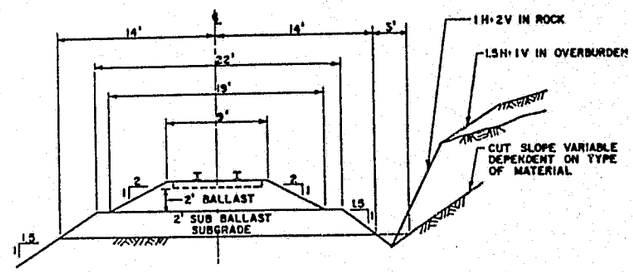
- AC GENERATOR, 3 PHASE, 60 HZ, WYE CONNECTED
- TRANSFORMER
- AUTO TRANSFORMER
- CIRCUIT BREAKER
- DRAWOUT CIRCUIT BREAKER
- LOW VOLTAGE AIR CIRCUIT BREAKER
- LINK IN ISOLATED PHASE BUS
- DISCONNECT SWITCH
- GROUND CONNECTION
- RESISTOR, ADJUSTABLE
- RTD — RESISTANCE TEMPERATURE DETECTOR
- STANDARD DEVICE
- 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
- G.I.S. — GAS-INSULATED SWITCHGEAR
- G.I.B. — GAS-INSULAYED BUS

HARZA-EBASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
WATANA SF-6 GAS-INSULATED SWITCHGEAR SINGLE LINE DIAGRAM	
EXHIBIT F	PLATE F 31 R

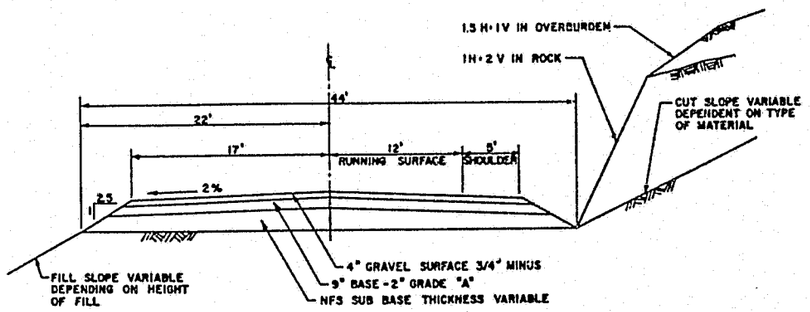

N
LEGEND
PROPOSED ROAD
PROPOSED RAILROAD
EXISTING RAILROAD
EXISTING ROAD
PROPOSED TRANSMISSION LINE
CANTWELL
RAILHEAD FACILITY
NENANA RIVER
DENALI HIGHWAY
ALASKA RAILROAD
PARKS HIGHWAY
CHULITNA RIVER
HURRICANE
CHULITNA
INDIAN RIVER
HIGH LEVEL SUSITNA RIVER BRIDGE
GOLD CREEK SWITCHING STATION
PORTAGE CREEK
DEVIL CANYON SUBSTATION
2-345 KV LINES
DEVIL CANYON DAM
4-345 KV LINES
DEVIL CANYON TEMPORARY VILLAGE
DEVIL CANYON CAMP SITE
GOLD CREEK
RAILHEAD FACILITY
DEVIL CREEK
PERMANENT TOWN & CONSTRUCTION VILLAGE
WATANA SUBSTATION
WATANA CAMP SITE
WATANA DAM
SUSITNA RIVER
FOG CREEK
YSUSENA CREEK
CADOMIN CREEK
WATANA CREEK
SCALE 0 2 4 MILES (1 INCH = 2 MILES)
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
ACCESS PLAN
PROPOSED ROUTE
EXHIBIT F
PLATE F 32



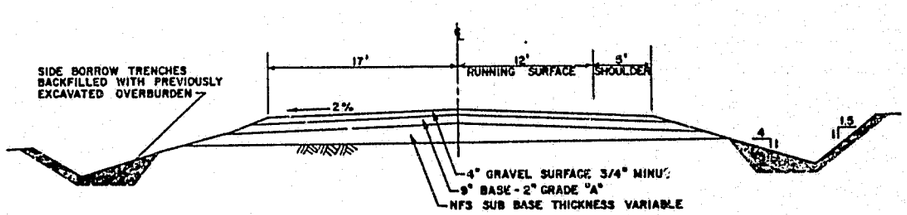
RAILHEAD FACILITY AT CANTWELL - PLAN
SCALE A



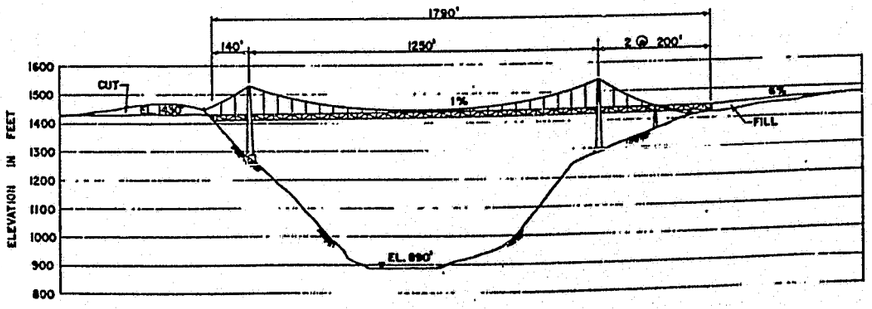
TYPICAL RAILROAD CROSS SECTION
SCALE B



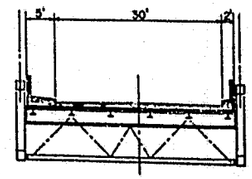
TYPICAL 'SIDEHILL CUT' SECTION
SCALE B



TYPICAL 'SIDE BORROW' SECTION
SCALE B



HIGH LEVEL SUSITNA RIVER BRIDGE
SCALE C



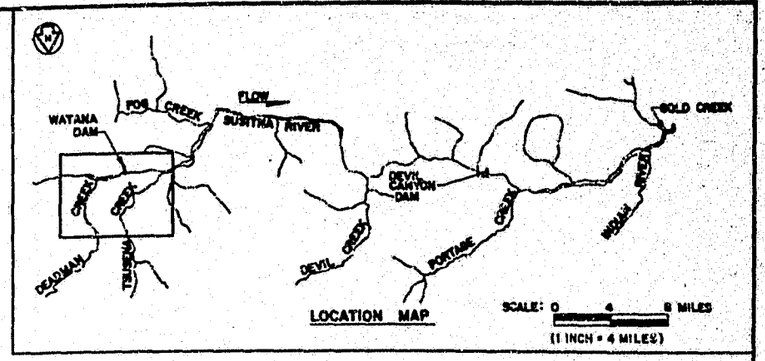
TYPICAL CROSS SECTION
HIGH LEVEL SUSITNA RIVER BRIDGE
SCALE D

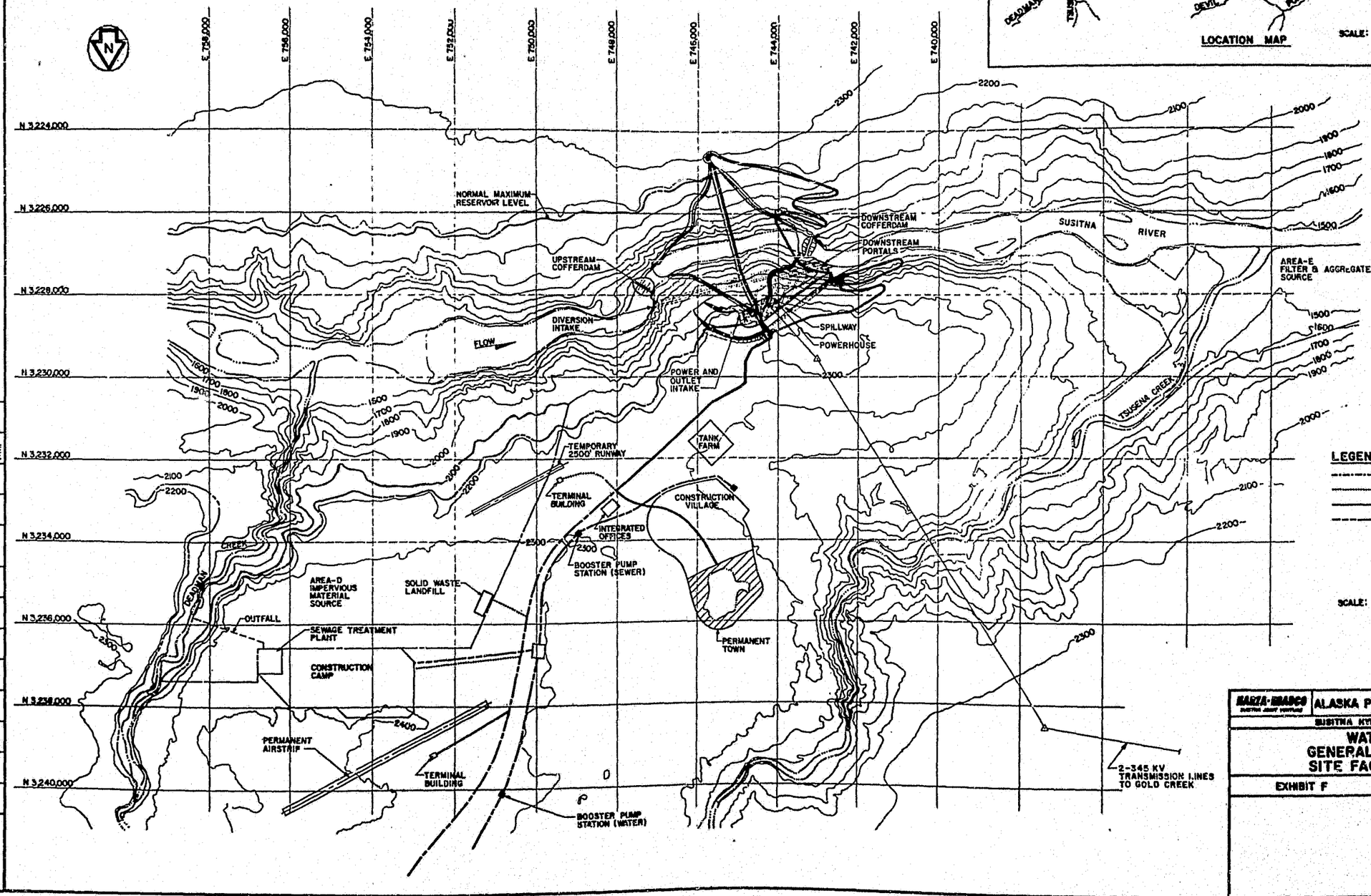
SCALE D 0 10 20 FEET (1 INCH = 10 FEET)
SCALE C 0 200 400 FEET (1 INCH = 200 FEET)
SCALE B 0 5 10 FEET (1 INCH = 5 FEET)
SCALE A 0 100 200 FEET (1 INCH = 100 FEET)

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ACCESS PLAN
TYPICAL DETAILS

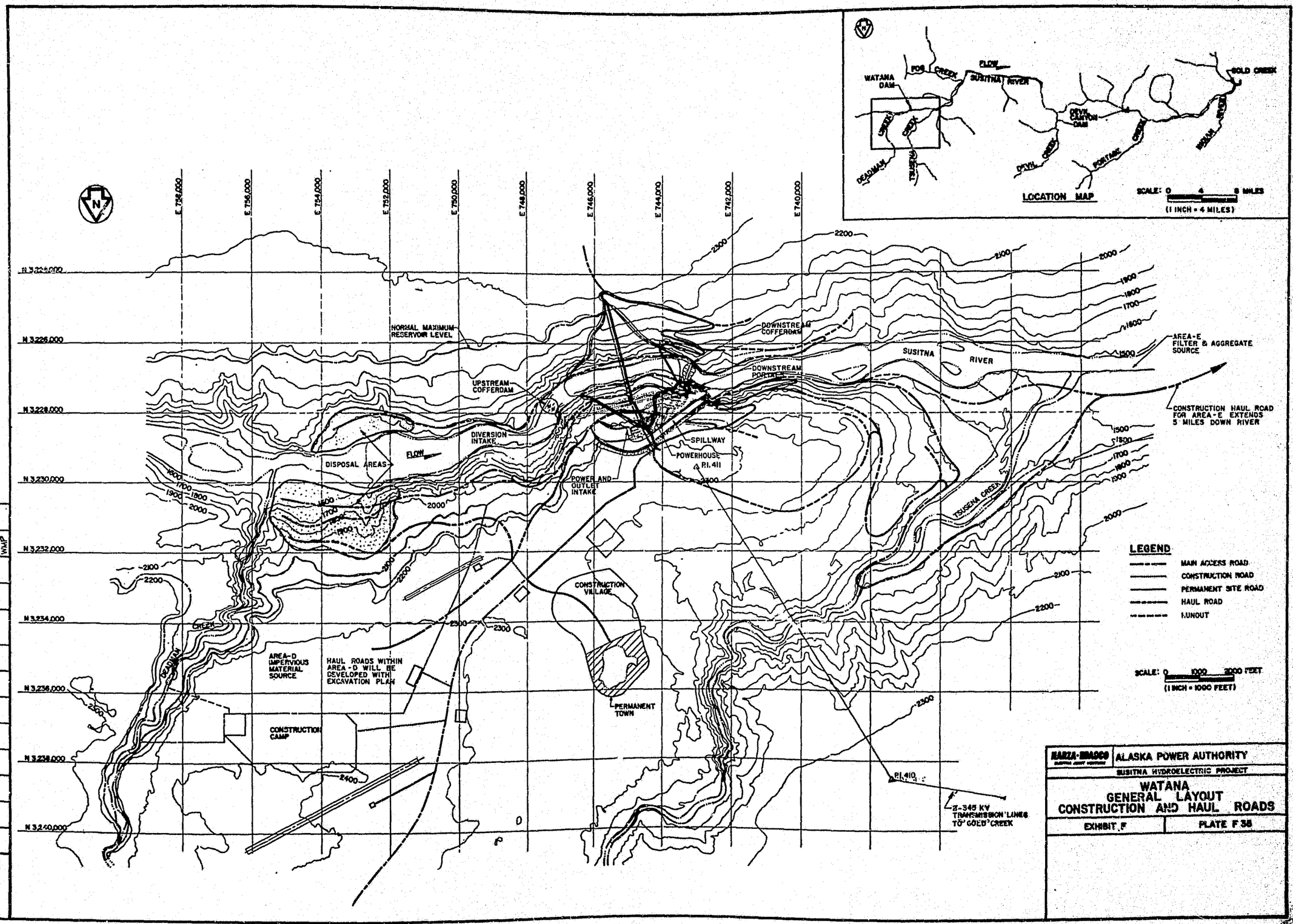
EXHIBIT F | PLATE F 33





MARTA-HRADEC	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
WATANA GENERAL LAYOUT SITE FACILITIES	
EXHIBIT F	PLATE F34

DWG. NO. 7114 - 34

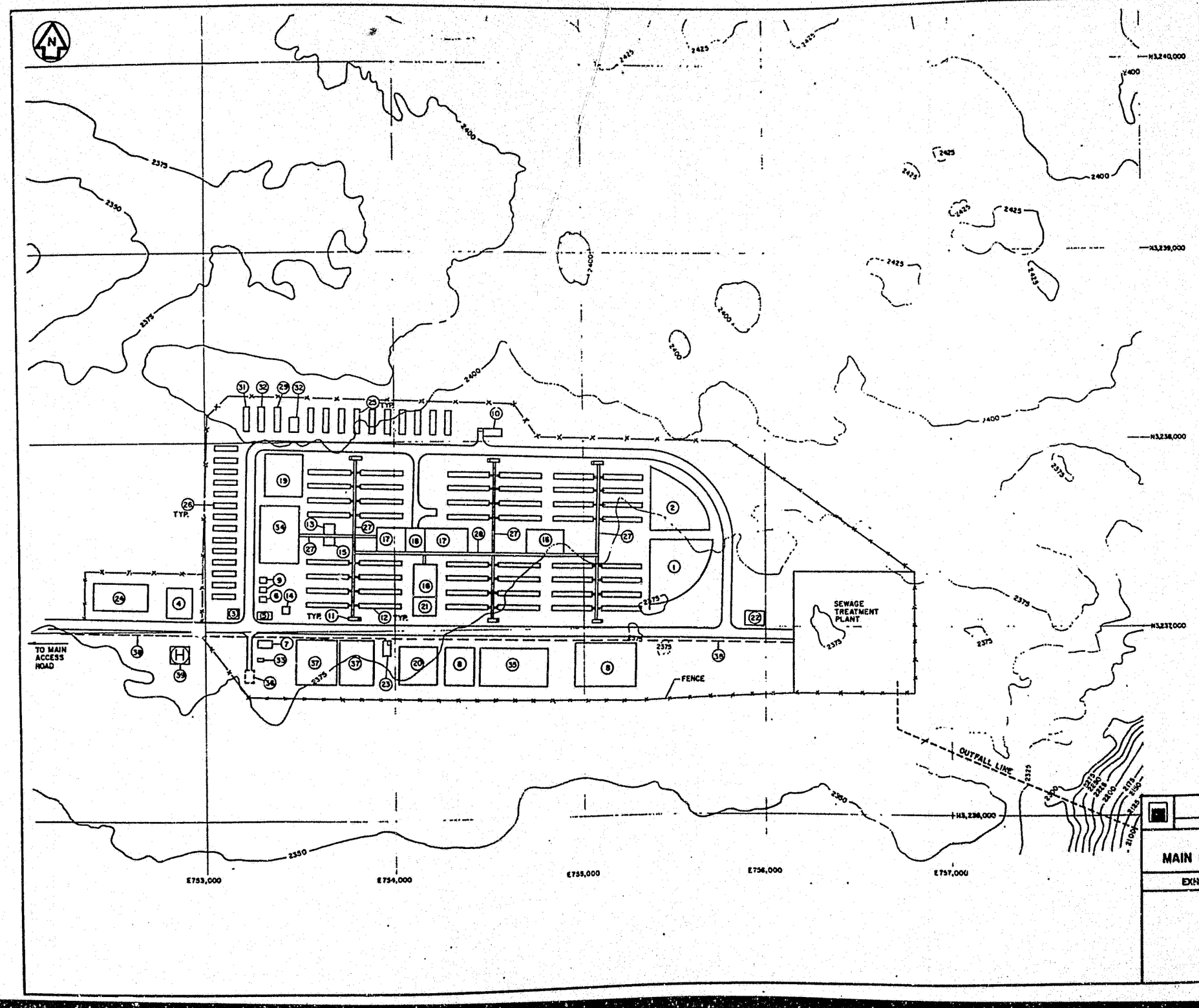


HARZA-EBASCO | ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

WATANA GENERAL LAYOUT CONSTRUCTION AND HAUL ROADS

EXHIBIT F | PLATE F 38



LEGEND

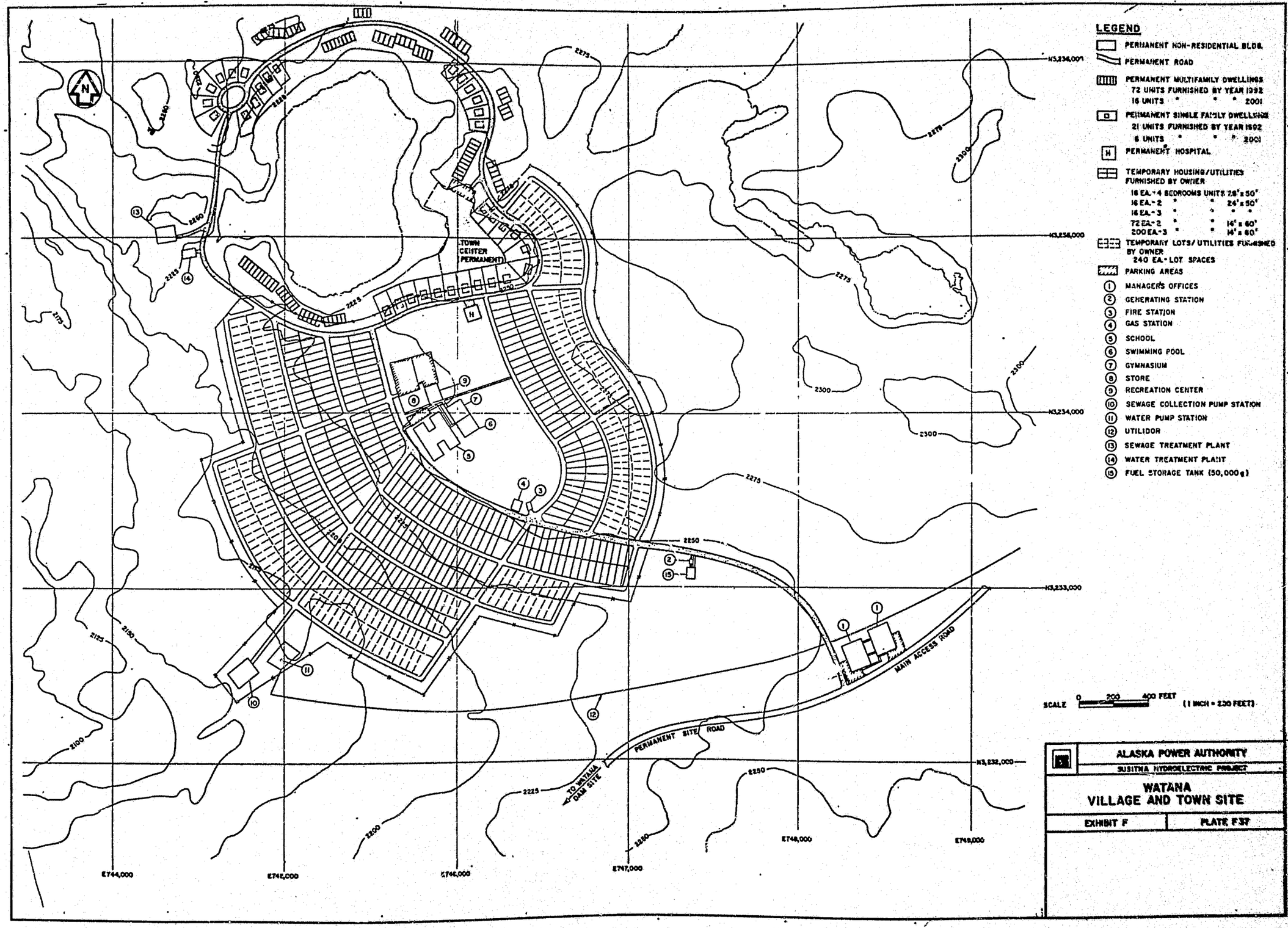
1. BASEBALL
2. SOFTBALL
3. SECURITY
4. HOSPITAL
5. FIRE & OIL SPILL
6. CAMP MANAGER'S OFFICE
7. SOILS LAB
8. PARKING AREAS
9. ADMINISTRATION OFFICES
10. STORE
11. BUS SHELTERS
12. DORMITORIES
13. LAUNDRY
14. COMMUNICATIONS CTR.
15. BANK
16. RECREATION HALL
17. KITCHEN & DINING
18. FOOD SERVICE WAREHOUSE
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

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

WATANA
MAIN CONSTRUCTION CAMP SITE

EXHIBIT F | PLATE F38



LEGEND

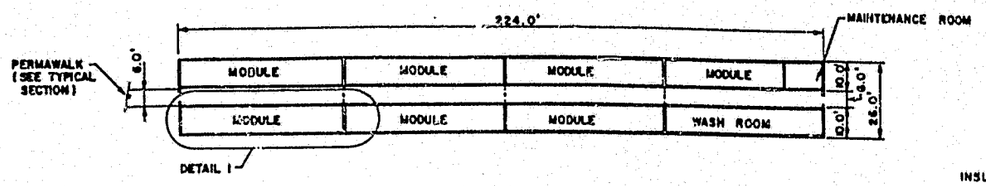
- PERMANENT NON-RESIDENTIAL BLDG.
- PERMANENT ROAD
- PERMANENT MULTIFAMILY DWELLINGS
  - 72 UNITS FURNISHED BY YEAR 1992
  - 16 UNITS " " " 2001
- PERMANENT SINGLE FAMILY DWELLINGS
  - 21 UNITS FURNISHED BY YEAR 1992
  - 6 UNITS " " " 2001
- H PERMANENT HOSPITAL
- TEMPORARY HOUSING/UTILITIES FURNISHED BY OWNER
  - 16 EA.-4 BEDROOMS UNITS 28'x50'
  - 16 EA.-2 " " 24'x50'
  - 16 EA.-3 " " " "
  - 72 EA.-2 " " 14'x60'
  - 200 EA.-3 " " 14'x60'
- 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)

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

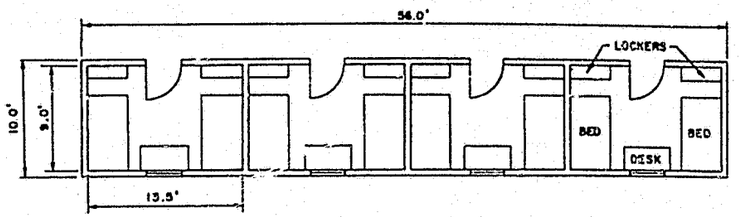
WATANA VILLAGE AND TOWN SITE

EXHIBIT F	PLATE F-37



TYPICAL DORM TWO MAN SLEEPING ROOMS (2 STORY, 8 MODULES PER STORY)

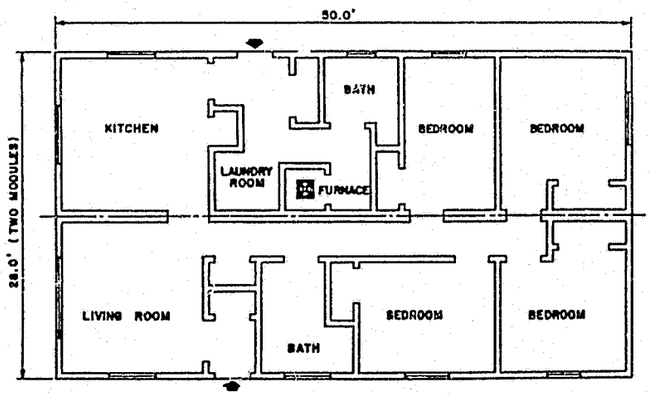
SCALE: B



DETAIL 1

TYPICAL DORMITORY MODULE

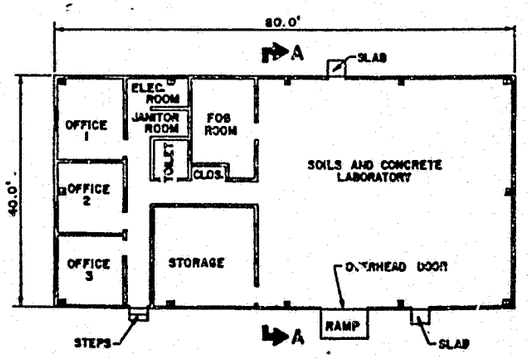
SCALE: C



TYPICAL WOOD FRAME MODULAR HOUSE

FOUR BEDROOM FAMILY UNIT

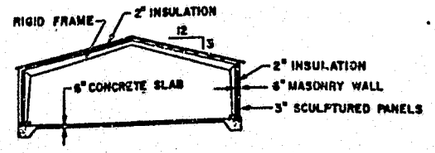
SCALE: C



TYPICAL STEEL FRAME BUILDING

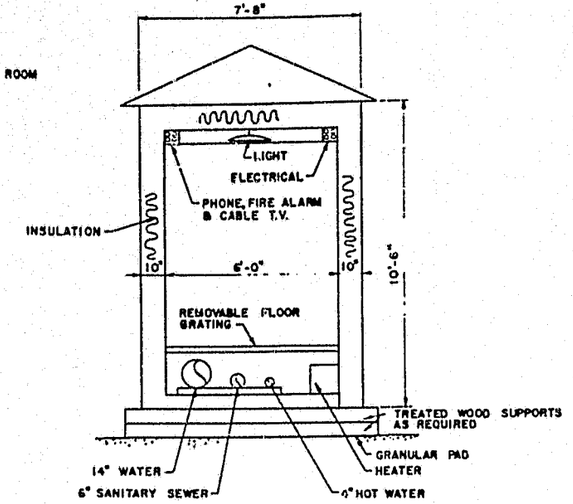
SOILS AND CONCRETE LABORATORY

SCALE: A



SECTION A-A

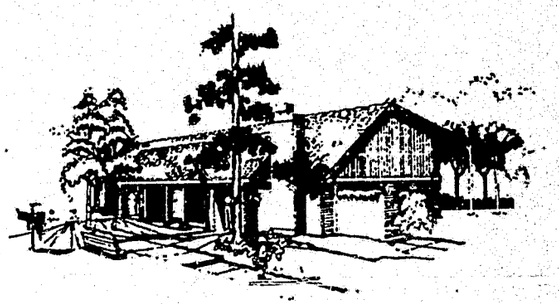
SCALE: A



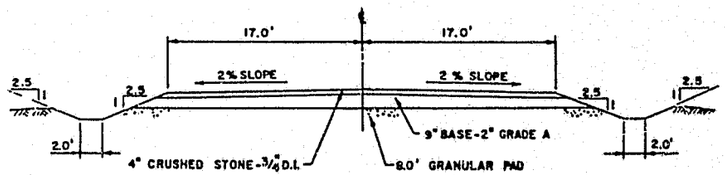
TYPICAL PERMAWALK

WITH UTILIDOR (AT DORMS)

SCALE: D

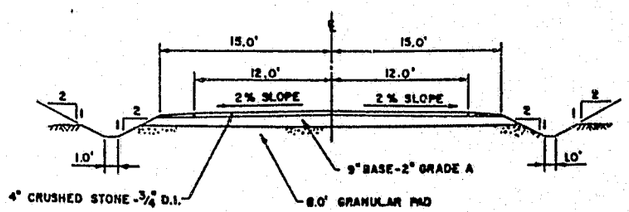


PERMANENT VILLAGE HOUSING



TYPICAL SECTION - PERMANENT SITE ROAD

SCALE: C



TYPICAL SECTION - SECONDARY SITE ROAD

SCALE: C

SCALE D 0 2 4 FEET (1/2 INCH = 1 FEET)

SCALE C 0 5 10 FEET (1 INCH = 5 FEET)

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

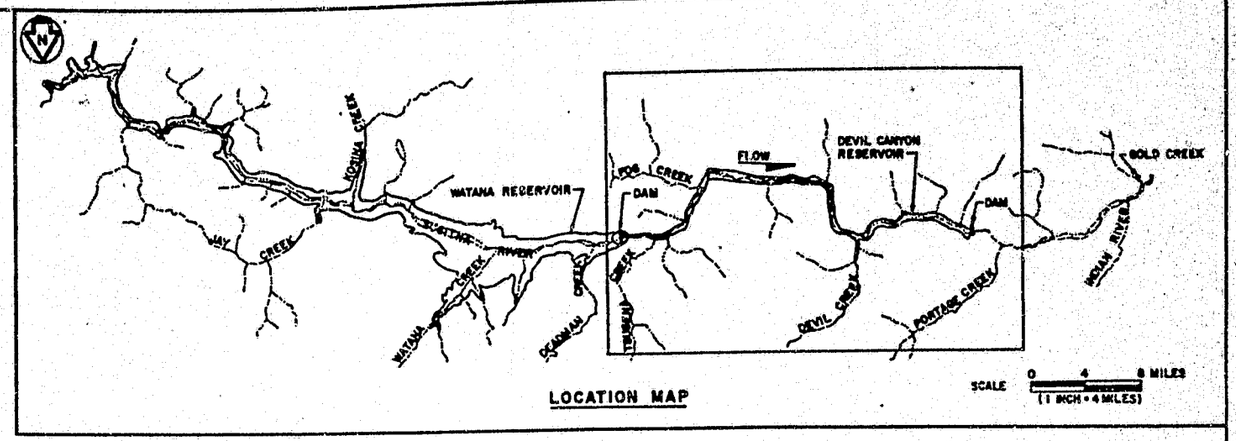
SCALE A 0 10 20 FEET (1 INCH = 10 FEET)

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

WATANA AND DEVIL CANYON CONSTRUCTION CAMP DETAILS

EXHIBIT F | PLATE F38

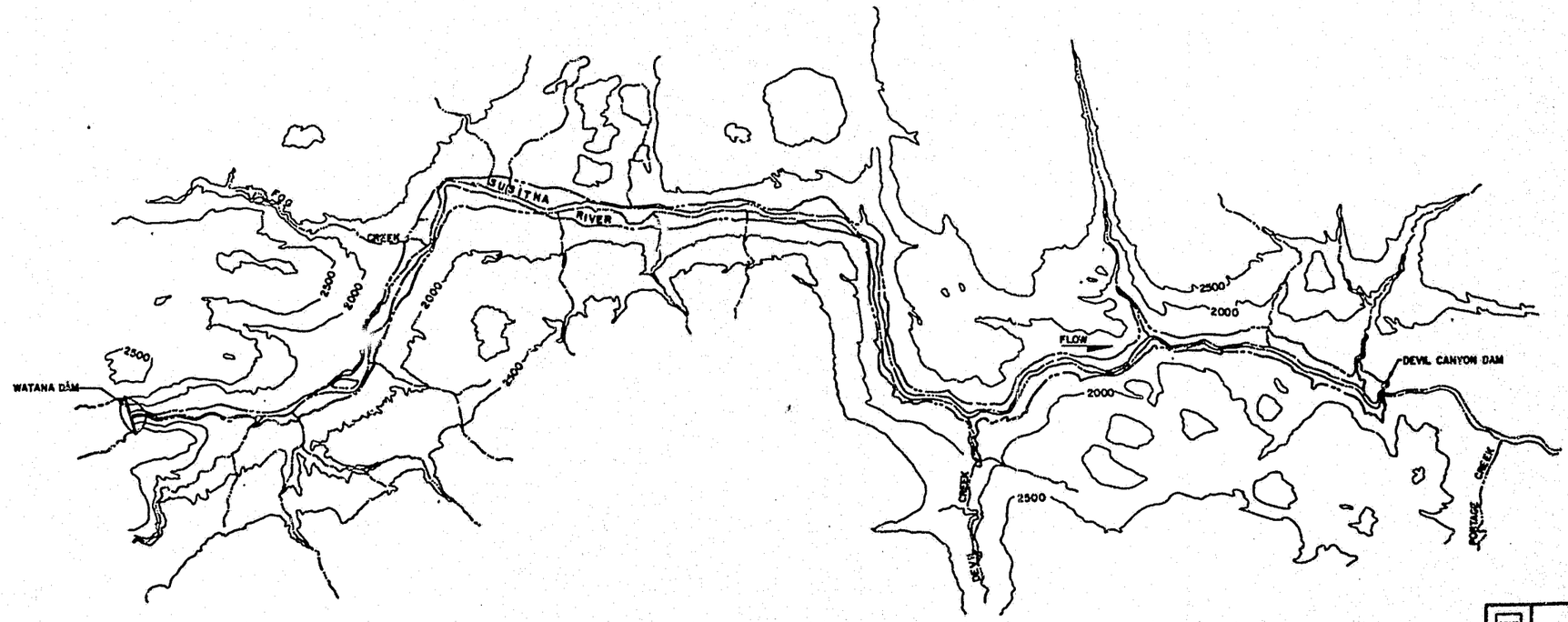


LOCATION MAP

LEGEND

NORMAL MAXIMUM OPERATING LEVEL EL. 1455

2000 CONTOUR IN FEET ABOVE MSL



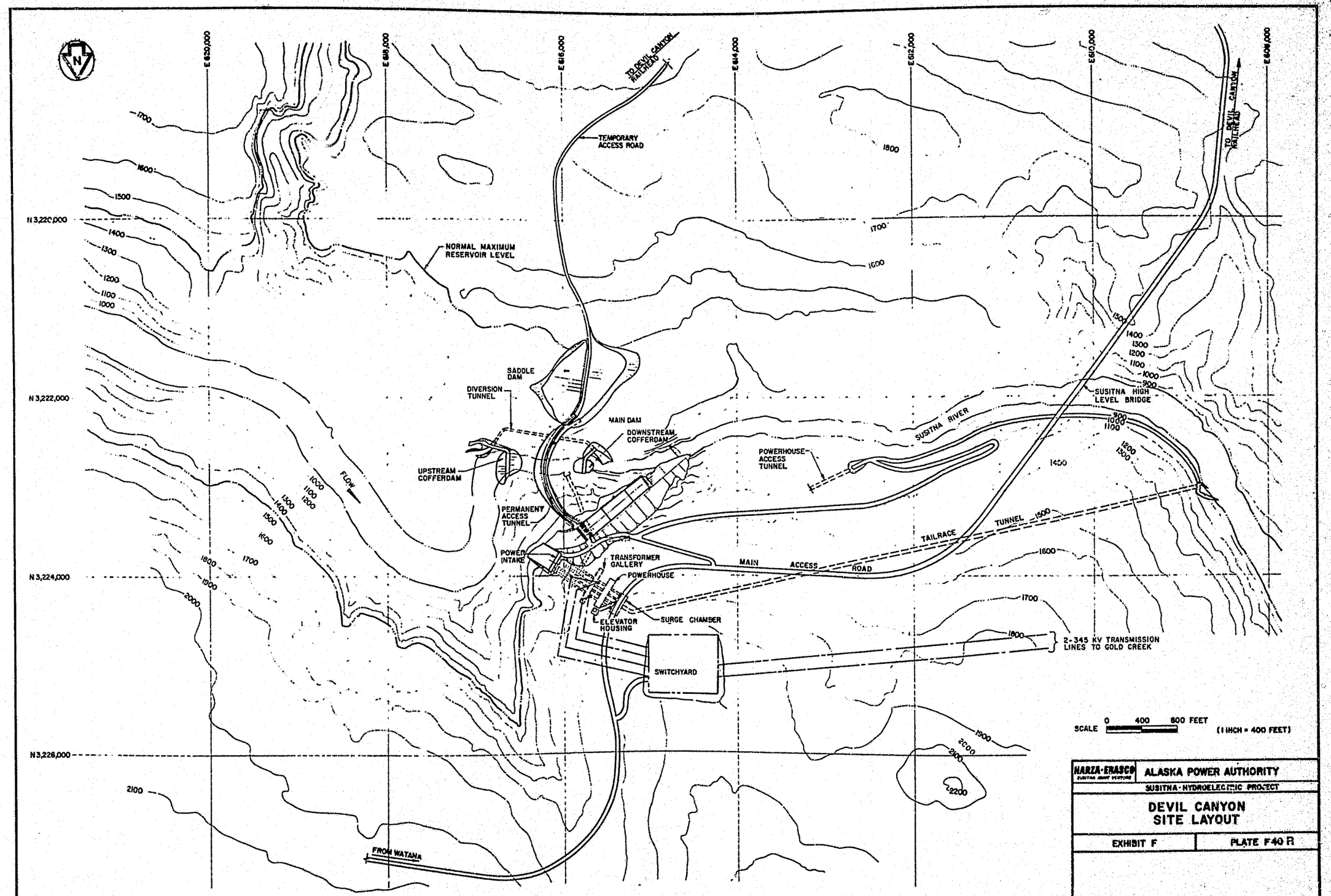
PLAN

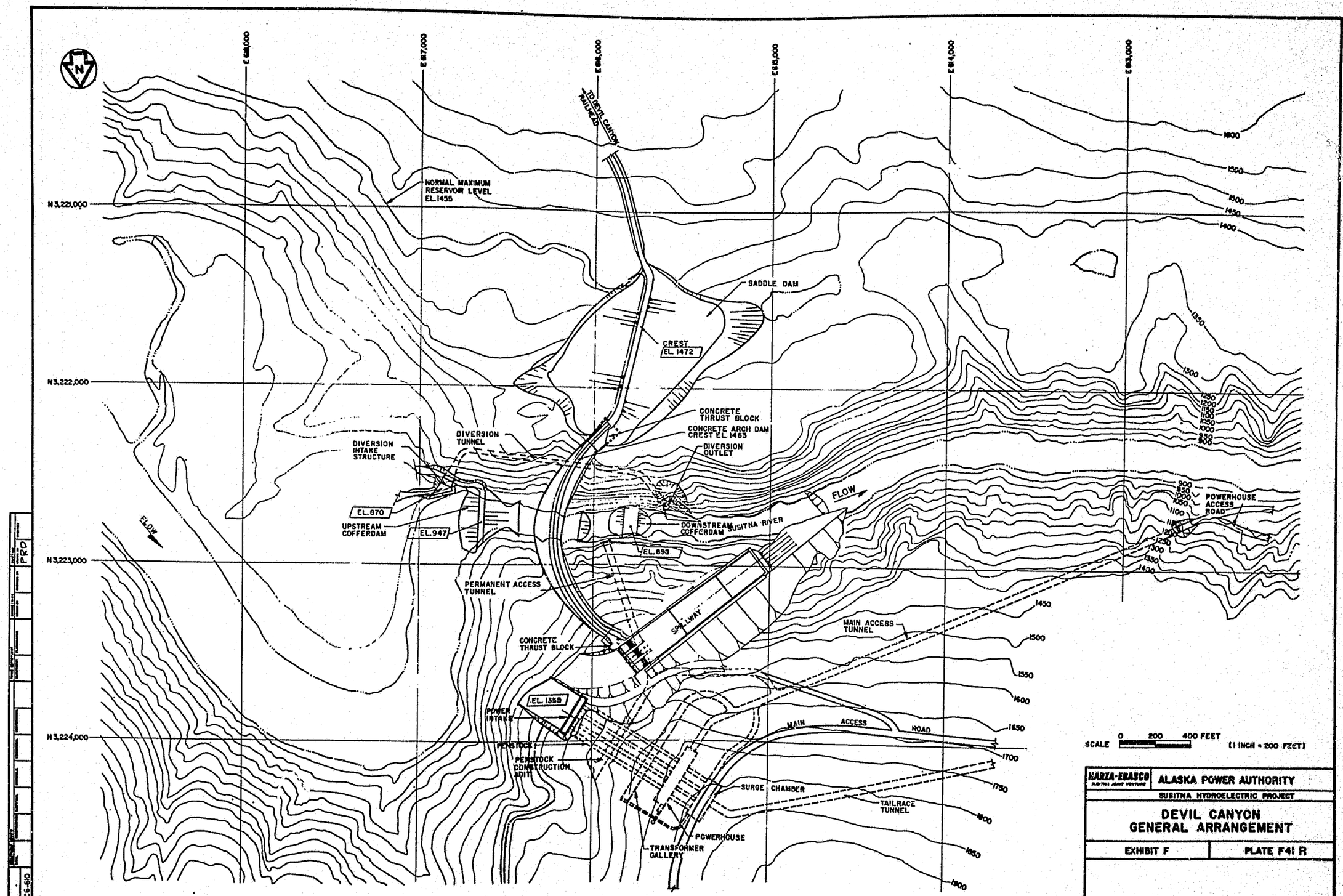
ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON RESERVOIR PLAN

EXHIBIT F | PLATE F39


E 620,000
E 618,000
E 616,000
E 614,000
E 612,000
E 610,000
E 608,000
N 3,220,000
N 3,222,000
N 3,224,000
N 3,226,000
TO DEVIL CANYON RAILHEAD
TEMPORARY ACCESS ROAD
NORMAL MAXIMUM RESERVOIR LEVEL
SADDLE DAM
DIVERSION TUNNEL
MAIN DAM
DOWNSTREAM COFFERDAM
UPSTREAM COFFERDAM
FLOW
PERMANENT ACCESS TUNNEL
POWER INTAKE
TRANSFORMER GALLERY
POWERHOUSE
ELEVATOR HOUSING
SURGE CHAMBER
SWITCHYARD
POWERHOUSE ACCESS TUNNEL
SUSITNA RIVER
SUSITNA HIGH LEVEL BRIDGE
TAILRACE TUNNEL
MAIN ACCESS ROAD
2-345 KV TRANSMISSION LINES TO GOLD CREEK
FROM WATANA
SCALE 0 400 800 FEET (1 INCH = 400 FEET)
HARZA-EBASCO SUSITNA JOINT VENTURE
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
DEVIL CANYON SITE LAYOUT
EXHIBIT F
PLATE F40 R
DWG. NO. 7114-40

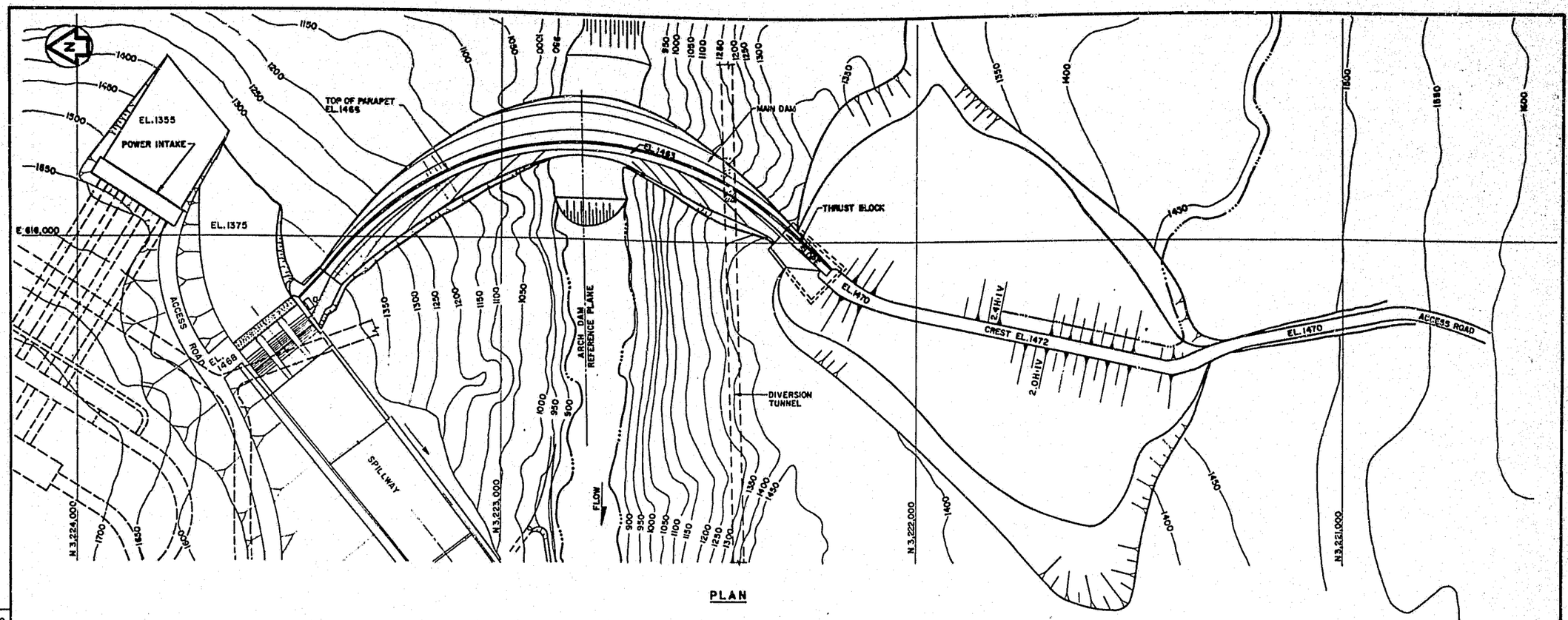


KARZA-EBASCO
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

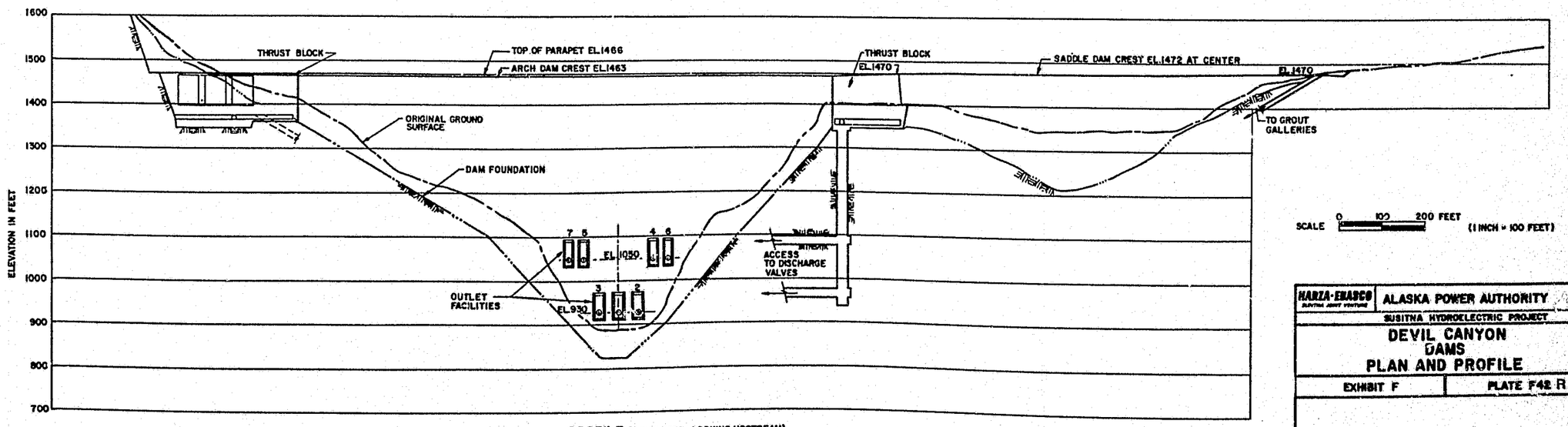
DEVIL CANYON GENERAL ARRANGEMENT

EXHIBIT F | PLATE F41 R

DWG. NO. 7114-41



PLAN



PROFILE (DEVELOPED-LOOKING UPSTREAM)

HARZA-EBASCO SUSITNA JOINT VENTURE	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON DAMS PLAN AND PROFILE	
EXHIBIT F	PLATE F42 R

DWG. NO. 7114-42

SK-5700-C6-613

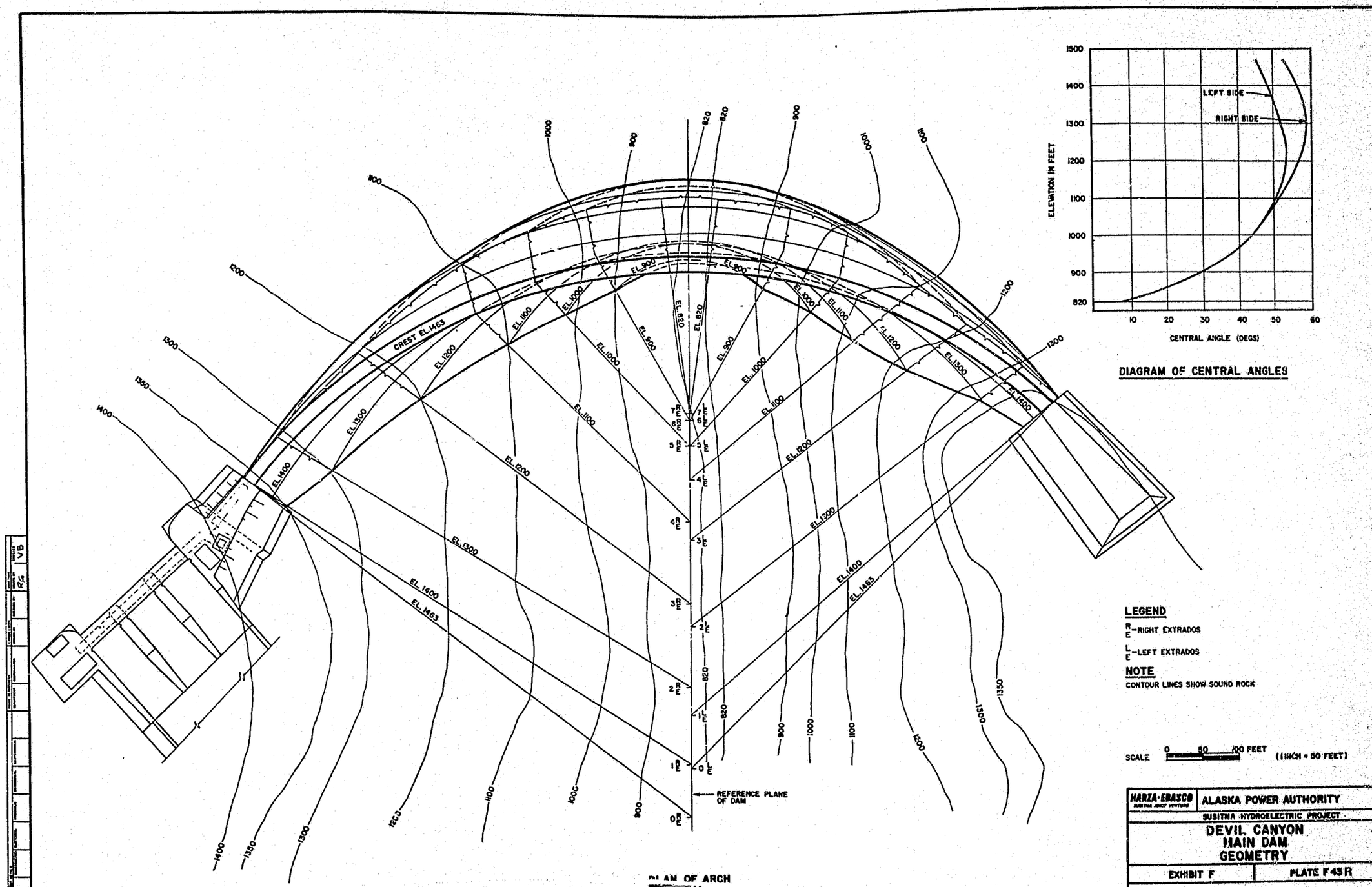


DIAGRAM OF CENTRAL ANGLES

LEGEND

RE–RIGHT EXTRADOS

LE–LEFT EXTRADOS

NOTE

CONTOUR LINES SHOW SOUND ROCK

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

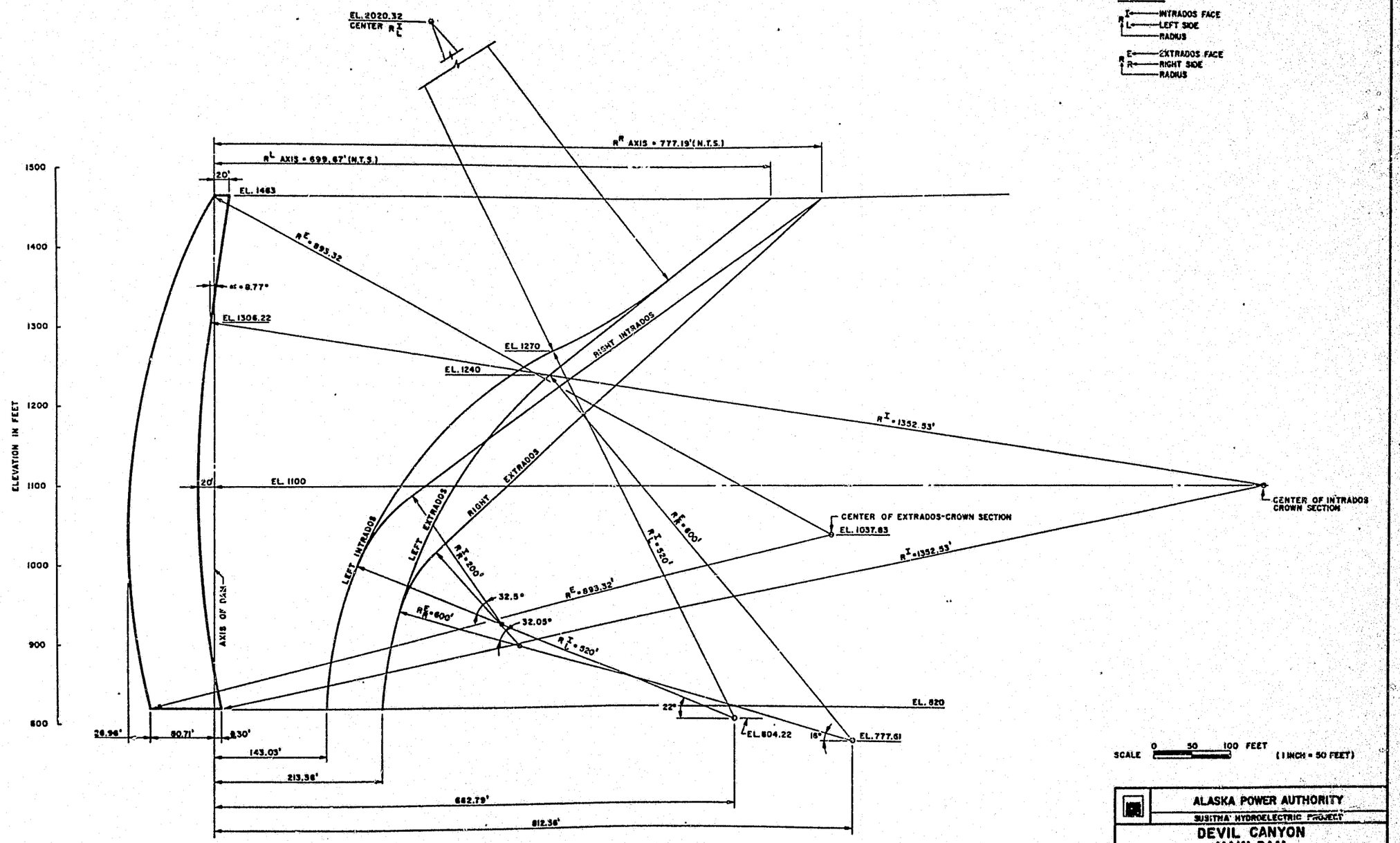
HARZA-EBASCO SUSITNA JOINT VENTURE | ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON MAIN DAM GEOMETRY

EXHIBIT F | PLATE F43R

DWG. NO. 7114-F43



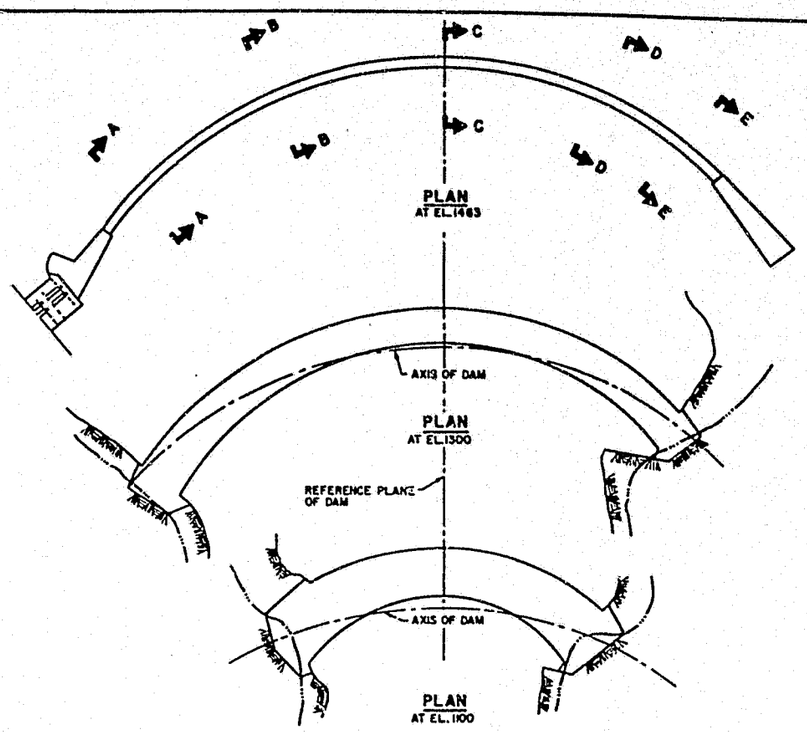
ALASKA POWER AUTHORITY

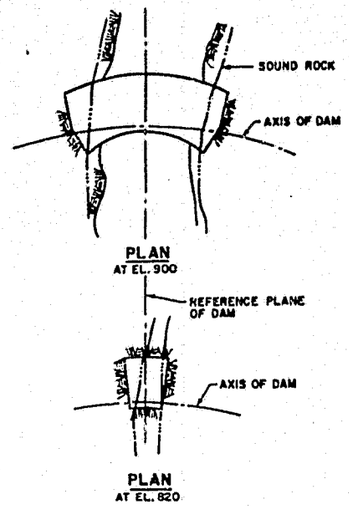
SUSITNA HYDROELECTRIC PROJECT

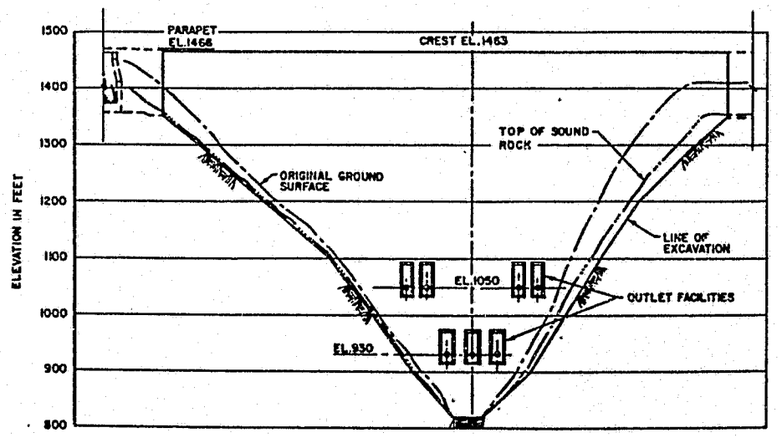
DEVIL CANYON MAIN DAM CROWN SECTION

EXHIBIT F

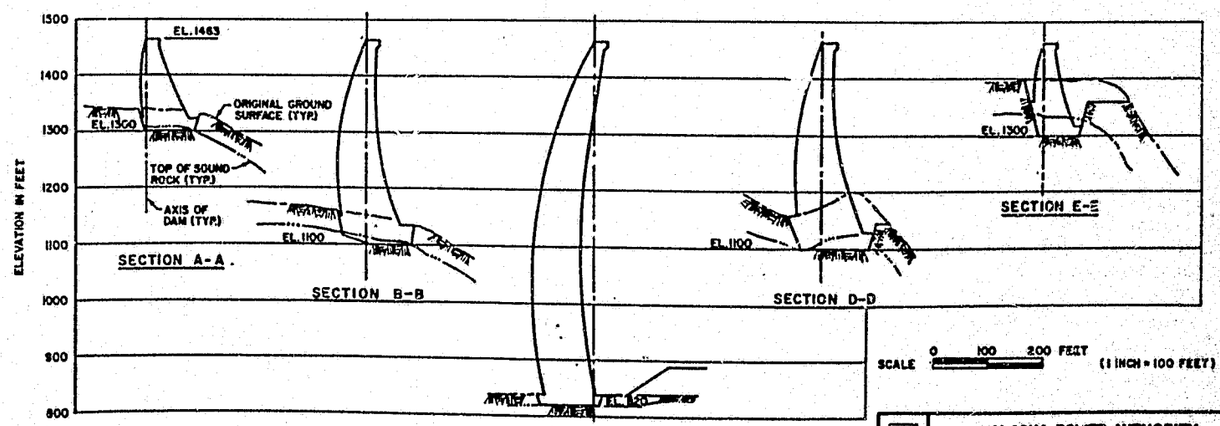
PLATE F44







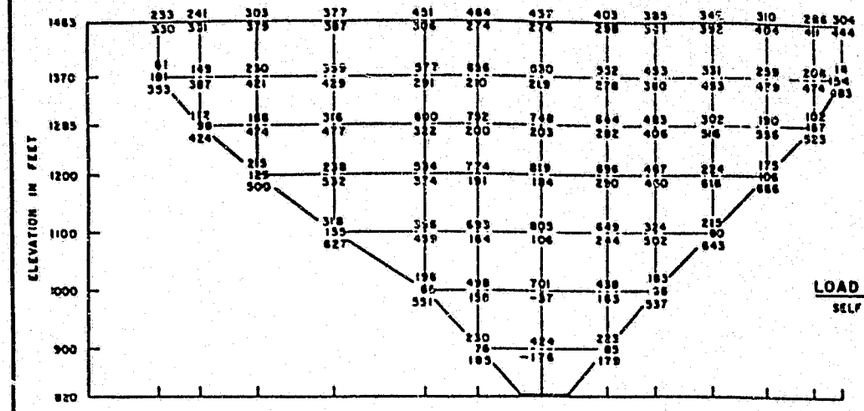
DAM PROFILE

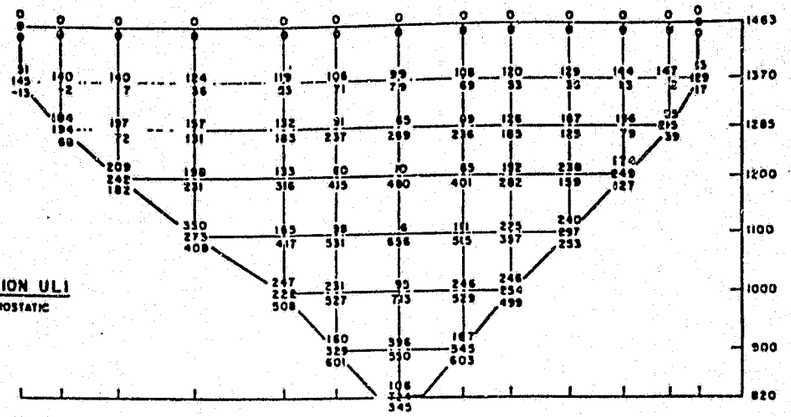


DAM SECTIONS
(PARAPET NOT SHOWN)

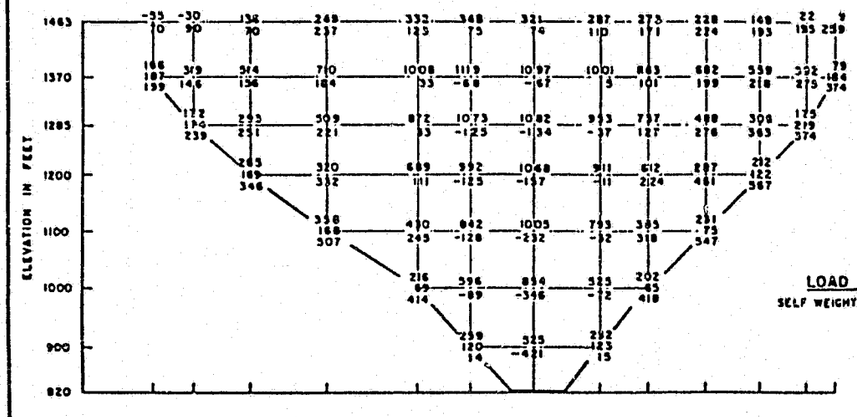
SCALE 0 100 200 FEET (1 INCH = 100 FEET)

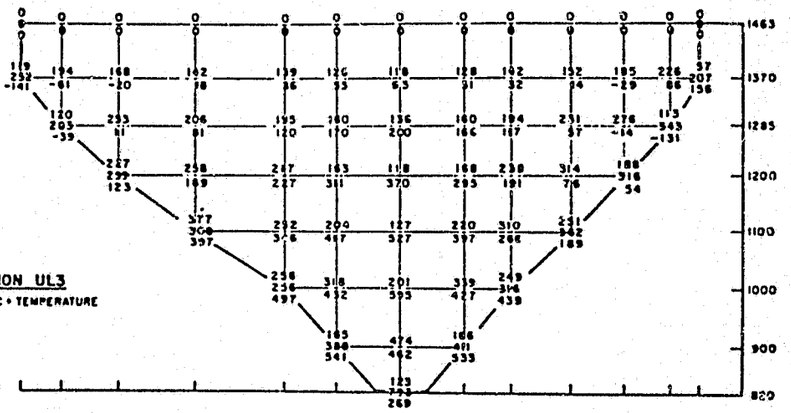
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
DEVIL CANYON
MAIN DAM
SECTIONS
EXHIBIT F | PLATE F-45



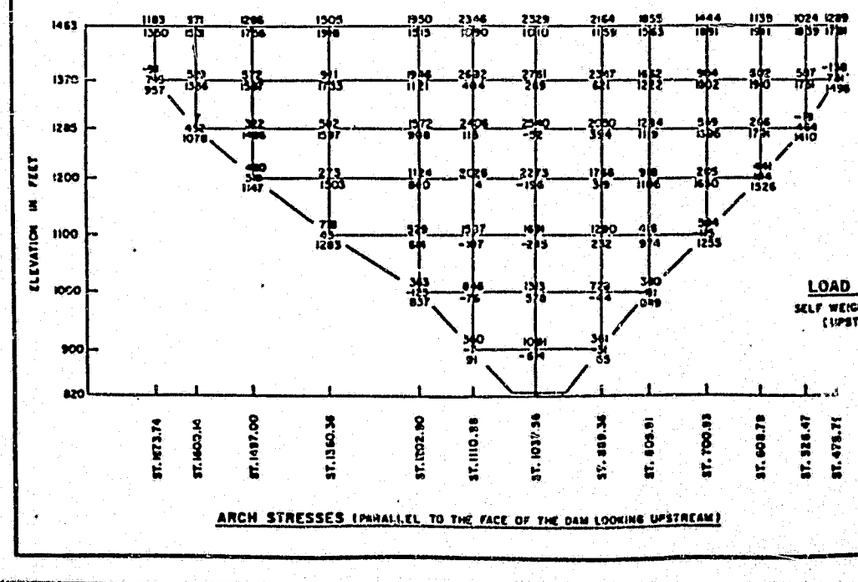


LOAD COMBINATION UL1
SELF WEIGHT + HYDROSTATIC



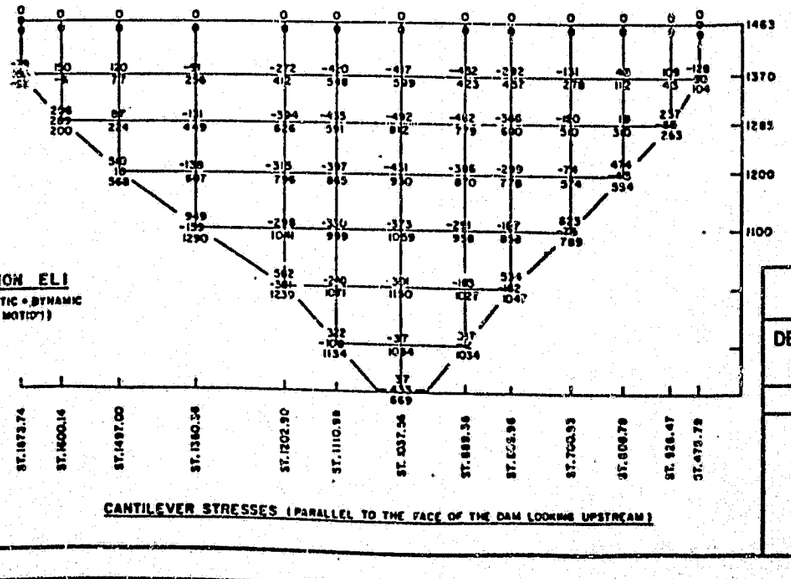


LOAD COMBINATION UL3
SELF WEIGHT + HYDROSTATIC + TEMPERATURE



LOAD COMBINATION EL1
SELF WEIGHT + HYDROSTATIC + DYNAMIC
(UPSTREAM GROUND MOTION)

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

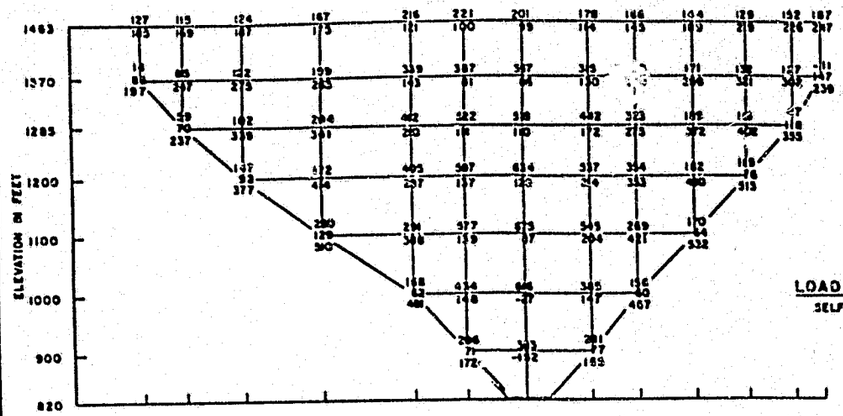


CANTILEVER STRESSES (PARALLEL TO THE FACE OF THE DAM LOOKING UPSTREAM)

LEGEND

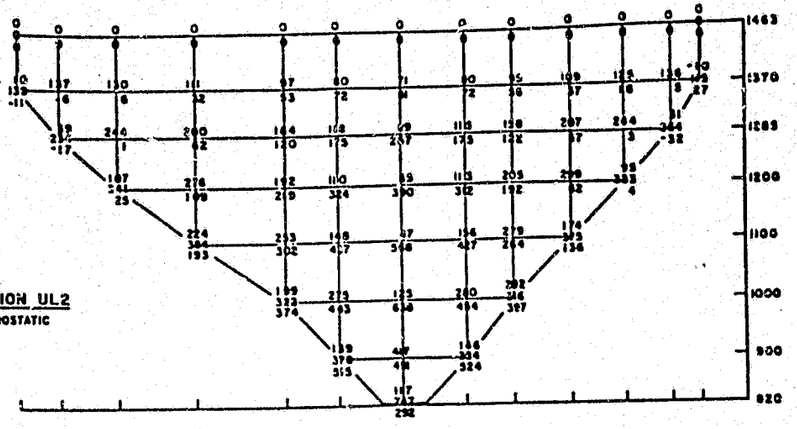
- (MINUS) INDICATES TENSION
- SHEAR STRESS IN PSI, WHERE SHOWN
- STRESS AT UPSTREAM OR EXTRADOS FACE
- STRESS AT DOWNSTREAM OR INTRADOS FACE

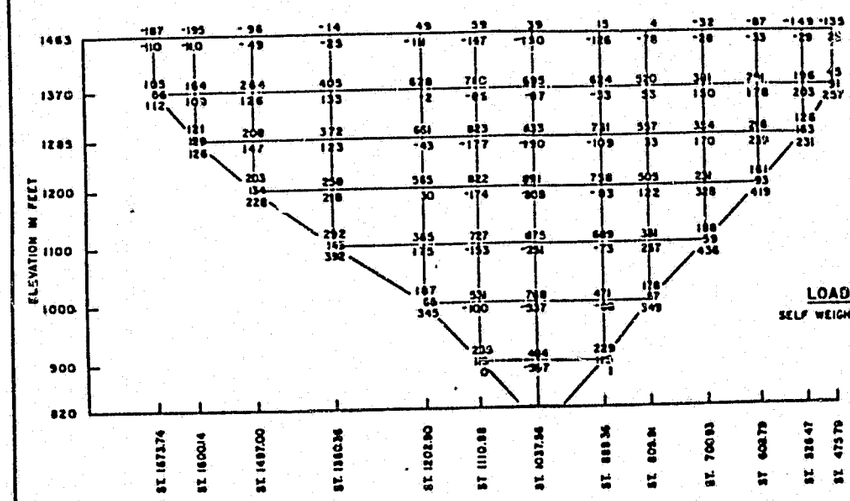
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON ARCH DAM STRESSES RESERVOIR AT EL. 1455	
EXHIBIT F	PLATE F45 A



LOAD COMBINATION UL2

SELF WEIGHT + HYDROSTATIC

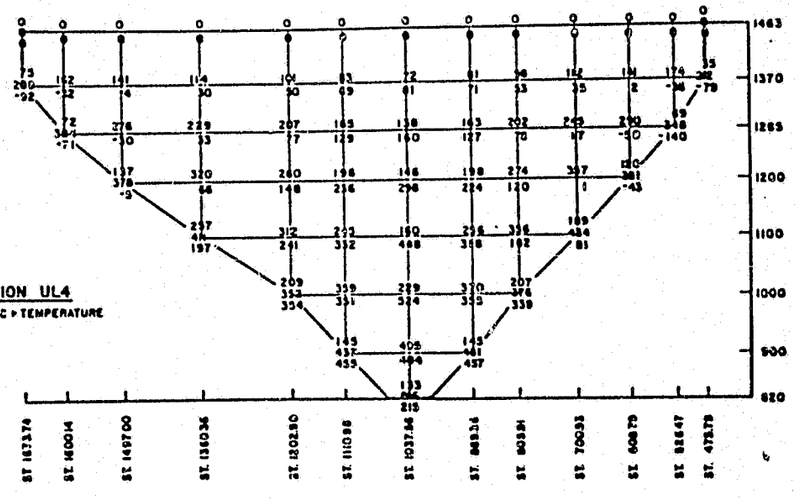




ARCH STRESSES (PARALLEL TO THE FACE OF THE DAM LOOKING UPSTREAM)

LOAD COMBINATION UL4

SELF WEIGHT + HYDROSTATIC + TEMPERATURE



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

LEGEND

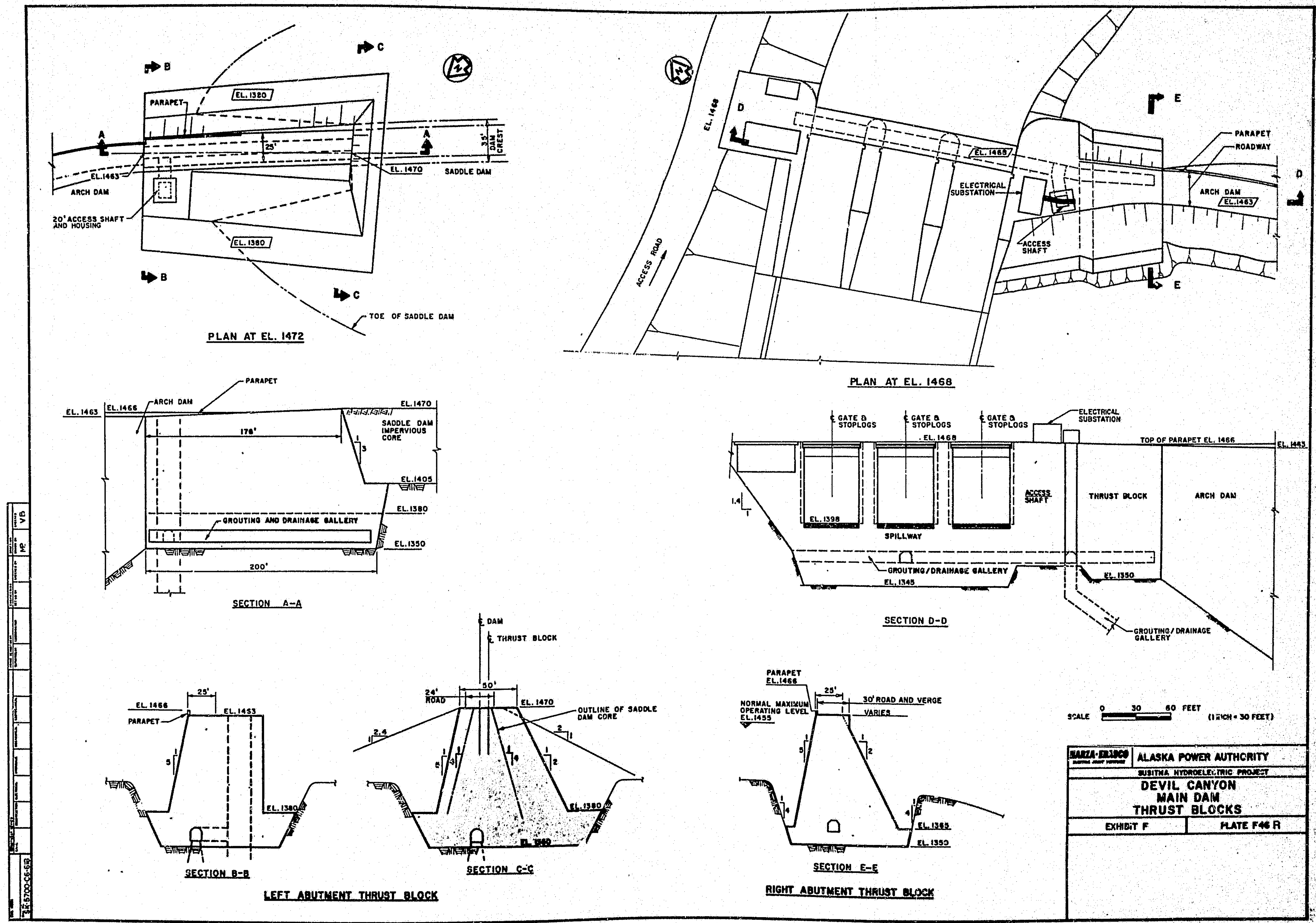
— (MINUS) INDICATES TENSION

SHEAR STRESS IF R.S.I. WHERE SHOWN

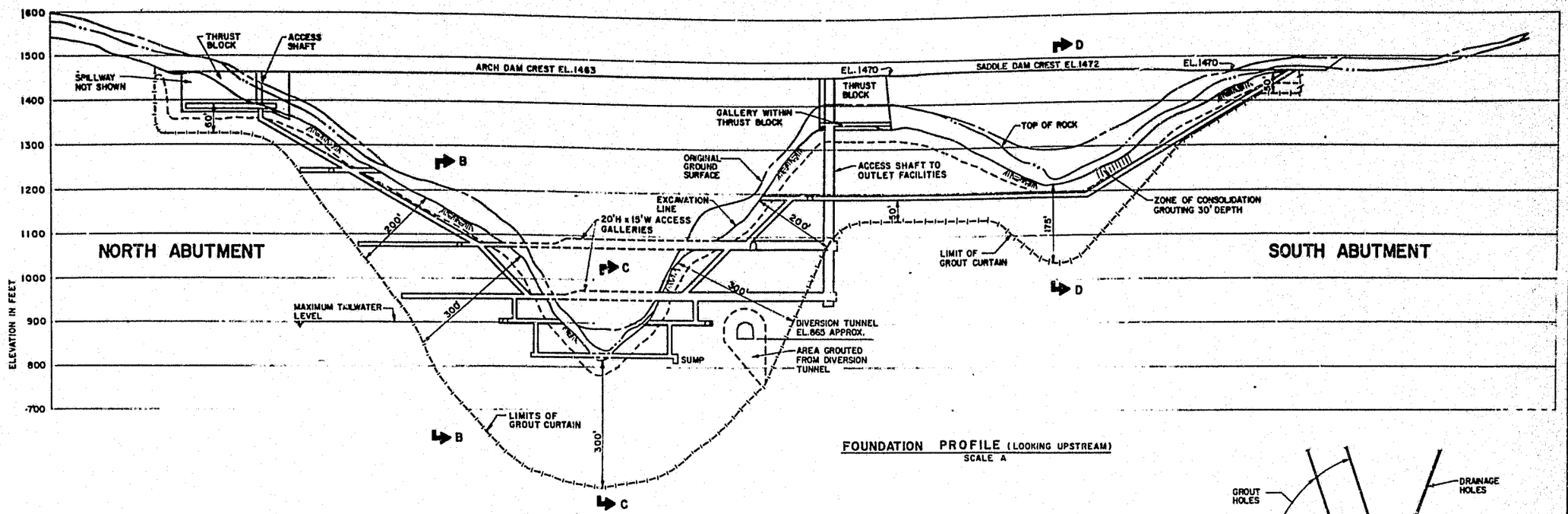
STRESS AT UPSTREAM OR EXTRADOS FACE

STRESS AT DOWNSTREAM OR INTRADOS FACE

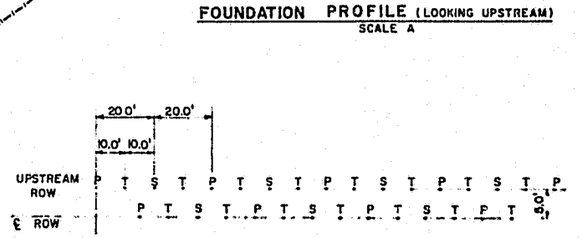
ALASKA POWER AUTHORITY	
SUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON ARCH DAM STRESSES RESERVOIR AT EL. 1405	
EXHIBIT F	PLATE F45



PLAN AT EL. 1472
PARAPET
EL. 1320
EL. 1463
ARCH DAM
20' ACCESS SHAFT AND HOUSING
EL. 1470
SADDLE DAM
35' DAM CREST
25'
EL. 1380
TOE OF SADDLE DAM
PLAN AT EL. 1468
EL. 1468
ACCESS ROAD
ELECTRICAL SUBSTATION
ACCESS SHAFT
PARAPET
ROADWAY
ARCH DAM
EL. 1463
SECTION A-A
EL. 1463
EL. 1466
ARCH DAM
178'
EL. 1470
SADDLE DAM IMPERVIOUS CORE
EL. 1405
EL. 1380
GROUTING AND DRAINAGE GALLERY
EL. 1350
200'
SECTION D-D
GATE & STOPLOGS
GATE & STOPLOGS
GATE & STOPLOGS
ELECTRICAL SUBSTATION
EL. 1468
TOP OF PARAPET EL. 1466
EL. 1463
ACCESS SHAFT
THRUST BLOCK
ARCH DAM
EL. 1398
SPILLWAY
GROUTING/DRAINAGE GALLERY
EL. 1345
EL. 1350
GROUTING/DRAINAGE GALLERY
SECTION B-B
EL. 1466
PARAPET
25'
EL. 1453
EL. 1380
SECTION C-C
DAM
THRUST BLOCK
24' ROAD
50'
EL. 1470
OUTLINE OF SADDLE DAM CORE
EL. 1380
EL. 1360
LEFT ABUTMENT THRUST BLOCK
SECTION E-E
PARAPET EL. 1466
NORMAL MAXIMUM OPERATING LEVEL EL. 1455
25'
30' ROAD AND VERGE
VARIES
EL. 1365
EL. 1350
RIGHT ABUTMENT THRUST BLOCK
SCALE 0 30 60 FEET (1 INCH = 30 FEET)
HARZA-EBASCO
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
DEVIL CANYON
MAIN DAM
THRUST BLOCKS
EXHIBIT F
PLATE F46 R

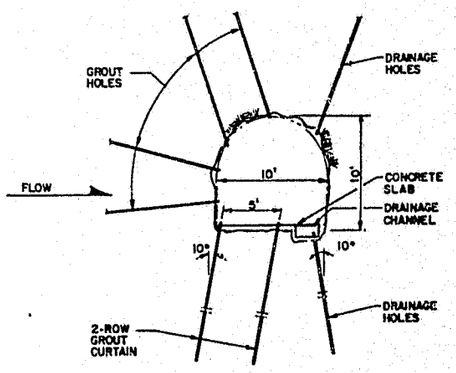


FOUNDATION PROFILE (LOOKING UPSTREAM)
SCALE A

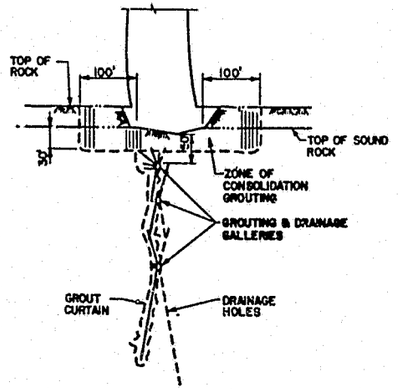


GROUT HOLE SPACING
SCALE C

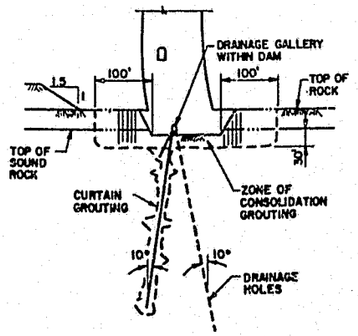
LEGEND
P = PRIMARY GROUT HOLE
S = SECONDARY GROUT HOLE
T = TERTIARY GROUT HOLE



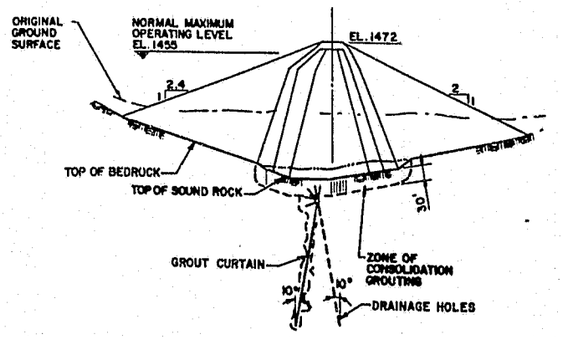
GALLERY DETAIL
SCALE B



SECTION B-B
SCALE A



SECTION C-C
SCALE A



SECTION D-D
SCALE A

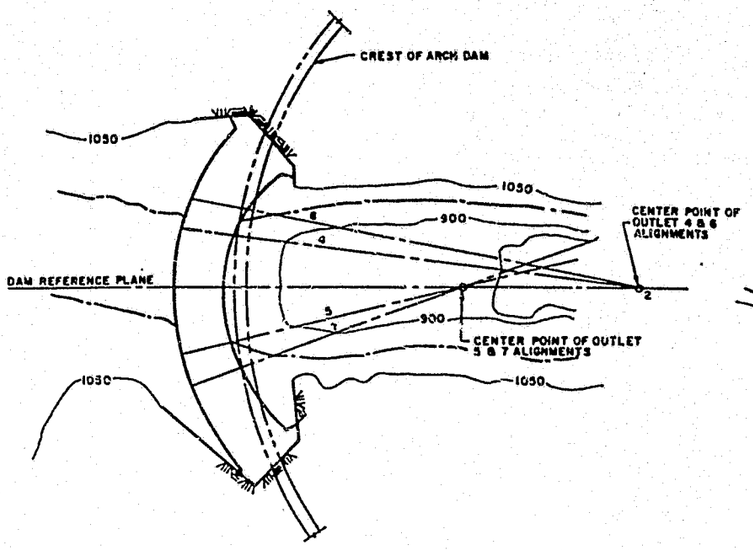
SCALE B 0 5 10 FEET (1 INCH = 5 FEET)
SCALE A 0 100 200 FEET (1 INCH = 100 FEET)

MARIA-ERASCO | ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

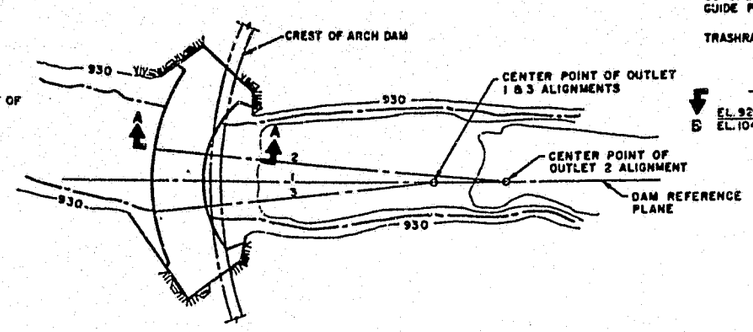
DEVIL CANYON MAIN DAM & SADDLE DAM GROUTING AND DRAINAGE

EXHIBIT F | PLATE F47R

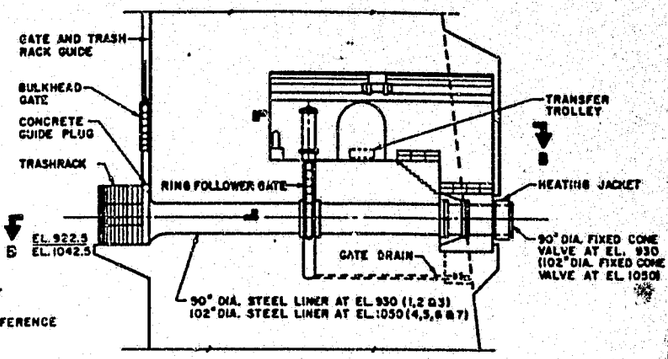
DWG. NO. 7114 - 47



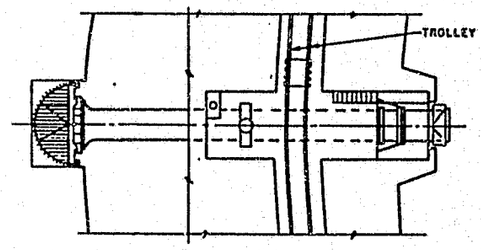
PLAN AT EL. 1050
SCALE A



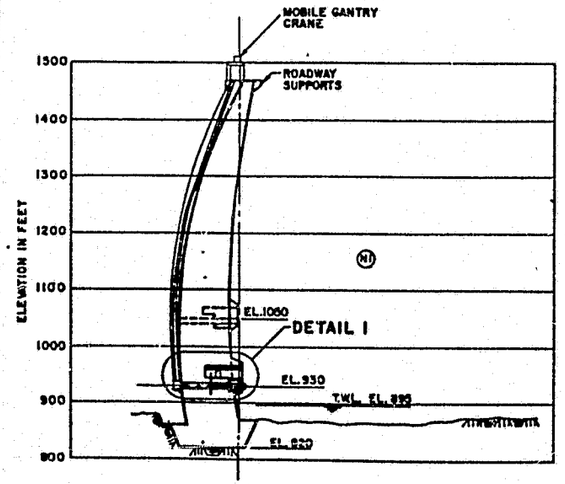
PLAN AT EL. 930
SCALE A



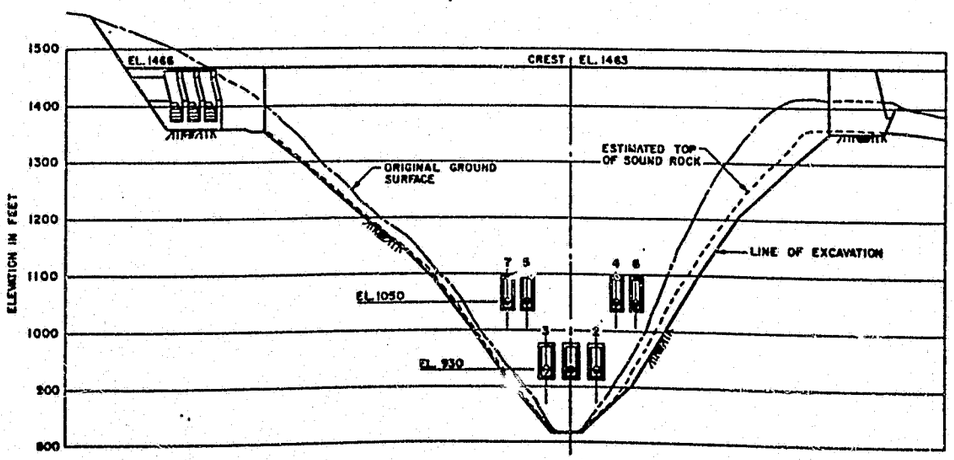
DETAIL I
SCALE B



SECTION B-B
SCALE B



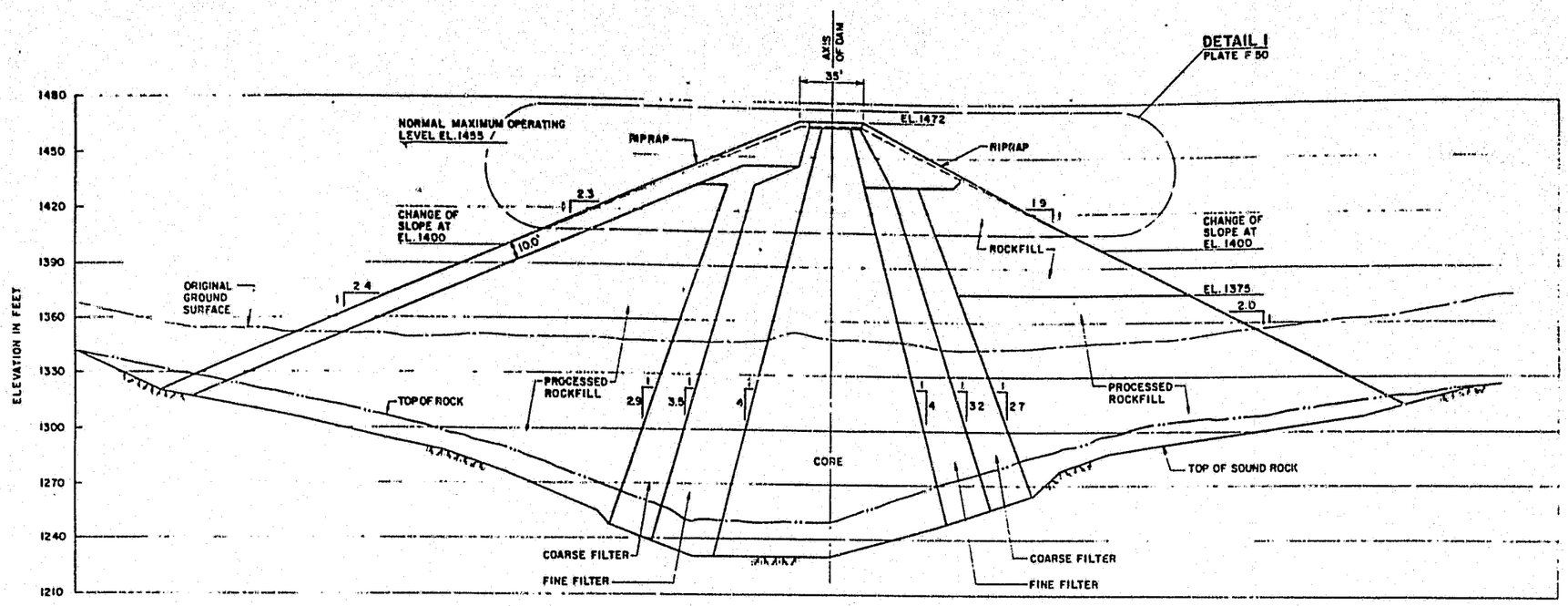
SECTION A-A (TYPICAL)
SCALE A



DAM PROFILE (PROJECTION-LOOKING UPSTREAM)
SCALE A

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

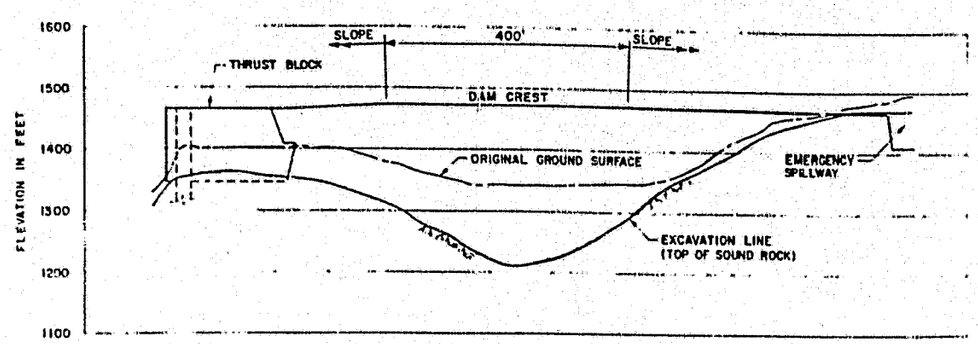
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
DEVIL CANYON
MAIN DAM
OUTLET FACILITIES
EXHIBIT F | PLATE F-48



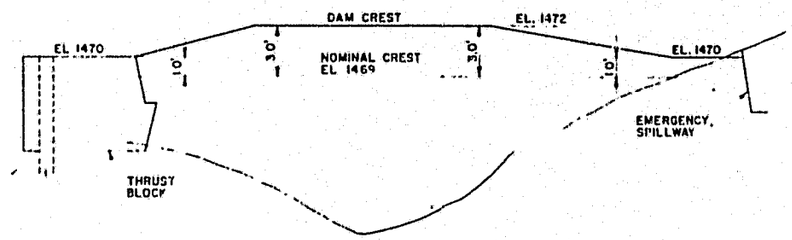
SECTION THROUGH SADDLE DAM
AT MAXIMUM HEIGHT

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

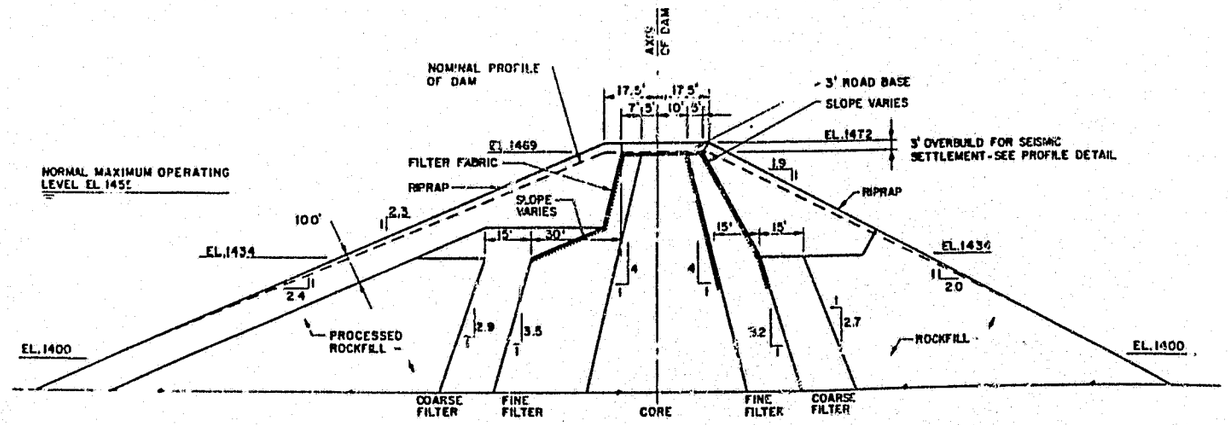
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
DEVIL CANYON
SADDLE DAM
SECTION
EXHIBIT F PLATE F49



PROFILE (LOOKING UPSTREAM)
SCALE A



PROFILE
SHOWING CREST ELEVATIONS
NTS

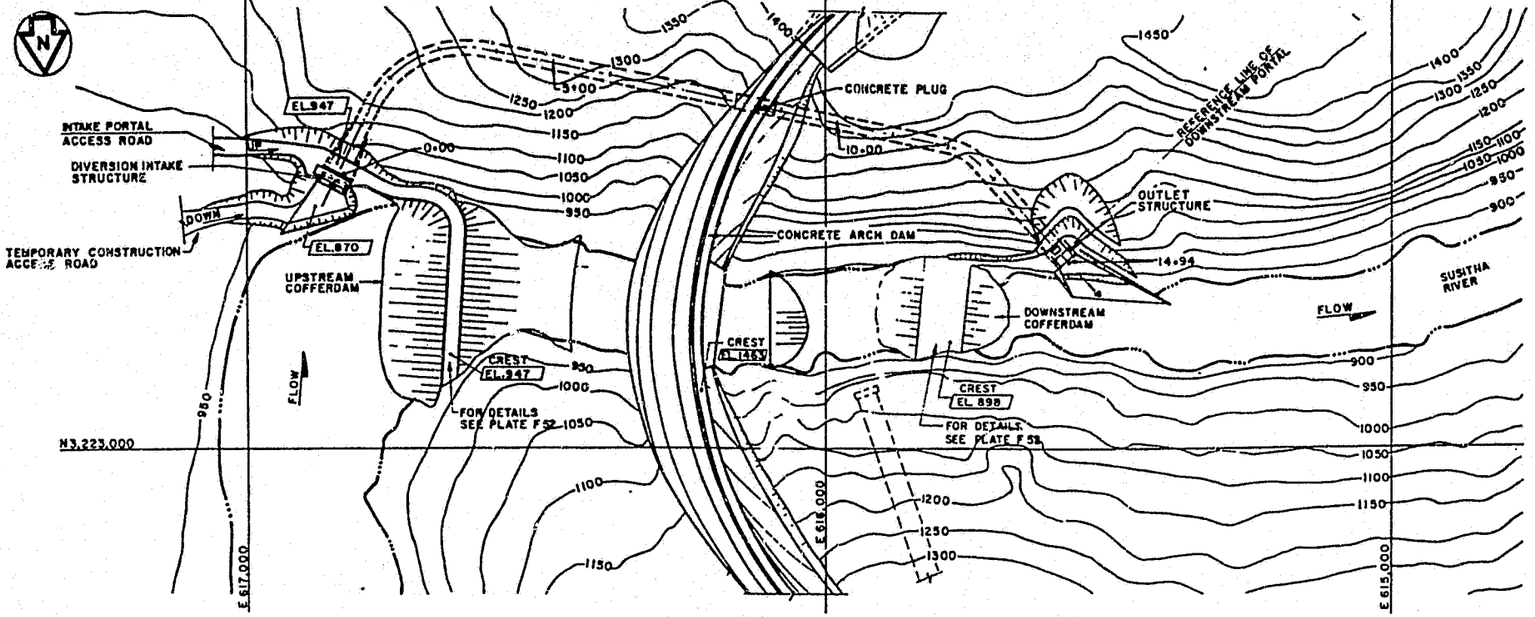


DETAIL 1
SCALE B (PLATE F49)

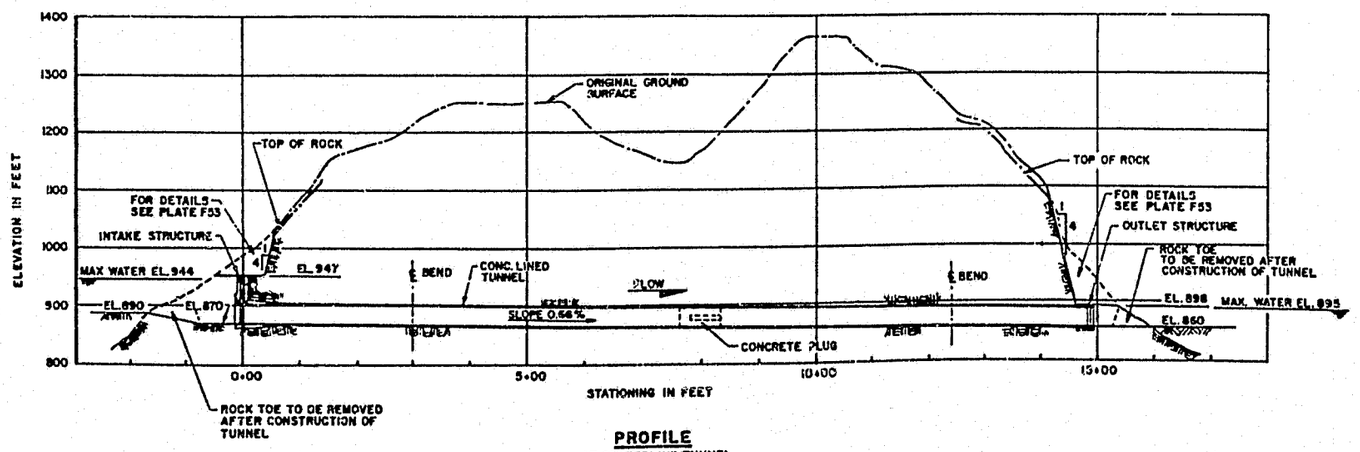
SCALE B 0 20 40 FEET (1 INCH = 20 FEET)
SCALE A 0 100 200 FEET (1 INCH = 100 FEET)

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

DWG. NO. 7114-50



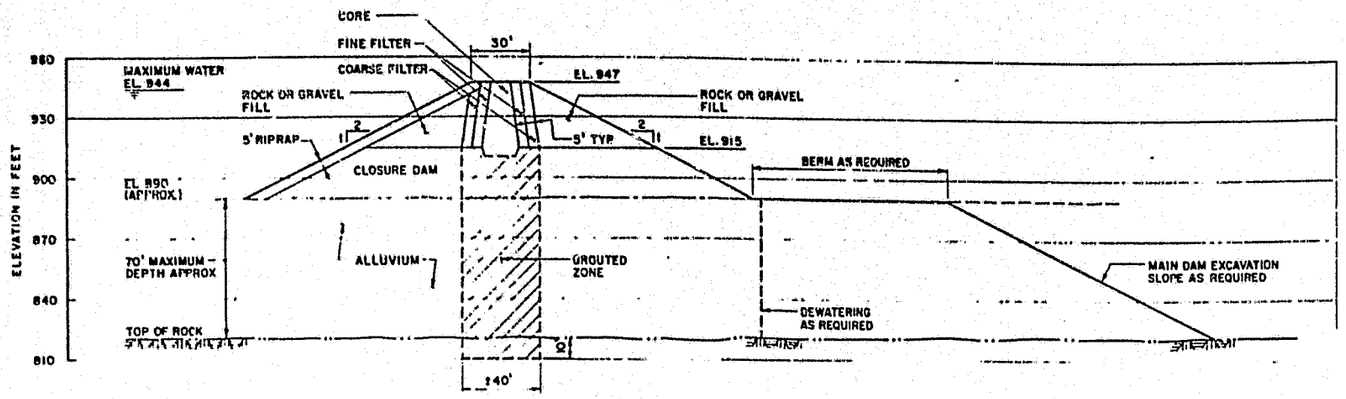
PLAN
SCALE A



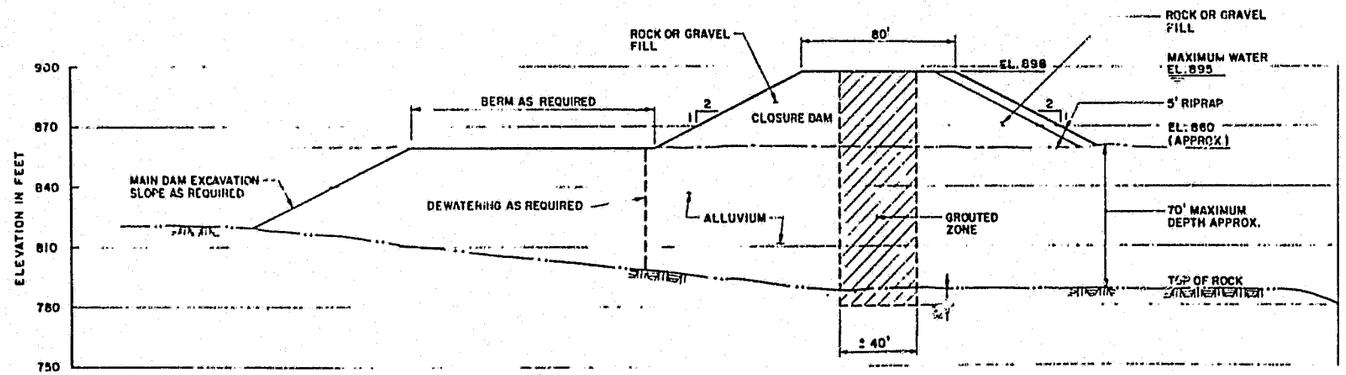
PROFILE
AT CENTERLINE TUNNEL
SCALE A

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

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
DEVIL CANYON
DIVERSION
GENERAL ARRANGEMENT
EXHIBIT F | PLATE F51



TYPICAL CROSS SECTION (PLATE F51)
UPSTREAM COFFERDAM

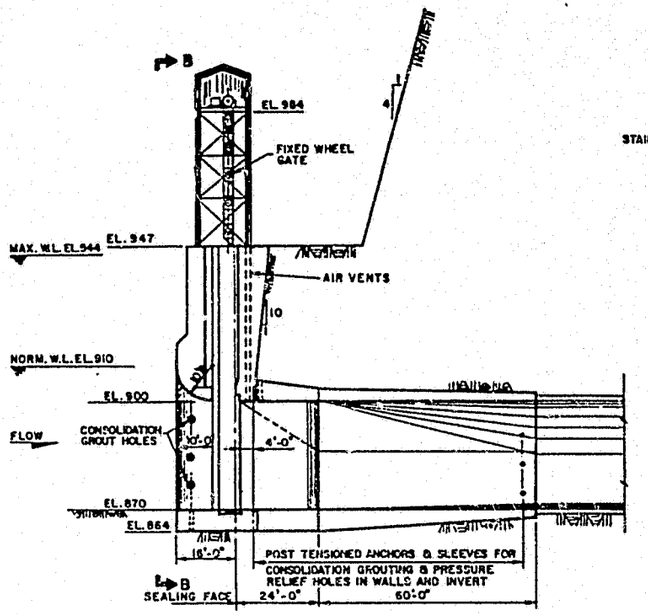


TYPICAL CROSS SECTION (PLATE F51)
DOWNSTREAM COFFERDAM

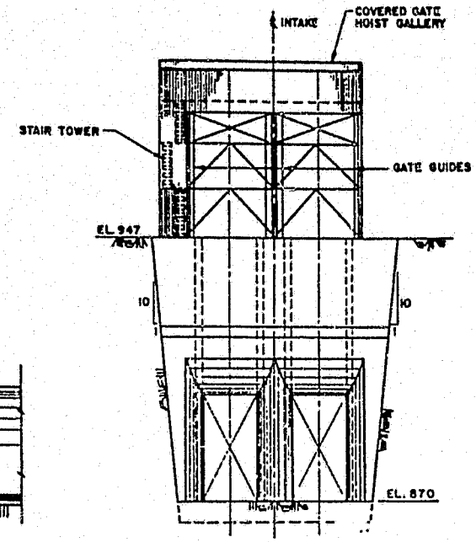
SCALE 0 30 60 FEET (1 INCH = 30 FEET)

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

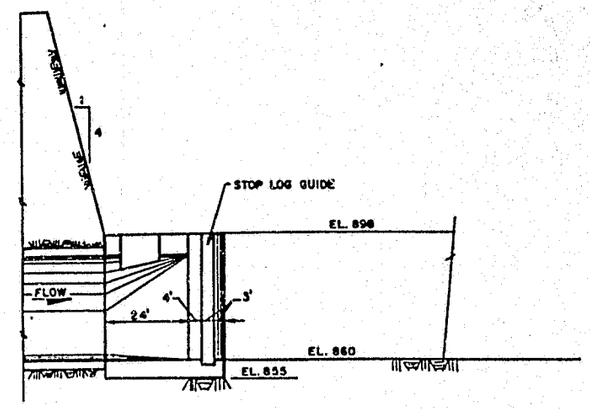
DWG. NO. 7114 - 52



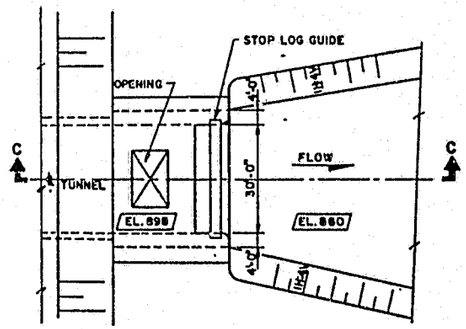
SECTION A-A
SCALE A



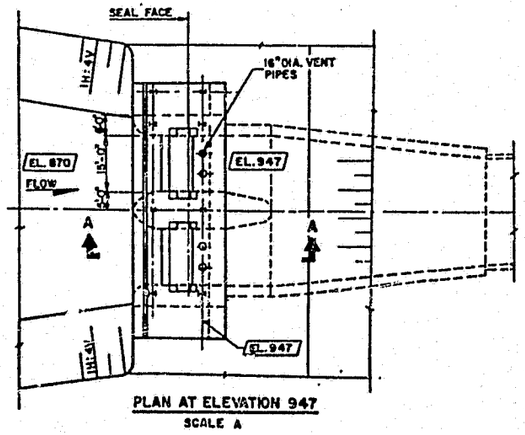
ELEVATION B-B
SCALE A



SECTION C-C
SCALE A

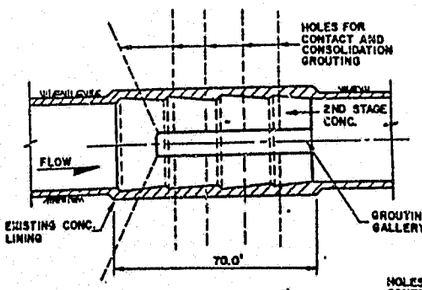


PLAN AT ELEVATION 898
SCALE A

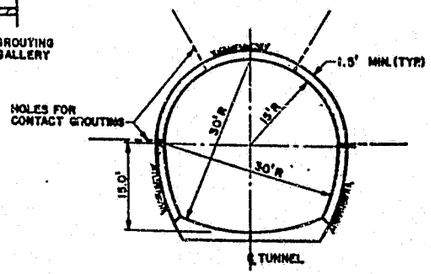


PLAN AT ELEVATION 947
SCALE A

DIVERSION INTAKE STRUCTURE (PLATE F51)



SECTION THRU PLUG
SCALE B



TYPICAL TUNNEL SECTIONS
SCALE C

DIVERSION OUTLET STRUCTURE (PLATE F51)

SCALE C 0 10 20 FEET (1 INCH = 10 FEET)

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

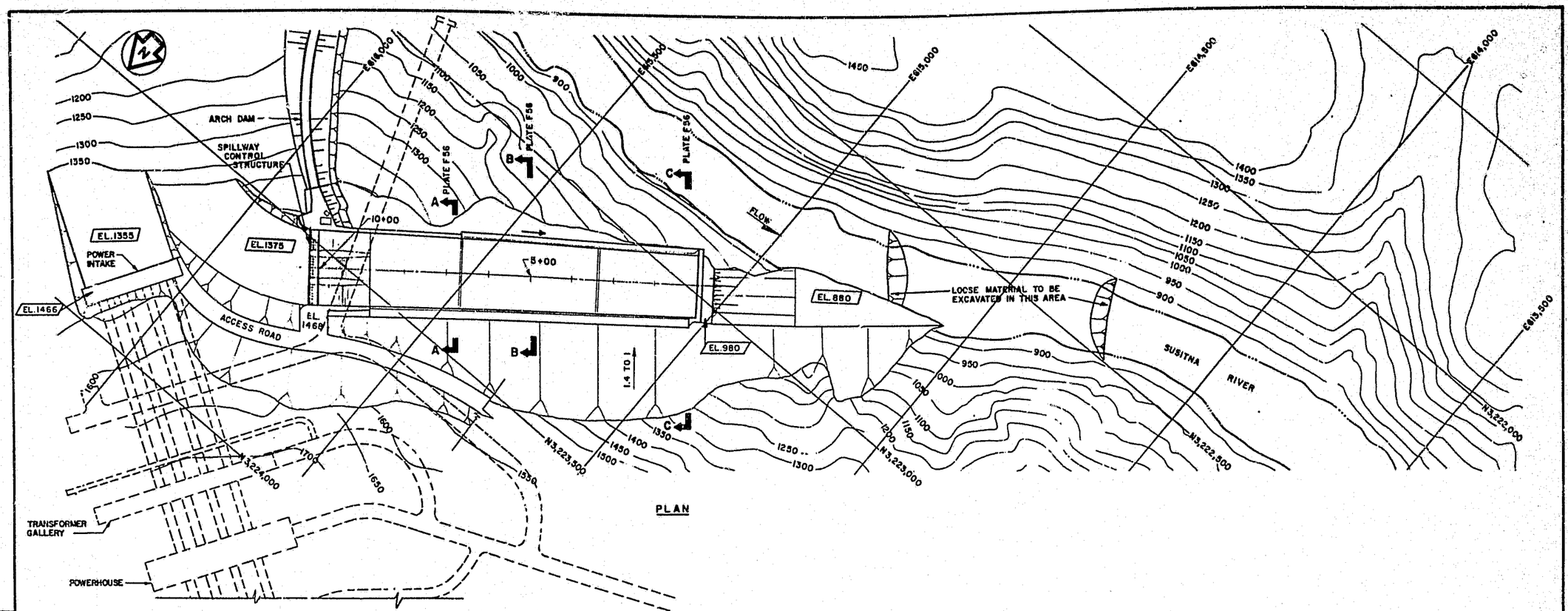
SCALE A 0 16 32 FEET (1 INCH = 16 FEET)

ALASKA POWER AUTHORITY

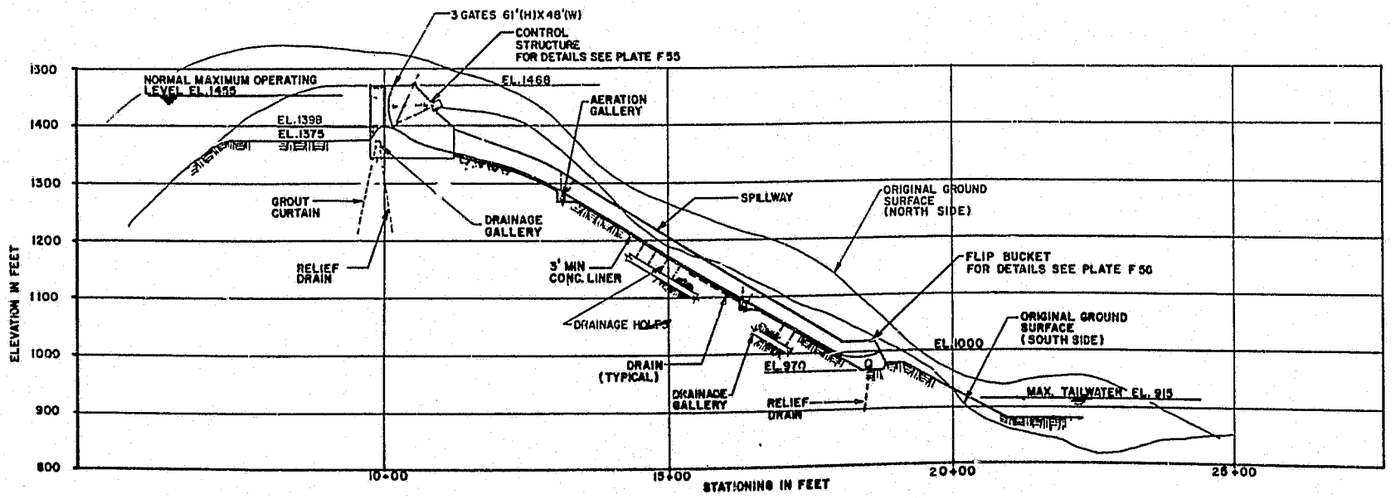
SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON DIVERSION SECTIONS

EXHIBIT F | PLATE F53



PLAN



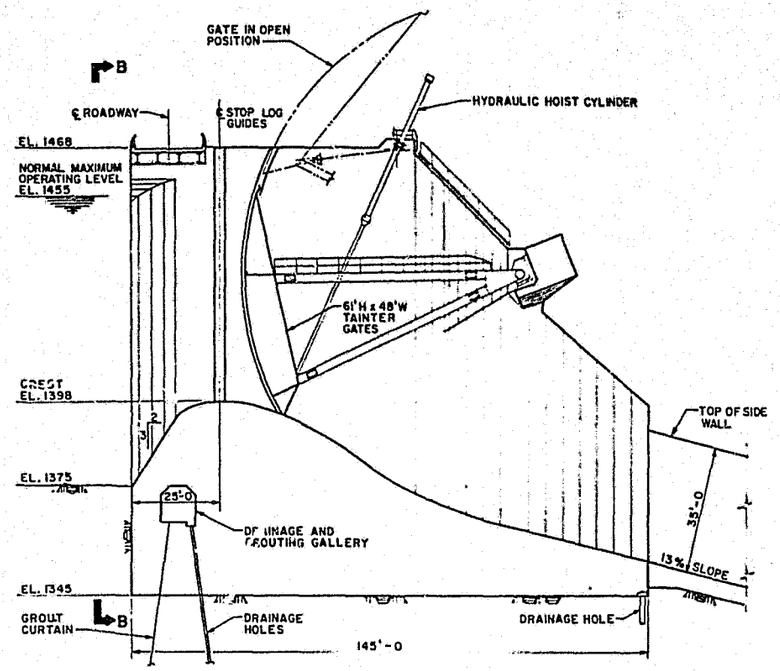
PROFILE

NOTE: FOR SECTIONS SEE PLATE F56

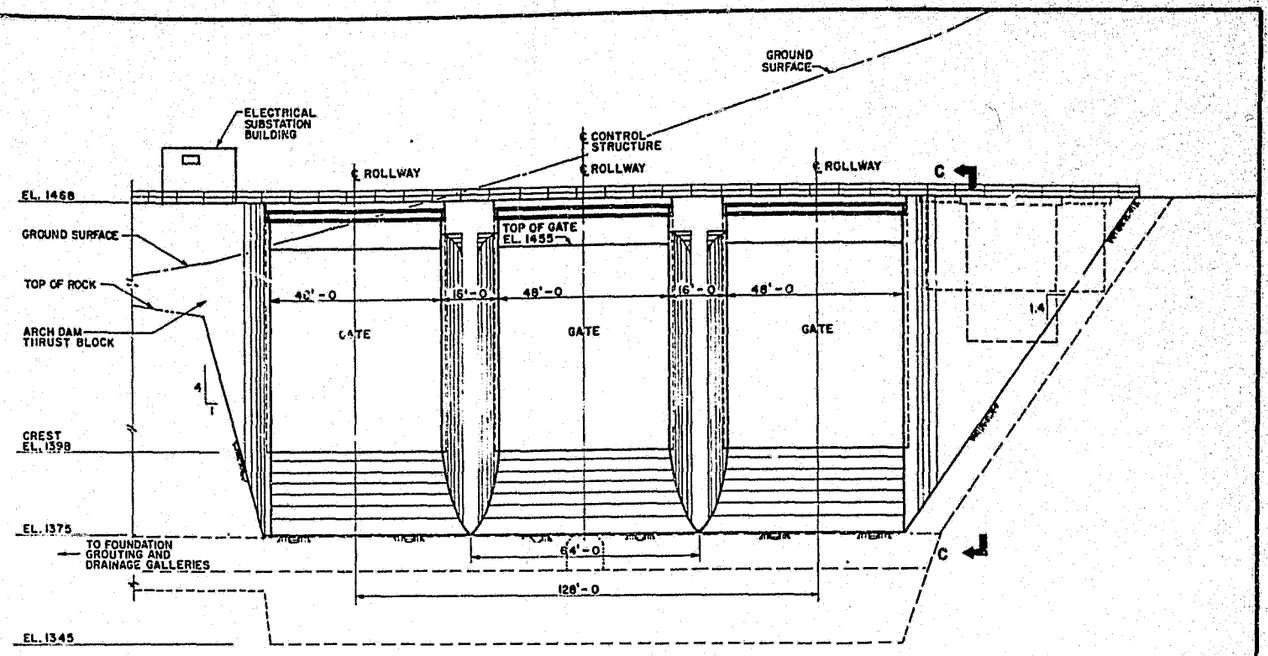
SCALE 0 100 200 FEET (1 INCH = 100 FEET)

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

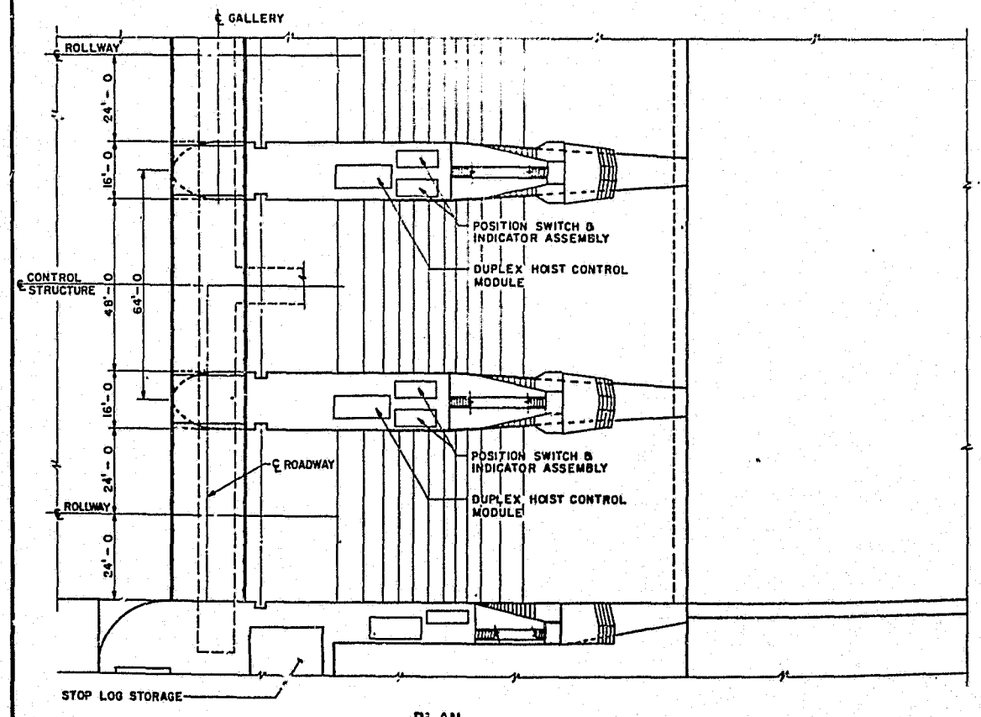
DWG. NO. 7114-54



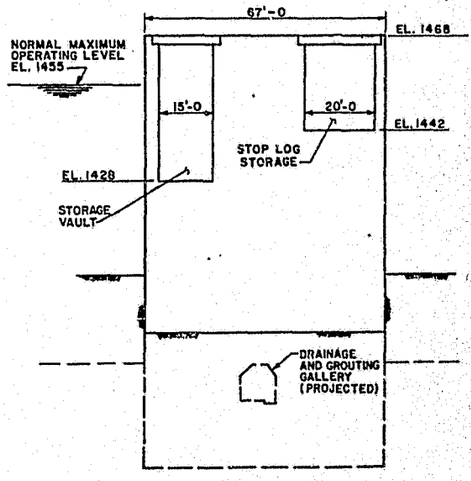
TYPICAL SECTION



ELEVATION B-B



PLAN



SECTION C-C

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

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
Ø=35°
c=30 PSI

HARZA-EBASCO JOINT VENTURE | ALASKA POWER AUTHORITY

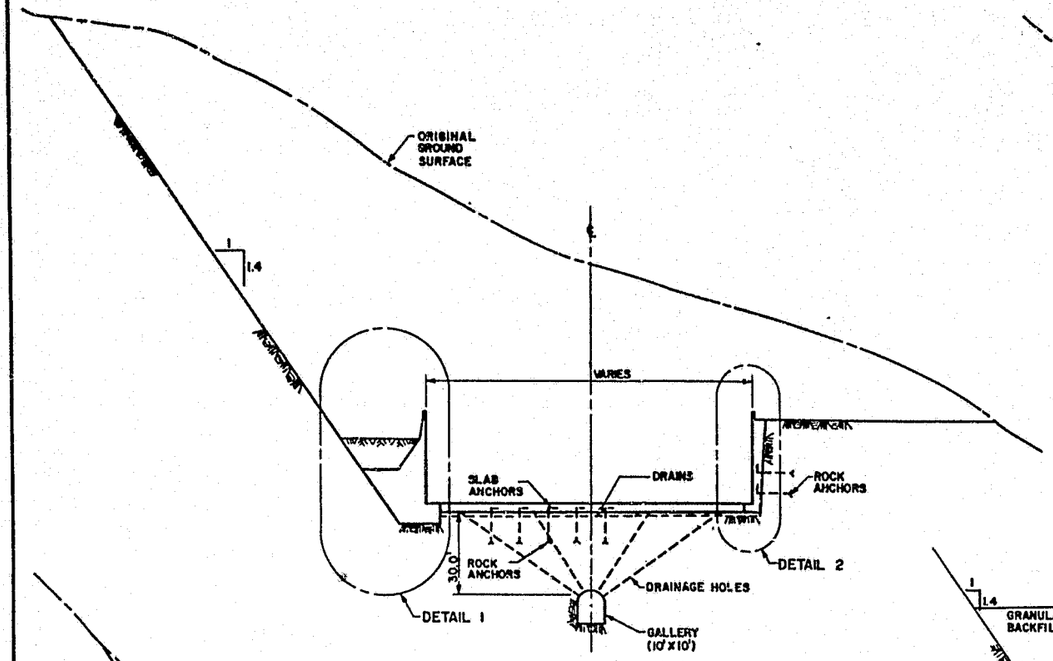
SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON SPILLWAY CONTROL STRUCTURE

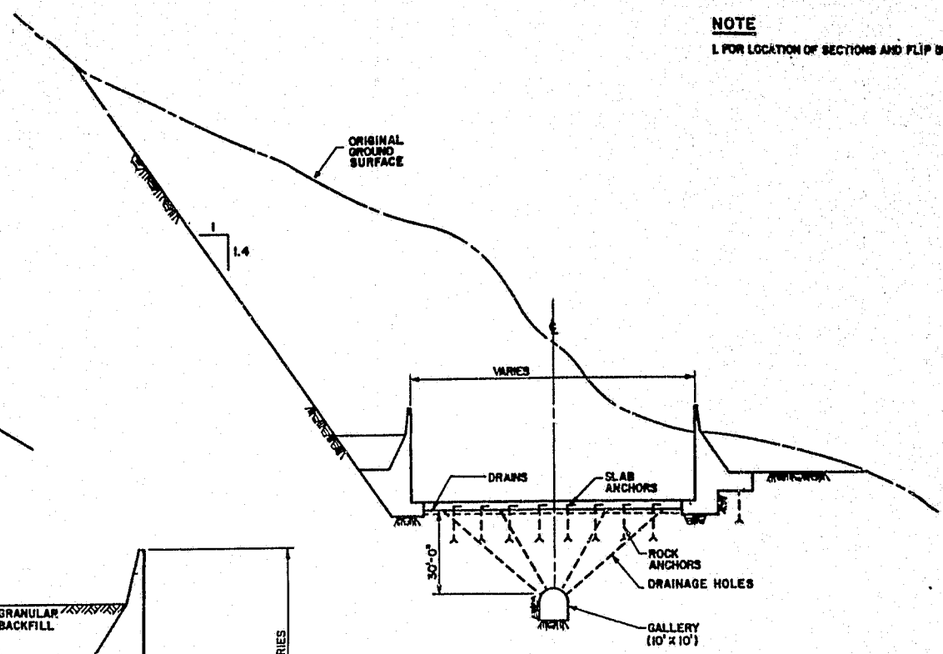
EXHIBIT F | PLATE F55R

NOTE

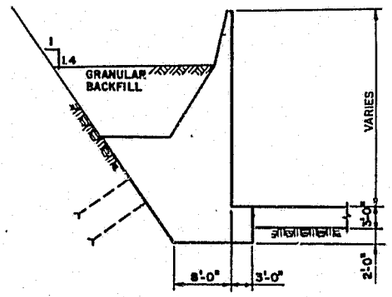
1. FOR LOCATION OF SECTIONS AND FLIP BUCKET, SEE PLATE F84



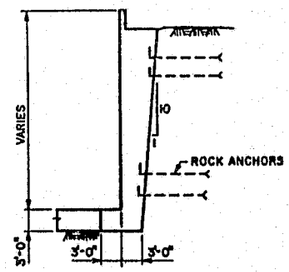
SECTION A-A
SCALE A



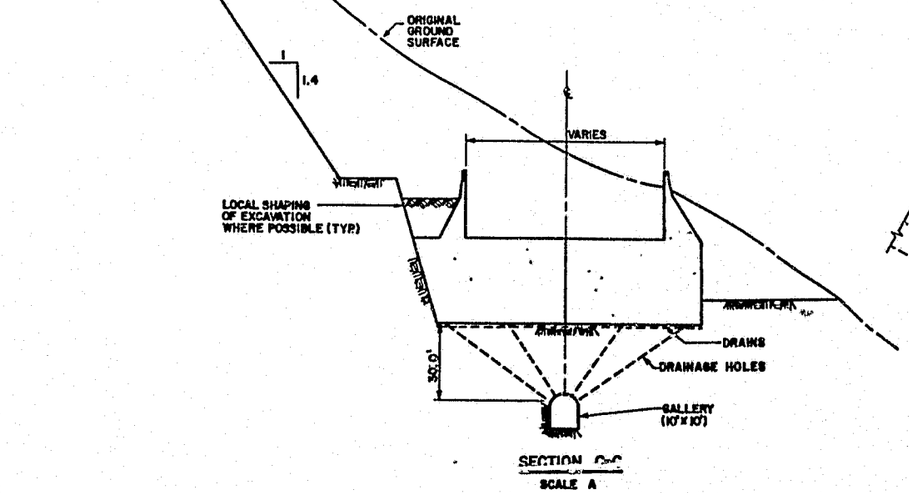
SECTION B-B
SCALE A



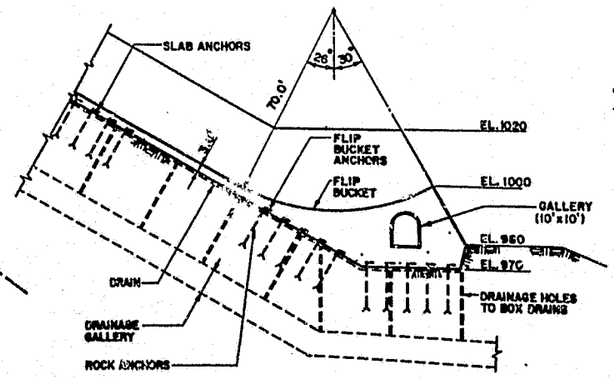
DETAIL 1
SCALE B



DETAIL 2
SCALE B



SECTION C-C
SCALE A



FLIP BUCKET DETAIL

SCALE B 0 8 16 FEET (1/8 INCH = 1 FEET)

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

HARZA-EBASCO | ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

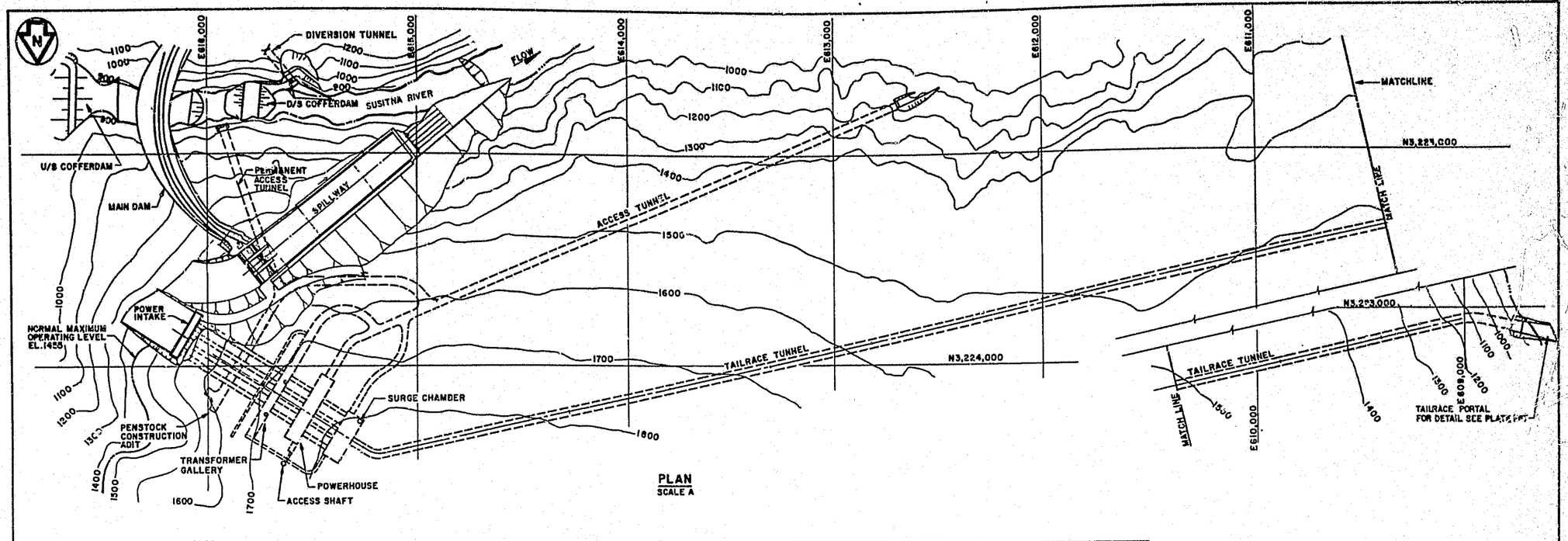
DEVIL CANYON SPILLWAY CHUTE SECTIONS

EXHIBIT F | PLATE F85

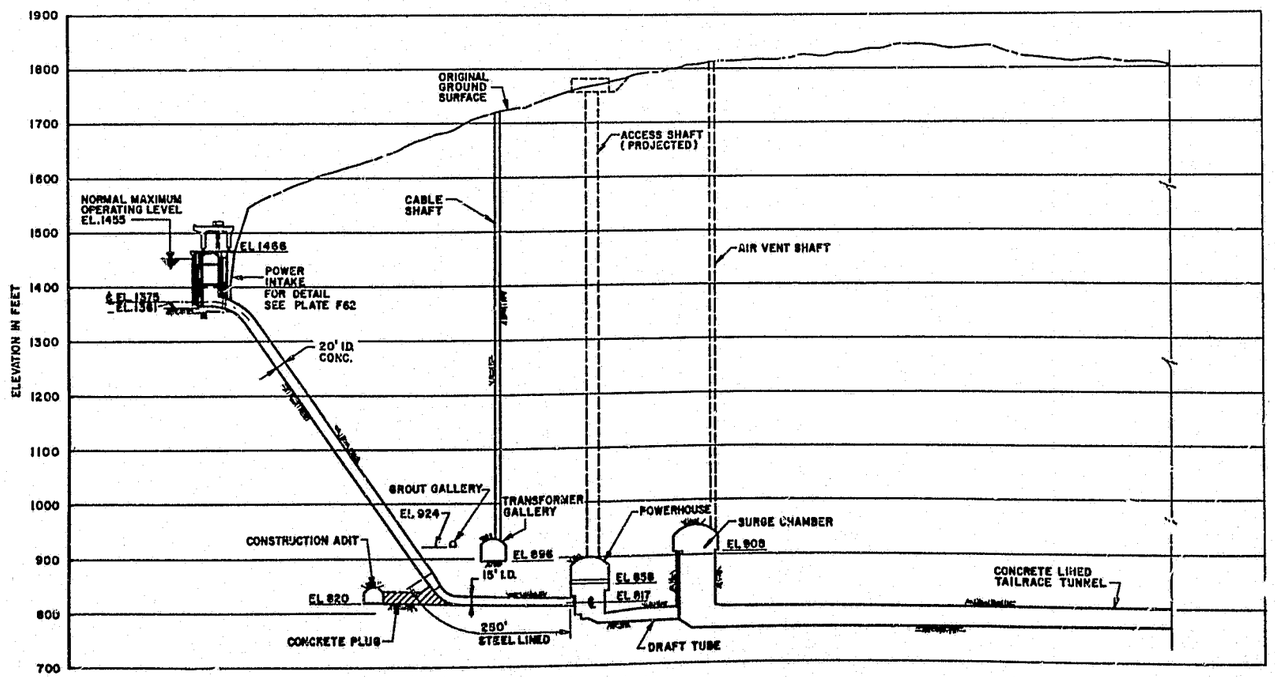
DWG. NO. 7114-85

L.L. V6

2300-05-4272



PLAN
SCALE A



PROFILE
SCALE B

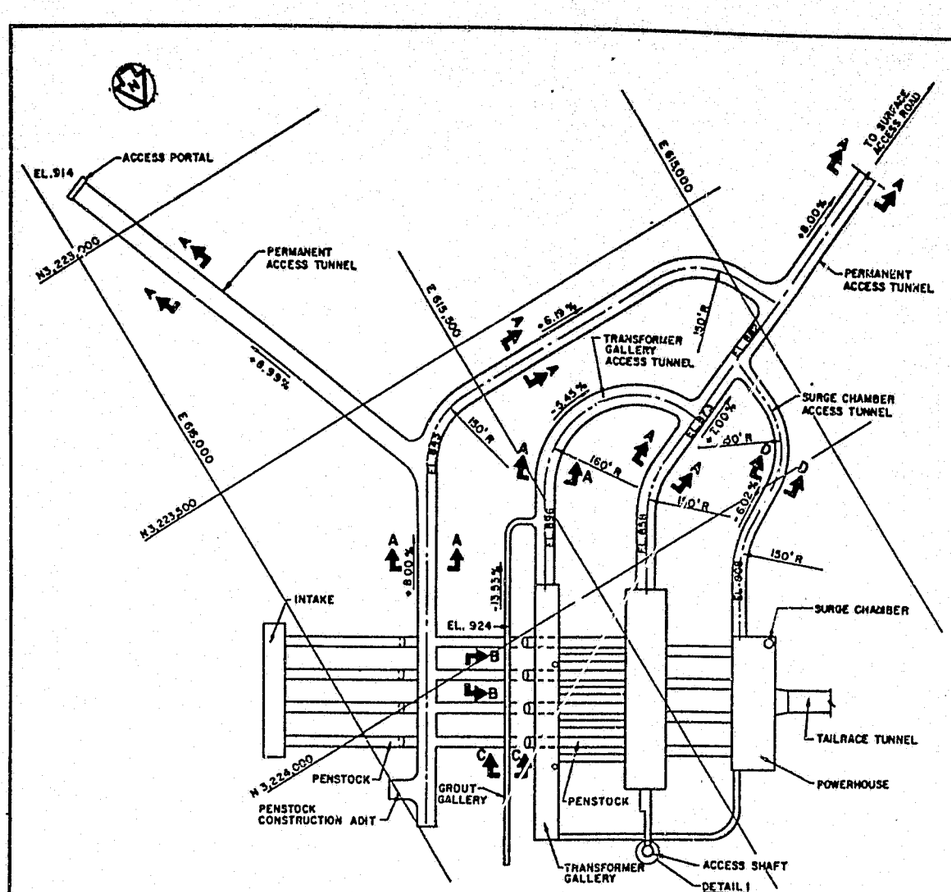
SCALE B 0 100 200 FEET (1 INCH = 100 FEET)
SCALE A 0 200 400 FEET (1 INCH = 200 FEET)

HARZA-EBASCO | ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

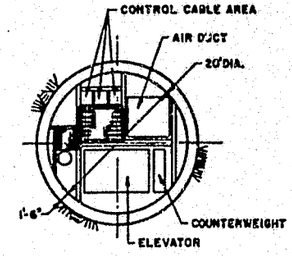
DEVIL CANYON POWER FACILITIES GENERAL ARRANGEMENT

EXHIBIT F | PLATE F59 R

DWG. NO. 7114-59

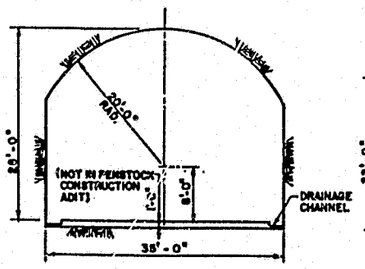


PLAN
SCALE A

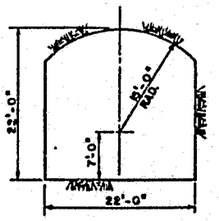


DETAIL I
SCALE B

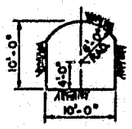
ISOMETRIC
SCALE A



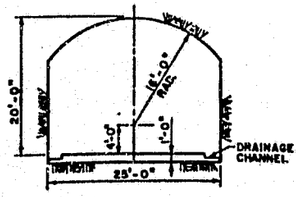
SECTION A-A
SCALE B



SECTION B-B
SCALE B



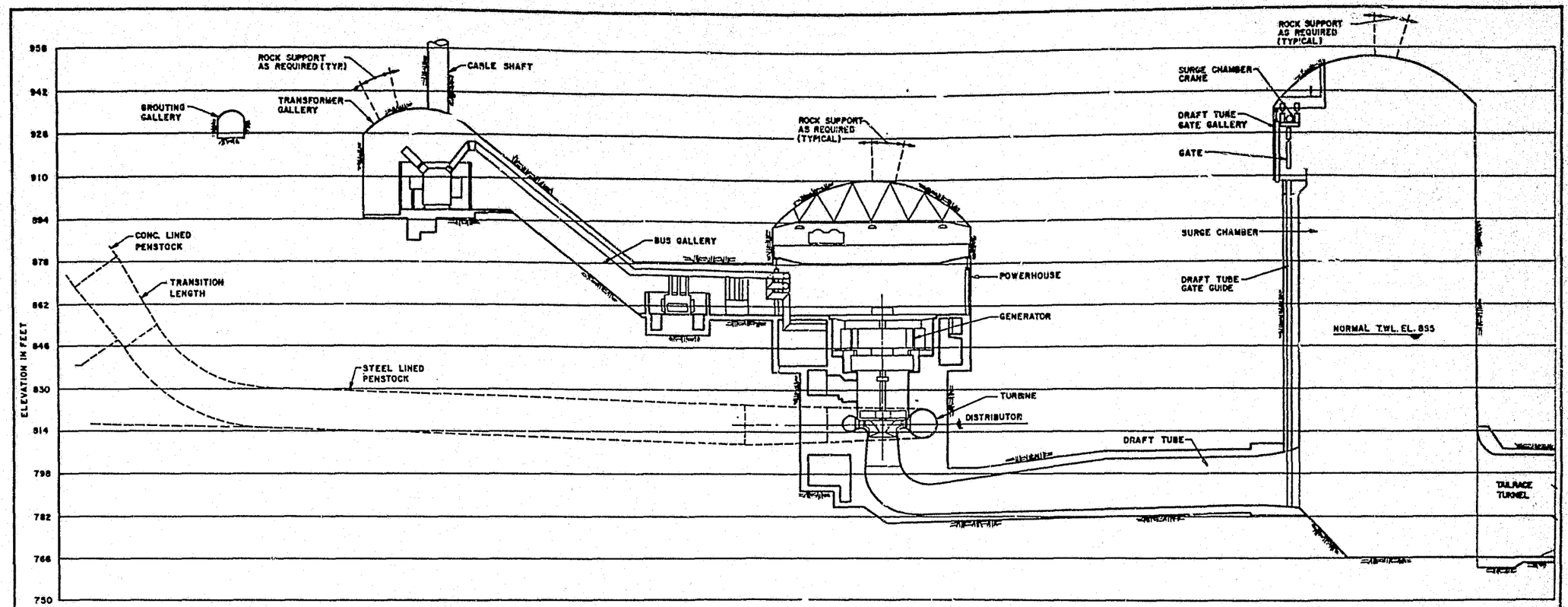
SECTION C-C
SCALE B



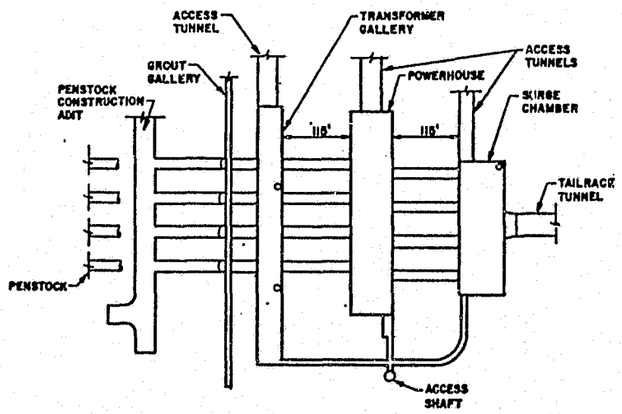
SECTION D-D
SCALE B

SCALE B 0 8 16 FEET (1/8 INCH = 1 FEET)
SCALE A 0 100 200 FEET (1 INCH = 100 FEET)

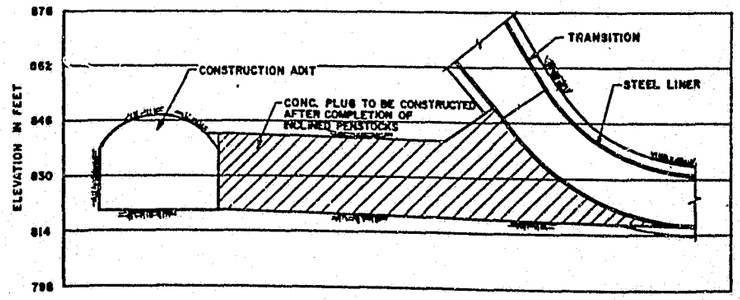
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
DEVIL CANYON
POWER FACILITIES
ACCESS
EXHIBIT F | PLATE F60



SECTION A-A
SCALE B



PLAN
SCALE A



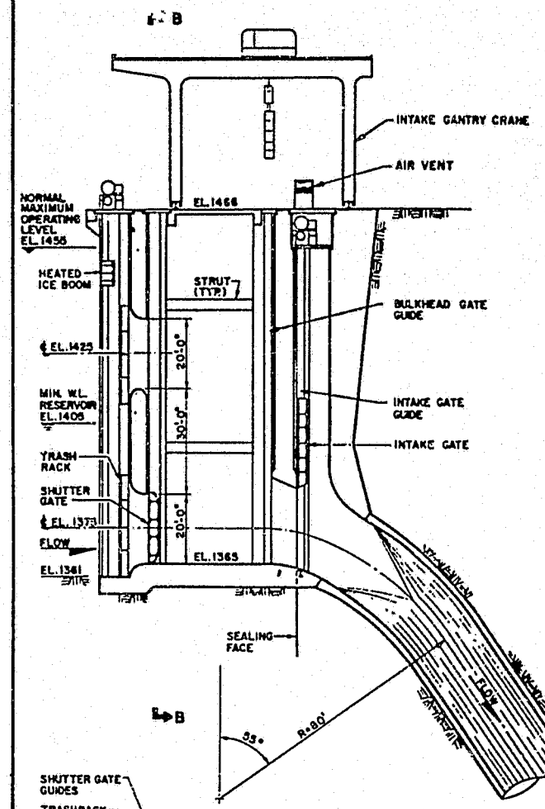
SECTION B-B
SCALE B

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

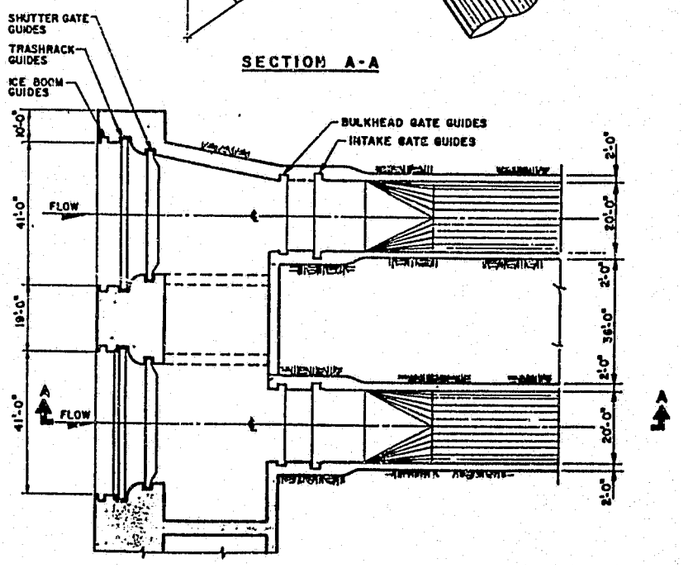
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON POWER FACILITIES PLAN & SECTIONS

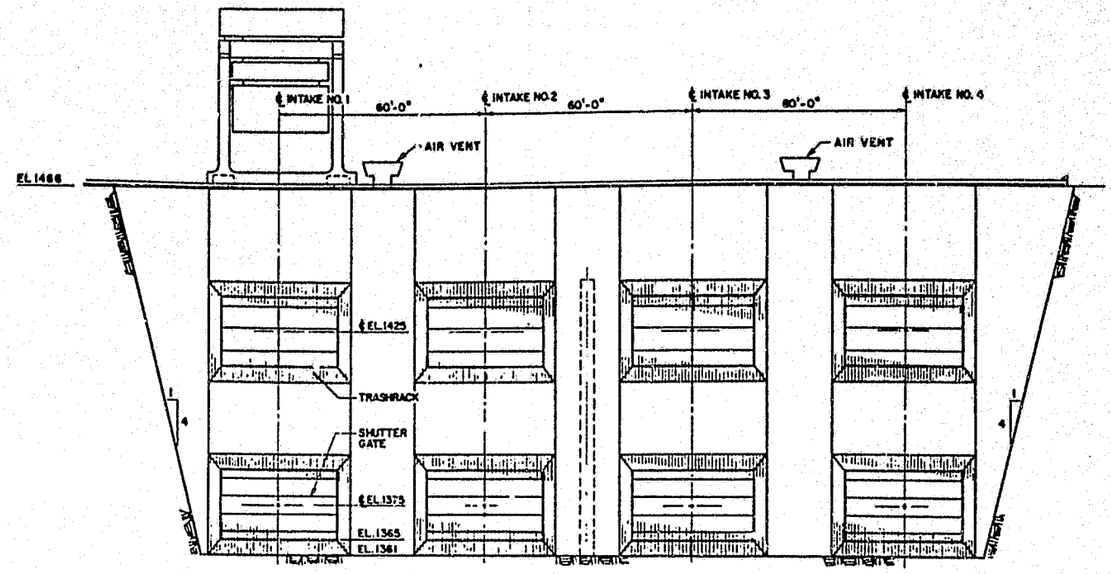
EXHIBIT F | PLATE F61



SECTION A-A



PLAN AT INTAKE CENTERLINE



ELEVATION B-B

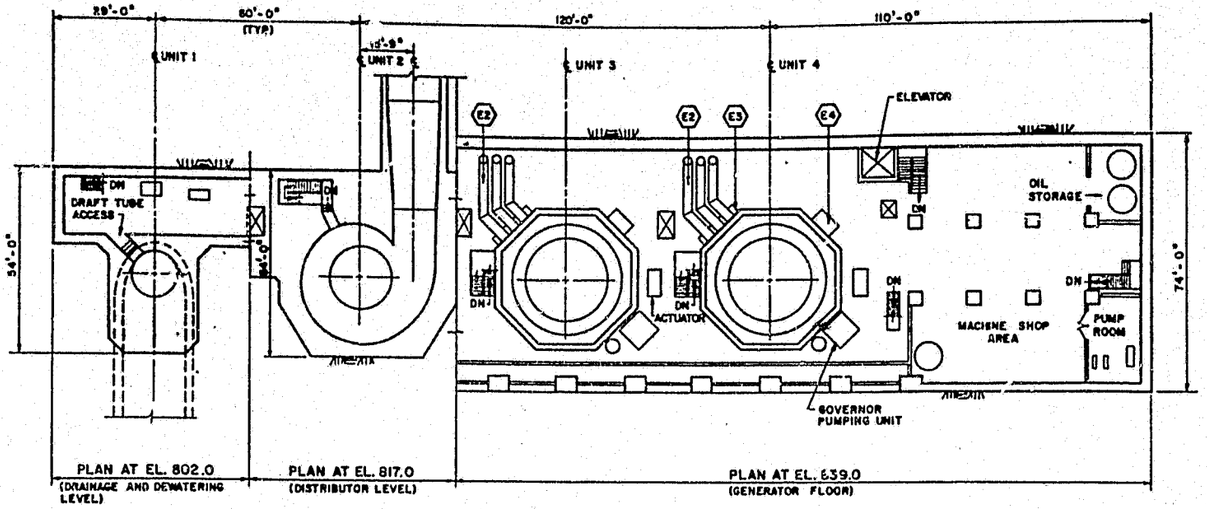
SCALE 0 16 32 FEET (1/16 INCH = 1 FEET)

ALASKA POWER AUTHORITY

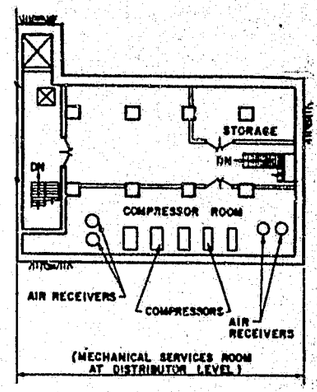
SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON
POWER INTAKE
SECTIONS

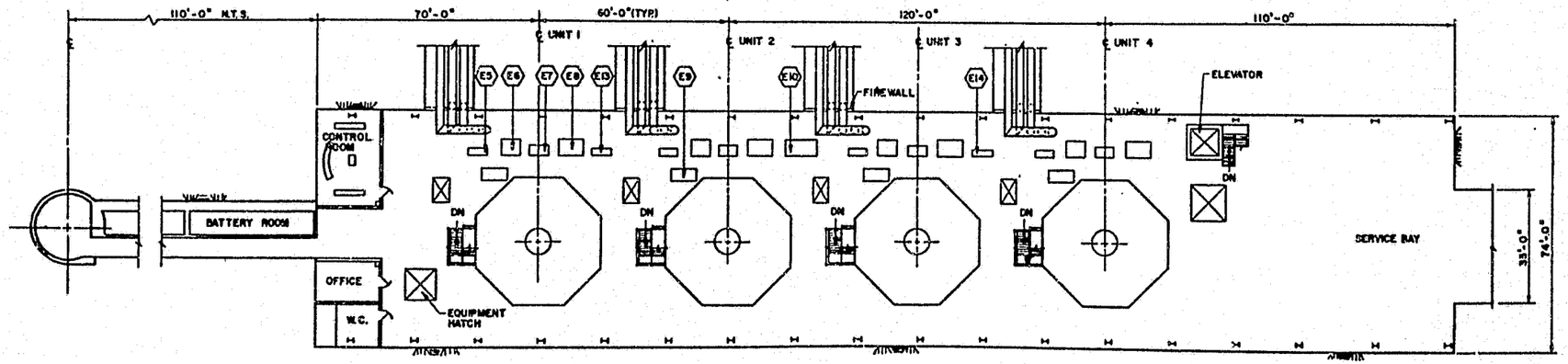
EXHIBIT F | PLATE F 62



POWERHOUSE PLAN



PLAN
AT EL. 817.0



POWERHOUSE PLAN
AT EL. 858.0

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

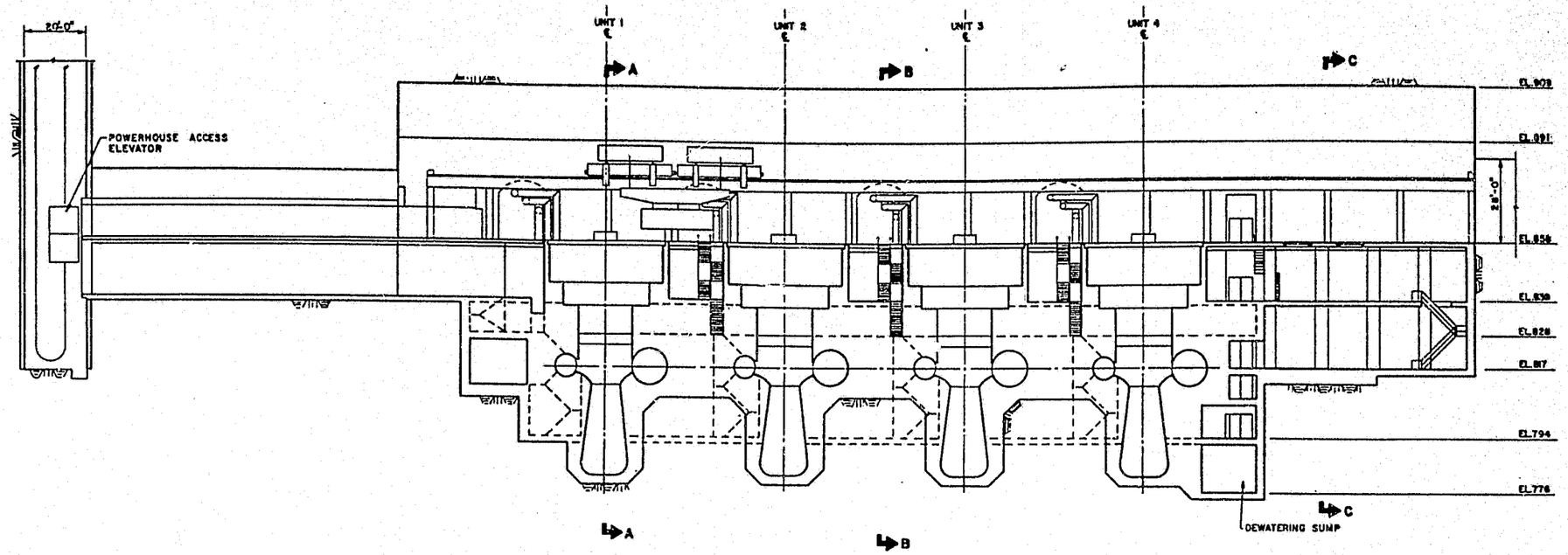
LEGEND

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

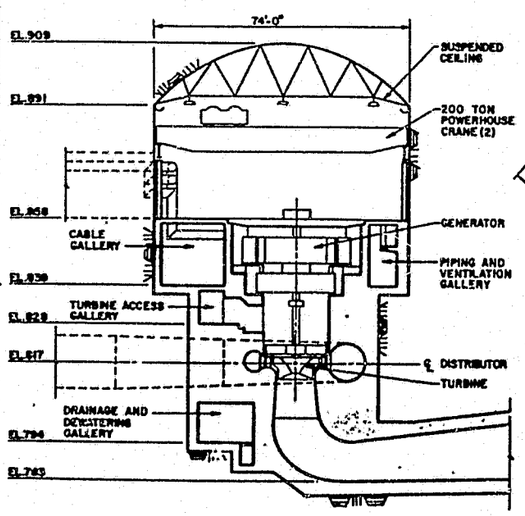
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON POWERHOUSE PLANS

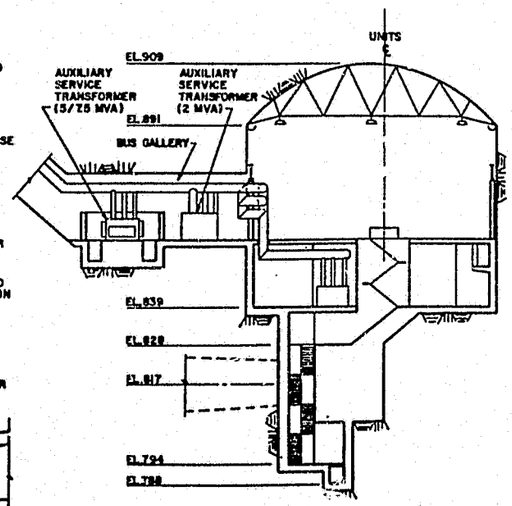
EXHIBIT F | PLATE F65



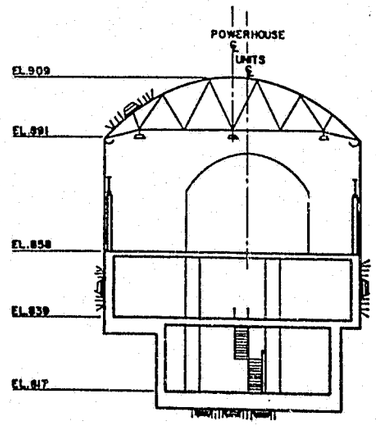
LONGITUDINAL SECTION (THRU CENTERLINE OF UNITS)



SECTION A-A (SECTION THRU CENTERLINE OF UNIT)



SECTION B-B (SECTION THRU BUS GALLERY)



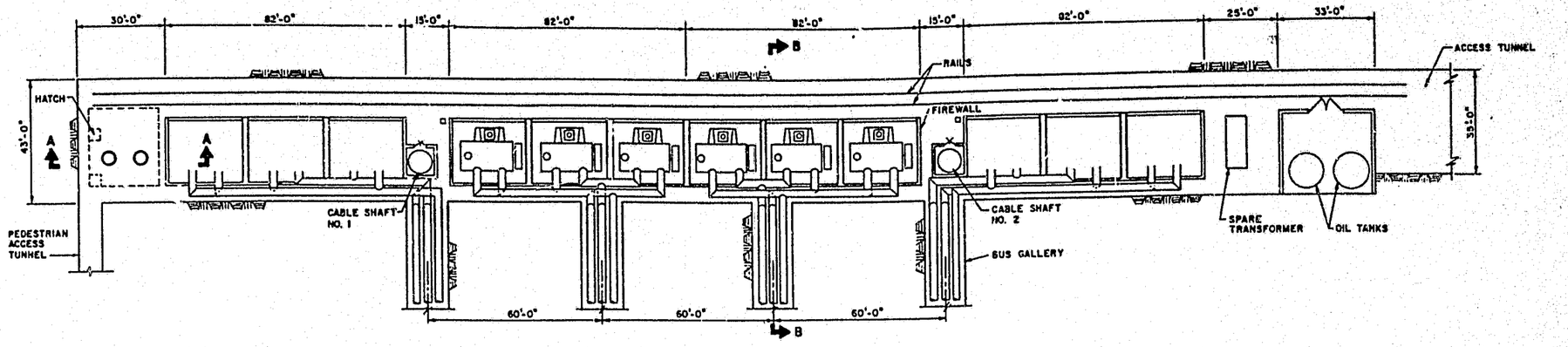
SECTION C-C (SECTION THRU SERVICE BAY)

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

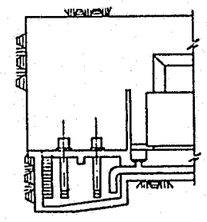
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON POWERHOUSE SECTIONS

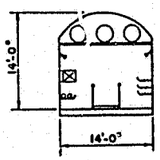
EXHIBIT F | PLATE F64



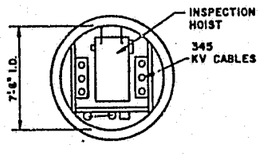
PLAN
SCALE A



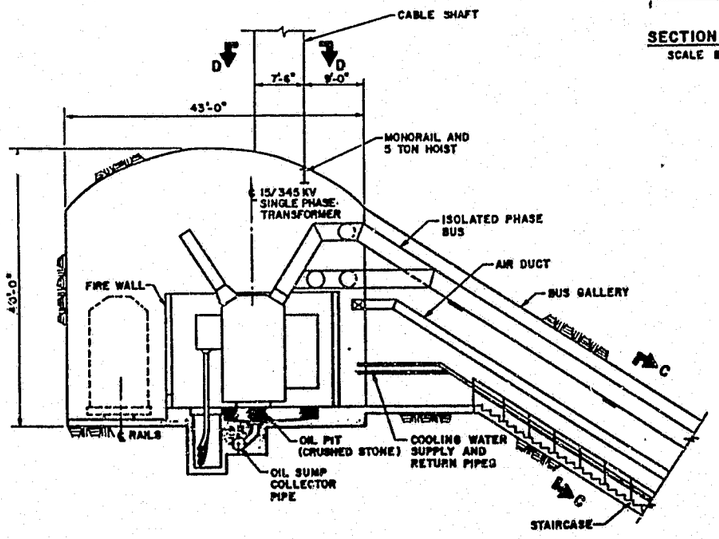
SECTION A-A
SCALE A



SECTION C-C
SCALE B



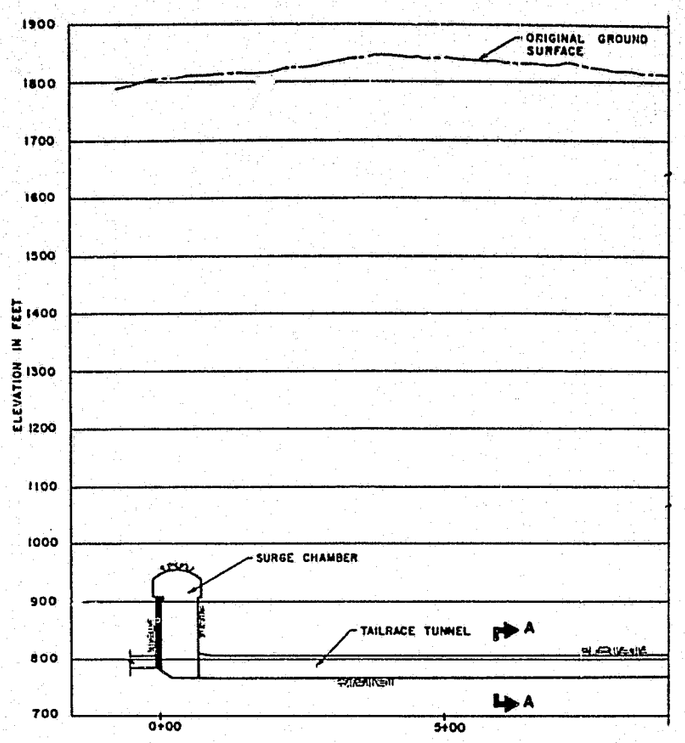
SECTION D-D
SCALE C

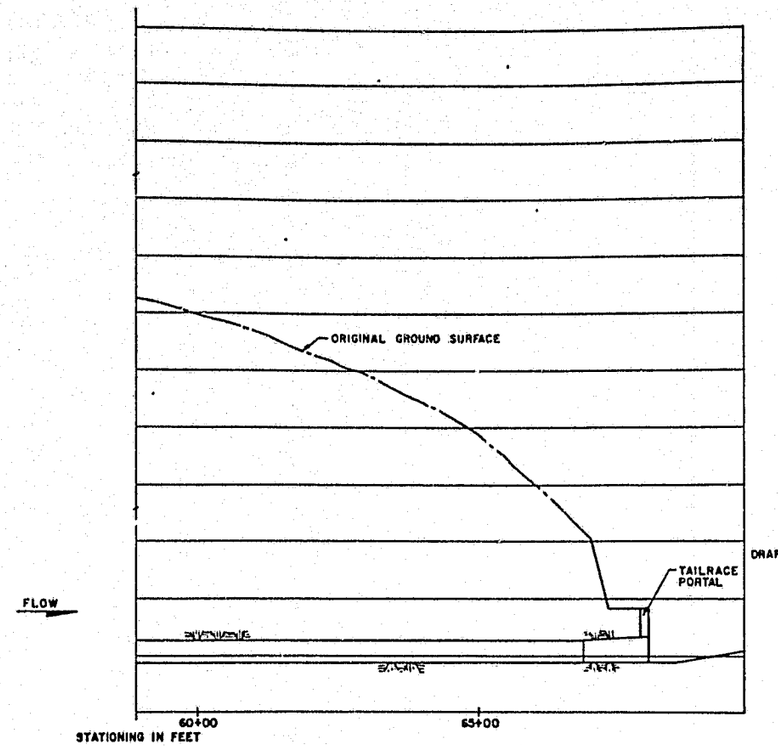


SECTION A-A
SCALE B

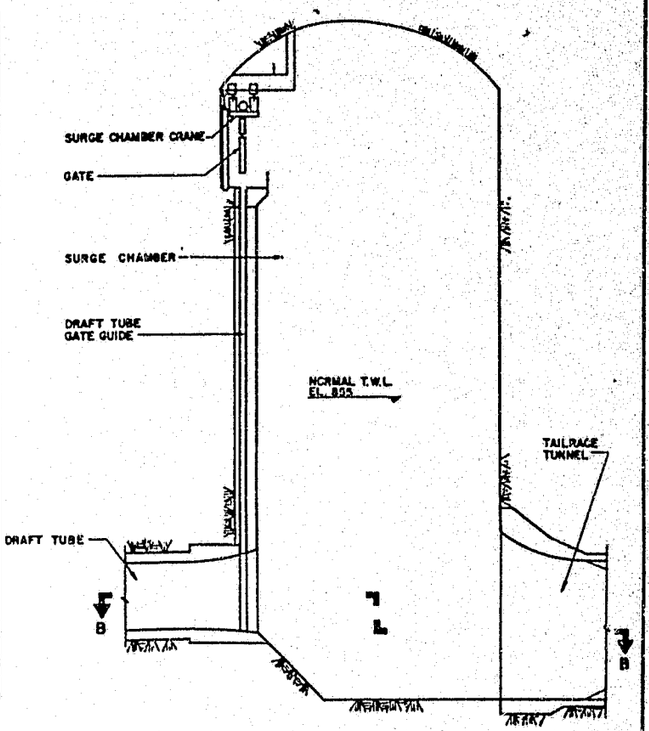
SCALE C 0 4 8 FEET (1/4 INCH = 1 FEET)
SCALE B 0 8 16 FEET (1/8 INCH = 1 FEET)
SCALE A 0 16 32 FEET (1/16 INCH = 1 FEET)

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

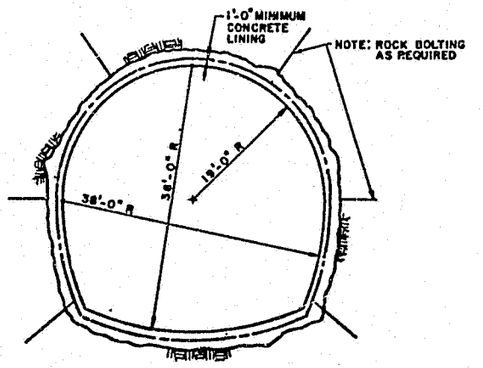




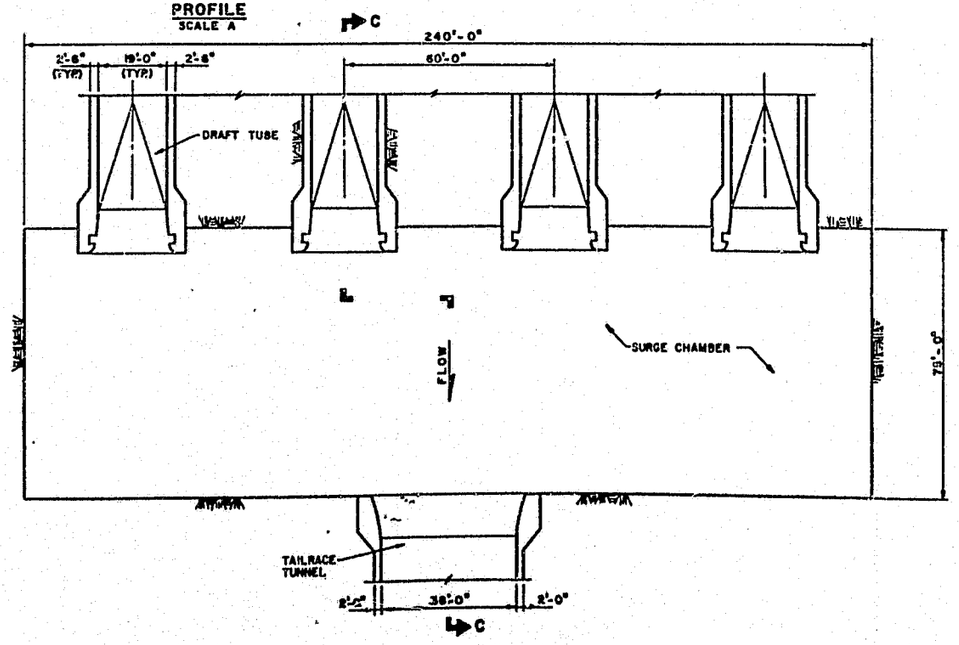
PROFILE
SCALE A



SECTION C-C
SCALE B



SECTION A-A
CONCRETE LINED TAILRACE TUNNEL
SCALE C



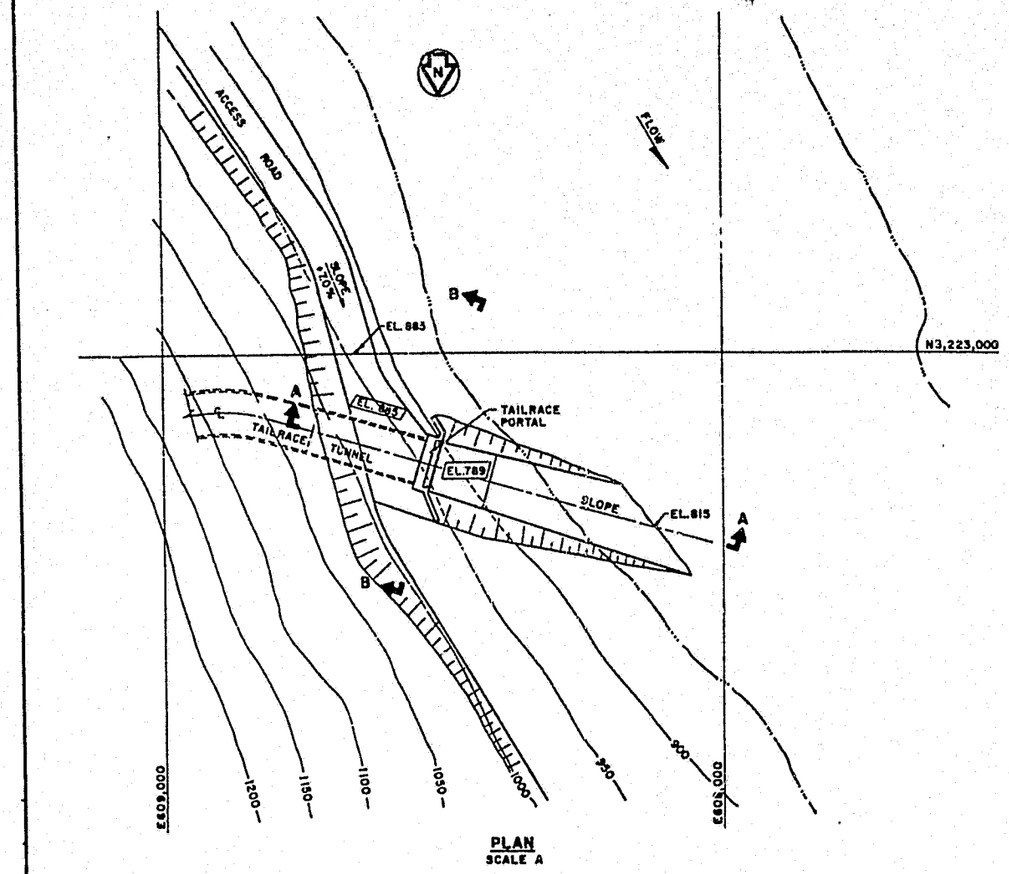
SECTION B-B
SCALE B

SCALE C 0 8 16 FEET (1/8 INCH = 1 FEET)
SCALE B 0 16 32 FEET (1/16 INCH = 1 FEET)
SCALE A 0 100 200 FEET (1 INCH = 100 FEET)

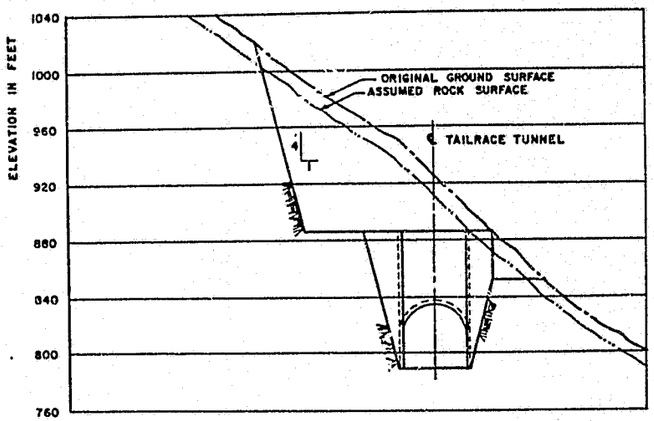
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON SURGE CHAMBER AND TAILRACE SECTIONS

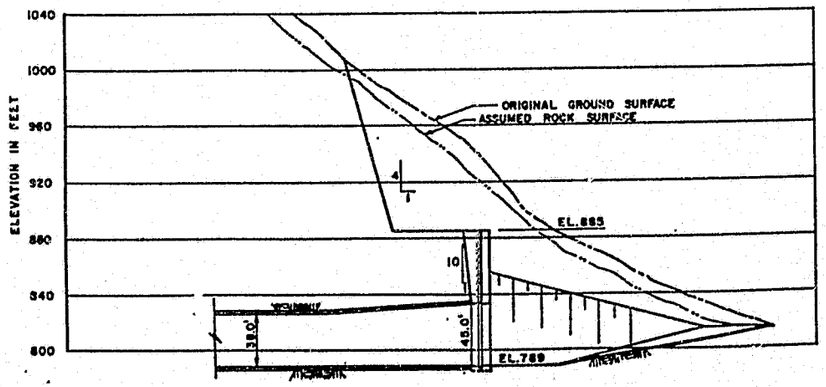
EXHIBIT F | PLATE F-66



PLAN
SCALE A



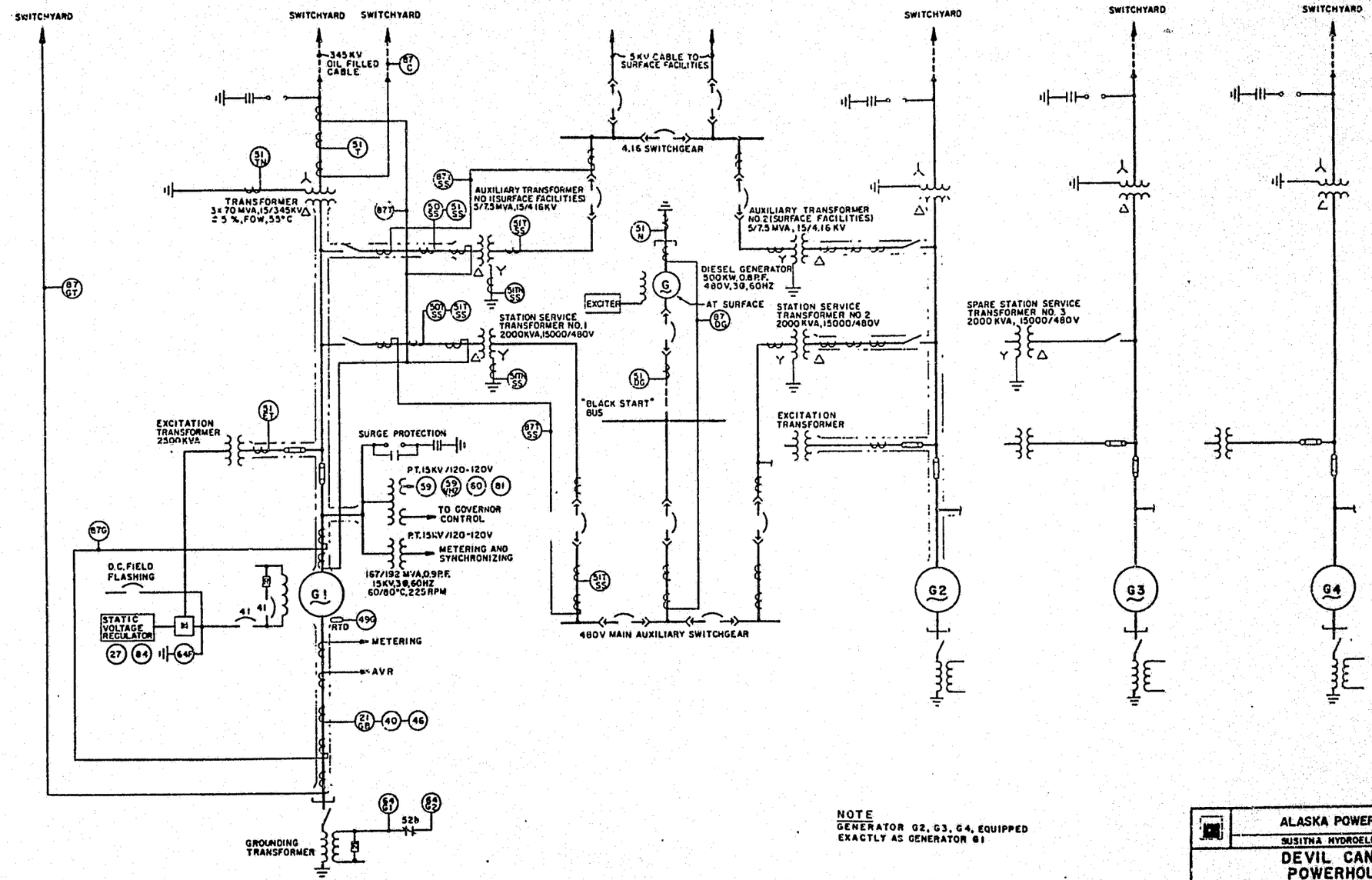
SECTION B-B
SCALE B



SECTION A-A
SCALE B

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

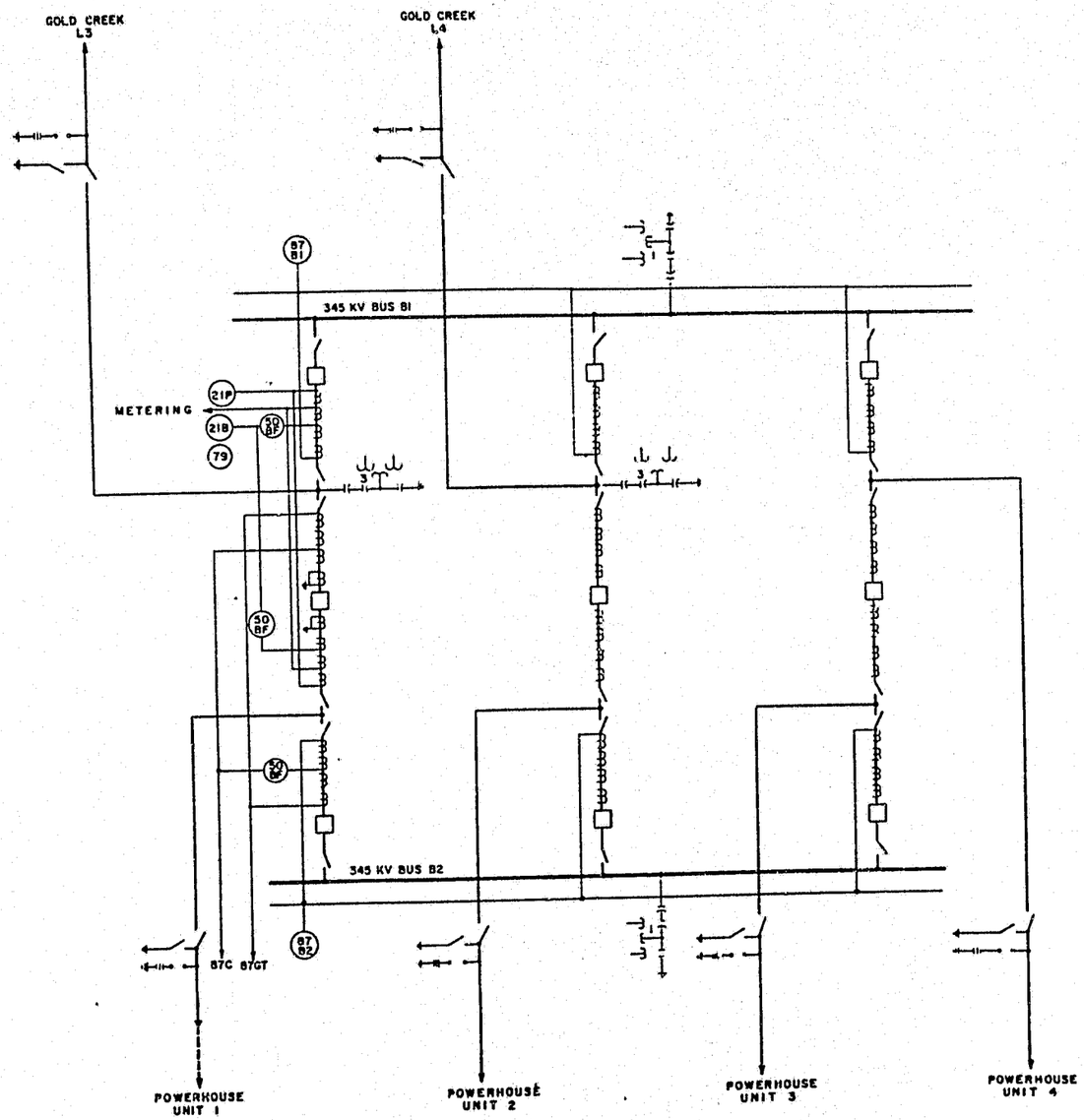


NOTE
GENERATOR G2, G3, G4, EQUIPPED EXACTLY AS GENERATOR G1

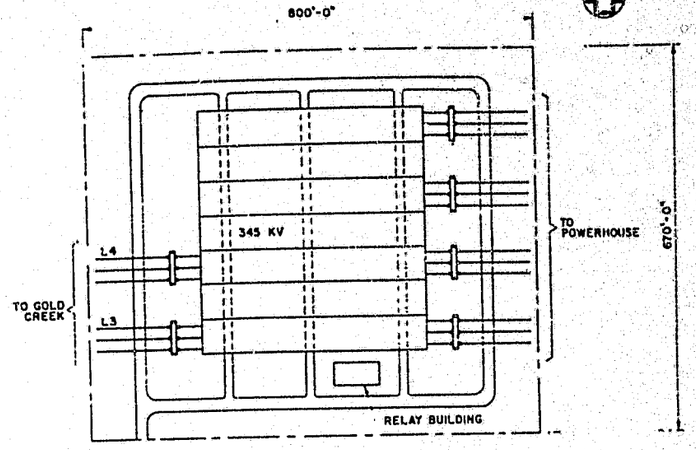
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON POWERHOUSE SINGLE LINE DIAGRAM

EXHIBIT F | PLATE F68



SINGLE LINE DIAGRAM



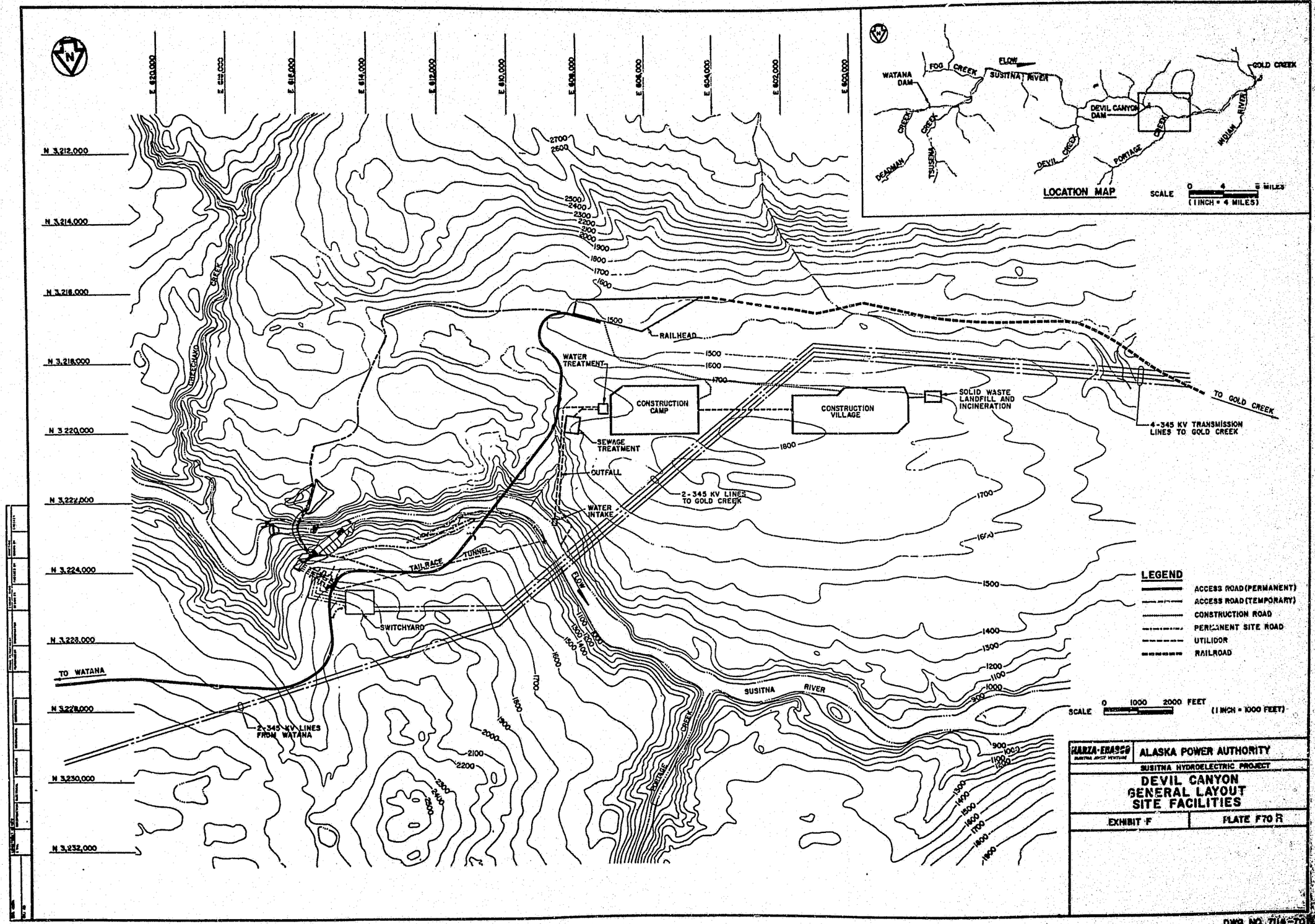
SWITCHYARD PLAN
SCALE A

SCALE 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



KARZA-ERASCO SUSITNA JOINT VENTURE

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON GENERAL LAYOUT SITE FACILITIES

EXHIBIT F | PLATE F70 R

DWG. NO. 711-F70

E 609,000
E 613,000
E 618,000
E 624,000
E 632,000
E 640,000
E 648,000

N 3,220,000
N 3,222,000
N 3,224,000
N 3,226,000

1700
1600
1500
1400
1300
1200
1100
1000
900
800
1800
1900
2000
2100

NORMAL MAXIMUM RESERVOIR LEVEL

DISPOSAL AREA

UPSTREAM COFFERDAM

DOWNSTREAM COFFERDAM

FLOW

SUSITNA RIVER

SUSITNA HIGH LEVEL BRIDGE

TO WATANA

FROM WATANA

TAILRACE TUNNEL

MAIN ACCESS ROAD

2-345 KV TRANSMISSION LINES TO GOLD CREEK

LEGEND

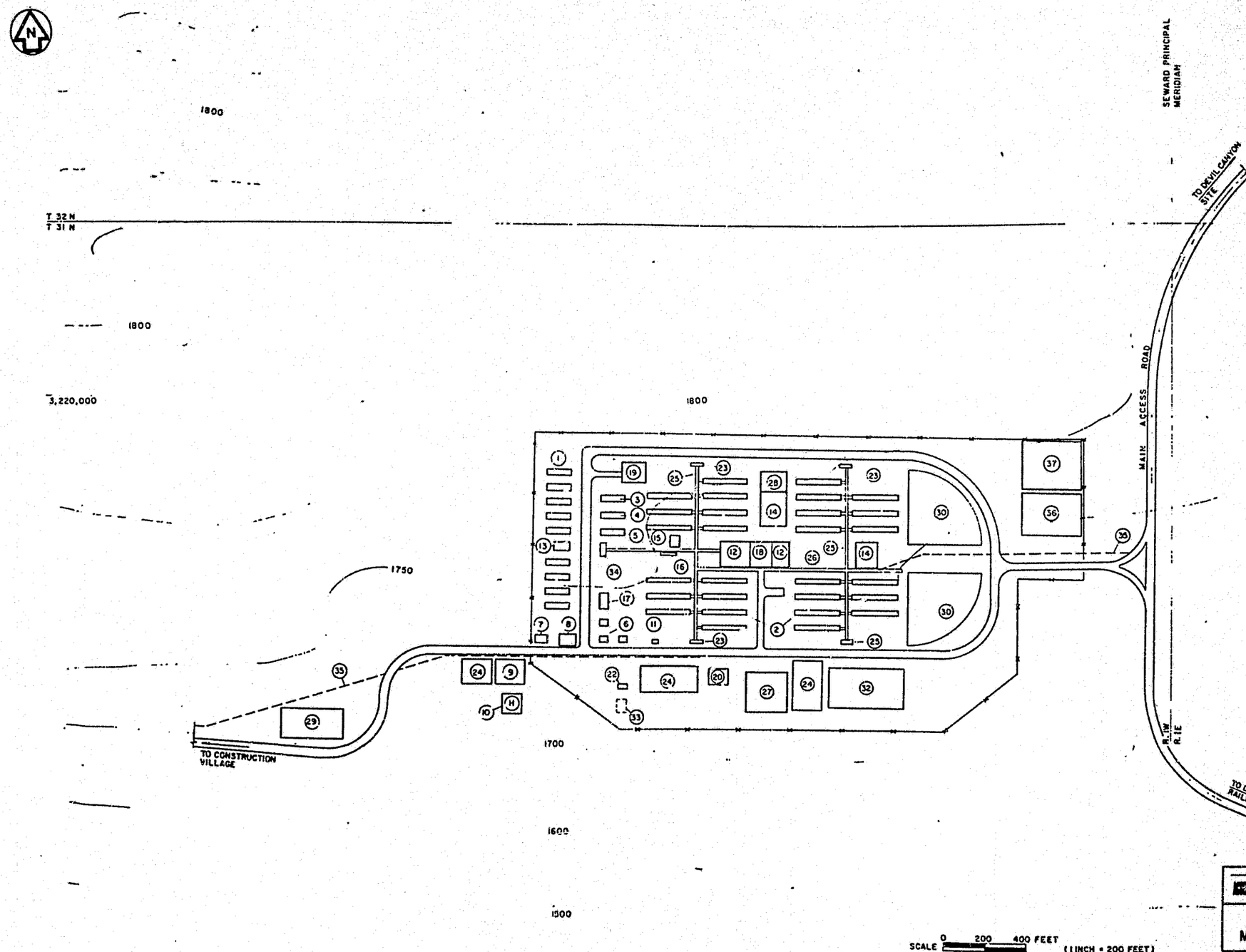
HAUL ROAD

RUNOUT

SCALE 0 400 800 FEET (1 INCH = 400 FEET)

HARZA-EBASCO	ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT	
DEVIL CANYON GENERAL LAYOUT CONSTRUCTION AND HAUL ROADS	
EXHIBIT F	PLATE F7[illegible]

DWG. NO. 7114-[illegible]



LEGEND

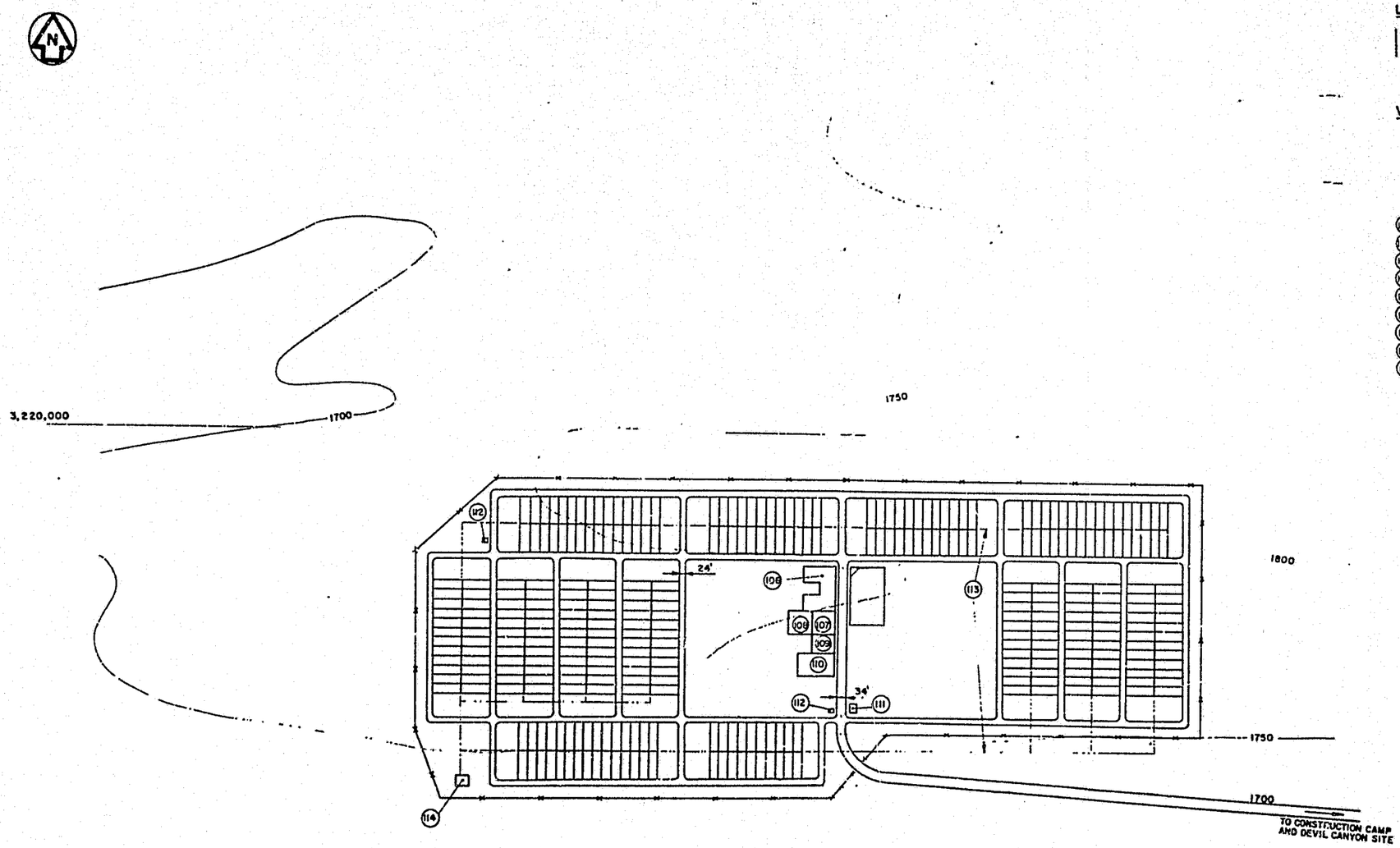
1. STAFF AND FOREMAN HOUSING
2. DORMITORIES
3. MANAGER'S GUEST HOUSE
4. OWNER'S GUEST HOUSE
5. CONTRACTOR'S GUEST HOUSE
6. CAMP MANAGER'S OFFICES
7. SECURITY
8. FIRE AND OIL SPILL
9. HOSPITAL
10. HELIPAD (MEDICAL EMERGENCY)
11. COMMUNICATIONS CENTER
12. KITCHEN AND DINING
13. STAFF CLUBHOUSE
14. RECREATION 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

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON MAIN CONSTRUCTION CAMP SITE

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')

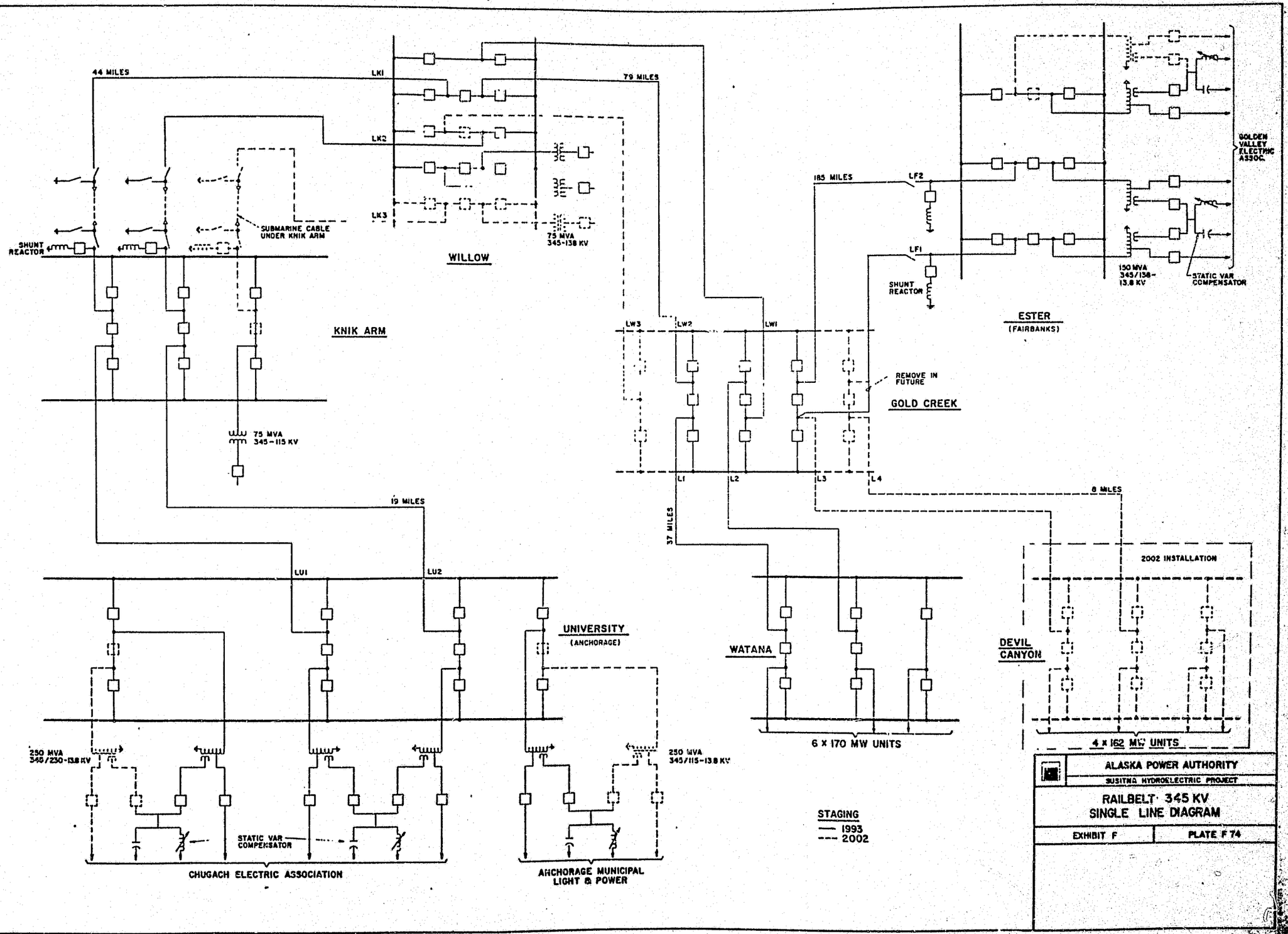
(104) SCHOOL - 30'x35' (12 UNITS)
(107) GYM - 100'x100'
(106) SWIMMING POOL - 100'x100'
(103) RECREATION CENTER 80'x100'
(110) STORE - 100'x160'
(111) FIRE STATION - 30'x40'
(112) GENERATING STATION - 20'x30' (2 UNITS)
(113) UTILIDOR
(114) SEWER PUMPING STATION - 50'x60'

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

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON
TEMPORARY VILLAGE

EXHIBIT F | PLATE F.73

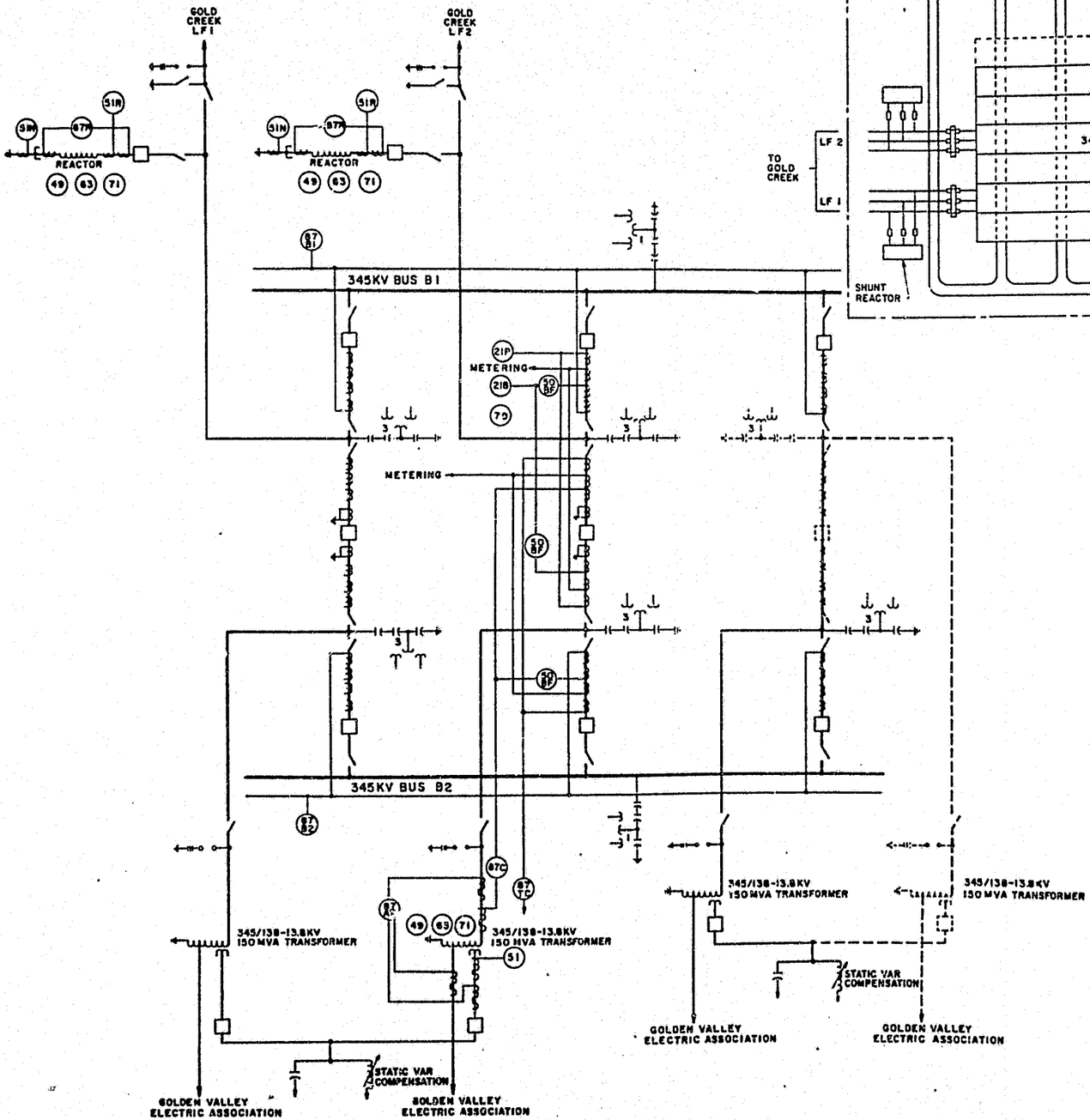


ALASKA POWER AUTHORITY

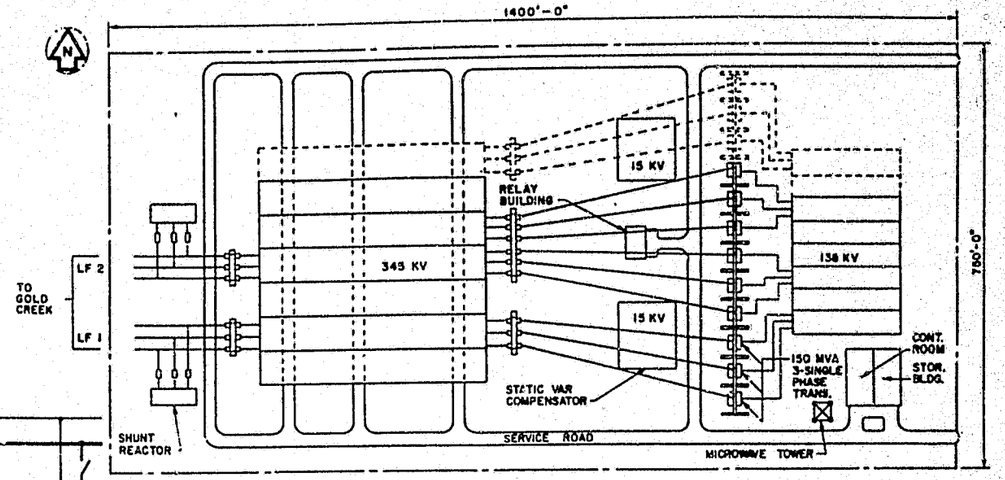
SUSITNA HYDROELECTRIC PROJECT

RAILBELT 345 KV SINGLE LINE DIAGRAM

EXHIBIT F | PLATE F 74



SINGLE LINE DIAGRAM



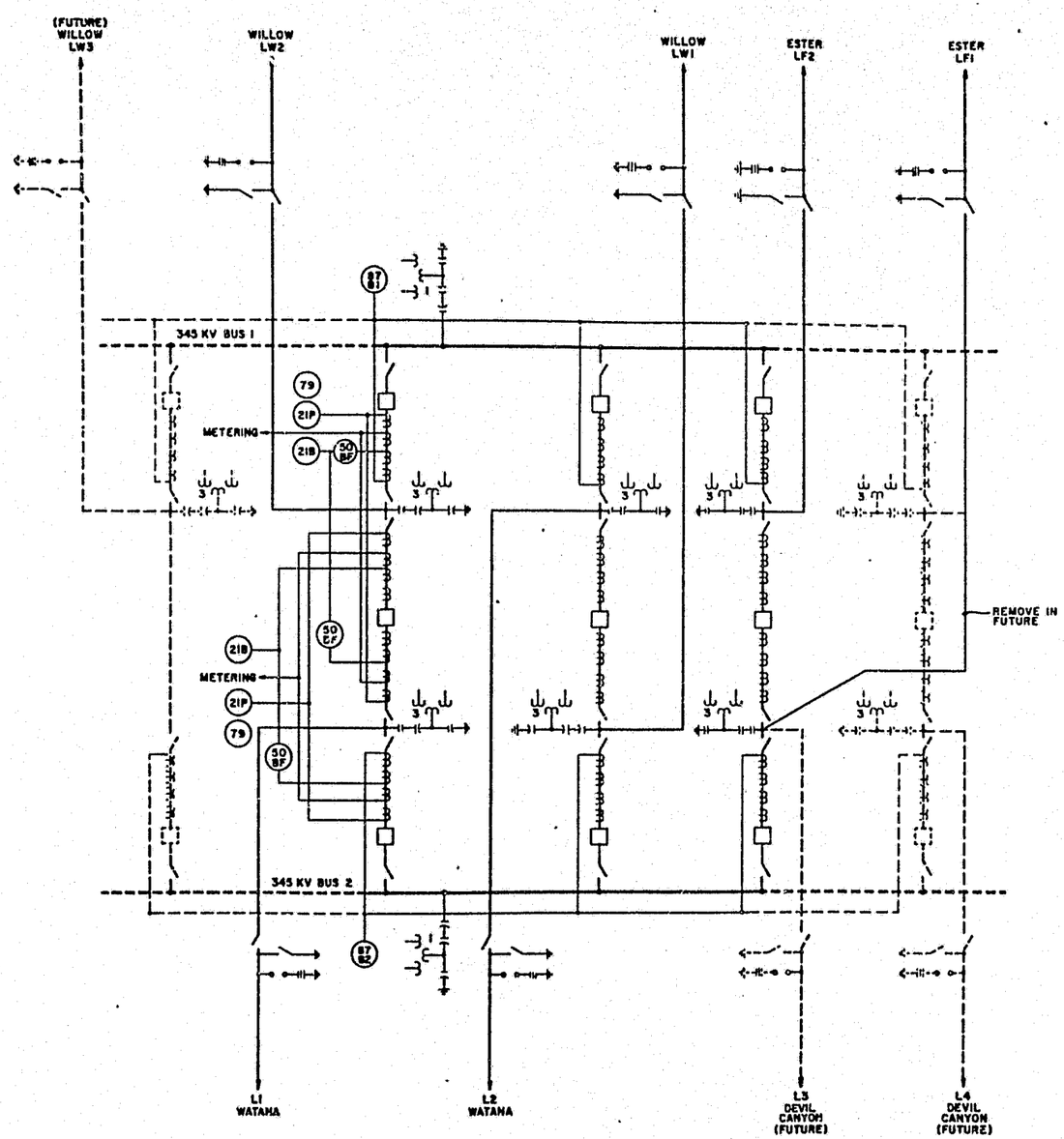
SUBSTATION PLAN
SCALE A

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

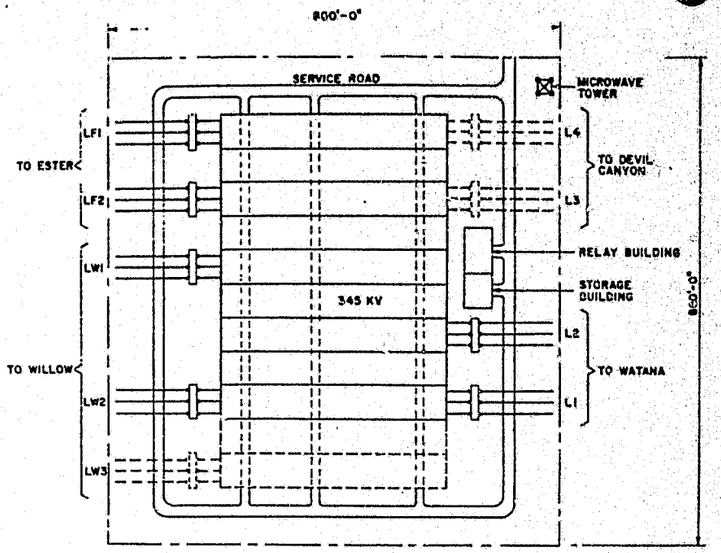
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ESTER SUBSTATION SINGLE LINE DIAGRAM AND PLAN

EXHIBIT F | PLATE F 75



SINGLE LINE DIAGRAM



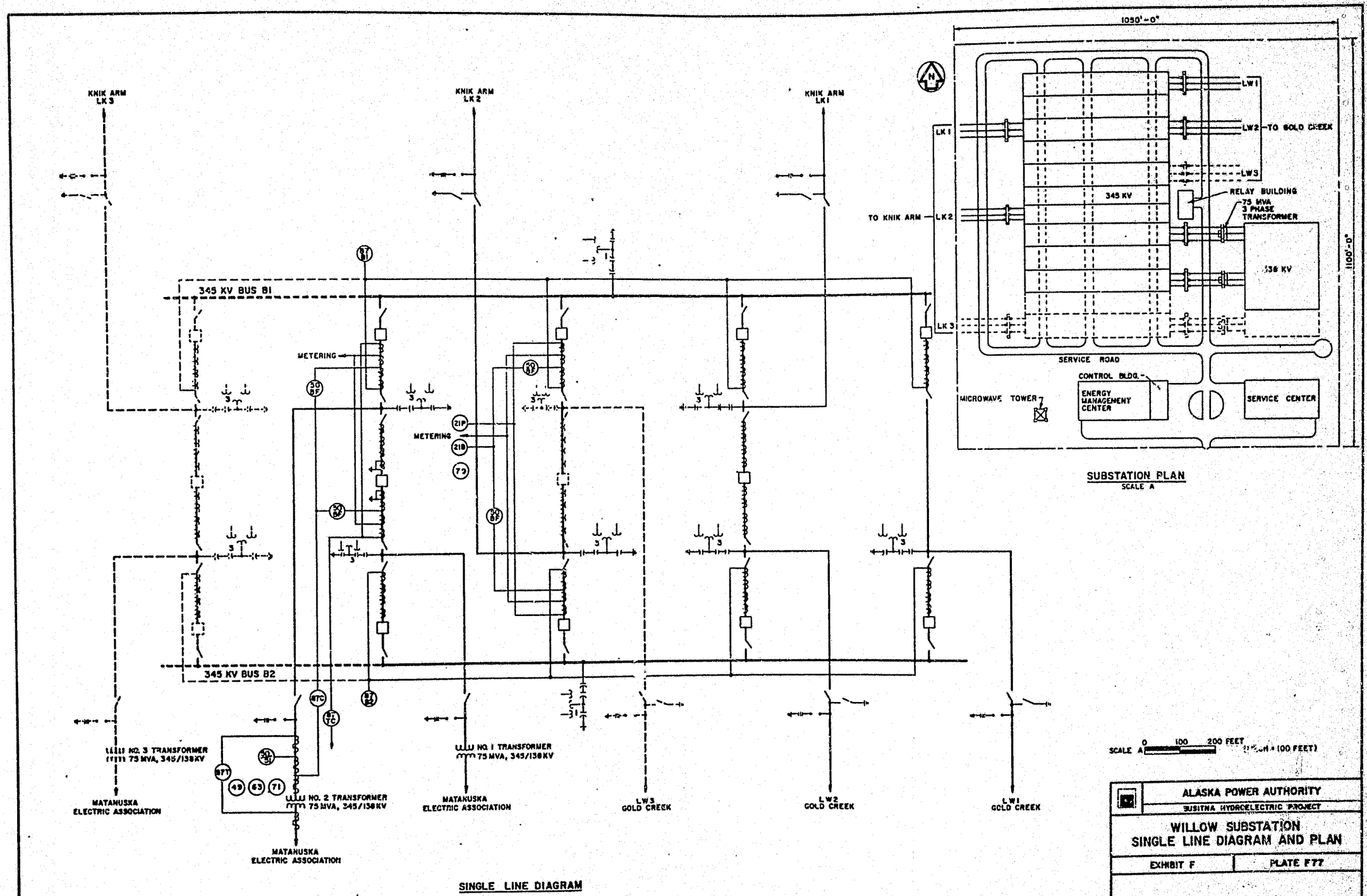
SWITCHYARD PLAN
SCALE A

SCALE 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



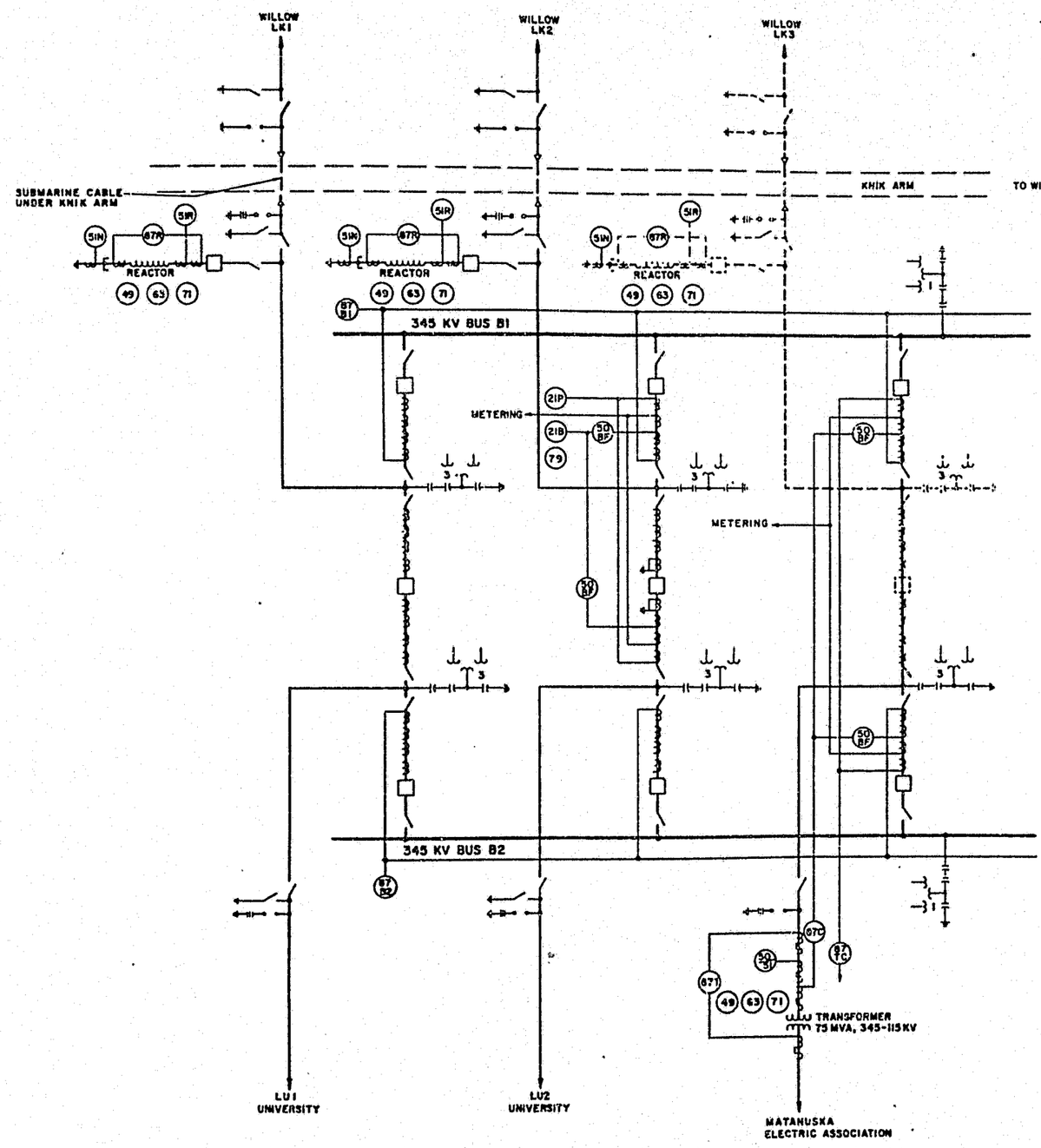
SUBSTATION PLAN
SCALE A

SINGLE LINE DIAGRAM

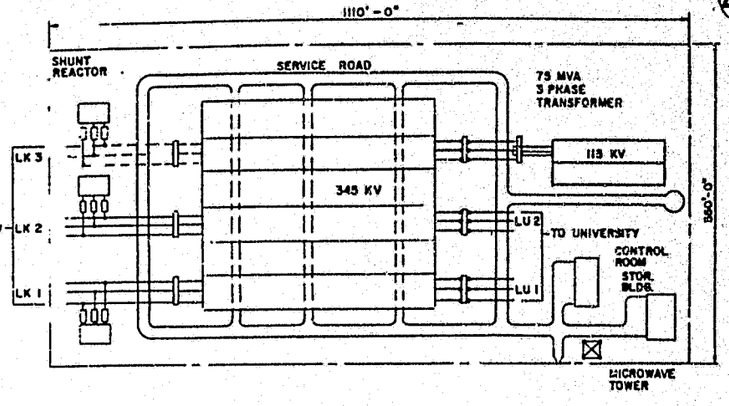
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

WILLOW SUBSTATION SINGLE LINE DIAGRAM AND PLAN

EXHIBIT F | PLATE F77



SINGLE LINE DIAGRAM



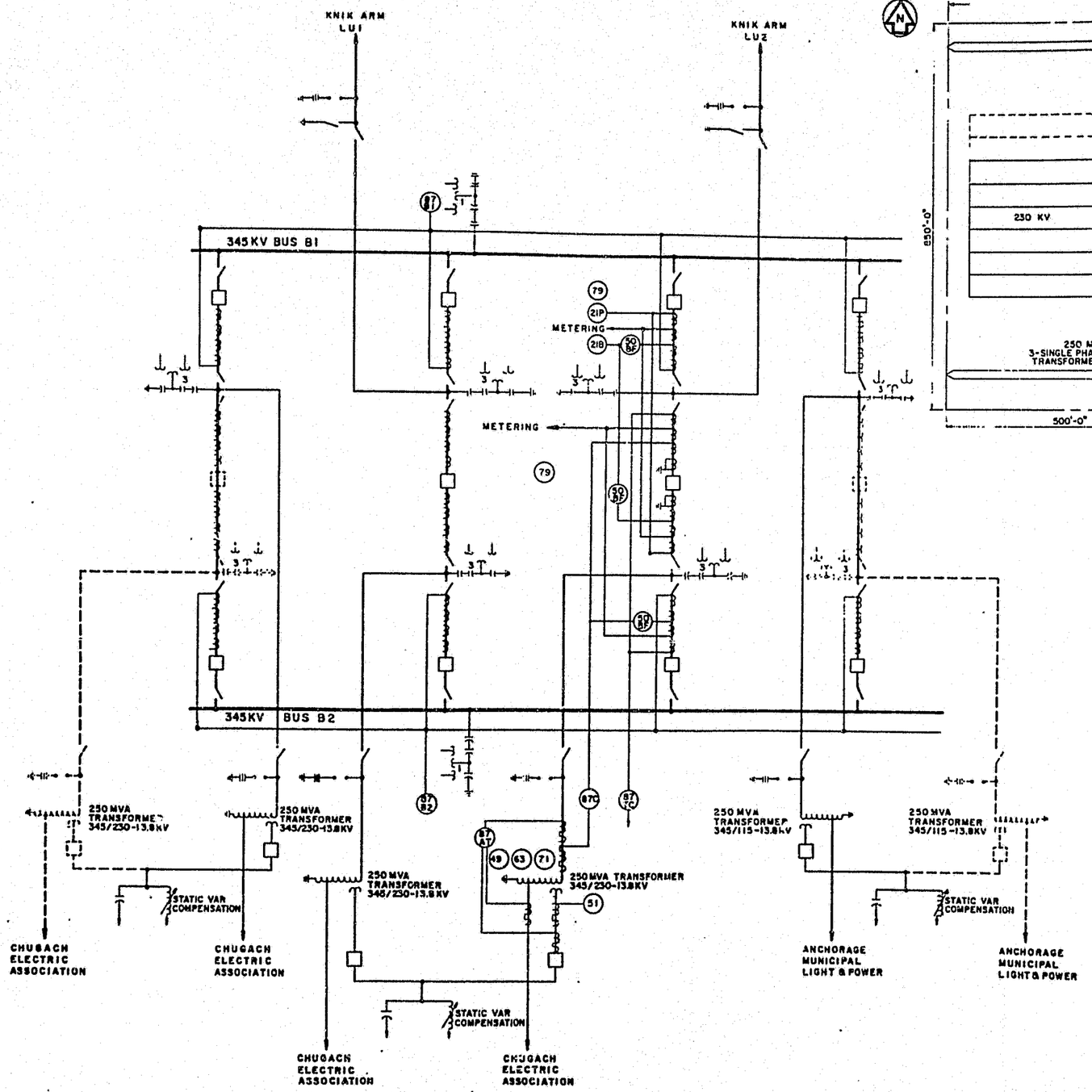
SUBSTATION PLAN
SCALE A

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

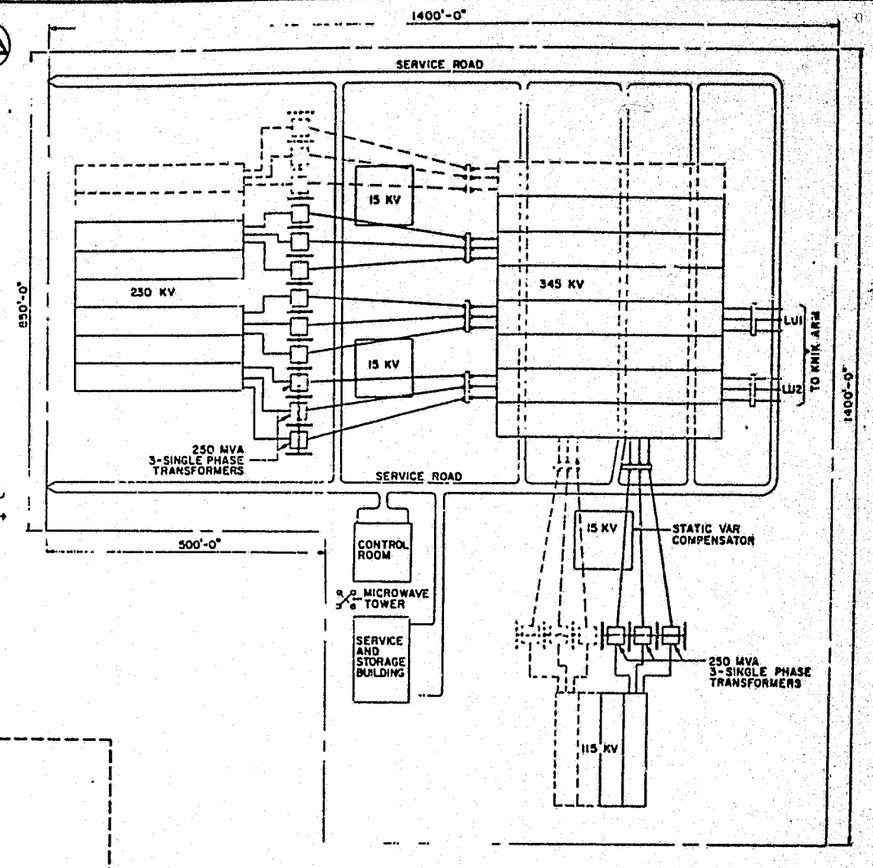
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

KNIK ARM SUBSTATION
SINGLE LINE DIAGRAM AND PLAN

EXHIBIT F | PLATE F 78



SINGLE LINE DIAGRAM



SUBSTATION PLAN
SCALE A

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

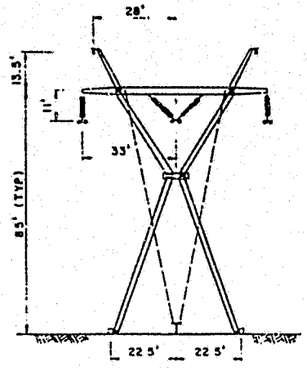
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

UNIVERSITY SUBSTATION
SINGLE LINE DIAGRAM AND PLAN

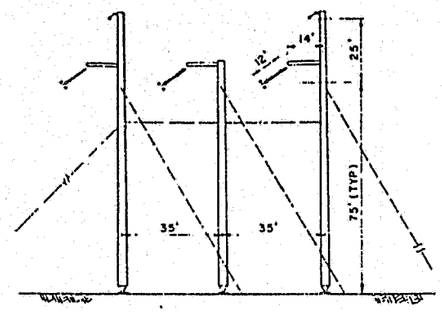
EXHIBIT F | PLATE F-79

NOTES:

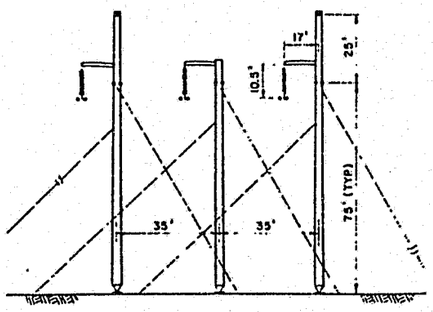
1. BASED ON PROPOSED STRUCTURES FOR INTERTIE PROJECT.
2. AVERAGE CONDUCTOR SAG - 37 FEET.
3. AVERAGE TOWER SPACING - 1400 FEET.



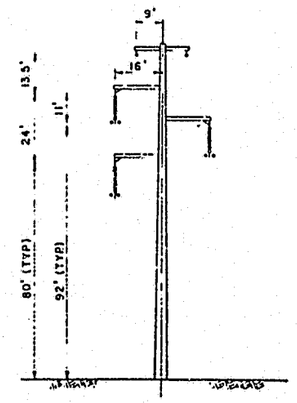
345 kV TANGENT OR LIGHT ANGLE STRUCTURE



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



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



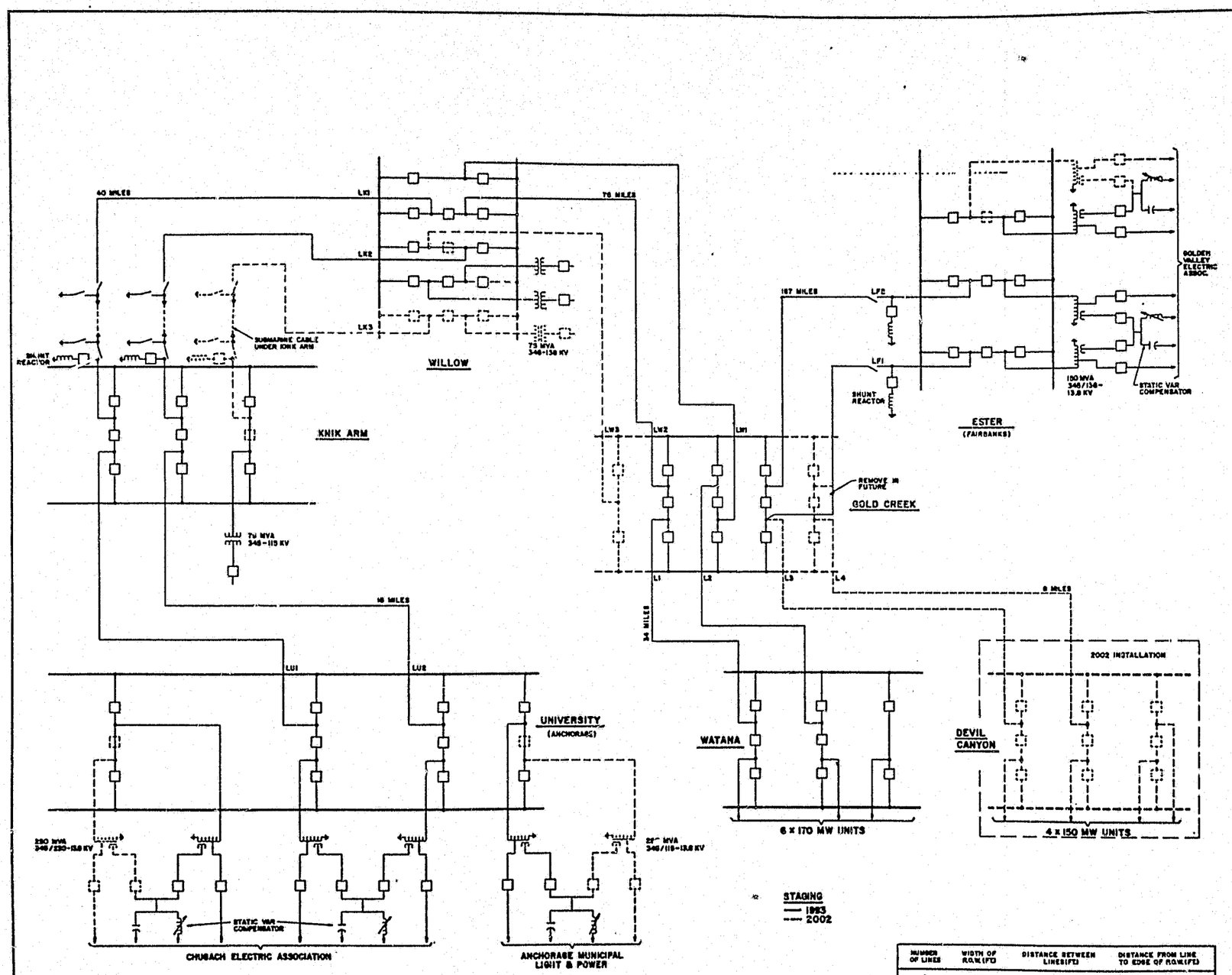
345 kV SINGLE CIRCUIT TANGENT POLE

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

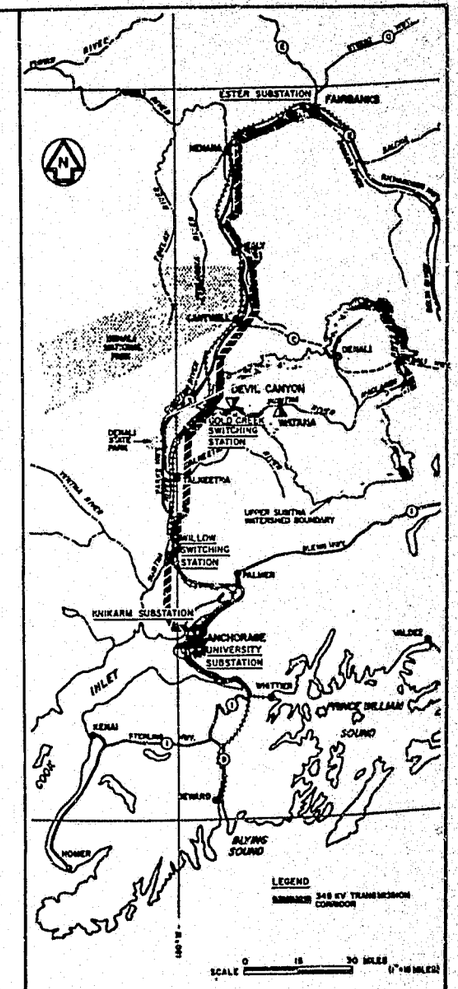
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

TYPICAL TRANSMISSION LINE STRUCTURES

EXHIBIT F | PLATE F80



345 KV TRANSMISSION SYSTEM SINGLE LINE DIAGRAM



345 KV TRANSMISSION CORRIDOR

NUMBER OF LINES	WIDTH OF ROW (FT)	DISTANCE BETWEEN LINES (FT)	DISTANCE FROM LINE TO EDGE OF ROW (FT)
1	190	—	95
2	300	105±	98
3	400	105±	98
4	510	105±	99

NOTE:

1. ESTIMATED GROUND RESISTIVITY FOR DESIGN IS 50 OHMS.

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

345 KV SYSTEM SINGLE LINE DIAGRAM AND TRANSMISSION CORRIDOR

EXHIBIT F | PLATE F8I